

Effect of a Leucine/Pyridoxine Nutraceutical on Energy Metabolism and Satiety in
Lean and Obese Dogs

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ABSTRACT

Obesity is the most common nutritional disorder of pet dogs (prevalence of 23–59%). This 29-week study investigated a nutraceutical containing 1 g leucine and 13 mg pyridoxine designed to maintain lean muscle mass while decreasing adiposity when compared with positive and negative controls. After determining individual maintenance calorie requirements over 3 – 4 weeks, thirty-six healthy adult Beagles were divided into obesification, weight gain prevention, or maintain ideal body weight arms.

Obesity was induced and during a weight loss phase, excess calories were removed, and obesification dogs were given nutraceutical with CAD (ObN), placebo with CAD (ObP), or a therapeutic weight loss diet (WLD). Weight gain prevention dogs were fed CAD at levels in excess of what they would naturally consume in a single meal with nutraceutical (ExN) or placebo (EXP), and dogs maintaining ideal body weight (IBW) were fed CAD to individual maintenance calories requirements over 12 weeks.

Based on MANOVA, ObN and WLD lost similar levels of total weight (3.4 +/- 0.6 vs. 4.4 +/- 1.1 kg) and fat mass (3.1 +/- 0.6 vs. 3.9 +/- 0.8 kg) after 12 weeks of treatment, and more than ObP (1.2 +/- 1.0 kg weight; 0.9 +/- 1.0 kg fat; $p < 0.0001$). ExP and ExN gained similar levels of weight and fat mass (up to 32.5 +/- 3.3 vs. 35.7 +/- 6.3% body fat). Behavioral indicators of medium term satiety did not differ clinically between groups. In general, plasma levels of gut hormones and endocrine factors followed expected trends and there was little effect of treatment on muscle or adipose tissue expression of genes involved in fat oxidation, oxidative phosphorylation, and mitochondrial biogenesis. Circulating plasma concentrations of IL6 and IL15 did not differ between groups.

These data show the nutraceutical holds promise as an option for successful weight loss in dogs. Maintenance levels of CAD were able to induce weight loss without risk of hypo- or anorexia, or the need to switch diets or restrict energy intake.

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INTRODUCTION

Statement of problem: obesity

Overweight and obesity are serious public health conditions currently affecting a considerable portion of the global population. The Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics (NCHS) estimate that in 2007 - 2010, 68.5% of adults in the United States (US) were overweight and 35.3% of those people were considered obese.¹ The World Health Organization (WHO) reports that in 2008, more than 1.4 billion adults were overweight, with 500 million of those considered obese.² Using an estimated world population of 6.7 billion in 2008 as reported by the Population Reference Bureau (PRB), the WHO estimates translate to a global overweight prevalence of 20.9%, with 35.7% of those classified as obese.^{2,3} Overweight adults are typically defined as those having a body mass index (BMI; weight (kg)/height (m) squared) from 25.0-29.9 while obese adults are those with a BMI of 30.0 or above.^{2,4,5} Overweight and obesity also affect canines, although there is not currently a central agency tracking yearly data trends. Various prevalence data have been published with 22.9-59.3% of adult dogs in the US, Australia, France, China, and United Kingdom being described as overweight or obese.⁶⁻¹⁴

A multitude of risk factors exist with obesity. In people, these risk factors are often based on age, gender, and race. Obesity becomes more common with age until age 80, at which point comparison to 20- to 39-year-old adults is not significantly different.¹⁵ Historically, women have had a higher obesity prevalence than men, although in recent years it has become more equal with US male obesity prevalence of 34.4% versus 36.1% in females.^{1,2,15} Race data based on gender, however, shows a higher prevalence in non-Hispanic White males (34.7%) versus females (32.9%), but women have higher prevalence compared to men in non-Hispanic Blacks (54.4% vs. 38.7%) and Mexicans (45.8% vs. 36.5%).¹ Evaluating data for race alone, non-Hispanic Blacks have the highest obesity prevalence of 36.1-41.4%, followed by Hispanics (28.7-34.2%), non-Hispanic Whites (24.5-29.8%), and non-Hispanic Asians (7.1%).^{15,16} In canines, the greatest prevalence of obesity and overweight is 6-10 years old. Neutered canines have the highest prevalence of overweight and obesity while Cocker Spaniels, Beagles, Labrador Retrievers, Golden Retrievers, Shetland Sheepdogs, Rottweilers, and Mixed-breed dogs have an overweight prevalence greater than or equal to 30%. Based on odds ratio, obese dogs are more likely to be older, of specific breeds (Shetland Sheepdogs, Dachshunds, Golden Retrievers), neutered, and consuming foods other than a commercially prepared complete and balanced extruded diet.⁶ Breed may even be referred to as an obesity risk factor, although currently published research involves small numbers (dogs and breeds) or breed categories (rather than specific breeds), so the risk factor classification is suggested, not proven, as pointed out by Corbee.^{8,17-19}

The above prevalence and risk factor data are important to keep in mind when considering diseases either caused by or associated with obesity and their impact on public and animal health. In people, recent focus has centered on metabolic syndrome, a cluster of metabolic disorders that is associated with increasing prevalence of obesity.²⁰ Data from the US indicates a prevalence of 34% among adults in 2003-2006.²¹ The syndrome encompasses hypertension, dyslipidemia (hypertriglyceridemia and high-density lipoprotein hypocholesteremia), insulin resistance (with or without hyperglycemia), and central obesity. These risk factors are considered interrelated and have been found to be associated with development of cardiovascular disease and type 2 diabetes mellitus.²⁰⁻²²

In addition to the metabolic syndrome, excess body mass is responsible for the sharp increase in prevalence of osteoarthritis in older Americans and is considered one of the strongest risk factors for this joint condition.²³ Many types of neoplasia are considered comorbidities of overweight and obesity, including colon, prostate, endometrial, gallbladder, and postmenopausal breast.^{24,25} Pelvic floor disorders (urinary incontinence, fecal incontinence, pelvic organ prolapse) occur at a higher rate in obese individuals, with the association between urinary incontinence and obesity reported most extensively.²⁶ Premenopausal obese women can experience menstrual irregularity, amenorrhea, infertility, and polycystic ovarian syndrome. Pre-pregnancy obesity is associated with fetal anomalies, gestational hypertension and preeclampsia, gestational diabetes mellitus, intrauterine fetal death, cesarean birth, and macrosomia (birth weight $\geq 4,000$ g).^{25,27} The skin is not immune to the effects of obesity, which interferes with skin barrier function, sebaceous glands and sebum production, apocrine and eccrine sweat glands, lymphatics, collagen structure and function, wound healing, micro- and macrocirculation and subcutaneous fat function.²⁸ Respiratory disorders are associated with obesity. For example, the increasing rate of asthma is suspected to be due to the rise in obesity and the majority of sleep apnea cases are seen in obese individuals.^{25,29}

Obesity comorbidities are not only seen in people; many of the same associations are reported to occur in dogs. Based on odds ratio, overweight adult dogs are more likely to be diagnosed with hypothyroidism, diabetes mellitus, pancreatitis, ruptured cruciate ligament, or neoplasia.^{6,30} They are at a greater risk of orthopedic, oral, and lower urinary tract disease.^{6,31,32} Hyperadrenocorticism, insulin resistance, tracheal collapse, transitional cell carcinoma, mammary carcinoma, calcium oxalate urolithiasis, dystocia, and altered immune function are other diseases associated with canine overweight and obesity.³² Lean Labrador Retrievers have been found to live 1.8 years longer than their overweight sex- and weight-matched siblings. In this same group of dogs, osteoarthritis was diagnosed in the majority of dogs regardless of body mass, but overweight animals required long-term treatment 3 years earlier. The overweight dogs also required treatment for any chronic condition 2.1 years earlier than their lean counterparts.³³

Diagnosis is important in order to combat overweight and obesity and prevent comorbidity development. In the human clinical setting, semiquantitative diagnosis is most commonly made via body mass index (BMI). BMI is calculated as [weight (kg)/height (m) squared].⁴ Specific interpretations and classifications of BMI values have varied over the years, but most now recognize the WHO definition for adults (<18.5 underweight; 18.5 – 24.9 normal; 25.0 – 29.9 overweight; $\geq$ 30.0 obese).^{25,34} Due to a wide range of values above BMI 30.0, additional categories have been described (30.00 – 34.99 obese class I; 35.00 – 39.99 obese class II; $\geq$ 40.00 obese class III).³⁴ While useful, BMI is not perfect and has limitations based on measurements needed for its calculation. Standing height is artificially affected by age-related changes, making BMI unreliable for children, adolescents, and elderly. Additionally, BMI has been found to be greater in those individuals with short leg length. Body weight can also vary based on lean and fat mass, meaning individuals with an above average lean body mass (e.g., body builders) will have a higher body weight and BMI, leading to incorrect classification as overweight or obese. The same can be said for those with a below average lean body mass, but a body frame equating to a normal weight BMI (e.g., sarcopenia).^{35–37} The final limitation of the BMI system is a lack of consideration of waist circumference, which is an independent predictor of obesity-related risk factors.²⁵ While extra mass contained within an enlarged waist circumference increases body weight and therefore BMI, special consideration must be given to waist measurement since fat in that location can be associated with greater health risks when compared to peripheral fat stores.^{38–44} Beyond simple waist circumference measurements, recent data has shown waist-to-height ratio is an even better screening tool for adult cardiometabolic risk factors.⁴⁵

A tool similar to BMI that is utilized in dogs is the body condition score (BCS). Multiple scales exist, but a 9-point BCS system for dogs was initially reported to have a 0.90 correlation coefficient between predicted percent body fat by BCS and actual percent body fat (%BF) determined by dual energy X-ray absorptiometry (DXA). Each unit increase on the scale was associated with a change of approximately 5 %BF where an ideal score of 5/9 was associated with 17.2 %BF in males and 19.9 %BF in females. The highest possible score, 9/9, was associated with 35.1 %BF in males and 43.0 %BF in females.⁴⁶ A second study confirmed the 9-point scale and %BF by DXA correlation with a value of 0.92, but found each unit increase in BCS was associated with a fat increase of approximately 8.7% and the ideal score of 5/9 was associated with 11 %BF.⁴⁷ A more recent publication reported a lower, but still positive, correlation of 0.58 between DXA and BCS.⁴⁸ Another widely used scale is a 5 point system where 2.5/5 to 3/5 is considered ideal for most mature dogs, based on lifestage, lifestyle, and intended use.⁴⁹

A more precise way to diagnose obesity, whether in human beings or animals, is via quantitative analysis. The gold standard for quantitative analysis of body composition is via desiccation and chemical analysis of tissues from

euthanized or deceased animals.^{47,50,51} In short, cadavers are frozen, sliced, and homogenized via multiple grindings. Multiple samples are collected from the ground cadaver and analyzed for water, fat, nitrogen, and ash contents.⁵² Alternatively, cadavers can be autoclaved as separate samples of carcass, viscera, and brain before being extracted and ground for sample collection.⁵¹ Outside of a research setting, this is not a realistic method to employ, however it has been used to validate other non-invasive quantitative methods in humans and canines, including DXA and total body water (TBW) analysis.⁵⁰⁻⁵⁵ In vivo measurement of TBW can be done with deuterium and tritium, the heavier isotopes of hydrogen, in the form of deuterium oxide (D₂O) and tritiated water. The isotope is injected intravenously, diffuses into extracellular and intracellular fluid compartments, and reaches a stable equilibrium within a short period of time. Isotope level is measured after equilibration to determine TBW.^{52,56} Use of TBW as a method to determine body composition is based on the principle that the body's fat-free mass contains water in a fixed proportion and fat mass contains little to no water.⁵⁷ These principals are the basis behind the use of TBW to indirectly determine fat-free (lean) mass, with most equations using 73.2% as the fixed value.⁵⁸ While effective, D₂O analysis is considered difficult and time-consuming and is not a practical clinical tool.⁴⁷

DXA analysis is considered a more practical clinical tool, especially in human medicine where it is more widely used when compared with veterinary medicine. A low current X-ray tube is used to generate X-rays at two levels that are released as a beam and exhibit attenuation proportional to the density of the tissue through which the beam travels. The beam is collected into a detector after passing through tissue a computer system calculates bone mineral content (BMC) and bone mineral density (BMD). Soft tissue body composition is assessed after system calibration using external standards.^{59,60} As with D₂O analysis, DXA assumes fat-free mass water content of 73%, which can lead to overestimation of the fat content in a subject with a higher hydration status. Obese subjects have a higher fat mass, leading to increased tissue depth. The increased depth means the X-ray beam attenuates through more material with the potential to cause inaccurate analysis as the beam attenuates through a disproportionately high tissue mass with low water content.^{60,61}

Another quantitative body composition tool is bioelectrical impedance analysis (BIA), which is based on the concept that intra- and extracellular fluid compartments in the body contain conducting ions. A high frequency (>50 kHz) current passes through the fluid compartments and is used to measure intracellular volume via capacitance (ratio of the change in an electric charge in a system to the corresponding change in its electric potential) and extracellular volume via resistance (opposition to the passage of an electric current). Data are used to calculate TBW volume as a linear function of resistance that has been found to be useful to estimate %BF in normal and overweight humanbeings.⁶²⁻⁶⁴ Increased adiposity requires frequencies higher than 50 kHz. Thus, the frequency used in BIA is unable to penetrate the adipose tissue, leading to a

falsely lowered %BF.^{64,65} In dogs with lean, optimal, or obese body condition, multiple electrode BIA was found to be useful in assessing body composition, but dog position, separation of electrodes, and core body temperature affected results.⁵⁸ A handheld BIA monitor showed positive correlation (0.44) with DXA, but not as high as the correlation between DXA and BCS (0.58) in dogs ranging from normal to obese condition.⁴⁸

Pathophysiology of obesity

In simplest terms, obesity occurs because of an imbalance in energy metabolism; therefore, an understanding of energetics is important for understanding the pathophysiology of obesity. Energetic macronutrients contained within dietary ingredients are protein, fat, and carbohydrates (CHO). These macronutrients are metabolized into amino acids, fatty acids, and glucose for distribution and utilization via energy, storage, function, or structure within the body. Amino acids (from the diet or from normal breakdown of tissue protein) are mainly used in a structural capacity for synthesis or maintenance of tissue protein. A lesser amount is utilized for gluco- or ketogenesis and other biosynthetic pathways. Fatty acids can be used for structural functions, but most are utilized as an energy source via the tricarboxylic acid (TCA) cycle or ketogenesis after conversion into acetyl-CoA via β -oxidation. Excess fatty acids, along with some excess amino acids and CHO, are converted into triglycerides and stored within adipocytes for use during times of decreased energy consumption. Glucose is used immediately for energy, stored as glycogen, or stored within adipocytes as described above. To provide energy, glucose is converted into pyruvate and lactate under anaerobic conditions or into acetyl-CoA for the TCA cycle under aerobic conditions.

Normally, a lean animal will actively balance energy intake and energy expenditure to maintain energy homeostasis via a complex neuroendocrine network.⁶⁶ Despite this control mechanism, however, imbalances do occur. Under conditions of increased energy consumption or decreased energy exertion, the resulting excess energy supply results in an overall increase in body fat stores leading to the condition of overweight with eventual obesity if the excess imbalance continues.⁶⁷ In 1962, Neel proposed what later became known as the “thrifty gene” hypothesis. He developed this hypothesis while trying to explain how diabetes mellitus can be diagnosed in people at a high frequency despite considerable genetic selection against the condition. Neel proposed that diabetogenic genes cause a rapid insulin production, allowing for efficient energy storage in the face of excess calories. He believed the switch to a diet containing refined ingredients led to overstimulation of this response with eventual insulin antagonism and pancreatic exhaustion.^{68,69} Neel later reaffirmed his hypothesis as potentially correct, although based on wrong data, since the idea of insulin antagonism had fallen out of favor.⁷⁰ His thrifty gene hypothesis can be updated with our current knowledge that insulin resistance (rather than antagonism) , induced by genetics, diet, and decreased exercise, causes excess

fat deposition and pancreatic beta-cell exhaustion.^{69,71} In early human evolution, this ability to efficiently store excess energy in the form of readily available fat stores was advantageous since those stores could be called upon for energy in times of low diet availability (low energy intake). Therefore, humans who had this “thrifty” predisposition were better able to survive during times of famine while their thinner counterparts succumbed to starvation due to their lower energy reserves.

In 1994, Brand Miller and Colagiuri expanded on this idea further with a discussion of the predominantly high protein, low CHO diet consumed by humans during the Ice Ages.⁷² They hypothesized that insulin resistance was advantageous for survival and reproduction during this time in human evolution. Following conversion to the much colder climate associated with the Ice Ages, there was a natural progression away from gathering plant foods and toward hunting large game animals, resulting in a carnivorous high protein, extremely low CHO diet. They argued that this type of diet is metabolized best in those with insulin resistance in order to maintain glucose homeostasis since high dietary protein causes increased carbon flux through gluconeogenesis. Natural selection would have encouraged development of a human population with a higher proportion of insulin resistance to take advantage of this principal. As society progressed into an agriculturally-based existence, those who transitioned earliest would be less likely to have maintained this selection pressure for insulin resistance. They point to European cultures, which have maintained a higher carbohydrate diet for 10,000 years and have a lower incidence of insulin resistance compared to other human populations.

More recently, Speakman proposed a “drifty” gene hypothesis.⁷³ He argues that if the “thrifty” hypothesis was correct, all humans would have inherited the thrifty genes and would consequently be obese due to the theoretical positive selection for obesity-related traits. Instead, because various body masses still exist within human populations, Speakman proposed that obesity is under a counterbalancing selection process of genetic “drift”. This would mean mutant obesity alleles are selectively neutral, rather than imparting positive selection pressure. He offers an example in which starvation constitutes a lower intervention limit and risk of predation is an upper intervention limit of the regulation of body fatness. Two million years ago, people decreased their risk of predation by becoming more social, developing weapons, and discovering fire. This change in the upper intervention limit allowed for genetic mutation and drift with a corresponding societal change encompassing freely available energy, leading to an overall susceptibility to obesity. Another scenario described by Speakman involves differences in basal fat oxidation rates as a result of historically low exposure to dietary fat. If the genes regulating fat oxidation underwent simultaneous random mutation and drift, people would have developed various oxidative capabilities. Once dietary fat levels increased, those who were genetically less able to oxidize fat would be more likely to become obese.

Mechanisms controlling weight

Energy intake: hedonic

In addition to genetic predisposition, there are other factors involved in changes of body mass. These changes can be controlled by energy intake, energy expenditure, and endocrine factors. Energy intake is generally considered to be influenced by either homeostatic or hedonic tendencies. Hedonic hunger refers to a subjective state in which satiety has little effect over the power of a highly palatable food item. When a food is highly palatable, the individual views that food as desirable and is more likely to consume it, regardless of how recently they have consumed other meals. Homeostatic hunger, on the other hand, is a response driven by prolonged lack of energy intake rather than the palatability factor of specific food items.⁷⁴ In people, assessment of hedonic hunger involves use of the 15-item Power of Food Scale (PFS) as developed by Lowe and colleagues.^{75,76} Reported food responsiveness to palatable food is subcategorized based on food that is generally available but is not physically present, food that is present, and food that has been tasted. In general, obese individuals have higher PFS scores compared to nonobese adults.^{76,77} When obese patients were compared to previously obese patients who had undergone gastric bypass surgery at least 1 year prior to answering the PFS questionnaire, hedonic hunger was better controlled in bypass patients.⁷⁷ A second study administered the questionnaire to obese patients before and between 11 and 39 months after bypass surgery. PFS scores were significantly lower post-surgery and a food frequency questionnaire (FFQ) revealed increased consumption of poultry, fish, eggs, and cooked vegetables with decreased consumption of chocolate, cakes/biscuits/cookies, and fruit juice/soft drinks.⁷⁸ These differences are not only seen with bypass patients since a recent paper documented similar results in people participating in a 12-week commercial weight loss program using a limited dietary intake.⁷⁹ Patients with a lower total PFS score (specifically the “food not present” category) after 12 weeks had a greater percentage of weight loss compared to those patients whose score did not change from baseline. These results suggest achieving lower hedonic hunger tendencies may aid weight loss efforts compared to those who are still experiencing pre-weight loss hedonic cues.

Energy intake: homeostatic

Central control mechanisms

As previously stated, energy intake may also be influenced by homeostatic factors, which are controlled by central and peripheral mechanisms. In combination, these mechanisms are capable of inducing the feeling of satiety, a lack of desire to eat. Assuming no influence of hedonic tendencies, satiation will cause decreased food intake. The central aspect of this control system utilizes the hypothalamus as a hub to receive and direct peripheral humoral and neural signals. The arcuate nucleus (ARC), located at the base of the

hypothalamus, expresses orexigenic and anorexigenic neurons. The orexigenic neurons coexpress neuropeptide Y (NPY) and agouti-related peptide (AgRP) while the anorexigenic neurons coexpress pro-opiomelanocortin (POMC) and cocaine- and amphetamine-regulated transcript (CART).⁸⁰ The orexigenic neuropeptides are able to counter the actions of the anorexigenic neuropeptides while initiating their own effects via inhibitory cross-talk, and vice versa.⁸¹ When expressed, NPY acts to increase food intake by stimulating hypothalamic Y1 and Y5 receptors.^{82–84} Increased food intake can also be stimulated by AgRP via stimulation of hypothalamic receptors in other nuclei and by directly antagonizing melanocortin receptors.⁸⁵ When energy supply is high (postprandial), the melanocortin receptors are instead stimulated by α -melanocyte stimulating hormone (α -MSH), the product of POMC cleavage, to decrease energy intake.⁸⁵ Specific receptors utilized by CART have not been identified, but CART is known to be anorexigenic since an anorectic response follows intracerebroventricular injection of CART in rats.⁸⁶ Projections of the NPY/AgRP and POMC/CART systems extend into the paraventricular nucleus (PVN), located adjacent to the third ventricle of the brain. The PVN contains neurons capable of expressing thyrotropin-releasing hormone and corticotropin-releasing hormone, which have been shown to be anorectic.^{87,88} The hypothalamus also contains other regions and receptors involved in appetite control. The lateral hypothalamic area (LHA) contains orexin and melanin-concentrating hormone (MCH), which are orexigenic hormones.^{80,89} Another mode of central appetite regulation is via the endocannabinoid system. This system utilizes lipid mediators that are synthesized when needed and activate receptors spread throughout the body. For appetite regulation, cannabinoid receptor 1 (CB1) activation by mediators such as delta-9-tetrahydrocannabinol (Δ^9 -THC) and anandamide leads to increased food intake.^{90,91} Figure 1 summarizes the relationship between these central control mechanisms and food intake.

Peripheral control mechanisms

The nucleus tractus solitaries (NTS) in the brainstem is the hub for gastrointestinal (GI) tract signals. Vagal afferents transfer signals from the gut to the brainstem to activate receptors involved in appetite regulation. These receptors respond to various peripheral factors, including those released from the GI tract. Ghrelin, an endogenous ligand for the growth hormone (GH) secretagogue receptor, is the only gut hormone currently identified as orexigenic.⁹² It is produced primarily by X/A-like cells within the oxyntic mucosa of the gastric lumen, but can also be produced by cells within the duodenum, ileum, cecum, and colon.^{93,94} Ghrelin is released in response to fasting, with high preprandial and low postprandial serum levels in rats, humans, and dogs in relation to fixed meal times.^{95–98} Simple gastric distension is not the deciding factor in when ghrelin is suppressed, however, because water ingestion does not decrease ghrelin levels.⁹⁹ In people with diet induced weight loss, fasting ghrelin levels are high, while obese individuals have lower fasting levels and a blunted postprandial suppression.^{100,101} In chronically obese dogs, fasting ghrelin is

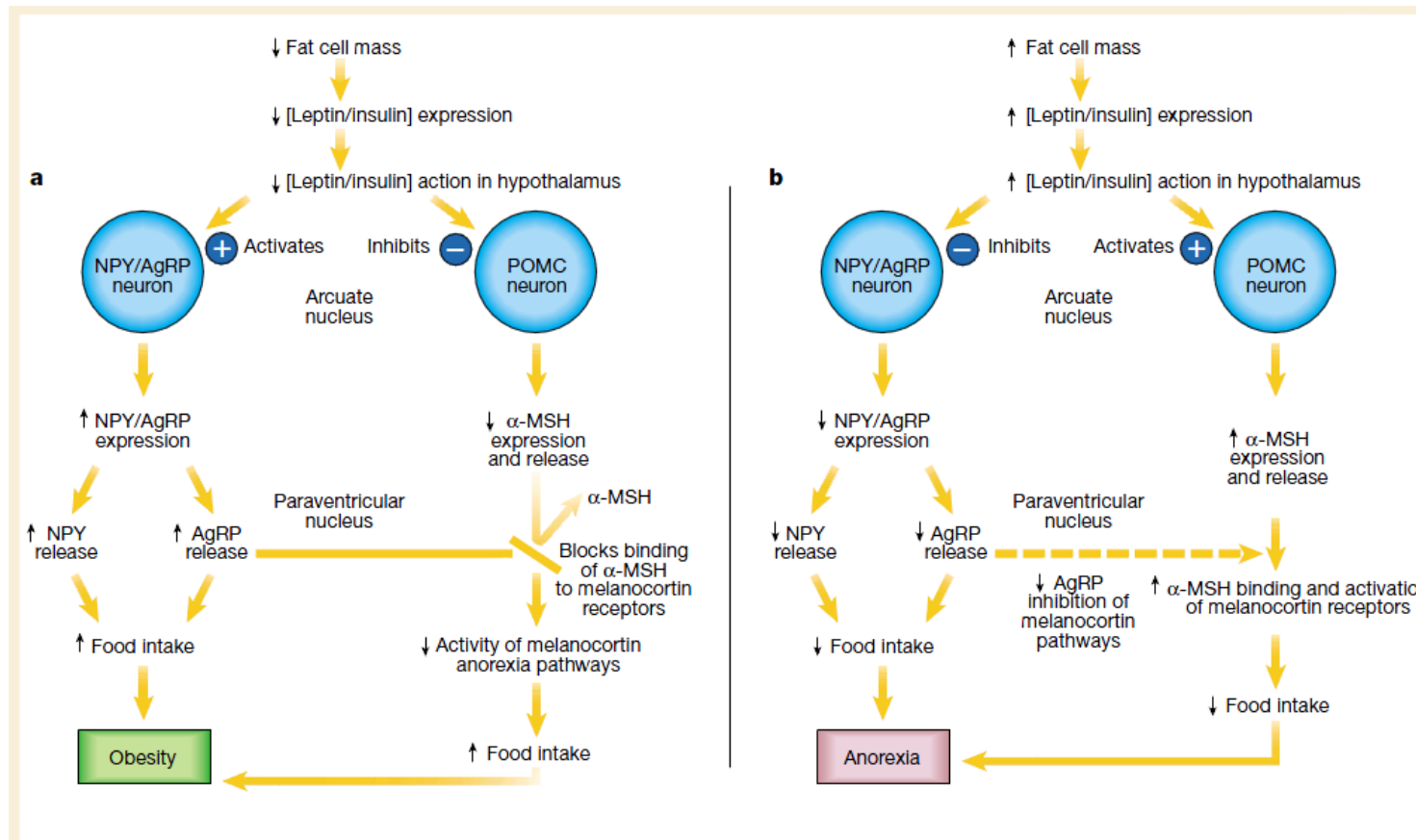


Figure 1 Role of arcuate nucleus in adiposity signaling.

a, Activity of leptin/insulin-sensitive adiposity signaling pathways in hypothalamus under conditions of leptin/insulin deficiency. **b**, Increased action of leptin/insulin in arcuate nucleus inhibits the NPY/AgRP anabolic pathway and stimulates the POMC catabolic pathway, resulting in reduced food intake and anorexia. Reprinted by permission from Macmillan Publishers Ltd: [NATURE] (Schwartz MW, Woods SC, Porte D, et al. Central nervous system control of food intake. Nature 2000;404:661–671), Copyright © 2000.¹⁰²

lower versus lean dogs, but is significantly higher during weight loss. After maintaining weight loss for six months, plasma ghrelin levels return to levels comparable to those of the lean animals.¹⁰³

Peptide tyrosine tyrosine (PYY) is another GI hormone involved with peripheral control of satiety. It is a pancreatic-polypeptide-fold peptide produced by L cells throughout the GI tract, with highest levels in the ileum, colon, and rectum.^{104–106} There are two different circulating forms (PYY_{1–36} and PYY_{3–36}), which both bind hypothalamic Y receptors.^{107,108} PYY is anorexigenic in nature, with low fasting levels and peak levels within 1–2 hours after a meal.¹⁰⁴ Peripheral administration of PYY_{3–36} causes reduced food intake in rodents and people.^{109,110} GI release of this peptide is influenced by diet macronutrients, with primary stimulation coming from dietary fat and some stimulation from direct contact of unabsorbed nutrients with the distal GI tract.^{111–113} PYY release can also be stimulated by multiple factors including cholecystokinin (CCK) and insulin-like growth factor 1 and can be inhibited by glucagon-like peptide 1 (GLP-1).^{114–116} Obese people have low fasting PYY levels compared to lean individuals, but are not resistant to the effects of PYY_{3–36} infusion.¹¹⁰ In obese children, fasting PYY is negatively correlated to degree of overweight and levels increase in correlation to the level of weight loss.¹¹⁷

Glucagon is produced by pancreatic islet α -cells and triggers an increase in blood glucose concentration via hepatic glycogenolysis in response to hypoglycemia.¹¹⁸ Intravenous infusion of glucagon in rats and people causes decreased food intake.^{119,120} Glucagon-like peptide 1 (GLP-1) is an anorexigenic preproglucagon gene product co-secreted with PYY from GI L cells as GLP-1_{7–37} or GLP-1_{7–36} amide.¹²¹ It is released after a meal to inhibit gastric acid secretion via an additive effect with PYY and to inhibit gastric emptying via the ileal brake mechanism.^{115,122,123} GLP-1 receptors are located within the hypothalamus and receptor activation causes cAMP production via adenylyl cyclase stimulation.^{124,125} As body mass rises, circulating GLP-1 levels decrease, with obese people showing a blunted GLP-1 response.^{126–129} In dogs, however, GLP-1 has been shown to increase with weight gain and decrease after weight loss.^{130,131} Another study initially indicated GLP-1 levels were associated with the level of adiposity, but no significant effect remained after two extreme outliers were removed from analysis.¹³² GLP-1 stimulates insulin secretion in a glucose-dependent manner via pancreatic β -cell receptor expression.^{133,134} It is also responsible for stimulation of insulin gene transcription, islet cell growth, and neogenesis.¹³⁴

Infusion of cholecystokinin (CCK), a gut hormone released by small intestinal I cells, causes decreased food intake as well.¹²⁰ While individual meal intake is reduced by CCK, total daily food intake recovers to normal levels due to increased feeding frequency in rats.¹³⁵ There are two known widely distributed CCK receptors; CCK1 and CCK2, and the former is responsible for mediating the decreased appetite effects of CCK. CCK plasma levels increase within 15 minutes of a mixed liquid meal in people and its half-life is only a few

minutes.^{118,136} Other effects of CCK include inhibition of gastric emptying, promotion of intestinal motility, stimulation of gallbladder contraction, and stimulation of pancreatic enzyme release.^{118,137,138}

Peripheral signals released in relation to the level of adiposity are referred to as adiposity signals. These signals are secreted into plasma in direct proportion to the level of fat mass, enter the CNS in proportion to their plasma levels, and have receptors in brain neurons involved in central control of energy intake. Central administration of adiposity signals decreases food intake and signal deficiency increases intake.¹⁰² Insulin, a peptide hormone produced by pancreatic β -cells, is an adiposity signal. It is released in a pulsatile fashion, leading to decreases in plasma glucose levels. When insulin binds its receptor, the intrinsic receptor tyrosine kinase is activated and phosphorylates insulin receptor substrate (IRS) proteins. IRS1 phosphorylates protein kinase B (PKB/AKT) allowing for movement of the GLUT4 transporter to the plasma membrane. GLUT4 allows adipose and striated muscle cells to move glucose intracellularly and effectively decreases the amount of glucose present in plasma (Figure 2).^{139,140} Insulin sensitivity is positively correlated to the oxidative capacity of muscle, which is related to the ratio of type I (slow twitch) to type II (fast twitch) fibers.¹⁴¹ As type II fiber expression increases during obesity, muscle oxidative capacity and subsequent insulin sensitivity decline.¹⁴² Obese individuals show pulsatile patterns similar to healthy weight individuals (release following meals and during overnight fasting), but the amplitude of insulin pulses are larger during obesity.¹⁴³ Insulin exhibits a diurnal release pattern, with peak levels 2 to 5 hours postprandial in dogs.¹⁴⁴ Insulin resistance is a common manifestation in obese people and has also been found in dogs.^{145–148} Insulin is also able to affect food intake via hypothalamic receptors.¹⁴⁹ When activated, these receptors inhibit NPY expression and coexpress POMC, thereby inhibiting food intake.^{150,151}

Leptin is an adiposity signal secreted from adipocytes via the *ob* gene in direct proportion to the level of fat mass.^{152–157} When leptin levels are low, mice exhibit weight gain, which is reversed after administration of an exogenous leptin source.^{158–160} Exogenous leptin causes decreased food intake and increased metabolic rate, body temperature, and activity levels compared to those exhibited in lean control mice.^{158,159} It also results in weight loss, decreased food intake, and reduced body fat in wild-type and diet induced obese mice.^{159,160} In chronically obese mice, however, leptin is elevated and unable to assert its antiobesity effects. In people, serum leptin concentration is 4 times higher in obese individuals versus those with a normal weight, with a strong positive correlation to the level of fat mass.¹⁵³ Similar results are seen when lean dogs (BCS 3/5) are compared to obese dogs (BCS 5/5), regardless of gender or breed.^{17,156} Age of adult dogs does not affect plasma leptin levels, but a positive correlation ($r=0.37$) is observed when dogs less than one year of age are included in analysis.^{17,156} This weak age relationship has been attributed to lower level of visceral fat mass found in puppies.¹⁵⁶ Adipocytes harvested from

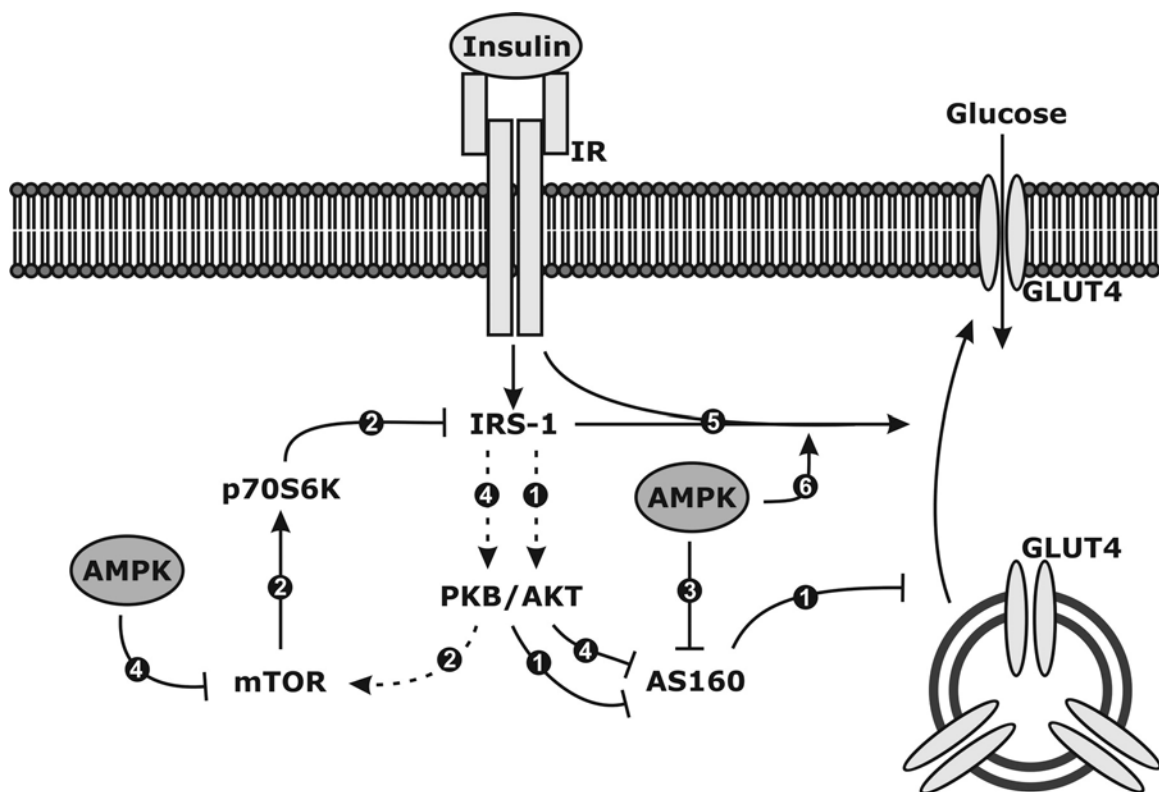


Figure 2 Regulation of glucose uptake by insulin and AMPK.

When insulin binds its receptor (IR), the intrinsic receptor tyrosine kinase is activated and phosphorylates insulin receptor substrate (IRS-1) proteins. IRS-1 phosphorylates protein kinase B (PKB/AKT) which then phosphorylates and inhibits AS160 allowing the translocation of the glucose transporter GLUT4 storage vesicles to the plasma membrane (1). In addition, PKB/AKT induces the phosphorylation and activation of the mammalian target of rapamycin (mTOR)/p70S6K pathway, which, then, phosphorylates IRS-1 leading to the inhibition of the insulin signaling (2). AMPK phosphorylates and inhibits AS160 stimulating glucose uptake independently of insulin (3). AMPK also inhibits the mTOR/p70S6K-dependent negative feedback loop leading to the over phosphorylation of the PKB/AKT/AS160 axis (4). Part of the insulin action on glucose uptake is independent of PKB/AKT/AS160 (5). The insulin-sensitizing effect of AMPK on glucose uptake could be due to the action of AMPK on these events (6). Reprinted by permission from The American Journal of Physiology (Ginion A, Auquier J, Benton CR, et al. Inhibition of the mTOR/p70S6K pathway is not involved in the insulin-sensitizing effect of AMPK on cardiac glucose uptake. *Am J Physiol - Heart Circ Physiol* 2011;301:H469–H477), Copyright © 2011, The American Physiological Society.¹³⁹

obese individuals have increased leptin mRNA expression as well.^{161,162} It has been suggested that these high leptin levels during obesity are indicative of resistance to the anorexigenic effects of the protein.^{153,161} There are two proposed underlying mechanisms of leptin resistance; defective transport across the blood brain barrier (BBB) and impaired leptin signaling.^{163–165} Leptin resistance is debated, however, since some argue the role of leptin is to signal undernutrition to the brain rather than to prevent overnutrition.¹⁶⁵ Four weeks after weight reduction, serum leptin concentrations in people increase to levels similar to those exhibited before weight loss.¹⁵³ In obese dogs, leptin levels decrease by 25% four weeks after consuming 45% less calories based on their target body weight despite maintaining a consistent body weight over that time frame.¹⁵⁷ After weight loss is achieved, leptin levels decrease 74.5%, but weight maintenance values in dogs have not been determined.¹⁰³ Leptin exhibits diurnal variation, with lowest levels just prior to an accustomed feeding time, and highest levels 8 hours postprandial in dogs.¹⁴⁴

Interleukin-6 (IL6) is a cytokine released from white adipose tissue (WAT), macrophages, fibroblasts, endothelial cells, and skeletal muscle cells.¹⁶⁶ It has been proposed that IL6 also be considered an adiposity signal because its plasma levels correlate to the level of adiposity and it has receptors in the dorsomedial and ventromedial hypothalamus.¹⁶⁷ IL6 is proinflammatory when in WAT and hepatic tissue and increases insulin resistance via downstream inhibition of insulin receptor and IRS1 phosphorylation.^{166,168–170} IL6 also has the ability to be anti-inflammatory in exercising skeletal muscle, evident by its attenuation of tumor necrosis factor- α (TNF α) production.¹⁷¹ It activates AMP-activated protein kinase (AMPK) in muscle and adipose tissue, with the greatest increases in muscle tissue in response to exercise.¹⁷² AMPK is a protein kinase that regulates cell metabolism by upregulating glucose uptake and fatty acid oxidation.¹⁷³

Energy expenditure

Basal metabolism

The minimal amount of energy an animal needs to maintain homeostasis in a post-absorptive state, when lying down, awake, and in a thermoneutral environment is the basal metabolic rate (BMR).^{67,174} Heat is produced in relation to meal consumption due to activation of the autonomic nervous system and due to ingestion, digestion, absorption, and assimilation of food. To account for the increased heat production, this thermic effect of food is represented by the resting fed metabolic rate (RFMR; BMR + thermic effect of food).⁶⁷ Resting energy requirement (RER) is the energy requirement at rest, in a thermoneutral environment, and in a non-fasted state. It also accounts for energy expended for recovery from physical activity. The energy needed to support energy equilibrium, over a long period of time, is the maintenance energy requirement (MER).¹⁷⁴ Because there is a time effect, MER includes the energy required for thermoregulation, spontaneous activity, and moderate exercise.⁶⁷ To calculate

the energy requirements of dogs, the vast range of possible body weights must be considered. For this reason, formulas include the body weight (BW) raised to an exponent (metabolic BW), commonly set to Kleiber's law [RER (kcal ME/day) = $70 \times BW_{kg}^{0.75}$].¹⁷⁵ A compilation of canine data by the National Research Council (NRC) provided a basal metabolic rate close to that estimated by Kleiber's law, validating its use in dogs.⁶⁷ MER is estimated by multiplying RER by a lifestage factor based on reproduction status and activity level.⁴⁹ Alternatively, MER may also be calculated as RER multiplied by a factor other than 70, in relation to breed, age, housing, and activity level.⁶⁷

Thermogenesis

Environmental temperature changes also affect energy metabolism since homeothermic animals adapt by modifying their body heat production to maintain a constant core body temperature. Energy consumption will increase whenever the animal is exposed to an ambient temperature outside the thermoneutral zone lower and upper critical temperatures.⁶⁷ This type of thermogenesis can be facultative (heat production is turned on when needed) or adaptive (heat production capacity increases due to prolonged cold exposure).¹⁷⁶ After adaptive thermogenesis has commenced, the animal switches from a shivering to a nonshivering state with an increased metabolic rate versus when warm acclimated.¹⁷⁷ To avoid confusing this classic definition with any metabolic process not related to shivering, it has been suggested to further define this type of adaptive thermogenesis as cold acclimation-recruited, cold exposure-induced nonshivering thermogenesis.¹⁷⁸ For simplicity, this is what will be meant by the use of nonshivering thermogenesis (NST) in this paper. The more inclusive definition of adaptive thermogenesis, however, involves nonshivering heat production from both ambient temperature and diet (Figure 3).¹⁷⁹

Adaptation from cold-induced shivering to NST is due to increased brown adipose tissue (BAT) recruitment.¹⁷⁸ BAT recruitment occurs with sympathetic nervous system activation and subsequent cyclic AMP (cAMP) generation. cAMP activates protein kinase A (PKA), leading to an acute increase in lipolysis and uncoupling protein-1 (UCP1) activity and chronic increases in UCP1 transcription, mitochondrial biogenesis, BAT hyperplasia, and BAT recruitment within white adipose tissue (WAT; Figure 4).¹⁷⁹ UCP1 is the mitochondrial protein contributing to the thermogenic function of BAT by uncoupling oxidative phosphorylation.^{180,181} This uncoupling process is commonly referred to as proton leak because protons generated through oxidative phosphorylation are moved from the mitochondrial intermembrane space to the matrix through UCP1 rather than through ATP-synthase for ATP production.¹⁸² The resulting heat generation allows for adaptive thermogenesis in response to chronic overfeeding or cold exposure.¹⁸³

In people, ¹⁸Fluoro-deoxyglucose positron emission tomography/X-ray computed tomography (¹⁸F-FDG-PET/CT) can detect active BAT stores.¹⁸⁴⁻¹⁸⁸ The combination of modalities allows for the CT images to correct the PET image

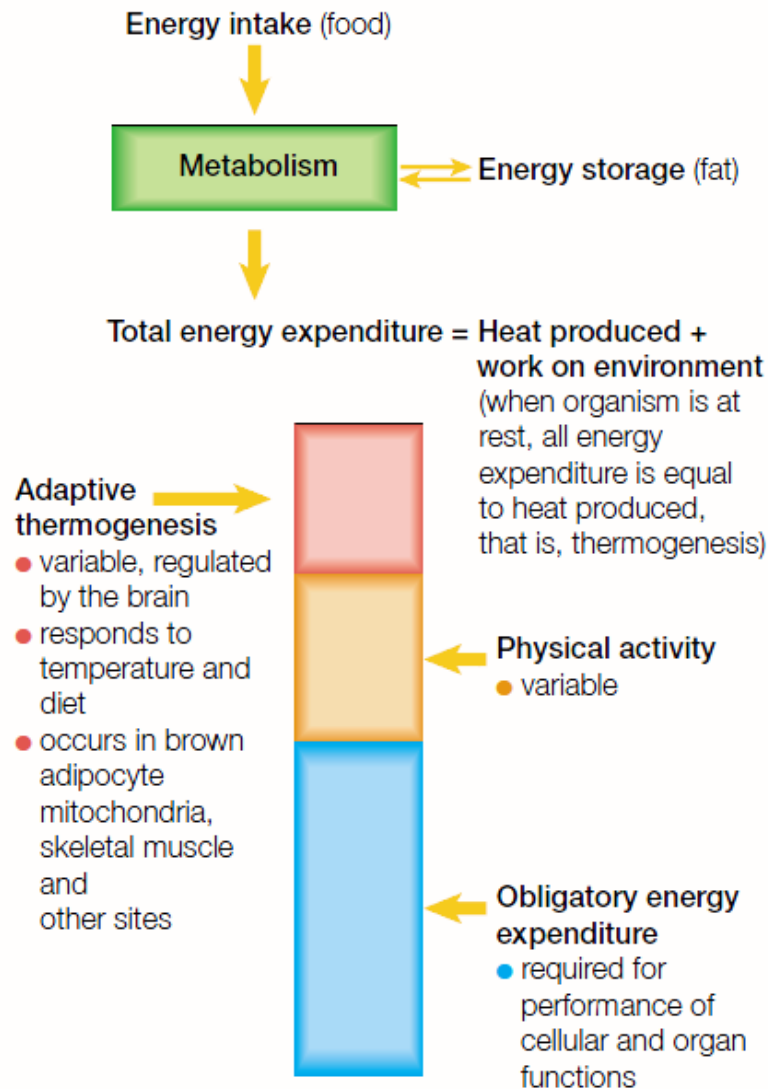


Figure 3 Thermodynamic perspective of energy expenditure.

Energy enters an organism as food and exits as heat and work. Energy can also be mobilized from adipose stores. Total energy expenditure can be subdivided into three principal components: obligatory energy expenditure required for normal functioning of cells and organs; energy expenditure resulting from physical activity; and expenditure attributed to adaptive thermogenesis, which is defined as heat production in response to environmental temperature or diet. Reprinted by permission from Macmillan Publishers Ltd: [NATURE] (Lowell BB, Spiegelman BM. Towards a molecular understanding of adaptive thermogenesis. Nature 2000;404:652–660), Copyright © 2000.¹⁷⁹

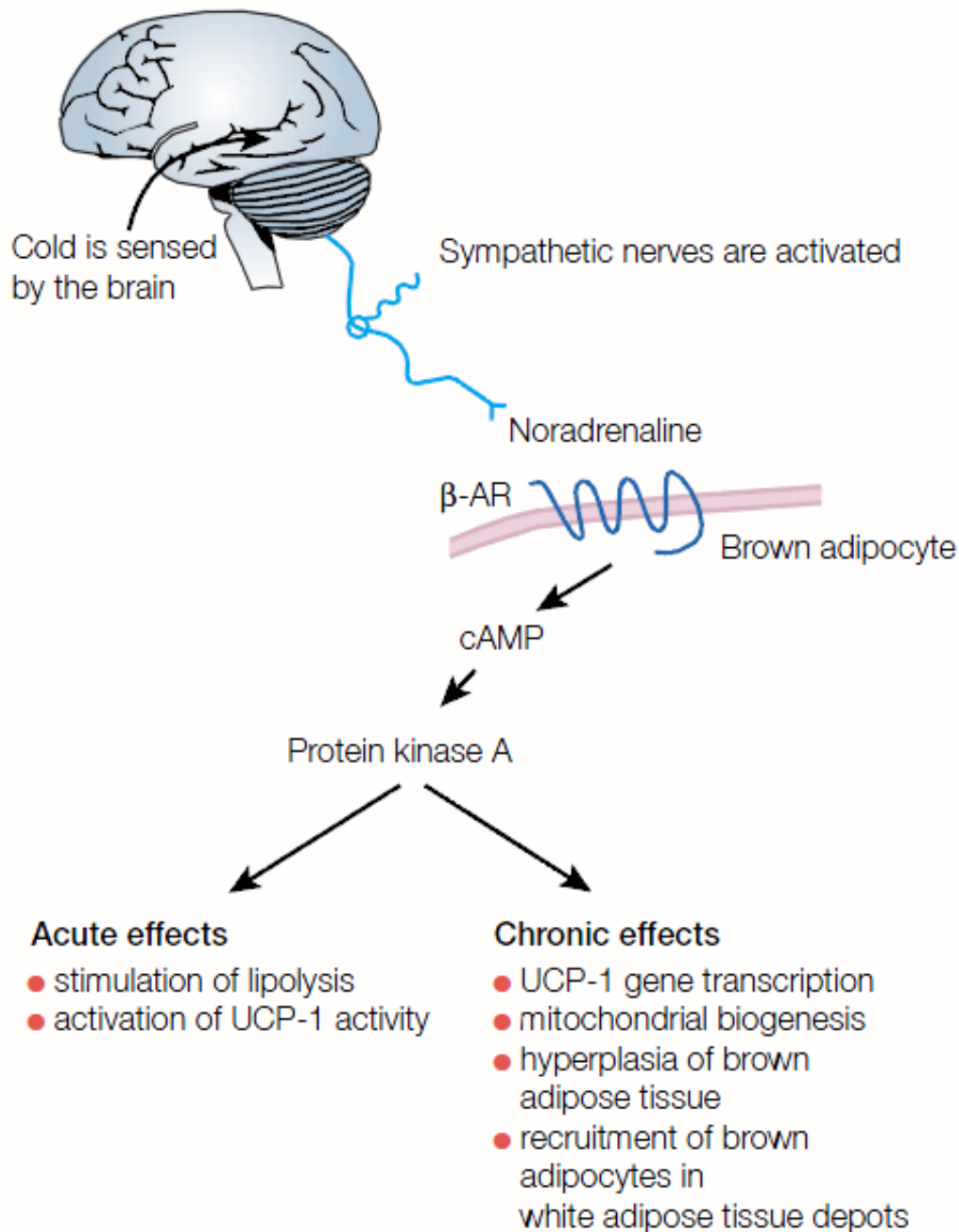


Figure 4 Mechanism of cold-induced adaptive thermogenesis.

Brown adipose tissue recruitment occurs with sympathetic nervous system activation and subsequent cyclic AMP (cAMP) generation. cAMP activates protein kinase A, leading to acute and chronic activation effects. UCP-1, uncoupling protein-1; β -AR, β -adrenergic receptor. Reprinted by permission from Macmillan Publishers Ltd: [NATURE] (Lowell BB, Spiegelman BM. Towards a molecular understanding of adaptive thermogenesis. Nature 2000;404:652–660), Copyright © 2000.¹⁷⁹

attenuation and provides better anatomic localization versus either modality alone.¹⁸⁹ ¹⁸F-FDG is a radiolabeled form of glucose, which is taken up by cells capable of metabolizing glucose, including BAT. ¹⁸F-FDG uptake by BAT was an important discovery because previous evidence indicated adults did not have active BAT. It is now known that as animals age, BAT is largely converted to WAT, leaving behind very few BAT deposits. There are, however, bilateral and symmetric deposits in the supraclavicular area, posterior neck, suprasternal notch, upper axilla, mediastinum, paraspinal regions, cardiac apex, and pararenal space.^{190–192} Babies have additional stores between the shoulder blades and an overall larger total volume of BAT compared to adults as they rely on NST for thermoregulation (Figure 5).¹⁹² In dogs, there is evidence BAT can be reactivated by either cold temperature or drug induction, but the author is unaware of similar ¹⁸F-FDG data in dogs.^{193,194}

Diet-induced thermogenesis can have a significant effect on metabolic rate, accounted for by the difference in BMR and RFMR and expressed as the heat increment.^{67,174} Heat increment values for animals have been estimated as 20 – 36 percent for protein, 0 – 15 percent for fat, and 5 – 22 percent for carbohydrate.^{174,195} This effect of food is most important at lower ambient temperatures when the animal needs to compensate by increasing core body temperature. The NRC has determined that dietary thermogenesis accounts for 10 percent of daily energy expenditure in dogs, although this value is affected by the number of meals consumed, with higher values in those fed several times a day.⁶⁷ In people, nonexercise activity thermogenesis (NEAT; fidgeting, posture maintenance, etc.) accounts for two-thirds of total daily energy expenditure, and contributes to resistance to fat gain with overfeeding.¹⁹⁶ In dogs, overfeeding in ambient temperature conditions causes weight gain without concurrent increases in energy expenditure as seen during cold-induced thermogenesis.¹⁹⁷ It is not clear why this species difference exists, although it may be due to the higher level of excess calories provided in the dog study, or it may be that adaptive thermogenesis as a response to overeating does not exist as argued by Westerterp.¹⁹⁸

Mitochondrial biogenesis genes

Energy metabolism can also be affected at the cellular level via mitochondrial biogenesis. This growth and division of pre-existing mitochondria is influenced by exercise, caloric restriction, cold temperature, oxidative stress, cell division, and cell renewal and differentiation. It is regulated at the transcriptional and post-translational levels of gene expression and there are multiple factors regulating mitochondrial biogenesis.¹⁹⁹ Peroxisome proliferator-activated receptor- γ (PPAR γ) coactivator 1 α (PGC1 α) is a transcriptional regulator originally named for its ability to activate PPAR γ , a nuclear hormone receptor involved in cold induced adaptive thermogenesis.²⁰⁰ It is now recognized to regulate lipid oxidation and mitochondrial metabolism gene expression as well as skeletal muscle fiber type expression.^{142,201,202} As shown in Figure 6, PGC1 α causes increased mitochondrial biogenesis and fatty acid oxidation. With high

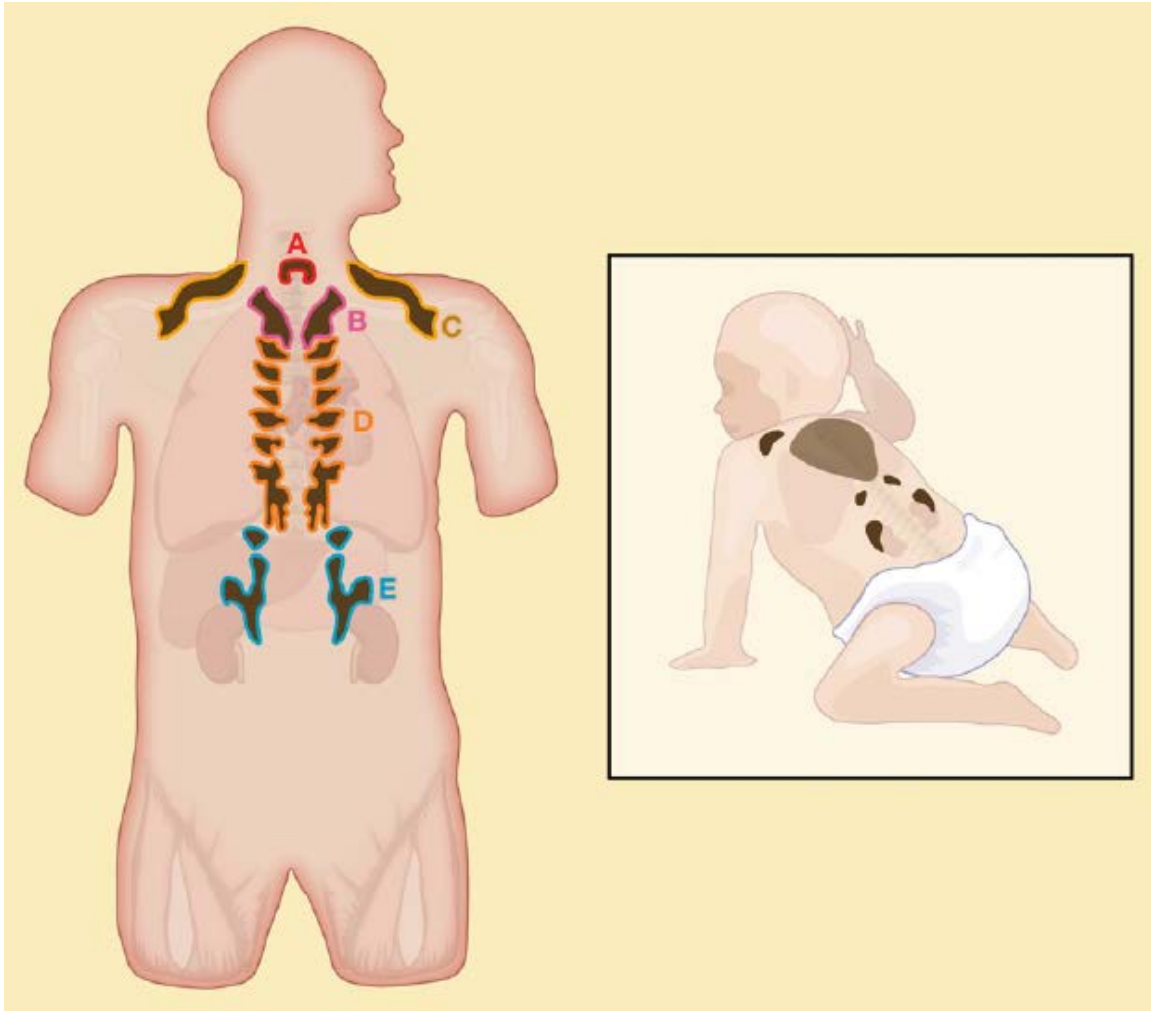


Figure 5 Location of hBAT in Adults and Infants.

The predominating locations are based on results from postmortem and PET/CT studies: (A) thyroid/tracheal, (B), mediastinal, (C) paracervical/ supraclavicular, (D) parathoracic, (E) supra and perirenal. In the infant, an additional kite-shaped thin layer of BAT has been described (in light brown). Reprinted from Cell Metabolism, Vol 11, Enerbäck S, Human brown adipose tissue, Pages 248–252, Copyright (2010), with permission from Elsevier.¹⁹²

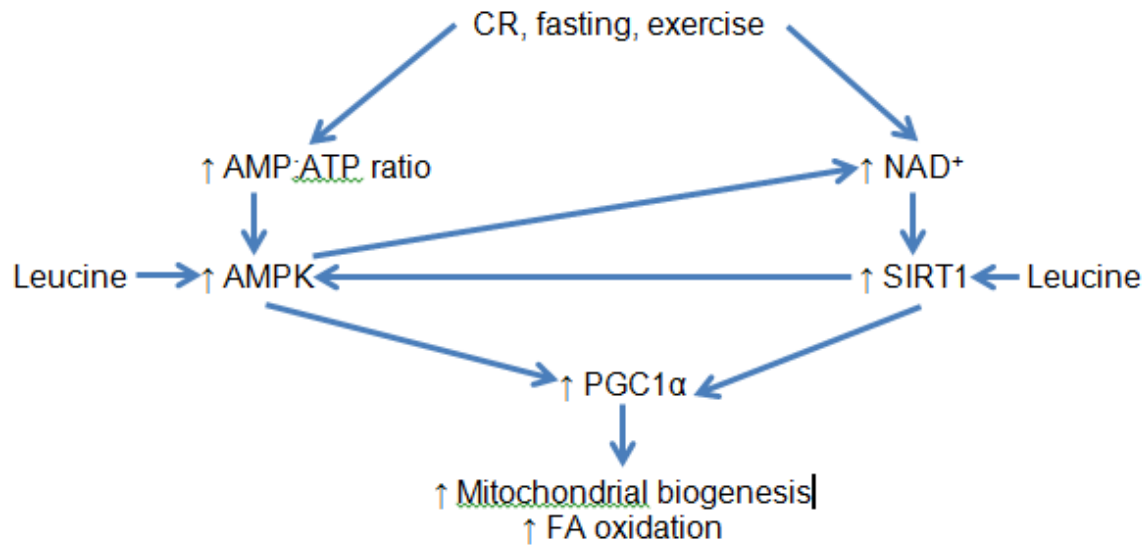


Figure 6 Metabolic relationship of sirtuin 1 (SIRT1), AMP-activated protein kinase (AMPK), and peroxisome proliferator-activated receptor- γ (PPAR γ) coactivator 1 α (PGC1 α).

expression levels in many tissues including hepatic, skeletal muscle, and BAT, PGC1 α affects biogenesis and oxidation capacities where there is a high energy requirement.¹⁴² It directly activates the production of nuclear respiratory factor 1 (NRF1), a transcription factor that promotes increased mitochondrial transcription factor A (mtTFA) activity. mtTFA translocates from the nucleus to the mitochondria, binds mitochondrial DNA, and initiates replication and transcription with eventual additional mitochondria production.^{203–207}

AMP-activated protein kinase (AMPK) is able to activate PGC1 α via its involvement in signaling events leading to activation of the transcription cascade.¹⁹⁹ Conditions that inhibit ATP production (hypoxia, hypoglycemia) and those that increase ATP consumption (muscle contraction) create an increase in the AMP:ATP ratio, with subsequent activation of AMPK.²⁰⁸ The metabolic activity of AMPK is extensive, but especially relevant to the discussion of overweight and obesity is its ability to increase nicotinamide adenine dinucleotide (NAD⁺) and indirectly activate sirtuin 1 (SIRT1).^{142,208} Sirtuins are a class of NAD⁺-dependent protein deacylases acting to promote organism survival.^{209,210} There are seven mammalian sirtuins (SIRT1 – SIRT7) with various localization and functions. SIRT1 is primarily a nuclear protein, with lesser levels present in cytosol.²⁰² It is a class I sirtuin, meaning it has high homology with yeast sirtuins, and has extensive deacetylase capabilities.²¹¹ SIRT1 is activated by high NAD⁺ levels seen during times of high energy demand (e.g., caloric restriction, fasting, and exercise), leading to a general switch from a glycolytic state to one of oxidative phosphorylation.^{212,213} This cross-talk relationship between AMPK and SIRT1 is illustrated in Figure 6.

Sirtuin3 (SIRT3) is also a class I sirtuin, but is located within the mitochondrial matrix rather than the nucleus like SIRT1.^{202,214} SIRT3 activity increases in liver, kidney, and muscle during calorie restriction, when in a glucose-poor state.^{214–217} As the major mitochondrial deacetylase, it has many targets, including genes involved in lipid metabolism. Long-chain acyl CoA dehydrogenase (LCAD) is one such gene, which is responsible for the first dehydrogenation step in fatty acid β -oxidation. During extended periods of fasting, SIRT3 activates LCAD, leading to increased oxidation of long-chain fatty acids into acetyl CoA.²¹⁴

Mitochondrial component genes

In addition to increasing the physical number of mitochondria, increasing the genes present within mitochondria also affects energy metabolism. One such example is the family of uncoupling proteins, which are located within the mitochondrial inner membrane. There are five homologues in mammals (UCP1 – UCP5) and the first three have high genetic sequence identity with each other.^{218–220} As previously discussed, UCP1 is the mitochondrial protein contributing to the thermogenic function of BAT by uncoupling oxidative phosphorylation.^{180,181} It is only found in BAT, while UCP3 is mainly expressed in skeletal muscle, but also has some activity in BAT and cardiac tissue.^{219,221–224} UCP2 is generally considered to be expressed in most tissues and the highest

levels of mRNA expression in dogs have been observed in adipose, spleen, and lung tissue.^{219,224} When activated, UCP1, UCP2, and UCP3 all cause uncoupling of oxidative phosphorylation in the mitochondria of the cells in which they are expressed.²¹⁹ In these different tissues, the uncoupling proteins are able to redirect intermembrane protons away from ATP production. This results in an increase in the AMP:ATP ratio and downstream activation of AMPK, SIRT1, and PGC1 α (Figure 6).

Cytochrome c oxidase (COX; complex IV), another mitochondrial component gene, is the final enzyme in the electron transport chain (Figure 7). It catalyzes the transfer of electrons from cytochrome c with resulting proton movement into the intermembrane space, leaving H₂O behind in the mitochondrial matrix. COX also generates moves protons across the inner mitochondrial membrane, which are then used to produce ATP. It is considered the pacesetter for mitochondrial oxidative metabolism and ATP synthesis and dysfunction of this enzyme may result in impaired ATP generation and impaired mitochondrial function.²²⁵ COX activity is experimentally used as an indicator of mitochondrial content has been shown to have a direct relationship with PGC1 α activity.²²⁶

NAD⁺ and NADH are the oxidized and reduced forms of the universal NAD coenzyme, which has very high levels in mitochondria. In fact, up to 72% of the total cellular pool is contained within mitochondria, depending on tissue and cell type.^{227,228} While mitochondria have a larger proportion of the total NAD pool, they actually have a much lower NAD⁺:NADH ratio of approximately 7 – 8:1 compared to cytoplasmic ratios of 60 – 700:1.²²⁸ This ratio difference is due to the extensive oxidative metabolism that occurs in mitochondria. NAD⁺-dependent deacetylation of mitochondrial enzymes (as carried out by SIRT3) acts to activate mitochondrial processes such as the TCA cycle, fatty acid metabolism, and oxidative phosphorylation.²²⁹ To help drive SIRT3 activation, it has been suggested to stimulate NADH dehydrogenase and subsequently increase in the NAD⁺/NADH ratio. The increased availability of NAD⁺ allows SIRT3 to activate oxidative metabolism pathways such as fatty acid oxidation.²³⁰

Endocrine factors

The endocrine system is responsible for maintaining homeostasis via hormone secretion and venous circulation. Thyroid hormone is an endocrine hormone secreted by the thyroid gland mainly as triiodothyronine (T₃) or thyroxine (T₄). T₄ is a prohormone that must be activated via deiodination into T₃, the active form of the hormone.²³¹ There are three levels of cellular thyroid hormone signaling regulation: (1) deiodinase expression; (2) target cell/organ uptake; (3) nuclear thyroid hormone receptor expression.²³¹ This interrelationship of hormone signaling allows the body to adjust its response to more than just absolute level of circulating thyroid hormone. Thyroid hormone is involved in controlling weight change via both energy expenditure and uptake.²³¹ It acts to stimulate BAT thermogenesis and hepatic gluconeogenesis with an

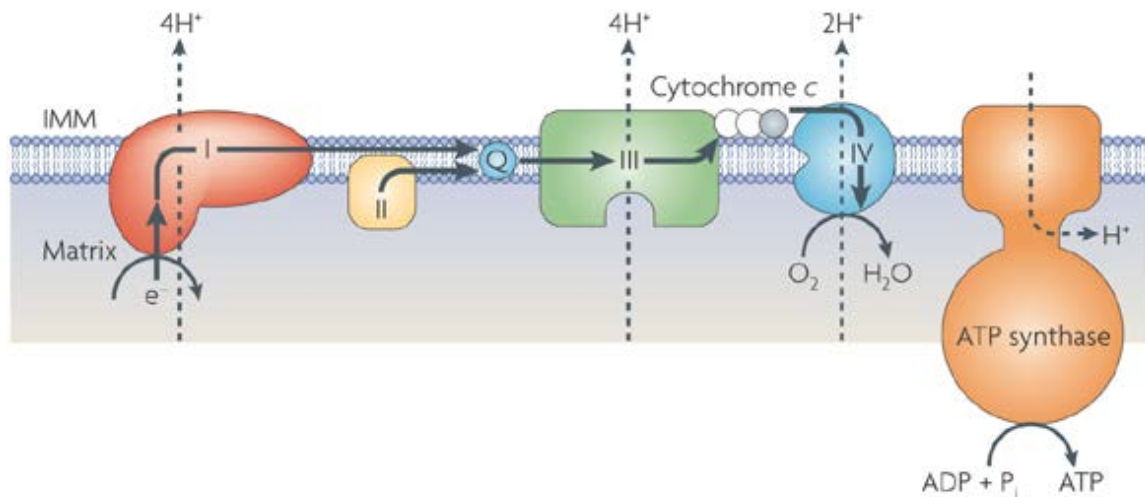


Figure 7 Electron transport chain.

Oxidative phosphorylation begins with the entry of electrons into the electron-transport chain on the inner mitochondrial membrane (IMM). There are four membrane-bound protein complexes (complex I–IV) in the electron transport chain, and the electrons pass through them (black arrows) with the aid of the electron carriers, namely ubiquinone (Q), cytochromes and iron-sulphur proteins. An electrochemical gradient is created across the inner mitochondrial membrane. Protons then flow through complex V (ATP synthase), which utilizes the energy to synthesize ATP from ADP. One of the essential molecules of the electron-transport chain is cytochrome c (grey circle). Cytochrome c accepts electrons from Complex III and diffuses to Complex IV (cytochrome oxidase), where it donates the electrons to O₂, converting O₂ to H₂O. Reprinted by permission from Macmillan Publishers Ltd: [NATURE REVIEWS MOLECULAR CELL BIOLOGY] (Ow Y-LP, Green DR, Hao Z, et al. Cytochrome c: functions beyond respiration. *Nat Rev Mol Cell Biol* 2008;9:532–542), Copyright © 2008.²³²

overall increase in energy expenditure.^{231,233} It also has an acute effect on increasing food intake via hypothalamic signaling.^{231,234}

The metabolic effects of thyroid hormone are most apparent in a state of thyroid hormone derangement. The naturally occurring disease process of hyperthyroidism is associated with hyperphagia, hyperactivity, increased energy expenditure and weight loss, while hypothyroidism exhibits opposite manifestations. Central injection of T_3 is associated with decreased body weight and hypothalamic AMPK activity and increased SNS activity and BAT UCP1, UCP3, and PGC1 α expression. Increasing AMPK activity via central injection attenuates these effects, but neither central injection affects food intake.²³⁴ In rats treated with T_4 to induce whole body hyperthyroidism, reduced weight gain in the face of hyperphagia and hypothalamic AMPK inhibition, fatty acid synthase (FASN) activation, increased malonyl CoA concentration, and decreased carnitine palmitoyltransferase-1 (CPT1) activity. FASN is integral to fat production by catalyzing palmitate production from acetyl CoA and malonyl CoA. CPT1, the rate limiting enzyme of the carnitine shuttle, functions to activate carnitine and move long chain fatty acids from the cytosol into the mitochondrial matrix for oxidation. Even after central inhibition of FASN and subsequent further increase in malonyl CoA, food intake did not decrease as would be expected in euthyroid animals.²³⁴ These data point toward distinct central and peripheral actions of thyroid hormone. In the hypothalamus, thyroid hormone affects AMPK activity, lipid metabolism, and body weight, but does not change energy intake levels.

Another faction of the endocrine control of energy metabolism are the catecholamines, dopamine, norepinephrine (noradrenaline), and epinephrine (adrenaline). They are actually members of the sympathoadrenal system (the sympathetic nervous system (SNS) and the adrenal medulla), but work in close coordination with the endocrine system to maintain energy homeostasis. Cold ambient temperatures, hypoglycemia, and changes in posture primarily activate the SNS. The adrenal medulla, as the primary source of epinephrine, is generally activated by hypoglycemia, caffeine, and mental acuity.²³⁵ Cold exposure, necessitating a thermogenic response, activates the SNS. The SNS innervation of BAT and skeletal muscle causes increased catecholamine production in these tissues and further downstream effects.¹⁷⁹ BAT predominantly produces α_1 -, β_1 -, and β_3 -adrenoreceptor subtypes and the β -adrenoreceptors (β AR) are responsible for mediating thermogenic effects.^{236,237} β AR are activated via phosphorylation after catecholamine binding. cAMP is produced, binds PKA, leading to an acute increase in lipolysis and UCP1 activity and chronic increases in UCP1 transcription, mitochondrial biogenesis, BAT hyperplasia, and BAT recruitment within WAT as previously discussed (Figure 4).¹⁷⁹

The final aspect of endocrine control involves adipokines, cell signaling proteins secreted by adipocytes. While there are many members of this family, leptin (previously discussed) and adiponectin are two key adipokines involved in

energy metabolism. Adiponectin is secreted by adipocytes in negative proportion to the level of fat mass.²³⁸ It has many mechanisms that allow it to have an impact on both insulin sensitivity and metabolism. It promotes pancreatic β -cell survival and decreases hepatic glucose output and lipogenesis. Within fat tissue, adiponectin upregulates lipid metabolism genes, reduces inflammatory mediators, and increases adipocyte numbers. Adiponectin also has central brain effects on energy expenditure.²³⁹ Adiponectin receptors 1 and 2 are distributed throughout the body, allowing for the wide range of tissue effects for this adipokine.^{239,240} There are three forms of adiponectin in circulation: trimers, hexamers [low molecular weight oligomer (LMW)], and high-molecular weight multimers (HMW), with LMW and HMW being the predominant forms in human plasma.²⁴¹ LMW and HMW adiponectin are able to bind to T-cadherin, another receptor located in endothelial and smooth muscle cells.²⁴² There is also speculation that other adiponectin receptors exist, although firm evidence is pending.^{243–245} HMW adiponectin is suspected to be the active form of the adipokine in people, as low levels are associated with upper body fat distribution, insulin resistance, impaired lipid oxidation, and dyslipidemia.^{246,247}

In dogs, total adiponectin, HMW adiponectin, and the ratio of NMW to total adiponectin have not been associated with insulin sensitivity as they are in people.²⁴⁸ There is conflicting evidence regarding total adiponectin levels in obese dogs. Some have found obese levels to be similar to levels seen in lean dogs,^{145,248,249} while others have found lower levels in obese versus lean dogs.^{250–252} Verkest and colleagues compared the two largest studies of the relationship between adiposity and adiponectin levels in dogs in order to determine if the lack of agreement could be explained.^{132,250,253} Both studies utilized the same assay and laboratory error was ruled out and assay results were confirmed. The earlier Ishioka study, which found obese levels to be lower than lean levels of adiponectin, had a higher population of intact dogs compared to the Verkest study (80% versus 18%). There was no significant interaction between BCS and neuter status on adiponectin level when approached as individual studies or when the data was combined. Both studies revealed confounding of BCS on adiponectin concentration because of age, while only Verkest's data showed confounding due to neuter status.²⁵³ The authors conclude there does not appear to be a sex-related difference in total adiponectin concentrations as there is in people and rodents, and they noted intact males actually had a higher mean level versus neutered male dogs.²⁵³ They also conclude obesity may decrease adiponectin concentrations in intact but not in neutered dogs, which seems to be supported by the use of a higher proportion of intact dogs in two of the studies supporting this hypothesis.^{250,251,253} Further research is needed to confirm the relationship between the level of adiposity and adiponectin status in intact versus neutered overweight or obese dogs.

While not an adipokine, interleukin-15 (IL15) is a proinflammatory cytokine produced by mononuclear, epithelial, and fibroblast cells and has high expression in skeletal muscle, heart, lung, and kidney tissues.²⁵⁴ It is considered

antiadipogenic because rats exposed to IL15 exhibited a decrease in WAT mass, circulating triglycerides, and hepatic lipogenesis.^{255,256} The effect of IL15 on adipocyte lipolysis has not been fully elucidated as there are conflicting reports of no effect in rats, but increased lipolysis in pig adipocytes.^{255,257} Leptin deficient and lean leptin receptor negative mice also respond to IL15 treatment by decreasing WAT mass and lipoprotein lipase (LPL) activity, but obese leptin receptor deficient mice did not respond.²⁵⁸ *In vitro* adipocyte work found IL15 caused decreased leptin expression and lipid accumulation.²⁵⁹ Adipocyte cultures treated with IL15 limited lipid accumulation in differentiating preadipocytes and stimulated adiponectin release from mature adipocytes.²⁶⁰ It also reduces adipocyte proliferation, partially stops differentiation, and induces apoptosis of cultured preadipocytes.²⁶¹ Chronic administration of this cytokine in rats increased myocyte lipid oxidation and limited adipocyte lipid uptake, which the authors suggest indicates the ability of IL15 to alter exogenous lipid partitioning.²⁶² Considered together, these data indicate IL15 inhibits adipocyte lipogenesis, LPL activity, proliferation, and differentiation while encouraging adipocyte apoptosis.²⁵⁶

IL15 also affects skeletal muscle by stimulating muscle-specific myosin accumulation and increases levels of contractile proteins in culture.^{263,264} The same group further showed increased muscle hypertrophy with myotube hypertrophy, stimulation of protein synthesis and inhibition of protein degradation with *in vitro* IL15 exposure.²⁶⁵ Effects on lipid oxidation as described for adiposity above are also seen, with a greater magnitude, in cultured myocytes. IL15 exposure increases expression of PPAR δ , a nuclear receptor involved in lipid oxidation, that causes increased type I, slow twitch, fiber expression in muscle.^{262,266} An additional action of IL15 in muscle is to stimulate glucose uptake *in vivo* with an associated increase in GLUT4 expression *in vitro*.²⁶⁷ Collectively, IL15 leads to an anabolic state in muscle, with increased glucose and lipid oxidation and concurrent increased muscle mass.

Animal models of obesity

Animals may be used in obesity research to develop prevention and treatment recommendations purely for their own species benefit. Animals are also often used to study obesity with the goal of translating research findings into clinical recommendations for people. Small rodents, specifically rats and mice, are used most commonly for this purpose due to their short gestation period and life spans as well as the ability to house large numbers in relatively small spaces. The animal model chosen is highly dependent on the research goals and will frequently utilize wild type animals with diet induced obesity or animals with specific genetic mutations.²⁶⁸

Monogenic models, in which a single gene has been spontaneously or deliberately altered, are arguably the most common animal models in place. Well known monogenic obesity models include Zucker (fa/fa; “fatty”) rats and leptin obese (Lep^{ob}/Lep^{ob}) and leptin diabetic (Lep^{db}/Lep^{db}) mice, which all exhibit

spontaneous single gene mutations with corresponding obesity development.^{152,159,268–271} Leptin obese mice exhibit a mutation of the ob gene, causing early termination of leptin release and subsequent leptin deficiency. Leptin diabetic mice are similar, but their mutation affects the leptin receptor, meaning these mice release adequate levels of leptin, but the receptor is unable to properly respond to the circulating adipokine. Zucker rats also have a mutation involving the leptin receptor. Their receptor is produced, but is maintained intracellularly, leaving inadequate surface receptor numbers and a diminished ability to respond to normal circulating levels of leptin.

Diet induced models of obesity (DIO) include use of animal strains with known responses to certain dietary manipulations. High energy, high fat, and cafeteria (Western style diets with increased meal size and frequency) diet manipulations are commonly employed based on desired outcomes. DIO may be a better way to study the obese state from a translation perspective because it involves animals responding to an excess calorie load and developing obesity in a more natural manner with many of the same outcomes seen in obese people. For this reason, DIO is a reasonable choice for testing prospective therapies, while monogenic models can be part of the initial therapy development and evaluation.^{268,272}

As previously stated, the highest prevalence of overweight and obesity in dogs is in neutered animals, while Cocker Spaniels, Beagles, Labrador Retrievers, Golden Retrievers, Shetland Sheepdogs, Rottweilers, and Mixed-breed dogs have an overweight prevalence greater than or equal to 30%.⁶ It stands to reason that these breeds are best suited as DIO unless genetic mutations are identified. There has been a recent call for investigating the canine genome and identifying predisposing genetic markers of obesity in dogs to better expand canine utilization for comparative research.^{273,274} This work has the potential to vastly expand the use of dogs as models of human obesity.

Theories on how to combat the problem

Dietary strategies

Dietary strategies employed to prevent or treat obesity in often involve macronutrient and portion size manipulations. General categories of macronutrient manipulations in people are low calorie diets (LCD), very low calorie diets (VLCD), low fat diets (LFD), and low carbohydrate diets (LCHO). Definitions vary, but LCD has been described as achieved by removing 500 calories from the diet (1000 – 1500 kcal/day) as opposed to VLCD, which limit total consumption to 400 – 800 kcal/day.^{25,275} Macronutrient proportions may be modified in LCD and VLCD, but the main premise is a focus on caloric restriction. Both a joint evidence report by the National Institute of Health (NIH) and the National Heart, Lung, and Blood Institute (NHLBI) and a meta-analysis by Tsai and Wadden concluded VLCD is associated with greater initial weight loss, but no weight loss difference exists between LCD and VLCD after one year.^{25,276}

LFD are another weight loss strategy used in people. Diets with 20 – 30 %ME fat have been associated with decreased caloric intake, even when caloric restriction is not a specific aspect of diet design.²⁵ When LCD and LFD are combined, better weight loss is achieved, and the NIH/NHLBI evidence report recommends this combination as the weight loss diet strategy of choice.²⁵ This recommendation has held up since 1998 as the United States Department of Agriculture (USDA) continues to promote LFD and caloric awareness for weight management.²⁷⁷ To determine if LFD are effective in dogs, either a LFD (24.5% ME) or high fat diet (HFD; 35.4 %ME) were fed to dogs with 24.1 – 24.6 %BF.²⁷⁸ The diets were fed at 60% MER for 7 weeks. LFD dogs lost a greater percentage of body weight, lean body mass, fat mass, and %BF compared to HFD, but both groups had significantly lower body composition values at the end of seven weeks than they did at the start. The authors concluded LFD was a superior weight loss diet due to the significantly greater loss of %BF in this group. Because the groups were technically considered within an ideal body condition (based on % BF) at the start of weight loss, however, it is unclear if similar differences would be repeated in truly overweight or obese dogs. While not a weight loss trial, Labrador Retrievers were found to have similar resting energy expenditure and body composition after consuming high (41 %ME) versus low (14 %ME) fat diets for thirty days.²⁷⁹ In general, LFD are not specifically employed in canine weight loss protocols, but most diets (except high fat LCHO) utilize a lower fat content as a means to achieve a reduced caloric density.

LCHO is a popular strategy in people, with many well-known examples including the Atkins, paleo, and South Beach diets. Each program has its own specific recommendations, depending on if the macronutrient distribution includes high fat versus high protein and low carbohydrate (CHO) versus very low CHO as central components. A generalization is to define low CHO as 20-40 %ME CHO and very low CHO as 0-20 %ME CHO. High fat diets contain 30-60 %ME fat, while high protein versions are 30-65 %ME protein.²⁸⁰ CHO is restricted to diminish readily available source of glucose and put the body into a glycogenolytic state for maintenance of euglycemia.²⁸¹ With chronic glycogenolysis, glycogen stores are depleted and the body moves toward lipolysis and β -oxidation as an energy source. β -oxidation produces acetyl-CoA, which is used for hepatic ketone body (acetone, acetoacetic acid, β -hydroxybutyric acid) production. Ketone bodies are utilized in most tissues, including skeletal muscle, while available glucose is preferentially reserved for glucose-dependent tissues like the brain and erythrocytes. Additional metabolic effects of LCHO are decreased fasting and postprandial glucose as well as circulating insulin.²⁸¹ Lowered insulin diminishes its inhibitory effect on lipolysis, leading to increased circulating triacylglycerol (TAG) for β -oxidation.

Overweight and obese dogs fed LCHO with 71 – 77 g/1000 kcal CHO, 84 – 89 g/1000 kcal protein, and 49 – 54 g/1000 kcal fat lost less weight than dogs fed a high fiber diet (HFD) with 129 – 139 g/1000 kcal CHO, 82 – 86 g/1000 kcal protein, and 28 – 29 g/1000 kcal fat. Even though LCHO contained 31 – 32.4%

more kcal/100 g compared to HFD, both groups were fed similar levels of calories and both lost significant weight over time.²⁸² Body condition score (BCS) and body composition changes during weight loss were not discussed, making the authors' conclusion of improved weight loss with HFD difficult to justify. Another study, utilizing the same HFD (23.8 %DM protein, 23.8 %DM starch, 38.6 %DM TDF, 5.2 %DM ash, 9.8 kJ/g ME as fed), compared it against a diet described as LCHO, but that was actually low in starch and high in fiber (47.5 %DM protein, 5.3 %DM starch, 30.8 %DM TDF, 7 %DM ash, 11.6 kJ/g ME as fed). The diets were fed to overweight or obese dogs and controlled for similar restricted energy intake. Both groups lost similar levels of weight, although the authors point to the difference in loss of lean body mass between the two groups as approaching significance ($p = 0.056$). They call for further study using high protein weight loss diets as a strategy to maintain lean body mass.²⁸³

High protein diets in people (25 – 30 %ME; 0.8 – 1.2 g/kg BW) are often used for weight loss due to protein's role in satiety, energy metabolism, and lean body mass maintenance.²⁸⁴ It is the most satiating macronutrient, leading to decreased overall protein oxidation with increased fat oxidation. Energy expenditure increases with high protein intake due to the energetic cost of protein synthesis and gluconeogenesis. The excess protein is also provided in high enough levels to provide normal protein content despite overall energy restriction.^{284,285} Beagle dogs with a body weight $\geq 25\%$ in excess of ideal weight were fed a high protein diet (103 g/1000 kcal protein, 2520 kcal/kg diet) at 50% MER to induce weight loss. This was deemed a very satisfactory weight loss regime since the dogs returned to their basal body weight and lean body mass.²⁸⁶ Increasing levels of protein (up to 39% ME) fed to overweight dogs undergoing caloric restriction in another study was associated with less lean tissue loss compared to dogs eating lower protein diets (down to 20% ME).²⁸⁷

In addition to high protein diets, increased fiber is often utilized in weight loss diets designed for dogs. Rather than a way to maintain lean muscle mass, fiber is employed for its satiety effect and ability to decrease total caloric consumption. Jackson et al tested voluntary food consumption in dogs fed high versus low fiber diets with what was described as similar ingredients and nutrient contents except for fat, fiber, and calories on an as fed basis. After conversion to an energy basis, however, a difference in protein level is also noted (Low fiber diet, 62.5 g/1000 kcal protein, 28.5 g/1000 kcal fat, 5.5 g/1000 kcal crude fiber, 39.1 g/1000 kcal total dietary fiber, 34.1 g/1000 kcal insoluble fiber, 5.0 g/1000 kcal soluble fiber; high fiber diet, 74.3 g/1000 kcal protein, 22.9 g/1000 kcal fat, 30.2 g/1000 kcal crude fiber, 92.5 g/1000 kcal total dietary fiber, 84.0 g/1000 kcal insoluble fiber, 8.5 g/1000 kcal soluble fiber. While dogs voluntarily consumed similar volumes of both diets, due to the lower caloric density of the high fiber diet, dogs on that diet consumed fewer total calories.²⁸⁸ Jewell and Toll investigated low and medium fiber diets with similar results, also attributed to the lower caloric density of the medium fiber diet.²⁸⁹ Butterwick and Markwell did not see a satiety effect of high fiber diet challenge meals, but they were using

energy-restricted dogs on an active weight loss plan, who should be considered highly motivated to consume food. Voluntary food intake in low fermentable fiber (LFF) versus high fermentable fiber (HFF) fed dogs tended to be higher, although a significant difference did not occur ($p=0.085$).²⁹⁰ It has also been reported in a survey of sixty-one owners and dogs in the US that lean dogs receive more crude fiber than obese dogs, regardless of the number of treats fed ($p<0.01$).²⁹¹

High protein and/or high fiber diets are the most common macronutrient distributions employed for dogs on weight loss plans. German and colleagues compared a high protein/high fiber diet (HPHF; 103 g/1000 kcal protein, 34 g/100 kcal fat, 60 g/1000 kcal crude fiber, 97 g/1000 kcal total dietary fiber, 2900 kcal/kg ME) to a high protein/medium fiber diet (HPMF; 104 g/1000 kcal protein, 31 g/100 kcal fat, 35 g/1000 kcal crude fiber, 56 g/1000 kcal total dietary fiber, 3275 kcal/kg ME) in overweight or obese dogs.²⁹² After starting individualized weight loss plans, HPHF dogs lost a greater percentage of weight (31.8 vs. 20.0 %) and at a faster rate (1.0 vs. 0.7 %/week) than matched HPMF dogs. Change in body fat mass loss was also greater in HPHF dogs compared with HPMF (58 vs. 37 %). The authors concluded HPHF improved outcome during weight loss in obese dogs when compared to HPMF. It is important to note HPHF was less calorically dense, attributable solely to its higher fiber content since fat level was maintained across both diets. From the same research group, the HPHF, HPMF and a moderate protein high fiber diet (MPHF; 86 g/1000 kcal protein, 28 g/1000 kcal fat, 87 g/1000 kcal crude fiber, 132 g/1000 kcal total dietary fiber, 2660 kcal/kg ME) were assessed for differences in a satiety effect. HPHF dogs consumed less calories compared with when fed HPMF and MPHF.²⁹³

In addition to the macronutrient component, addressing food portion sizes has also become a central component of weight loss plans. Average food portion sizes have been on an increasing trend since 1977 for specific classes of foods (e.g. salty snacks, desserts, soft drinks, French fries, etc.) commonly consumed both inside the home and out at restaurants.^{294,295} It is not surprising that increased energy consumption is associated with larger food portions, but can be ameliorated by smaller portions.^{296–301} This is a difficult task for people due to identified barriers to healthy portion size control: (1) lack of clarity and irrelevance of suggested serving size guidance; (2) guiltless eating; (3) lack of self-control over food cues; (4) distracted eating; (5) social pressures; (6) emotional eating rewards; and (7) quantification habits ingrained from childhood.³⁰² Because domestic dogs typically rely on food provided by their owners as the sole source of nutrition, portion size provided by the owner is just as important as individual consumption by the dog. There is evidence owners are more likely to portion a larger amount of food if using a large bowl and large scoop compared to when using a small bowl and small scoop combination.³⁰³ There is also poor precision noted when using measuring cups versus weighing portions of extruded diets.³⁰⁴

Exercise strategies

Regular exercise is an important component of weight loss plans, but should be combined with other strategies to be most effective.^{305,306} If consistently performed for eight months, however, exercise alone has been shown to cause decreased abdominal, minimal waist, and hip circumference measurements in nondieting, overweight people.³⁰⁷ The group with an exercise level calorically equivalent to approximately 20 miles of jogging per week at 65 – 80% peak oxygen consumption lost significantly more body and fat mass compared to lower intensity and frequency groups. To achieve this high intensity level, an individual would need to jog 5 miles four times per week, which may limit effective compliance. Compliance has been shown to increase in some situations such as with “point-of-decision” prompts to encourage stair use, work/community-wide campaigns (education, support, incentives, access to fitness facilities), school-based physical education, and individually-adapted health behavior changes.^{308–310} According to the National Weight Control Registry, a website tracking over 10,000 people who have lost and maintained weight for long periods of time, 94% of participants increased activity, typically through walking during active weight loss. To maintain their loss, 90% report an average of 1 hour committed to daily exercise.³¹¹ The American College of Sports Medicine (ACSM) released a position stand in 2009 outlining appropriate physical activity intervention strategies for weight loss and prevention regain for adults (Table 1).³¹² For weight maintenance, the CDC currently recommends 150 min/week of moderate-intensity aerobic activity and 75 min/week of vigorous-intensity aerobic activity (225 min/week total), falling within the 225 – 500 min/week recommended to lose 5 – 7.5 kg from the ACSM report.³¹³

There is very limited data regarding minimum duration and intensity of physical activity for weight loss/maintenance in dogs. Survey data of interview responses from dog-owning households in Perth, Australia show odds of obesity decreased (OR = 0.9) for every hour of weekly exercise.³¹⁴ Based on accelerometry data, obese dogs have been shown to spend significantly less time in vigorous daily activity compared to ideal weight dogs (7 ± 3 vs. 21 ± 15 min/day).³¹⁵ Research utilizing pedometers found higher BCS was associated with fewer steps taken per day and modest correlation between steps recorded for both dogs and owners ($r = 0.469$).³¹⁶ Another pedometer project found every 1000 steps allowed dogs on a weight loss plan to consume 1 kcal/kg^{0.75} more while maintaining a loss of 2%/week.³¹⁷ A pilot study by Chauvet et al demonstrated weight loss achievement while using an underwater treadmill and leash walks over three months, although all dogs were also on restricted energy intake and there was no control group for comparison.³¹⁸

Drug/nutraceutical strategies

Anti-obesity medications are another tool for obesity treatment and/or prevention. Three basic classifications are agents affecting nutrient absorption, satiety, and metabolism. An exhaustive review of all available agents is beyond

Table 1 ACSM position regarding physical activity for weight loss and maintenance.

<i>Physical activity category</i>	<i>ACSM position</i>	<i>Evidence category</i>
Weight gain prevention	150 to 250 min/week prevents gain > 3%	A
Weight loss	< 150 min/week promotes minimal weight loss > 150 min/week results in modest weight loss of ~2–3 kg > 225–420 min/week results in 5 - 7.5 kg weight loss	B
Weight maintenance after weight loss	200 – 300 min/week supported by some studies, but requires further research	B
Combined with diet restriction	Increased weight loss with modest diet restriction No additional effect if diet restriction is severe (i.e., < resting metabolic rate)	A
Resistance training	Not effective for weight loss with or without diet restriction Limited evidence of lean mass gain/maintenance or loss of body fat during energy restriction Some evidence of improved disease risk factors (i.e., HDL, LDL, insulin, BP)	B

HDL, high density lipoprotein; LDL, low density lipoprotein; BP, blood pressure

Evidence categories of the National Heart, Lung, and Blood Institute (NHLBI); A, randomized controlled trials (rich body of data); B, randomized controlled trials (limited body of data)²⁵

Table modified from Donnelly JE, et al. 2009³¹²

the scope of this document, but select examples from each classification will be discussed in further detail. The first example, orlistat (alli®, GlaxoSmithKline, Brentford, Middlesex; Xenical®, Genentech, Inc, San Francisco, CA), is an agent capable of affecting nutrient absorption. It was introduced in 1998, is approved for longterm use (≥ 24 weeks), and decreases fat absorption via gastric and pancreatic lipase inhibition.^{319,320} When consuming 80 g fat/day (30% ME), 60 mg of orlistat with each meal (180 mg total dose) decreases intestinal fat absorption by 30%.³²¹ This dose produced 2.44 kg and 2.51 kg more weight loss versus placebo at 1 and 2 years, respectively (based on weighted mean difference, WMD).³²² Doubling the dose led to 3.19 kg greater loss versus placebo at 1 and 2 years (based on pooled WMD).³²² Common side effects are gastrointestinal in nature, including diarrhea, abdominal cramping, and nausea.³²¹

Dirlotapide, (SLENTROL®, Zoetis, Florham Park, NJ) is the only US Food and Drug Administration (FDA) approved medication for weight loss in dogs. Like orlistat, it is an agent affecting fat absorption, although through a different mechanism of action (MOA). It is a microsomal transport protein (MTP) inhibitor and inhibits transport of lipids out of enterocytes, causing lipid accumulation. As enterocytes are lost through normal intestinal sloughing, the accumulated lipid is lost in fecal matter and not absorbed. While this loss of lipid absorption does explain a small portion of dirlotapide's MOA, 90% of the MOA is actually attributed to intracellular accumulated fat triggering release of intestinal PYY, which is anorexigenic.³²³ Weight loss occurs due to decreased food intake. Because of this relationship with fat, a dog receiving dirlotapide must be dosed based on dietary fat content or the MOA is less efficient.³²⁴ When fed diets with 5% fat, dogs needed higher doses of dirlotapide compared to when eating diets with 10 or 15% fat on a dry matter basis.³²⁵ Side effects common to treatment are emesis, especially during initial therapy, and intermittent loose stools throughout use of the drug.³²⁶ Fat digestibility is also decreased with dirlotapide therapy, but it is minimal, and therefore is expected to have little effect on bioavailability of lipid soluble vitamins (A, D, E, K).³²⁶ It is important to note that MTP is also present within hepatocytes and dirlotapide can inhibit hepatocyte MTP in non-canine species, including cats and people. For this reason, all dosing instructions for this drug should include warnings against its use in cats and people due to the risk of induced hepatic lipidosis. Liver function should also be assessed prior to use and dogs with evidence of liver dysfunction should not receive dirlotapide as it may cause minor elevations in alanine aminotransferase (ALT).³²⁷

Many satiety agents have been withdrawn from the market due to negative side effects, but the FDA has recently approved two new products. Lorcaserin HCl (Belviq®, Arena Pharmaceuticals GmbH, Zofingen, Switzerland), is a selective serotonin 2c (5-HT_{2C}) receptor agonist that causes pro-opiomelanocortin (POMC) system activation.³²⁸ A meta-analysis of 1-year randomized controlled trials (RCTs) found weight loss of 3.23 kg compared to

placebo. It also led to decreased total cholesterol, LDL, triglycerides, blood pressure, and waist circumference. Negative side effects include diarrhea, , nausea, fatigue, headache, and dizziness^{328,329} Phentermine/topiramate (Qsymia®, VIVUS, Inc, Mountain View, CA) combines an anticonvulsant (topiramate) with an anorexigenic compound (phentermine). Weight loss is a known side effect of topiramate use; however the exact mechanism of action is unknown. Phentermine is a sympathomimetic amine, causing catecholamine release in the hypothalamus, and subsequent appetite suppression.³²⁹ From three clinical trials, phentermine/topiramate has produced 5% weight loss in approximately 75% of treated subjects and 10% weight loss in 50% of treated subjects.^{330–333} As with lorcaserin, decreased blood pressure, waist circumference, and improved serum lipid profiles have been observed.³³¹ Paraesthesia, dizziness, insomnia, and constipation are a few of the negative side effects noted with use.³³²

There are no FDA approved agents targeting satiety or metabolism in dogs, although there are a few nutraceuticals with purported metabolism effects. White kidney bean (*Phaseolus vulgaris*) extract contains amylase inhibitors, which may help prevent complex carbohydrate digestion.³³⁴ Multiple products labeled for dogs contain white kidney bean extract as an active ingredient. A single clinical study was conducted in overweight or obese dogs receiving 500 – 1,000 mg white bean extract sprinkled on their food. There was an average weight loss of 1.2 kg, representing a 3.61% average body weight loss per dog over 8 weeks.³³⁵ This translates into a loss of 0.45% per week. While the results are intriguing, there was no placebo control or food intake data. Since owner assessment of food consumption is not discussed, it is possible the supplement caused a degree of food aversion and noted weight loss may be due to decreased food intake rather than inhibition of carbohydrate digestion. Amylase inhibitors can also be extracted from wheat and have been shown to have 100 times more inhibitory activity versus bean inhibitors in people.³³⁶ When tested in dogs for 9 weeks, dogs fed 1.5 g of the wheat amylase inhibitor had similar weight loss values versus control dogs (1.4 ± 0.7 vs. 1.1 ± 0.2 kg). Amylase inhibitor dogs did exhibit delayed carbohydrate digestion and absorption with lowered blood glucose levels without affecting pancreas size.³³⁶ The authors concluded the amylase inhibitor shows promise as diabetes mellitus therapy, but is not an effective means of weight loss.³³⁶

Green tea (derived from *Camellia sinensis*) is dried and steamed in a manner that does not activate polyphenol oxidase, the enzyme responsible for polyphenol oxidation in black tea. This is an important distinction between the two types of tea because it is the polyphenols left behind in green tea that are considered to be of pharmacological interest.³³⁷ Of these polyphenols, epigallocatechin gallate (EGCG) has garnered much attention and has been included as an active ingredient in many weight loss supplements geared toward both people and their pets.³³⁸ It is currently believed, although supportive literature is inconclusive, that the polyphenols of green tea are able to increase

thermogenesis or fat oxidation, with an overall effect of decreased fat accumulation.^{337,339} While being fed an excess level of calories, one study in obese dogs did find that nutritional (as opposed to pharmacological doses) of green tea extract (80 mg/kg/d) may improve insulin sensitivity and lipid profiles and alter glucose and lipid homeostasis gene expression, but there was no difference in body composition or food intake over 12 weeks.³⁴⁰ To the author's knowledge, there are no studies into the effectiveness of green tea extract on weight loss in companion animals fed maintenance levels of calories. Despite the lack of efficacy evidence, there are canine and feline specific weight loss products on the market containing green tea extract.

The final bioactive component that is a common ingredient in companion animal weight loss supplements is chromium, an essential trace mineral with roles in glucose and insulin metabolism. In people, it is reported to improve insulin sensitivity and potentiate insulin's actions at its receptor.^{341,342} Two recent meta-analyses of data in people suggest chromium supplementation causes statistically significant, but clinically marginal reductions in body weight.^{343,344} To the author's knowledge, there is no canine or feline data to support or refute the use of chromium as a weight loss supplement; however it has been investigated for glucose tolerance/insulin sensitivity effects in both species. Oral doses of chromium picolinate (20-60 µg/kg/d) did not allow for parenteral insulin dose reduction in dogs with naturally acquired diabetes mellitus, nor did it cause any harmful effects.³⁴⁵ A recent review of these studies and additional data concluded there is no clear benefit of chromium supplementation for weight loss dogs.³³⁴

NuShape®: a leucine/pyridoxine nutraceutical

A new metabolic agent available for people combines leucine and pyridoxine (NuShape®, NuSirt Sciences, Nashville, TN) and is designed to encourage lipolysis while maintaining lean tissue mass. Leucine is an essential ketogenic branched chain amino acid (BCAA), with highest concentrations (g leucine/100 g food item) in eggs, soy-derived products, and dairy products.³⁴⁶ Leucine has been shown to modulate fat oxidation and energy partitioning between adipose tissue and skeletal muscle. The cross-talk that occurs causes diminished adipocyte lipid storage, increased net fat oxidation, and decreased overall adiposity.³⁴⁷⁻³⁵² Pyridoxine (vitamin B₆) is a cofactor for various macronutrient metabolism enzymes in its active form, pyridoxal 5'phosphate (PLP). It is essential for other functions including hemoglobin, neurotransmitter, nucleic acid, and one carbon unit synthesis or metabolism.³⁵³ It tends to be highest in fortified foods, but naturally occurring sources of pyridoxine with high concentrations (mg pyridoxine/100 g food item) are pistachios, wheat and rice bran, garlic, sunflower seeds, and various spices.³⁴⁶ PLP is specifically used in this supplement for its attenuation of calcium signaling and overall decreased net lipid storage.^{347,354} The effects of both leucine and PLP have been determined

through *in vitro* and *in vivo* research, mostly in rodents, and an overview of pertinent results is discussed below.

Leucine

Leucine has been shown to increase muscle fatty acid oxidation and UCP3 expression and to decrease adipocyte fatty acid synthase (FASN) and PPAR γ expression *in vitro*.³⁴⁸ As its name implies, FASN is integral to fat production by catalyzing palmitate production from acetyl CoA and malonyl CoA. PPAR γ stimulates lipid uptake and production within adipocytes and UCP3 causes oxidative phosphorylation, mainly in skeletal muscle. In mice fed a high fat diet (HFD) *ad libitum* and consuming leucine via drinking water, total weight gain and adiposity were reduced compared to HFD without leucine. Decreased adiposity was attributed to increased UCP3 expression. Insulin sensitivity was also improved in these mice as exhibited by decreased glucagon, gluconeogenic amino acids, and hepatic glucose 6 phosphate activity.³⁵¹ These results collectively indicate improved glucose homeostasis, a shift toward muscle oxidative phosphorylation, and a shift away from adipocyte fat production and storage.

Leucine increases mitochondrial mass in both muscle and fat cells *in vitro* with a corresponding increase in expression of mitochondrial biogenesis genes (SIRT1, PGC1 α , and NRF1) and mitochondrial component genes (UCP3, Cox, and NADH).³⁴⁹ Another *in vitro* study examined differences in adipocytes and myocytes exposed to serum from overweight and obese people fed low or high dairy diets for 28 days. High dairy adipocytes had increased change from baseline values for SIRT1 activity and gene expression. UCP2, PGC1 α , NADH dehydrogenase, cytochrome C oxidase (Cox 7c), NRF1, and UCP3 activity and expression were upregulated, indicating increased mitochondrial biogenesis and component gene activation. In dairy myocytes, similar results were noted with increased SIRT1, Cox 7c, NRF1, and UCP3. Leucine was also specifically cultured with recombinant human SIRT1 enzyme, causing an almost 50% increase of SIRT1 activity from baseline.³⁵⁵ SIRT1 transfection into myocytes suppressed both SIRT1 expression and PGC1 α and NRF1 expression, which is normally stimulated by leucine. This implicates SIRT1 as a mediator of myocyte mitochondrial biogenesis.³⁴⁹ Myocyte culture in adipocyte-conditioned medium was associated with decreased mitochondrial abundance and UCP3 expression with increased PGC1 α expression. The authors suggested this data and evidence of decreased abundance in myocyte and adipocyte co-cultures indicate feedback stimulation of mitochondrial biogenesis in which adipocytes are able to attenuate myocyte effects.³⁴⁹ Overall, there is evidence of mitochondrial component gene generation and increased mitochondrial biogenesis in both muscle and fat tissue after leucine supplementation.

Cultured adipocytes and obese mice treated with leucine (0.5 mM or 24 g/kg diet) with or without resveratrol were studied. Positive effects were seen with leucine alone, but the highest gene activity was seen when leucine and

resveratrol were combined. Increased fatty acid oxidation, AMPK, SIRT1, and SIRT3 activity in cultured adipocytes and increased adipose SIRT1 activity, insulin sensitivity, and adiponectin with reduced adiposity and the inflammatory cytokine IL6 in obese mice were noted.³⁵⁶ When consuming a high fat diet (HFD) for 8 weeks, mice developed obesity, hepatic lipidosis, inflammatory changes in adipose tissue, insulin resistance, and other metabolic profile alterations. Leucine added to drinking water of mice consuming the HFD caused improved glucose tolerance via decrease peak glucose from 420 ± 21 to 356 ± 25 mg/dl. It also improved insulin signaling via return to insulin injection induced phosphorylation levels of insulin receptor, insulin receptor substrate1 (IRS1), and protein kinase B (PKB/Akt) in muscle, liver, and fat (Figure 8). Leucine also decreased hepatic steatosis, noted via histologic examination and return to baseline expression levels of fatty acid biosynthesis enzymes FASN and acetyl CoA carboxylase. These results indicate improved insulin sensitivity and decreased net lipid production and storage with leucine supplementation.

In addition to effects on insulin, fat metabolism, and mitochondria, leucine stimulates protein synthesis in skeletal muscle via mammalian target of rapamycin (mTOR) dependent and independent pathways.^{357,357–362} mTOR is a serine/threonine kinase that mediates the stimulatory effects of insulin on protein synthesis.³⁶² There are at least two mTOR multiprotein complexes, mTORC1 and mTORC2, with mTORC1 being the complex involved in cell growth and metabolism.³⁶³ Mammalian protein synthesis is regulated at two steps during translation initiation. The first step involves formation of the 43S pre-initiation complex, which scans mRNA for the start codon. The second regulation step is recognition of the 5' mRNA cap structure and subsequent formation of a ribosome binding site/translation start site. Eukaryotic initiation factor (eIF) 4F complex contains three eIF subunits (eIF4A, eIF4E, and eIF4G) and is required for this second step. Its activity is inhibited by eIF4E binding protein (4EBP1). mTOR phosphorylates 4EBP1, preventing it from binding eIF4E, allowing for increased protein translation (Figure 9). mTOR also phosphorylates ribosomal protein S6 kinase (S6K1). In this case, S6K1 is activated by phosphorylation, causing three downstream effects: (1) protein synthesis initiation factor 4B (eIF4B) activation; (2) 40S ribosomal protein (S6) activation; (3) elongation factor 2 kinase (eEF2K) inhibition.^{358,363–365}

The exact mechanism by which leucine exerts its mTOR-independent protein synthesis is unknown, but evidence of the association does exist. The same research laboratory investigated responses in rats after 18 hours of food deprivation followed by various refeeding conditions. Leucine restored protein synthesis to free feeding levels with leucine or leucine/CHO supplemented diets, but not with CHO alone. 4EBP1 phosphorylation was increased, inhibiting its ability to phosphorylate eIF4E in the leucine supplemented rats³⁵⁸ When in the presence of insulin, leucine was able to enhance production of eIF4E and eIF4G and increase phosphorylation 4EBP1, S6K1, and S6. When insulin release after a meal was inhibited by somatostatin administration, protein synthesis in these

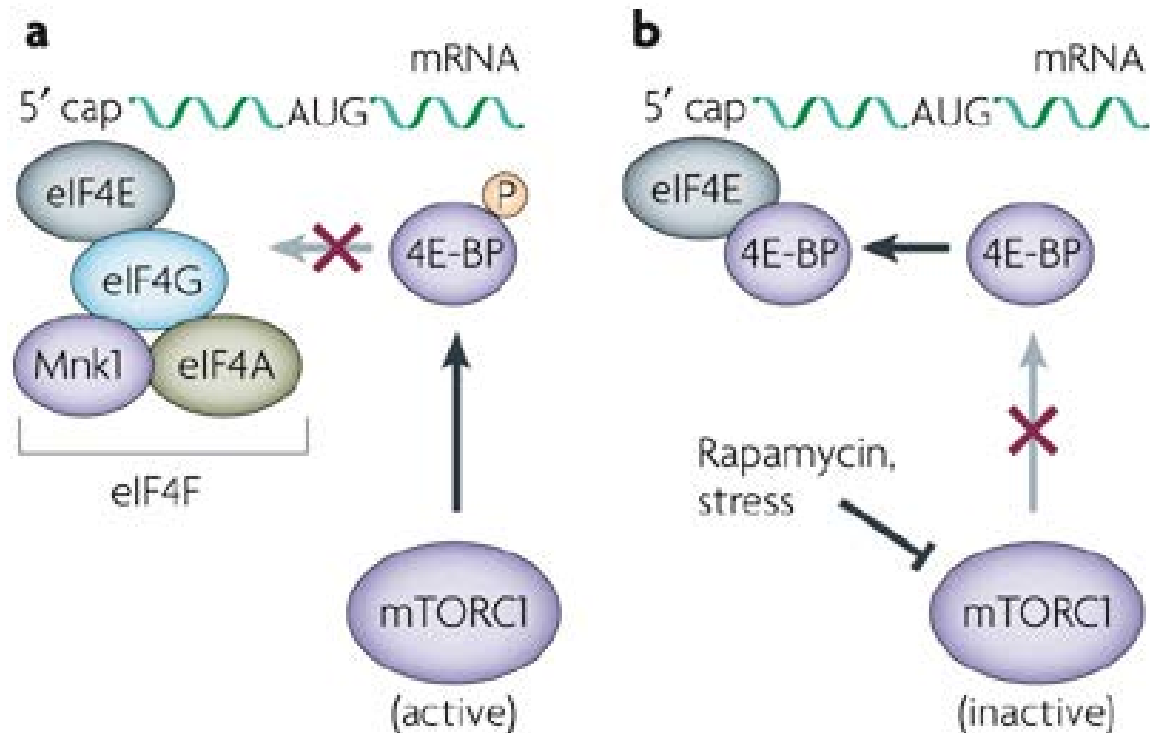
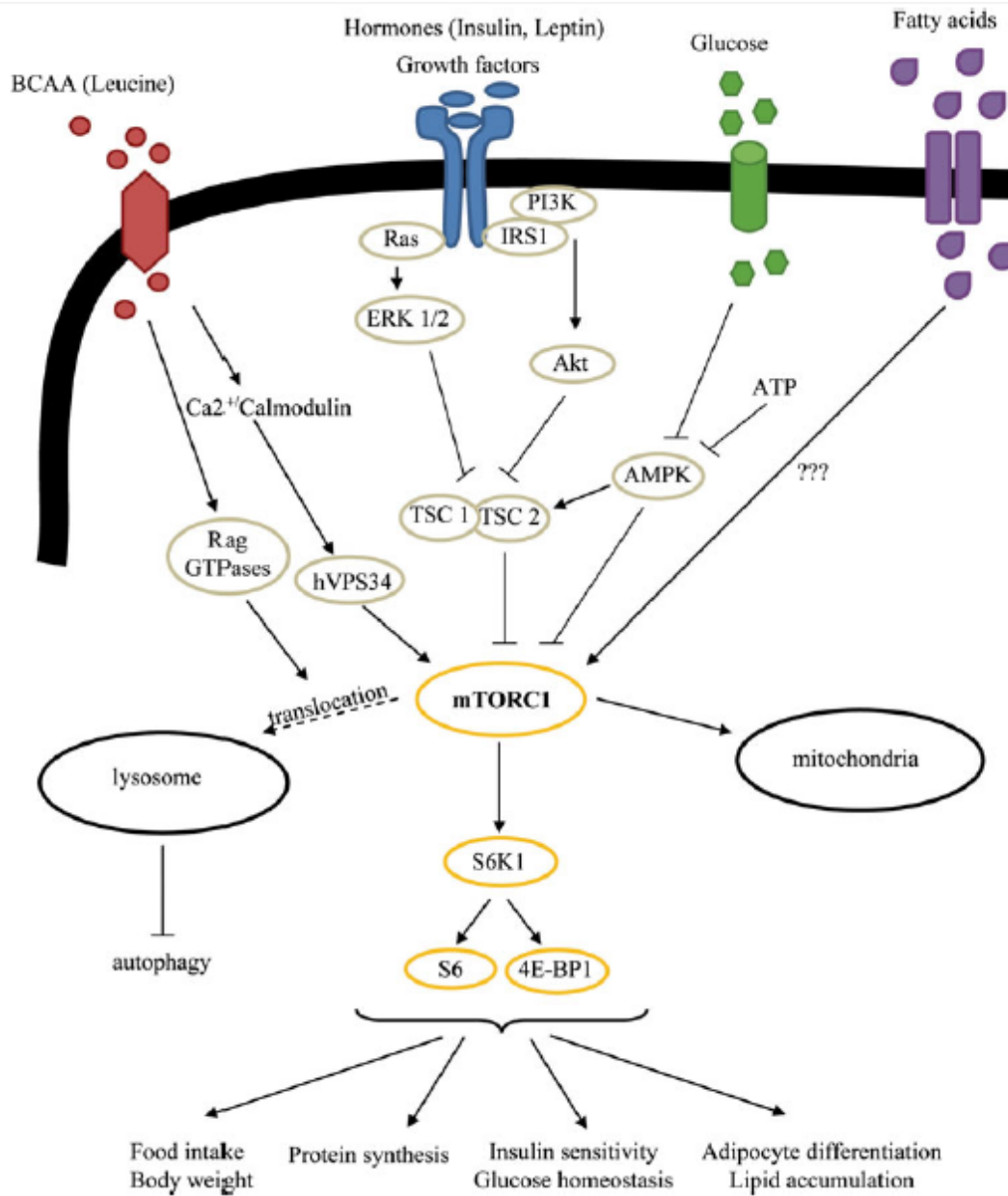


Figure 8 mTOR control of cap-dependent translation.

The eukaryotic initiation factor (eIF) 4F complex consists of: eIF4E, the subunit that binds to the 5' cap and thus brings the complex to the mRNA; eIF4G, the scaffolding protein to which the other components bind; mitogen-activated protein kinase-interacting kinase 1 (Mnk1), an eIF4E kinase; and eIF4A, an RNA helicase. The functionality of the eIF4F complex relies on the association between eIF4E and eIF4G. However, the binding of 4E-BP to eIF4E displaces eIF4E from eIF4G and the remainder of the complex, and thus inhibits cap-dependent translation. mTOR complex 1 (mTORC1) controls whether or not 4E-BP binds eIF4E by controlling 4E-BP phosphorylation. When mTORC1 is active, under positive growth conditions (a), it phosphorylates 4E-BP, which is therefore unable to bind to eIF4E. Thus, eIF4E is free to bind to eIF4G, which completes the eIF4F complex on the 5' cap and permits translation to proceed. Under negative growth conditions, for example, during stress or the inhibition of mTORC1 by rapamycin (b), mTORC1 is inactive; 4E-BP therefore becomes hypophosphorylated and binds efficiently to eIF4E, thereby removing it from the eIF4F complex and inhibiting cap-dependent translation. Reprinted by permission from Macmillan Publishers Ltd: [NATURE REVIEWS MICROBIOLOGY] (Buchkovich NJ, Yu Y, Zampieri CA, et al. The TORrid affairs of viruses: effects of mammalian DNA viruses on the PI3K–Akt–mTOR signalling pathway. *Nat Rev Microbiol* 2008;6:266–275), Copyright © 2008.³⁶⁶

Figure 9 The mTORC1 pathway.

The mammalian target of rapamycin complex 1 (mTORC1) pathway can be activated by hormones, growth factors and nutrients. Various upstream kinases [e.g. extracellular signal-regulated kinases1/2 (ERK1/2), phosphoinositide 3-kinase (PI3 K/Akt), AMP-activated protein kinase (AMPK)] that converge on the tuberous sclerosis complex (TSC1/TSC2), regulate mTORC1 activity. High-glucose levels inhibit AMPK, whereas low-glucose and low-ATP levels lead to the AMPK dependent activation of TSC2, which inhibits mTORC1 signaling. AMPK also directly inhibits mTORC1 by phosphorylating Raptor, a component of mTORC1. Hormones such as insulin signal to mTORC1 through PI3 K and Akt, which inactivates TSC2 to prevent TSC2 inhibition of mTORC1. Activation of mTORC1 leads to phosphorylation of its downstream targets ribosomal protein S6 kinase (S6K1), eukaryotic initiation factor 4E-binding protein (4E-BP) and ribosomal protein S6 (S6). Prolonged or constitutive activation of mTORC1/S6K1 signaling attenuates insulin-dependent PI3 K/Akt activity by inhibiting insulin receptor substrate (IRS) proteins. Amino acids increase mTORC1 signaling by favoring Rag protein action on mTORC1 and its translocation to the lysosome, a phenomenon that leads to autophagy inhibition, and by inducing a Ca^{2+} /calmodulin-mediated activation of the class III PI3 K human vacuolar protein sorting-34 (hVPS34). Certain fatty acids have been shown to activate mTORC1 downstream targets, but actual mechanisms of actions are currently unknown. Once activated the mTORC1 pathway affects the hypothalamic control of energy balance and regulates protein synthesis, whole body glucose metabolism, insulin sensitivity, lipogenesis and adipogenesis. BCAA, branched-chain amino acid. Reprinted by permission from Cambridge University Press: [PROCEEDINGS OF THE NUTRITION SOCIETY] (André C, Cota D. Coupling nutrient sensing to metabolic homeostasis: the role of the mammalian target of rapamycin complex 1 pathway. *Proc Nutr Soc* 2012;71:502–510), Copyright © 2012.³⁶⁷



rats did not increase, despite leucine supplementation. Phosphorylation of 4EBP1, S6K1, and S6 was attenuated, but lack of insulin release did not affect eIF4G and eIF4E production.³⁶⁸ Leucine fed rats exhibited stimulated adipose, skeletal muscle and renal protein synthesis, while the synthesis in CHO fed rats was unchanged, despite an increase in insulin level.³⁶⁹ Leucine was even effective at lower doses than previously tested (0.135 vs. 1.35 g/kg BW). Amplitude of the effect on eIF4G and eIF4E was unchanged, but 4EBP1 and S6K1 effects exhibited a leucine dose response.³⁷⁰ In tumor bearing rats receiving 1 g/kg/day leucine, reduced body weight loss and protein degradation compared to control rats was observed. The leucine rats had increased phosphorylation of mTOR, p70S6K, and 4EBP1 with subsequently increased levels of the eIF4G-eIF4E complex and reduced eEF2 phosphorylation versus control.³⁷¹ This all provides evidence of leucine's ability to stimulate muscle protein synthesis independent of insulin. The relationship between leucine, insulin, glucose, and mTOR is shown in Figure 10.

Leucine is also able to maintain muscle mass via an antiproteolytic effect. Under normal resting conditions, protein synthesis will decrease in skeletal muscle when fasting and will increase after a meal, but will net no change in total protein mass.³⁷² The ubiquitin proteasome pathway acts to maintain net protein mass by initiating proteolysis. After mRNA translation, an ubiquitin protein will attach to a substrate protein in a series of steps requiring an ubiquitin activating enzyme (E1), ubiquitin carrier protein (E2), and ubiquitin protein ligase (E3). After four or more ubiquitins are attached in a chain, the 26S proteasome degrades the substrate protein into short peptides (Figure 11).³⁷³ When chronically administered over 10 days, leucine supplemented diets (5% of diet, ~0.7 g/kg/day) were associated with down regulated ubiquitination and proteasome activity in rats.^{372,374} When given to tumor bearing cachectic rats, leucine (3% of diet) over 20 days reduced protein degradation compared to control rats.³⁷⁵ A review by Zanchi et al identified two studies in people resulting in proteolysis inhibition without increased protein synthesis, and one study resulting in increased protein synthesis without inhibition of proteolysis. This data, along with all of the rodent research reviewed, led the authors to conclude varying results are most likely related to leucine dose and methodology differences related to proteolysis quantification.³⁷⁴

Evidence supporting leucine's role in thermogenesis has been shown in multiple ³⁷⁶studies in which uncoupling protein expression increased.^{348,349,351,355} The resulting uncoupling process generates heat and increases energy expenditure.^{183,377} In mice fed a high fat diet (HFD) *ad libitum* and consuming leucine via drinking water, increased energy consumption (measured as oxygen consumption, VO₂) was higher compared to HFD without leucine.³⁵¹ Measured in a novel system as the monotonic decrease in dissolved oxygen in parts per million (ppm), oxygen consumption was stimulated by *In vitro* exposure of myocytes and adipocytes to leucine.³⁴⁹ These data support the role of leucine as

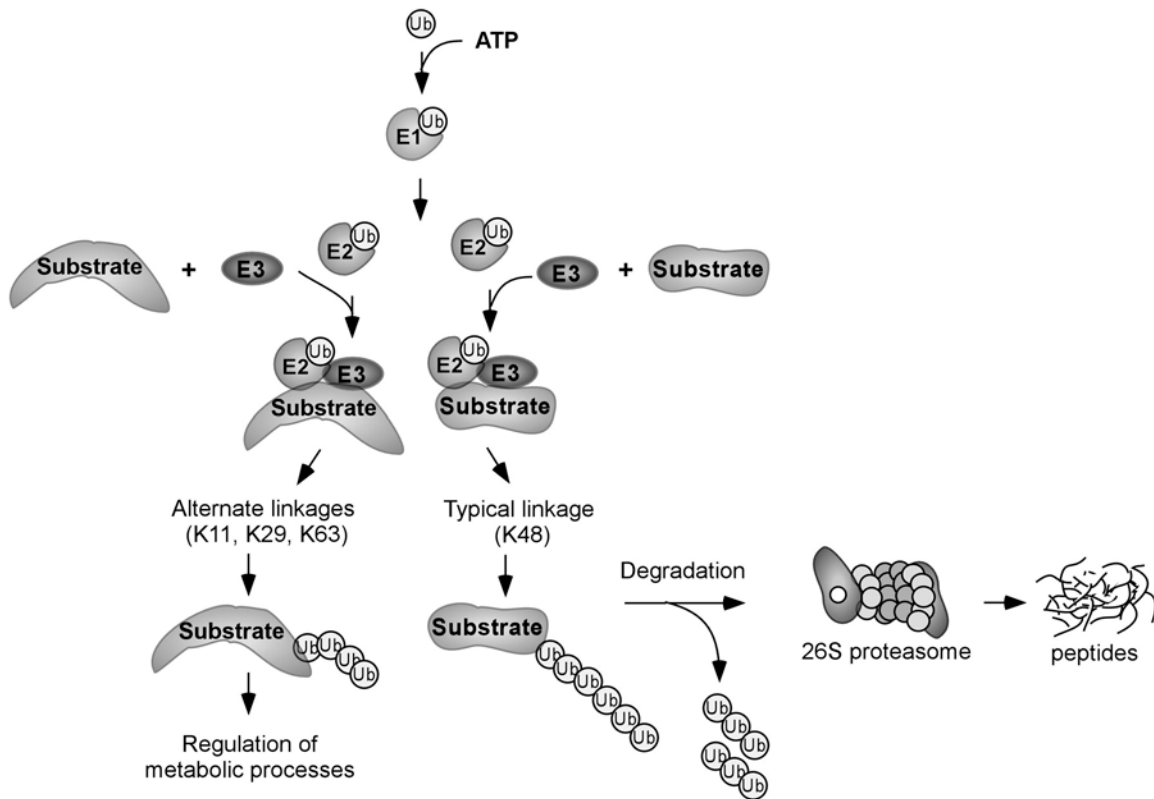
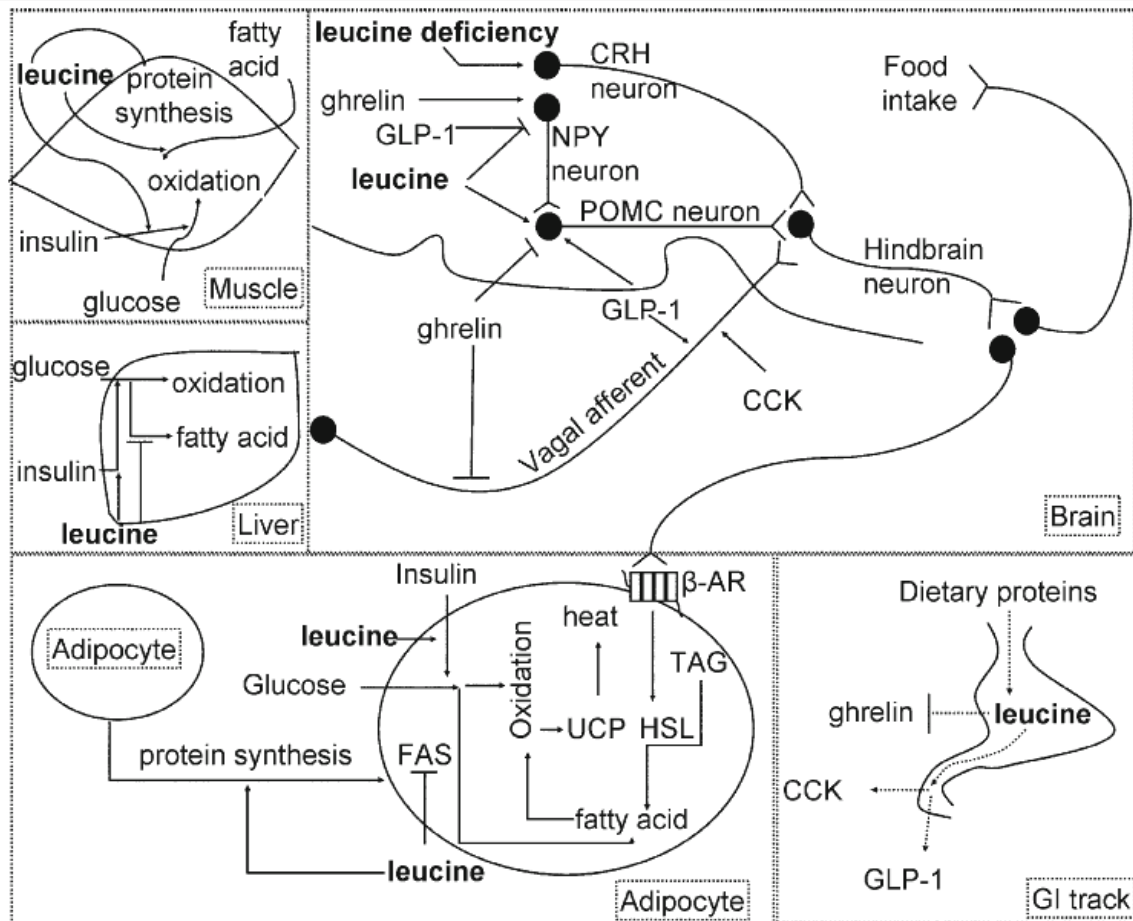


Figure 10 Ubiquitin proteasome pathway.

Initially, an ubiquitin-activating enzyme (E1) uses ATP to form an E1 ubiquitin thioester adduct with the COOH-terminal glycine of ubiquitin (Ub). After ubiquitin activation, members of the ubiquitin-carrier protein family (E2) participate in the transfer of the activated ubiquitin to protein substrates. In the majority of cases, a member of the ubiquitin protein ligase family (E3) also participates in the conjugation process. In a typical linkage, a series of ubiquitin molecules are conjugated to a substrate and a polyubiquitin chain is formed using Lys48 in ubiquitin as the site for chain extension. When a chain of 4 or more ubiquitin molecules is formed, the chain is recognized by the 26S proteasome and the substrate protein is degraded into short peptides. In some cases, polyubiquitin chains consisting of alternate linkages, ubiquitin molecules are conjugated to different lysine units in ubiquitin (K11, K29, K63), which will regulate different processes such as DNA repair, quality control of protein folding in the endoplasmic reticulum, apoptosis, or regulation of the duration and intensity of signaling by effector molecules. Reprinted by permission from The American Journal of Physiology (Debigaré R, Price SR. Proteolysis, the ubiquitin-proteasome system, and renal diseases. *Am J Physiol - Ren Physiol* 2003;285:F1–F8), Copyright © 2003, The American Physiological Society.³⁷³

Figure 11 Possible central and peripheral regulation of energy balance by leucine.

The hypothetical model shows how availability of leucine in the diet could influence the peripheral and central mechanisms regulating energy balance. In the gastrointestinal (GI) tract, hydrolysis of dietary proteins releases leucine, which stimulates the production of cholecystokinin (CCK) and glucagon-like peptide-1 (GLP-1) whilst inhibits the production of ghrelin. Upon release into the circulatory system, the hormones and leucine directly influence the activity of the vagal afferent (hormones only) and/or hypothalamic neurons expressing pro-opiomelanocortin (POMC) and neuropeptide Y (NPY) (hormones and leucine). The resulting increased signaling through the central nervous system causes alteration in food intake. Signaling to the adipose tissue activates the β -adrenergic receptor (β -AR), leading to an alteration in the expression or activity of hormone sensitive lipases (HSL) and mitochondrial uncoupling proteins (UCP). Direct action of leucine on cells of peripheral tissues influence the expression of fatty acid synthase (FAS; in adipocytes), tissue protein anabolism (in muscle cells and adipocytes) and lipid catabolism and insulin-induced glucose uptake and metabolism (liver, adipose and muscle). Intake of leucine-deficient diet activates hypothalamic neurons producing the corticotropin-releasing hormone (CRH), leading to alteration in food intake and adiposity. Reprinted by permission from Springer: [JOURNAL OF PHYSIOLOGY AND BIOCHEMISTRY] (McAllan L, Cotter PD, Roche HM, et al. Impact of leucine on energy balance. *J Physiol Biochem* 2013;69:155–163), Copyright © 2013.³⁷⁷



a regulator of energy expenditure and give it value as a method to inhibit weight gain or to facilitate weight loss.

It has been suggested that leucine has an effect on satiety, exhibited via decreased food intake. Ropelle et al showed decreased food intake when rats consumed a leucine and casein supplemented diet (50 g leucine and 202 g casein/kg diet). They also showed decreased AMPK and increased mTOR activity in the hypothalamus with subsequent NPY inhibition and POMC stimulation after intracerebroventricular injection. Other research confirms POMC activation and decreased food intake after intracerebroventricular injection.^{378,379} Since NPY is expressed by orexigenic neurons, reduces energy expenditure, and increases adiposity, decreasing NPY and increasing anorexigenic POMC expression may explain a central mechanism behind leucine's effects on thermogenesis.^{80,377,380,381} McAllan and colleagues have proposed a combined signaling cascade in which dietary leucine inhibits ghrelin release and stimulates CCK and GLP1, the latter of which is responsible for POMC activation. POMC decreases food intake through the central nervous system and directly signals adipocytes via β -adrenergic receptors (β AR). Adipose tissue activates hormone sensitive lipase (HSL) for triglyceride hydrolysis and UCP expression (Figure 11).³⁷⁷

In vivo research suggests leucine may increase weight and fat loss with caloric restriction. In rats undergoing 50% food restriction for 6 weeks with or without 5.91 g leucine/kg ration, total body mass was unchanged compared to control group, but fat mass was lower.³⁵² Even when fed *ad libitum*, mice consuming leucine via drinking water had reduced total weight gain and adiposity compared controls without leucine in their water.³⁵¹ In a similar study, but with leucine supplemented HFD, mouse total weight gain did not differ while fat mass was lower with leucine.³⁵⁰

In adult dogs, recommended leucine intake is 1.7 g/1000 kcal (0.22 g/BW_{kg}^{0.75}). A safe upper limit has not been established because there are no reports of toxicity related to excess leucine consumption in dogs fed complete, balanced diets.³⁸² The author is unaware of research specifically assessing leucine as a treatment for obesity in dogs, but there is evidence of lower serum levels of multiple amino acids, including leucine, in caloric-restricted Labrador Retriever dogs ≥ 6 years old.³⁸³ These authors suggest this may be due to increased amino acid oxidation as the caloric-restricted dogs looked toward an alternative energy source.

Pyridoxine

Pyridoxine acts to attenuate calcium signaling, inhibiting calcium movement into adipocytes *in vitro*. This has been noted in research utilizing pyridoxine deficient rats, which have enhanced influx of calcium into vascular smooth muscle.^{384,385} Administration of PLP inhibited the calcium influx by enhancing calcium channel antagonist binding in vascular tissue.³⁸⁵ Spontaneously hypertensive rats also exhibit increased intracellular calcium

levels, which is reduced with dietary pyridoxine supplementation at both recommended and 20 x recommended dietary intake levels.³⁸⁶ Cultured adipocytes treated with PLP (50 or 100 nM) also exhibited reduced intracellular calcium concentration.³⁵⁴

The ability to limit intracellular calcium accumulation is important to discussions surrounding weight loss because calcium regulates adipocyte lipid metabolism. This relationship has been shown using human adipocytes exposed to agouti protein, which is associated with obesity and is expressed primarily in adipocytes. Agouti protein exposure increased adipocyte FASN expression in these adipocytes, indicating a lipogenic state.^{387,388} Increased intracellular calcium concentration also leads to increased FASN expression in adipocytes.³⁸⁹ In human adipocyte cultures, glycerol release was used as an indication of lipolysis, and intracellular calcium levels were associated with diminished glycerol release.^{389–391} This information collectively signals pyridoxine may be used to attenuate calcium signaling, decrease fatty acid synthesis, and increase lipolysis with an overall reduction in net lipid storage.³⁵⁴

In adult dogs, adequate pyridoxine intake is 0.3 mg/1000 kcal (0.04 mg/BW_{kg}^{0.75}) and the recommended allowance is 0.375 mg/1000 kcal (0.049 mg/BW_{kg}^{0.75}). Presumed safe upper dietary levels are 1,000 mg/kg diet for less than 60 days and 500 mg/kg diet for longer than 60 days.³⁹² These upper levels are based on research showing daily pyridoxine doses of 150 mg/BW_{kg} lead to anorexia and weight loss with progression to ataxia and loss of proprioception.³⁹³ Similarly, 200 mg/BW_{kg}/day causes ataxia, muscle weakness, and loss of balance between 40 and 75 days of treatment.³⁹⁴ Higher daily doses (300 mg/BW_{kg}) were associated with locomotor abnormalities within 9 days, described as a toxic, peripheral sensory neuropathy.³⁹⁵

NuShape® (previously NuFit active blend); 2.25 g leucine/30 mg pyridoxine

In overweight and obese people, 750mg leucine and 10mg pyridoxine three times daily caused a decreased respiratory quotient with corresponding increased fat oxidation after 4 weeks of treatment. The homeostasis model assessment of insulin resistance (HOMA_{IR}; [Insulin (μU/ml) x glucose (mM)]/22.5) showed improved insulin sensitivity compared to baseline. Cultured adipocytes were synergistically able to reduce FASN expression and activity, adipocyte triglyceride content, and intracellular calcium concentration.³⁵⁴ In a 6 month study, people consuming a total daily dose of 2.25g leucine and 30mg pyridoxine lost a total of 1.82 ± 0.70 kg fat mass versus no change of fat mass in the placebo group when consuming a maintenance amount of calories. When calorically restricted (500 kcal/day reduction), supplement subjects lost significantly more total weight (8.15 ± 1.33 vs. 5.25 ± 1.13 kg, $p < 0.01$) and fat mass (7.00 ± 0.95 vs. 4.22 ± 0.74 kg, $p < 0.01$) than the placebo group over the 6 month time frame.³⁴⁷ These promising results in people show leucine/pyridoxine to be a viable weight and fat loss supplement as an adjunct to caloric restriction or on its own while consuming maintenance energy levels. With the knowledge

that overweight and obesity also affect dogs, investigation into use of this supplement in dogs is warranted.

CHAPTER I
EFFECT OF A LEUCINE/PYRIDOXINE NUTRACEUTICAL ON
FOOD INTAKE AND BODY COMPOSITION OF OBESE DOGS
LOSING WEIGHT

Introduction

Various data indicate a global overweight and obesity prevalence of 22.9-59.3% in adult dogs.⁶⁻¹⁴ The greatest prevalence is when 6-10 years old, neutered, and when represented by specific breeds (i.e., Beagle, Labrador Retriever, and Rottweiler).⁶ Lean Labrador Retrievers have been found to live 1.8 years longer and require long-term treatment for osteoarthritis 3 years later than their overweight sex- and weight-matched siblings, giving credence to undertaking efforts to achieve weight loss.³³

Diet manipulations to decrease caloric intake have long been the treatment of choice for canine obesity, but compliance and long-term weight maintenance success has proven difficult to achieve.^{292,325,326,396-400} Most plans involve feeding specially designed therapeutic weight loss diets, typically providing an increased nutrient to calorie ratio, increased fiber and protein content, and reduced kcal/kg food content.^{282,292} In cases where switching the diet is not desirable, alternative methods are required.

In people, a nutraceutical combining 2.25 g leucine and 30 mg pyridoxine (NuShape®, NuSirt Sciences, Nashville, TN) has shown promise as an effective aid to the management of obesity.^{347,354} The premise involves capitalizing on the synergistic ability of the two nutrients to encourage lipolysis while maintaining lean tissue mass. Leucine is an essential ketogenic branched chain amino acid (BCAA), with highest concentrations (g leucine/100 g food item) in eggs, soy-derived products, and dairy products.³⁴⁶ Leucine has been shown to modulate fat oxidation and energy partitioning between adipose tissue and skeletal muscle. The cross-talk that occurs causes diminished adipocyte lipid storage, increased net fat oxidation, and decreased overall adiposity.³⁴⁷⁻³⁵² Pyridoxine (vitamin B₆) is a cofactor for various macronutrient metabolism enzymes in its active form, pyridoxal 5'phosphate (PLP). It tends to be highest in fortified foods, but naturally occurring sources of pyridoxine with high concentrations (mg pyridoxine/100 g food item) are pistachios, wheat and rice bran, garlic, sunflower seeds, and various spices.³⁴⁶ PLP is specifically used in this supplement for its attenuation of calcium signaling and overall decreased net lipid storage.^{347,354}

The central aim of the study was to determine if a leucine/pyridoxine supplement in a dose modified for dogs would enhance weight loss and maintenance of lean tissue mass and/or impact medium term satiety in obese dogs losing weight compared to a negative placebo control and a positive weight reduction diet control. We hypothesized the nutraceutical would produce weight loss results similar to the therapeutic weight loss diet, and that both diets would induce increased body fat loss with maintenance of lean muscle mass compared to placebo. A similar pattern is expected for medium term satiety induction. The nutraceutical was expected to upregulate tissue expression of genes involved in fat oxidation, oxidative phosphorylation, and mitochondrial biogenesis, while decreasing genes associated with lipogenesis. It would increase circulating IL15, which has been implicated in muscle maintenance, glucose and lipid oxidation,

while decreasing proinflammatory and insulin resistance promoting IL6. Dogs maintaining their weight are expected to have consistent results at all time points.

Materials and methods

Animals

Twenty-four healthy two-year-old male castrated Beagles were used for this positively and negatively controlled study. A random number table was used to assign dogs to four groups. Individual groups were maintained in the same room and all dogs were individually housed in runs within the laboratory animal facilities of the University of Tennessee College of Veterinary Medicine. Dogs were deemed healthy prior to inclusion based on physical examination, complete blood counts, plasma biochemical analysis, and urinalysis. The study protocol was reviewed and approved by The University of Tennessee Institutional Animal Care and Use Committee.

Diet and group assignments

Dogs were fed based on group assignments (obese nutraceutical group, ObN; obese placebo group, ObP; obese therapeutic weight loss diet group, WLD; ideal body weight group, IBW; Figure 12).

To avoid confounding satiety cues based on habitual feeding patterns, dogs in a group were fed in a random order as determined by a random number table at each feeding.

Establish ideal BW and MER: 24 dogs

Resting energy requirement (RER; $70 \times BW_{kg}^{0.75}$) was calculated for each dog based on calculated ideal body weight. Ideal body weight [(current weight x current % lean) / ideal % lean] was calculated using the percent body fat (% BF) relating to each dog's current body condition score (BCS) based on the 9-point scale. Each unit increase on the scale is associated with a change of approximately 5 percent body fat (%BF) where an ideal score of 5/9 equates to 20 – 25 %BF and 9/9 equals 40 – 45 %BF.^{46,401} Current % lean was determined by subtracting the current % BF from 100 and 20% was used as the ideal lean value. Maintenance energy requirement (MER; RER x lifestage factor) was calculated using a lifestage factor of 1.6, corresponding to the recommendation for a castrated adult dog.⁴⁹

Dogs were fed a canned adult diet (CAD; Table 2) at MER divided into two daily meals (8AM and 4PM) for three (ObP, WLD) or four weeks (ObN, IBW) and had access to food for 45 minutes at each feeding. Food was weighed before and after meal access five days a week (Monday – Friday). Weekend meals (Saturday and Sunday) were prepared Friday afternoon by the research staff, placed in Ziploc bags labeled for each dog, and refrigerated until fed. Weekday meals were prepared and fed by the investigators while weekend food was fed

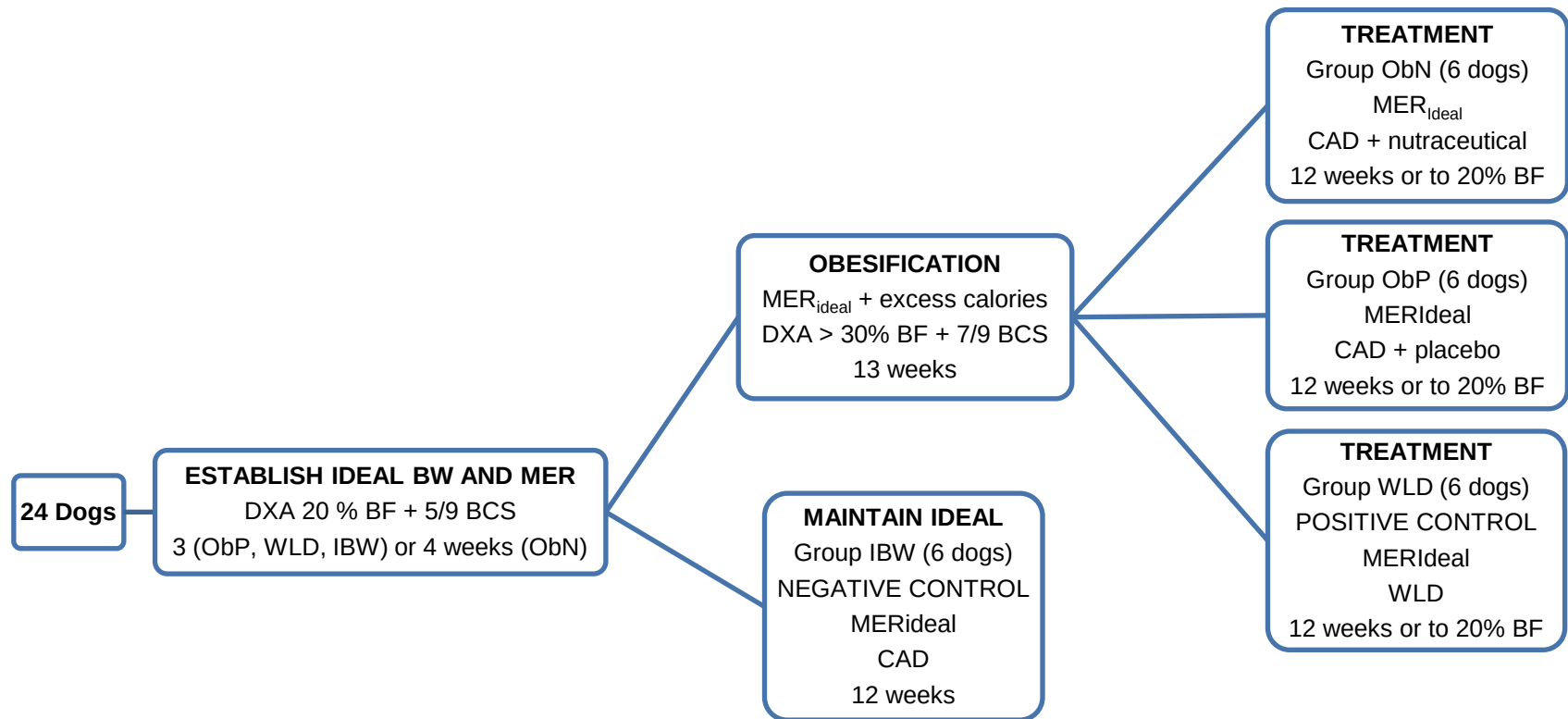


Figure 12 Group assignments.

BW, body weight; MER, maintenance energy requirement; DXA, dual energy X-ray absorptiometry; % BF, percent body fat; BCS, body condition score; IBW, ideal body weight; ObN, obese nutraceutical; ObP, obese placebo; WLD, weight loss diet; CAD, canned adult diet.

Table 2 Diet nutrient profiles.

<i>Nutrients (per 1000 kcal)</i>	<i>CAD diet</i>	<i>WLD diet</i>	<i>Kitten diet</i>
Protein (g)	56	85	85
Fat (g)	38	29	57
Carbohydrate (g)	129	131	61
Crude fiber (g)	2	7.1	3
Leucine (mg)	5,000	6,000	9,180
Isoleucine (mg)	1,960	2,730	3,530
Valine (mg)	2,550	4,090	3,930
Pyridoxine (mg)	2.4	3.3	2.4
Metabolizable energy (kcal/kg)	1021	733	4196

Information provided by manufacturer product guide average nutrient analysis. Values not listed in product guide were obtained directly from manufacturer.

CAD, canned adult diet (Science Diet Adult Gourmet Beef Entrée, Hill's); WLD, weight loss diet (Prescription Diet r/d, Hill's); kitten diet (Science Diet Kitten Healthy Development, Hill's).

by the animal care staff. Body weight and BCS were recorded Monday, Wednesday, Friday and feeding amount was adjusted to establish the individual's ideal MER (MER_{ideal}) based on achieving or maintaining lean body weight and BCS.

Maintain ideal weight: 6 dogs

IBW dogs were maintained on CAD at established MER_{ideal} as a negative control for an additional 12 weeks. Body weight and BCS were determined once a week (Monday). Feeding amount was adjusted in $\frac{1}{4}$ can increments as needed to maintain ideal body weight and condition.

Obesification: 18 dogs

MER_{ideal} as established was continued for ObN, ObP, and WLD dogs. Body weight and BCS determination was decreased to twice weekly. In order to induce an overweight or obese state ($\% BF \geq 30$) excess calories were provided from canola oil, vegetable oil, and extruded kitten food. Nutrient profile of the kitten diet is shown in Table 2. Oils were provided as 10 g each with both meals for the first 5 weeks based on a previously published protocol.⁴⁰² Due to intermittent soft stools and decreased appetite noted in some dogs, oil dose was decreased to 5 g each with both meals. After another 4 weeks (9 weeks into obesification) oil dosing was changed to morning meals only, still providing 10 g

of both oils. Kitten food was given in ¼ cup increments and increased as needed to encourage weight and % BF gain over the final 4 weeks (13 total obesification weeks). Dogs that lost or maintained a consistent weight over one week during obesification had ¼ can CAD added to their daily offered food.

Treatment: 18 dogs

Excess calories were removed and dogs were maintained on MER_{ideal} from CAD (ObN and ObP) or therapeutic weight loss diet (WLD; Table 2). All feeding amounts were decreased to a maximum of 3 cans CAD (1133.3 kcal) or 4.5 cans WLD (1154.5 kcal) per day due to concerns regarding maintenance calories being provided in excess to some dogs. The average body weight of all eighteen dogs was 16.0 kg (RER 560 kcal; RER x 1.6 = 896 kcal, MER), so this caloric level limited the dogs to approximately 20% above calculated MER (~2 x RER). ObN dogs received two nutraceutical capsules (1 g leucine + 13 mg pyridoxine total dose) and ObP dogs received two placebo capsules (corn starch) in a CAD meatball before getting access to their morning meal. The combined diet and nutrient content levels based on average food intake at study completion across the treatment groups are shown in Table 3. The weight (g) of the capsule meatball was recorded as part of the morning meal weight. In the event a dog split open its capsules rather than swallowing them, capsule contents were rubbed into the meatball and fed to the dog until eaten, and before the morning meal was fed.

Table 3 Diet and treatment nutrient profiles based on average food consumption.

<i>Nutrients (per 864 kcal*)</i>	<i>Nutraceutical & CAD (ObN)</i>	<i>Placebo & CAD (ObP)</i>	<i>Weight loss diet (WLD)</i>
Leucine (mg)	5,184	4,320	5,184
Isoleucine (mg)	1,693	1,693	2,359
Valine (mg)	2,203	2,203	3,534
Pyridoxine (mg)	13.3	2.1	2.9

* Calorie level based on average consumption at study completion for the 15 dogs from groups ObN, ObP, and WLD that were used in final data analysis.

Calculations based on information provided by manufacturer product guide average nutrient analysis.

Values not listed in product guide were obtained directly from manufacturer.

CAD, canned adult diet (Science Diet Adult Gourmet Beef Entrée, Hill's); WLD, weight loss diet (Prescription Diet r/d, Hill's).

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group.

Body weight and BCS determination was decreased to once a week. Treatment was continued until the dog reached 20 %BF or for up to twelve weeks. For dogs reaching ideal body composition before twelve weeks, body fat level as estimated by BCS was confirmed using dual energy X-ray absorptiometry (DXA) prior to treatment termination.

Food consumption

To avoid confounding changes in food consumption due to fasting prior to DXA, food intake calculations were based on average food consumption over four days at baseline, one, four, eight, and twelve weeks into treatment. The fifth day of food recording was dropped to account for morning meal loss and poor afternoon meal consumption post anesthesia on DXA days.

During obesification, food consumption attributable only to CAD, not the excess calories from oil and kitten food, was calculated. For the duration of this report, all calories offered and consumed during obesification are credited only to CAD as calculated by the following formulas:

Proportion of offered food consumed

$$\frac{[Total\ food\ consumed\ (g)]}{[Total\ food\ offered\ (g)]}$$

Calories consumed from oil

$$Proportion\ of\ offered\ food\ consumed \times oil\ offered\ (g) \times 8.57 \frac{kcal}{g} food$$

Calories consumed from extruded kitten food

$$\left\{ \frac{\left[Proportion\ of\ offered\ food\ consumed \times cat\ food\ offered\ (g) \times 4196 \frac{kcal}{kg} food \right]}{1000 \frac{g}{kg}} \right\}$$

Calories consumed from CAD

$$\left\{ \frac{\left[Proportion\ of\ offered\ food\ consumed \times dog\ food\ offered\ (g) \times 1021 \frac{kcal}{kg} food \right]}{1000 \frac{g}{kg}} \right\}$$

Calories consumed from WLD

$$\left\{ \frac{\left[Proportion\ of\ offered\ food\ consumed \times dog\ food\ offered\ (g) \times 733 \frac{kcal}{kg} food \right]}{1000 \frac{g}{kg}} \right\}$$

Intrusion meal consumption

Medium term satiety based on food intake was determined at baseline, one week, and twelve weeks into treatment, or when end of treatment limits were achieved. On sample days, dogs were fed their standard 8AM meal in a random order as previously described. Each dog was provided with its meal in a two minute delay staggered pattern. Three hours later (12PM) a second intrusion meal was fed, also following the two minute staggered pattern. This meal provided more calories than each dog would consume in a single sitting and was provided in the same random order as the 8AM meal from that day. Meals were weighed before and after feeding and intrusion meal calories consumed was calculated. CAD was used for all intrusion meals, including dogs being fed WLD because both diets share a similar palatability profile and would therefore not be expected to trigger hedonic tendencies in relation to novel diet exposure (Jewell, DE; personal communication).

Body composition

Body composition was determined using HOLOGIC® fan-beam QDR 4500A DXA (Hologic, Inc., Bedford, MA) before starting treatment, serving as the baseline measurement. Dogs were fed their standard evening meal the day prior and then fasted the morning of analysis. An intravenous or intramuscular injection of butorphanol (0.2 mg/kg) and acepromazine (0.05 mg/kg) was given as premedication 10-20 minutes prior to induction. Propofol (2-8 mg/kg, to effect) was given intravenously and dogs were immediately placed in ventral recumbency on the DXA table. Scans were performed using the whole body fan beam setting and analyzed using APEX System Software version 2.3 (Hologic, Inc., Bedford, MA) by the same operator. DXA was performed under general anesthesia one, four, eight, and twelve weeks into treatment. Additional scans were performed as needed during weight loss to confirm study termination in those dogs reaching ideal body condition prior to twelve weeks.

Behavioral observations

Behavioral observations were obtained at baseline, one week, and twelve weeks into treatment, or when end of treatment limits were achieved. Six volunteers recorded behavior observations while dogs were consuming the intrusion meal. One group of dogs was observed per day and volunteers were randomly assigned to individual dogs prior to each session for which they volunteered. Each dog was fed in the same random order as the 8AM meal from that day. The general procedure was for all volunteers to quietly enter the room together. As the first dog was provided with its meal, the volunteer assigned to observe that dog sat down in front of the run and recorded specific behaviors for the next 46 minutes. Two minutes after this first dog was fed, the second dog was fed and the volunteer assigned to this dog sat down in front of the cage to record behaviors. This process continued every two minutes until all volunteers were sitting and recording behavior.

Observations were made every two minutes and all volunteers avoided communicating with the dogs or with other volunteers during this time. Recorded behaviors were eating meal/head in bowl, drinking, corprophagia, urinating/defecating, stretching, yawning/panting, body shaking, playing with toys, grooming, resting (head down), lying (head up), sitting, standing, walking/running/jumping, cage position (front, middle, back), and vocalizing. Due to the two minute staggered feeding pattern, the volunteers completed 46 minutes of observation in the same staggered pattern. They were instructed to remain quiet and as still as possible until the final volunteer finished recording. Once this final volunteer stood up, all other volunteers would stand and remove their dog's food bowl from the room.

To avoid reactions to novel situations, each volunteer trained at least once prior to observation days by observing the dogs during a standard morning or evening meal. This allowed the volunteer to become familiar with the behavior scoring sheet and also habituated the dogs to having personnel near their cages while eating. Volunteers were only allowed to have a cage liner to sit on, pen, paper, clipboard, and a timer. All cell phones and any other items capable of making noise or being distracting, were left in a staging room.

On observation days, signs were hung within the animal facility warning people that noise sensitive research was underway. Anyone approaching within close proximity to the room being observed was asked to make as little noise as possible.

Blood samples

Blood samples were obtained at baseline, one week, and twelve weeks into treatment, or when end of treatment limits were achieved. On sample days, dogs were fed their standard 8AM meal in a random order as previously described. Each dog was provided with its meal in a two minute delay staggered pattern. Just prior to being offered the intrusion meal three hours later (12PM), blood samples were collected (time 0) via jugular venipuncture and placed in BD Vacutainer® EDTA tubes (4ml, Becton, Dickinson and Company, Franklin Lakes, NJ). Additional samples were collected 60, 90, 120, 180, 420 minutes after the intrusion meal. Each dog's sample was collected in two minute increments, following the same random order as the morning feeding, in order to allow time for sample collection. The same two research personnel were responsible for all blood sample collections. The afternoon meal was not fed until after all 420 minute samples were collected.

Blood glucose was immediately determined after each collection with the AlphaTRAK® Blood Glucose Monitoring System companion animal specific glucometer (Abbott Laboratories, Abbott Park, IL). Samples were centrifuged at 3,500 x RPM for 10 minutes at room temperature. Serum was removed and

frozen in Corning® polypropylene cryogenic vials (Corning, Inc., Amsterdam, The Netherlands) at -80°C for later analysis.

Biopsies, RNA extraction

Biopsies of subcutaneous adipose tissue and semitendinosus or semimembranosus muscle tissue were obtained when under general anesthesia for DXA at baseline, one week, and end of treatment time periods for all dogs. Approximately 100mg samples were collected, placed in RNeasy® (AMBION, Inc., Austin, TX), and frozen at -80°C for later analysis.

In preparation of RNA extraction, groupings of up to eight tissue samples were thawed to room temperature. Muscle samples were disrupted and homogenized using 20G sterile Monoject™ needles (Covidien™, Mansfield, MA) and the QIAGEN QIAshredder™ kit (QIAGEN, Valencia, CA). Fat samples were disrupted and homogenized using TRIzol® reagent (Invitrogen™, Carlsbad, CA) and a tissue homogenizer. Total RNA was extracted from homogenized samples using the RNeasy® Mini Kit (muscle) and RNeasy® Lipid Tissue Mini Kit (adipose; QIAGEN, Valencia, CA). Total RNA concentration, purity, and quality were assessed for initial samples by measuring the 260/280 ratio (1.8-2.0) using the ND-1000 Spectrophotometer (NanoDrop Technologies Inc., Wilmington, DE).

Reverse transcription and real-time PCR

Reverse transcription and real-time PCR of muscle tissue samples were carried out in a single reaction on the AB StepOne™ Real-Time PCR System (Applied Biosystems, Foster City, CA) in a 10 µl mixture containing 3 µl total RNA, 5.25 µl TaqMan® RNA-to-C_T™ 1-Step Kit (5 µl Taq, 0.25 µl enzyme; Applied Biosystems, Foster City, CA), 0.5 µl of each primer/probe mixture, and 1.25 µl RNase free water. The SIRT3 reaction varied slightly, with a 10 µl mixture containing 5 µl total RNA, 3.25 µl TaqMan® RNA-to-C_T™ 1-Step Kit (3 µl Taq, 0.25 µl enzyme), 0.5 µl primer/probe mixture, and 1.25 µl RNase free water. Reverse transcription and real-time PCR of fat tissue samples were carried out in a similar single reaction in a 10 µl mixture containing 3 µl total RNA, 5.25 µl TaqMan® RNA-to-C_T™ 1-Step Kit (5 µl Taq, 0.25 µl enzyme;), 0.5 µl of each primer/probe mixture, and 1.25 µl RNase free water. GAPDH reactions also contained 0.2 µl ROX Reference Dye (Clontech Laboratories, Inc.; Mountain View, CA) and corresponding reduced 1.05 µl RNase free water.

The real-time PCR conditions were 48°C for 30 minutes and 95°C for 10 minutes, followed by 45 cycles of 95°C for 15 seconds and 60°C for 1 minute. The relative amount of gene expression was obtained from the fluorescence cycle threshold (CT). Relative transcript levels were calculated by the $2^{-\Delta\Delta CT}$ method, and samples were normalized to the B2M (muscle) or GAPDH (fat) reference gene expression.⁴⁰³

Most primers and probes were obtained from Applied Biosystems TaqMan® Assays-on-Demand™ Gene Expression primers and probe set collection (Catalogue #4351372; Applied Biosystems, Foster City, CA; Table 4). GAPDH was designed using Integrated DNA Technologies PrimeTime® Std qPCR Assay (Integrated DNA Technologies, Coralville, IA) based on previously published sequences.⁴⁰⁴ The sequence information for GAPDH was as follows: 72-bp product sense, 5'-CTG GGG CTC ACT TGA AAG G-3', and antisense, 5'-CAA ACA TGG GGG CAT CAG-3'; and Taqman probe, 5'-AGC AGA GAT GAT GAC CCT CTT GGC-3'(Figure 13).

All samples were run in triplicate for each gene. Triplicates were averaged and analyzed together if the difference between CT values was <1. If the difference between CT values was >1, duplicate differences were calculated. If a duplicate had a difference between CT values <1, that pairing was kept and the outlier was dropped from analysis. If two or more duplicates had differences between CT values >1, a new analysis of that gene was performed. If the reference gene needed a new analysis based on these criteria, PCR was repeated for all genes corresponding to that RNA sample. If > 5 genes on a single reaction plate needed to be repeated, the entire reaction was performed again.

ELISA

Previously frozen serum samples were thawed to room temperature prior to use. Canine adiponectin was analyzed at three time points (0, 120, 420 minutes) from three sample dates (baseline, one week, twelve weeks into treatment) for all 24 dogs. Canine adiponectin sandwich ELISA kits were obtained from EMD Millipore (St. Charles, MO) and analysis was performed according to manufacturer instructions. All samples, controls, and standards were run in duplicate and no samples from the same collection date for a single dog were run on the same plate. Absorbance was read at 450 nm on an EL x 800 Universal Microplate Reader (Bio-Tek Instruments; Winooski, VT) and analyzed using Gen5 2.01.14 software (Bio-Tek Instruments; Winooski, VT).

Multiplex ELISA

Previously frozen serum samples were thawed to room temperature prior to use. Select canine gut hormones were analyzed at three time points (0, 120, 420 minutes). Select canine cytokines were analyzed at two time points (0, 420 minutes). Three sample dates (baseline, one week, twelve weeks into treatment) were analyzed for all 36 dogs. Multiple gut hormone (active ghrelin, active GLP1, insulin, leptin, total PYY) and cytokine (IL-6, IL-15) kits were obtained from EMD Millipore (St. Charles, MO) and analysis was performed according to manufacturer instructions. All samples, controls, and standards were run in duplicate and no samples from the same collection date for a single dog were run on the same plate. Kits were read using the Luminex reader version 100/200 (Austin, TX) and analyzed using Luminex xPONENT.3.1.971.0 (Austin, TX).

Table 4 Sequences for primers and probes.

Gene	Primers context (sense) sequence	Amplicon Length (Bp)	Assay number
B2M	5'GATCGTTAAGTGGGACCGAGACAAC-3'	59	Cf02659078
FASN	5'CCACTTACTGGGCATGGCCGTCTTC-3'	86	Cf02649409
NRF1	5'GCAGTGGCTGATGGAGAGGTGGAAC-3'	96	Cf02703906
PGC1A	5'AGAGGCAGAGGCAGAAGGCAATTGA-3'	93	Cf02707650
SIRT1	5'AAACGGCTTGATGGTAACCAGTATC-3'	84	Cf02666196
SIRT3	5'CTGGGGCCCGGCAGGGTGGAGGAGT-3'	139	Cf02664398
UCP2	5' TCATGACAGATGACCTCCCTTGCCA-3'	93	Cf02730413
UCP3	5'-GGATCAGACCACTCCAGCATCACTA-3'	91	Cf02621970

Parameter Set:

RT-qPCR (Primers with Probe) Amplicon length = 72

	Start	Stop	Length	Tm	GC%
Forward	372	391	19	62	57.9
<u>CTGGGGCTCACTTGAAAGG (Sense)</u>					
Probe	395	419	24	68	54
<u>AGCAGAGATGATGACCCTCTTGGC</u>					
<u>(AntiSense)</u>					
Reverse	426	444	18	61	55.6
<u>CAAACATGGGGGCATCAG (AntiSense)</u>					

>XM_003435649_2

GCCCCACAGACAGCCGCGTCTTCTGGTGCTGCGCCAGGCGCGTCCCCGAGGCACGATGGT
GAAGGTCGGAGTGAACGGATTTGGCCATATTGGGCGCCTGGTCACCAGGGCTGCTTTTAAC
TCTGGCAAAGTGGATATTGTCGCCATCAATGACCCCTTCATTGATCTCAACTACATGGTGTAC
ATGTTCCAGTATGATTCTACCCACAGCAAATTCCACGGCACAGTCAAGGCTGAGAACGGGAA
ACTTGTCAACAACGGGAAGTCCATCTCCATCTTCCAGGAGCGAGATCCTGCCAACGTCAAAT
GGGGTGATGCTGGTGCTGAGTATGTTGTGGAGTCCACTGGGGTCTTCACCACCATGGAGAA
GGCTGGGGCTCACTTGAAAGGCGTGGCCAAGAGGGTCATCATCTCTGCTCCTTCTGCTGAT
GCCCCCATGTTGTGATGGGCGTGAACCATGAGAAGTATGACAACTCCCTCAAGATTGTCAG
CAATGCCTCCTGCACCACCAACTGCTTGGCTCCTCTAGCCAAAGTCATCCATGACCACTTCG
GCATCGTGGAGGGCCTCATGACCACCGTCCATGCCATCACTGCCACCCAGAAGACCGTGGA
GGGTCCCTCTGGGAAGCTGTGGCGTGACGGCCGAGGGGCTGCCCAGAACATCATCCCTGC
TTCCACTGGCGCCGCCAAGGCTGTGGGCAAGGTCATCCCTGAGCTGAACGGGAAGCTCAC
TGGCATGGCCTTCCGTGTCCCCACCCCAATGTATCAGTTGTGGATCTGACCTGCCGCCTG
GAGAAAGCTGCCAAATATGACGACATCAAGAAGGTAGTGAAGCAGGCATCGGAGGGACCCC
TCAAGGGCATCCTGGGCTACACTGAGGACCAGGTGGTCTCCTGTGACTTCAACAGTGACAC
CCACTCTTCCACCTTCGACGCCGGGGCTGGCATTGCCCTCAATGACCACTTTGTCAAGCTCA
TTTCTGGTATGACAATGAATTCGGCTACAGCAACCGGGTGGTGGACCTCATGGTCCACATG
GCCTCCAAGGAGTAAGAGCCTCCTGGACCACCAGCCCCAGCAAGAACAAGAGGAAGAGAG
AGGCCCTCAGCTGCTGGGGAGTCCCTGCCCCAACTTAATCCCCAACACACTGAGAATCTC
CTGACCTCCAATTTACATCCTAGACCCCAAGGAAGGGGAGGGGCTTGGGGAGCCCTACCTT
GTCATGTACCATCAATAAAGTATACTGTACCCAGCCAAAA

Figure 13 GAPDH primer/probe information.

Insulin:glucose ratio

The insulin:glucose ratio was calculated using the average of the 420 minute duplicate insulin results and the 420 minute glucose value. Unit conversion calculations were performed using the molecular weight of insulin (5808 g/mol) and a fixed conversion factor (1 μ U/ml insulin = 6 nmol/L) as follows:^{145,405}

$$\text{Insulin} \left(\frac{\text{pmol}}{\text{L}} \right) = \frac{\left[\text{Insulin} \left(\frac{\text{pg}}{\text{ml}} \right) \right]}{\left[5808 \frac{\text{g}}{\text{mol}} \right]}$$

$$\text{Insulin} \left(\frac{\mu\text{U}}{\text{ml}} \right) = \frac{\left[\text{insulin} \left(\frac{\text{pmol}}{\text{L}} \right) \right]}{\left[6 \left(\frac{\text{nmol}}{\text{L}} \right) \right]}$$

$$I:G = \frac{\left[\text{Insulin} \left(\frac{\mu\text{U}}{\text{ml}} \right) \times 100 \right]}{\text{Fasting glucose} \left(\frac{\text{mg}}{\text{dl}} \right)}$$

Statistical analysis

Based on a power calculation, six dogs per group was considered sufficient to demonstrate significant differences. The calculation utilized assumptions of a difference in mean body fat between treated (ObN) and untreated (ObP) dogs of 15% (increase in body fat from 15 to 25% in treated and 15 to 40% in untreated dogs), a within standard deviation of 25% in body fat, an alpha of 0.05, and a beta of 0.9.

Data was analyzed using MANOVA for repeated measures with SAS® version 9.4 (SAS Institute, Inc., Cary, NC). Multiple comparisons within group, time and their interaction effects were corrected with Tukey's HSD. P values less than 0.05 were reported as statistically significant.

Positive behavioral observations were counted and analyzed based on count number for all behaviors except cage position. Since one of three possible cage positions was recorded at all observation times, distribution of position was analyzed.

Gut hormone and endocrine factor plasma samples were further analyzed for the 420-minute subgroup. The significant *p* value was adjusted using the Bonferroni procedure to control for the risk of type I error.

Results

Twenty-four dogs started the study and twenty-one dogs were included in final data analysis. Three dogs (one from each obesification group) did not reach the

required 30% BF threshold during obesification and were dropped from analysis. One dog from WLD reached ideal body weight (18.2 %BF) at week 8 and ended study participation at that point.

Scale weight and BCS

There were no differences in body weight (BW) and BCS at baseline or one week into treatment within or between groups. At the end of treatment, BW and BCS for group ObP were not different from baseline or one week values. Compared to baseline and one week, BW and BCS for group ObN and WLD were significantly different from their respective ending values, but were not different from each other. Group ObP end of treatment BW was different from ObN and WLD ($p < 0.0001$), but mean BCS did not differ for group ObP versus ObN, while WLD differed from both ($p < 0.01$; Table 5). Based on change from baseline, ObN and WLD lost similar levels of BW after twelve weeks of treatment, and more than ObP ($p < 0.0001$; Table 6).

Food consumption

Consumption followed a similar significance pattern when analyzed as kcal, kcal/BW_{kg}, and kcal/BW_{kg}^{0.75}. As the metabolic body weight (BW_{kg}^{0.75}) is considered a more suitable way to describe the relationship between mass and energy in dogs, it will be used in reference to caloric intake discussions.⁶⁷ Kcal and kcal/BW_{kg} values are provided in Table 5 for additional reference.

Food offered

There were no differences in kcal/BW_{kg}^{0.75} offered within groups at all time points, except twelve weeks. At this final time point, group ObN was offered a greater metabolic amount of calories than was offered at baseline ($p = 0.0116$), due to a feeding amount transcription error at baseline. Kcal/BW_{kg}^{0.75} offered to group ObN were significantly less than those offered to ObP and WLD, which were not different from each other, at all time points ($p < 0.05$). Based on baseline versus end of study comparisons, including the WLD dog that ended study participation at 8 weeks, metabolic food offered to WLD did not differ from ObN or ObP, which differed from each other (ObN, 101.3 ± 12.7; ObP, 134.1 ± 17.3; WLD, 127.9 ± 35.5; $p = 0.0077$).

Food not consumed

All three groups left food behind at statistically similar levels before treatment started. One week into treatment, the amount left behind was similar between group ObN versus ObP and ObP versus WLD, but WLD left more behind than ObN ($p = 0.0072$). From week four to study termination, all three groups left behind similar levels of calories.

Table 5 Body weight, BCS, and food consumption by obesification group and time point (study week).

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks</i> ¹
Scale weight (kg)					
ObN*	16.4 ± 0.7 ^{a,#}	16.0 ± 0.8 ^{a,b,#,\$}	15.0 ± 1.1 ^{a,\$}	13.7 ± 1.3 ^{a,%}	12.9 ± 1.5 ^{a,%}
ObP*	17.2 ± 1.4 ^{a,#}	17.0 ± 1.1 ^{a,#}	16.8 ± 0.9 ^{b,#}	15.9 ± 0.4 ^{b,#}	16.0 ± 0.4 ^{b,#}
WLD*	16.3 ± 1.4 ^{a,#}	15.3 ± 1.4 ^{b,#,\$}	14.7 ± 1.0 ^{a,\$,%}	13.9 ± 1.0 ^{a,%}	12.4 ± 1.0 ^{a,^}
BCS (9-point)					
ObN	8.8 ± 0.4 ^{a,#}	8.8 ± 0.4 ^{a,#}	8.0 ± 0.7 ^{a,#}	7.4 ± 0.9 ^{a,#}	6.4 ± 0.9 ^{a,\$}
ObP	8.2 ± 0.8 ^{a,#}	8.0 ± 1.0 ^{a,#}	8.0 ± 0.7 ^{a,#}	8.0 ± 1.4 ^{a,#}	7.4 ± 0.9 ^{a,#}
WLD	8.4 ± 1.3 ^{a,#}	8.0 ± 1.2 ^{a,#}	7.8 ± 1.1 ^{a,#,\$}	6.8 ± 1.3 ^{a,\$,%}	5.3 ± 1.0 ^{b,%}
Food offered (kcal)					
ObN	614.4 ± 150.4 ^{a,#}	641.6 ± 147.6 ^{a,#}	641.9 ± 139.2 ^{a,#}	650.2 ± 115.5 ^{a,#}	687.3 ± 101.2 ^{a,#}
ObP	1177.37 ± 284.8 ^{b,#}	1071.0 ± 127.9 ^{b,#}	1067.9 ± 135.6 ^{b,#}	1065.31 ± 123.3 ^{b,#}	1074.4 ± 133.7 ^{b,#}
WLD	977.4 ± 406.9 ^{c,#}	848.7 ± 256.9 ^{a,#}	847.2 ± 253.8 ^{a,#}	867.0 ± 267.7 ^{b,#}	780.6 ± 236.2 ^{a,#}
Food intake (kcal)					
ObN	515.6 ± 134.5 ^{a,#}	641.6 ± 147.6 ^{a,#}	641.9 ± 139.2 ^{a,#}	650.2 ± 115.5 ^{a,#}	687.3 ± 101.2 ^{a,#}
ObP	749.4 ± 169.0 ^{b,#}	1000.8 ± 177.4 ^{b,\$}	1060.2 ± 149.5 ^{b,\$}	1065.3 ± 123.3 ^{b,\$}	1074.4 ± 133.7 ^{b,\$}
WLD	696.0 ± 158.4 ^{b,#}	672.3 ± 79.7 ^{b,#}	842.6 ± 247.8 ^{b,#}	867.0 ± 267.7 ^{b,#}	747.2 ± 173.9 ^{a,#}
Food not eaten (kcal)					
ObN	98.8 ± 136.0 ^{a,#}	0 ± 0 ^{a,\$}	0 ± 0 ^{a,#}	0 ± 0 ^{a,#}	0 ± 0 ^{a,#}
ObP	428.0 ± 317.3 ^{a,#}	70.2 ± 83.7 ^{a,b,#}	7.7 ± 17.3 ^{a,#}	0 ± 0 ^{a,#}	0 ± 0 ^{a,\$}
WLD	281.4 ± 265.4 ^{a,#}	176.1 ± 214.7 ^{b,#,\$}	4.5 ± 10.2 ^{a,\$,%}	0 ± 0 ^{a,%}	33.5 ± 65.9 ^{a,#,\$,%}

Table 5 (Continued) Body weight, BCS, and food consumption by obesification group and time point (study week).

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks¹</i>
Food offered (kcal/BW _{kg})					
ObN	37.2 ± 8.3 ^{a,#}	39.7 ± 7.7 ^{a,#}	42.3 ± 7.0 ^{a,#,\$}	47.2 ± 5.2 ^{a,#,\$}	53.6 ± 7.1 ^{a,\$}
ObP	69.8 ± 21.6 ^{b,#}	63.6 ± 10.3 ^{b,#}	63.8 ± 9.7 ^{b,#}	67.2 ± 8.5 ^{b,#}	67.0 ± 8.8 ^{a,b,#}
WLD	62.0 ± 30.9 ^{b,#}	56.7 ± 21.6 ^{b,#}	58.6 ± 20.5 ^{b,#}	62.6 ± 20.3 ^{b,#}	62.5 ± 15.9 ^{b,#}
Food intake (kcal/BW _{kg})					
ObN	31.3 ± 8.0 ^{a,#}	39.7 ± 7.7 ^{a,#}	42.3 ± 7.0 ^{a,#,\$}	47.2 ± 5.2 ^{a,#,\$}	53.6 ± 7.1 ^{a,\$}
ObP	43.5 ± 8.1 ^{a,#}	59.4 ± 12.4 ^{b,\$}	63.4 ± 10.5 ^{b,\$}	67.2 ± 8.5 ^{b,\$}	67.0 ± 8.8 ^{a,\$}
WLD	43.7 ± 14.0 ^{a,#}	44.5 ± 9.6 ^{a,b,#}	58.3 ± 20.2 ^{a,b,#,\$}	62.6 ± 20.3 ^{a,b,\$}	60.0 ± 11.8 ^{a,\$}
Food offered (kcal/BW _{kg} ^{0.75})					
ObN	75.0 ± 17.2 ^{a,#}	79.6 ± 16.1 ^{a,#,\$}	83.6 ± 14.9 ^{a,#,\$}	90.8 ± 11.3 ^{a,#,\$}	101.3 ± 12.7 ^{a,\$}
ObP	141.4 ± 41.2 ^{b,#}	128.7 ± 19.2 ^{b,#}	129.1 ± 18.6 ^{b,#}	134.0 ± 16.6 ^{b,#}	134.1 ± 17.3 ^{b,#}
WLD	123.4 ± 58.9 ^{b,#}	111.5 ± 40.2 ^{b,#}	114.3 ± 38.4 ^{b,#}	120.7 ± 38.5 ^{b,#}	117.5 ± 31.1 ^{b,#}
Food intake (kcal/BW _{kg} ^{0.75})					
ObN	63.1 ± 16.2 ^{a,#}	79.6 ± 16.1 ^{a,#,\$}	83.6 ± 14.9 ^{a,#,\$}	90.8 ± 11.3 ^{a,#,\$}	101.3 ± 12.7 ^{a,\$}
ObP	88.6 ± 17.2 ^{a,#}	120.3 ± 23.9 ^{b,\$}	128.1 ± 20.2 ^{b,\$}	134.0 ± 16.6 ^{b,\$}	134.1 ± 17.3 ^{a,\$}
WLD	87.2 ± 25.8 ^{a,#}	87.7 ± 16.7 ^{a,#}	113.7 ± 37.7 ^{a,b,#,\$}	120.7 ± 38.5 ^{a,b,\$}	112.7 ± 22.8 ^{a,\$}

Numerical data presented as mean ± standard deviation.

^aObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group.

¹WLD in this column determined from 4 dogs, because 1 dog reached ideal weight and ended treatment at 8 weeks.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{#, \$, %}Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 6 Change in body composition by obesification group and time point

<i>Change from baseline</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks¹</i>
Scale weight (kg)			
ObN [*]	1.2 ± 0.5 ^{a,#}	2.5 ± 0.5 ^{a,#,\$}	3.4 ± 0.6 ^{a,\$}
ObP [*]	0.5 ± 0.5 ^{a,#}	1.4 ± 0.9 ^{b,\$}	1.2 ± 1.0 ^{b,#,\$}
WLD [*]	1.6 ± 0.5 ^{a,#}	2.3 ± 1.0 ^{a,#}	4.4 ± 1.1 ^{a,\$}
Fat mass (kg)			
ObN	1.2 ± 0.3 ^{a,#}	2.2 ± 0.4 ^{a,\$}	3.1 ± 0.6 ^{a,%}
ObP	0.4 ± 0.5 ^{b,#}	0.8 ± 0.7 ^{b,#}	0.9 ± 1.0 ^{b,#}
WLD	1.5 ± 0.4 ^{a,#}	2.7 ± 0.8 ^{a,\$}	3.9 ± 0.8 ^{a,\$}
Body fat (%)			
ObN	3.4 ± 1.3 ^{a,#}	7.3 ± 1.7 ^{a,\$}	12.1 ± 3.7 ^{a,\$}
ObP	0.7 ± 1.0 ^{b,#}	2.4 ± 2.2 ^{b,#}	2.6 ± 3.2 ^{b,#}
WLD	5.2 ± 1.9 ^{a,#}	11.7 ± 3.2 ^{a,\$}	17.0 ± 4.8 ^{a,\$}
Lean mass (kg)			
ObN	0.5 ± 0.3 ^{a,#}	0.6 ± 0.5 ^{a,#}	0.6 ± 0.3 ^{a,#}
ObP	0.3 ± 0.3 ^{a,#}	0.3 ± 0.2 ^{a,#}	0.4 ± 0.3 ^{a,#}
WLD	0.4 ± 0.5 ^{a,#}	0.4 ± 0.6 ^{a,#}	0.4 ± 0.5 ^{a,#}
Lean (%)			
ObN	-3.0 ± 1.3 ^{a,#}	-6.7 ± 1.5 ^{a,\$}	-11.3 ± 3 ^{a,\$}
ObP	-0.5 ± 0.8 ^{a,#}	-3.6 ± 3.6 ^{b,#}	-2.4 ± 3.0 ^{b,#}
WLD	-4.8 ± 2.0 ^{a,#}	-10.7 ± 3.3 ^{a,\$}	-16.2 ± 4.7 ^{a,\$}

Numerical data presented as mean ± standard deviation.

^{*}ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group.

¹WLD in this column determined from 4 dogs, because 1 dog reached ideal weight and ended treatment at 8 weeks.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{#, \$, %}Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Food consumed

Metabolic food intake between groups did not differ at baseline. One week into treatment, ObP consumed more food than at baseline, ($p = 0.0046$) and consumption remained unchanged for the duration. At week twelve, group ObN consumed more kcal/BW_{kg}^{0.75} than at baseline ($p = 0.001$). WLD consumed more kcal/BW_{kg}^{0.75} at weeks 8 and 12 than they did at baseline ($p < 0.006$). By the end of treatment, kcal/BW_{kg}^{0.75} consumption was similar between all groups.

Body composition

Body composition data for obesification groups are listed in Table 7.

Table 7 DXA body composition by obesification group and time point (study week).

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks</i> ¹
Fat mass (kg)					
ObN	7.1 ± 0.5 ^{a,#}	6.7 ± 0.5 ^{a,#}	5.9 ± 0.6 ^{a,b,#,\$}	4.9 ± 0.7 ^{a,b,\$,%}	4.0 ± 1.0 ^{a,%}
ObP	6.7 ± 1.0 ^{a,#}	6.3 ± 0.7 ^{a,#}	6.3 ± 0.7 ^{a,#}	5.8 ± 0.7 ^{a,#}	5.7 ± 0.8 ^{b,#}
WLD	6.4 ± 1.4 ^{a,#}	5.9 ± 1.4 ^{a,#,\$}	4.9 ± 1.1 ^{b,\$}	3.7 ± 0.9 ^{b,\$,%}	3.1 ± 0.8 ^{c,%}
Body fat (%)					
ObN	42.9 ± 2.9 ^{a,#}	42.9 ± 3.0 ^{a,#}	39.5 ± 2.5 ^{a,#,\$}	35.6 ± 2.9 ^{a,\$,%}	30.8 ± 5.4 ^{a,%}
ObP	38.7 ± 3.6 ^{a,#}	37.3 ± 3.5 ^{a,#}	38.0 ± 3.5 ^{a,b,#}	36.3 ± 4.0 ^{a,#}	36.0 ± 4.9 ^{a,#}
WLD	38.8 ± 5.3 ^{a,#}	37.5 ± 6.1 ^{a,#,\$}	33.6 ± 5.8 ^{b,\$}	27.1 ± 6.3 ^{b,%}	24.0 ± 4.6 ^{b,%}
Lean mass (kg)					
ObN	9.0 ± 0.6 ^{a,#}	8.5 ± 0.7 ^{a,#}	8.5 ± 0.6 ^{a,#}	8.4 ± 0.9 ^{a,#}	8.4 ± 0.7 ^{a,#}
ObP	10.1 ± 0.9 ^{b,#}	10.0 ± 1.1 ^{b,#}	9.8 ± 0.7 ^{b,#}	9.8 ± 0.8 ^{b,#}	9.7 ± 0.8 ^{b,#}
WLD	9.6 ± 0.4 ^{a,b,#}	9.2 ± 0.2 ^{a,b,#}	9.1 ± 0.2 ^{a,b,#}	9.2 ± 0.4 ^{a,b,#}	9.1 ± 0.2 ^{a,b,#}
Lean (%)					
ObN	54.4 ± 2.9 ^{a,#}	54.3 ± 3.0 ^{a,#}	57.4 ± 2.5 ^{a,#,\$}	61.1 ± 2.8 ^{a,\$,%}	65.7 ± 5.1 ^{a,%}
ObP	58.6 ± 3.4 ^{a,#}	59.7 ± 3.5 ^{a,#}	59.1 ± 3.4 ^{a,b,#}	60.7 ± 4.0 ^{a,#}	60.9 ± 4.9 ^{a,#}
WLD	58.5 ± 5.0 ^{a,#}	59.6 ± 5.8 ^{a,#}	63.3 ± 5.6 ^{b,#,\$}	69.2 ± 5.8 ^{b,\$,%}	72.6 ± 4.6 ^{b,%}
DXA total mass (kg)					
ObN	16.5 ± 0.6 ^{a,#}	15.7 ± 0.7 ^{a,#,\$}	14.9 ± 1.0 ^{a,\$,%}	13.7 ± 1.4 ^{a,%,[^]}	12.8 ± 1.4 ^{a,[^]}
ObP	17.2 ± 1.4 ^{a,#}	16.8 ± 1.2 ^{a,#}	16.6 ± 0.8 ^{b,#}	16.1 ± 0.6 ^{b,#}	15.9 ± 0.5 ^{b,#}
WLD	16.5 ± 1.5 ^{a,#}	15.6 ± 1.4 ^{a,#,\$}	14.5 ± 1.0 ^{a,\$}	13.3 ± 0.8 ^{a,%}	12.6 ± 1.0 ^{a,%}

Numerical data presented as mean ± standard deviation.

^aObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group.

¹WLD in this column determined from 4 dogs, because 1 dog reached ideal weight and ended treatment at 8 weeks.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$,%,[^]}Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Fat mass

Within and across groups, both absolute (AF) and percent fat mass (%BF) did not differ at baseline or one week into treatment. Within groups, ObN and ObP lost AF and %BF compared to baseline ($p < 0.0001$), while ObP did not. At study termination, WLD AF was significantly less than ObN ($p = 0.0379$) and ObP ($p < 0.0001$). ObN AF was also less than ObP ($p < 0.0001$). %BF was lower than ObN and ObP ($p < 0.0003$) at twelve weeks, which did not differ. Based on change from baseline, ObN and WLD lost similar levels of AF and %BF after twelve weeks of treatment, and more than ObP ($p < 0.0001$; Table 6). Based on baseline versus end of study comparisons, including the WLD dog that ended study participation at 8 weeks, WLD end of study AF did not differ from ObN, but both were less than ObP (ObN, 4.0 ± 1.0 ; ObP, 5.7 ± 0.8 ; WLD, 3.0 ± 0.7 ; $p < 0.0001$).

Lean mass

Within groups, absolute lean mass (AL) was static across time. Percent lean mass (%LM) was higher at study termination compared baseline for ObN and WLD ($p < 0.0001$), not ObP. Baseline AL was higher in ObP versus ObN ($p = 0.0073$), not versus WLD. At the end of treatment, AL did not differ between ObP and WLD, but ObN was significantly lower than ObP ($p < 0.0001$). %LM was consistent both within and across groups at baseline and one week. By the end of treatment, WLD %LM was higher than ObN and ObP ($p < 0.0003$), which did not differ. Based on change from baseline, all three groups maintained similar levels of AL, but ObN and WLD gained more %LM after twelve weeks of treatment compared to ObP ($p < 0.0001$; Table 6).

Total mass

Total mass determined by DXA did not differ from BW recorded from digital scales. Group differences by BW are outlined above.

Negative control (Group IBW)

BW, AF, and %BF increased at eight weeks compared to baseline ($p < 0.008$) and decreased back to baseline levels at week 12. BCS, food not eaten, LM, and DXA total mass were consistent for the duration of the study. %LM decreased over time, although the twelve week level did not differ from baseline. Over time, food offered (and subsequent food intake; $p < 0.0001$) was significantly decreased to maintain ideal BW (Table 8). Compared to baseline, food offered ($\text{kcal}/\text{BW}_{\text{kg}}^{0.75}$) was decreased by approximately 35% at study termination in order to maintain ideal BW. This end of study value ($139.8 \pm 38.9 \text{kcal}/\text{BW}_{\text{kg}}^{0.75}$) did not differ from ObP ($134.1 \pm 17.3 \text{kcal}/\text{BW}_{\text{kg}}^{0.75}$) or WLD ($117.5 \pm 31.1 \text{kcal}/\text{BW}_{\text{kg}}^{0.75}$), but was greater than ObN ($101.3 \pm 12.7 \text{kcal}/\text{BW}_{\text{kg}}^{0.75}$; $p = 0.0004$).

Table 8 Food consumption and body composition by ideal body weight group time point

	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks</i>
Scale weight (kg)	11.2 ± 0.8 [#]	11.3 ± 0.7 ^{#, \$}	12.2 ± 0.7 ^{#, \$}	12.5 ± 0.8 ^{\$}	11.8 ± 0.9 ^{#, \$}
BCS (9-point)	4.3 ± 0.8 [#]	4.5 ± 0.5 [#]	5.0 ± 0 ^{a, #}	5.0 ± 0 [#]	4.2 ± 0.4 [#]
Food offered (kcal)	1301.7 ± 200.9 [#]	1274.6 ± 208.4 [#]	1171.1 ± 221.3 ^{#, \$}	1037.1 ± 213.1 ^{\$, %}	887.6 ± 255.3 [%]
Food intake (kcal)	1301.5 ± 201.1 [#]	1274.6 ± 208.4 [#]	1171.1 ± 221.3 [#]	1037.1 ± 213.1 ^{#, \$}	887.5 ± 255.3 ^{\$}
Food not eaten (kcal)	0.2 ± 0.3 [#]	0 ± 0 [#]	0 ± 0 ^{a, #}	0 ± 0 ^{a, #}	0.1 ± 0.1 [#]
Food offered (kcal/BW _{kg})	118.2 ± 25.3 [#]	113.4 ± 23.3 [#]	96.2 ± 17.6 ^{#, \$}	83.4 ± 17.0 ^{\$, %}	75.5 ± 21.0 [%]
Food intake (kcal/BW _{kg})	118.1 ± 25.3 [#]	113.4 ± 23.3 [#]	96.2 ± 17.6 ^{#, \$}	83.4 ± 17.0 ^{\$, %}	75.5 ± 21.0 [%]
Food offered (kcal/BW _{kg} ^{0.75})	215.2 ± 42.6 [#]	207.6 ± 40.2 [#]	179.7 ± 32.7 ^{#, \$}	156.5 ± 31.6 ^{\$, %}	139.8 ± 38.9 [%]
Food intake (kcal/BW _{kg} ^{0.75})	215.1 ± 42.6 [#]	207.6 ± 40.2 [#]	179.7 ± 32.7 ^{#, \$}	156.5 ± 31.6 ^{\$, %}	139.7 ± 38.9 [%]
Fat mass (kg)	2.1 ± 0.5 [#]	2.2 ± 0.4 [#]	2.8 ± 0.4 ^{#, \$}	3.0 ± 0.4 ^{\$}	2.8 ± 0.3 ^{#, \$}
Body fat (%)	18.7 ± 4.0 [#]	19.4 ± 3.0 [#]	23.1 ± 2.7 ^{#, \$}	25.3 ± 2.5 ^{\$}	23.7 ± 2.2 ^{#, \$}
Lean mass (kg)	8.6 ± 0.8 [#]	8.7 ± 0.6 [#]	8.7 ± 0.6 [#]	8.6 ± 0.6 [#]	8.6 ± 0.5 [#]
Lean (%)	77.6 ± 4.0 [#]	76.9 ± 2.9 [#]	73.4 ± 2.8 ^{#, \$}	71.3 ± 2.5 ^{\$}	72.7 ± 2.3 ^{#, \$}
DXA total mass (kg)	11.1 ± 0.8 [#]	11.3 ± 0.7 [#]	11.9 ± 0.7 [#]	12.0 ± 0.7 [#]	11.8 ± 0.7 [#]

Numerical data presented as mean ± standard deviation.

^{#, \$, %} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Intrusion meal consumption

Kcal/BW_{kg}^{0.75} consumption increased over time for ObP ($p = 0.0049$) and WLD ($p = 0.0132$), while it remained constant for ObN. All three groups, however had consumption levels similar to each other at all time points. Group IBW maintained intrusion food consumption levels for the duration of the study. At baseline, consumption differed from ObN, ObP, and WLD ($p < 0.0004$). One week into treatment, IBW intrusion consumption was greater than all other groups ($p < 0.0068$), which did not differ from each other. At study termination, IBW intrusion consumption did not differ from ObN, ObP, and WLD (Table 9).

Behavioral observations

Any time point without a notation for resting, lying, sitting, standing, or walking/running/jumping was entered as standing. When cage position was not specified, two positions were marked, or a notation other than front, middle, or back was used, middle was recorded as the position for analysis. One dog from group IBW had lying and sitting both marked at the same time point. Lying was used as the count for analysis. One dog from group WLD and another in group ObN had both walking and standing marked at the same time point. Walking was used in the analysis for both dogs.

Volunteers did not consistently record total time spent eating meals, so this data could not be analyzed. There were no significant group differences for drinking, urinating/defecating, yawning, body shaking, playing with toys, grooming, lying (head up), or walking/running/jumping. There were no recorded instances of corprophagia and no significant differences in cage position by group or time point (Figure 14).

Selected instantaneous sampling of behavior related to medium term satiety intrusion meals are listed in Table 10.

There were no across group differences for head in bowl/eating, resting, lying, standing, and running/walking/jumping behaviors. IBW vocalized more than ObN and ObP ($p = 0.0268$) one week into treatment, but no other across or within group vocalizing differences were noted. At baseline, IBW sat more than ObP ($p = 0.242$). IBW also sat more at baseline than at study termination ($p = 0.0299$). ObP had more instances of head in bowl/eating at end of study than at baseline ($p = 0.009$), but one week counts did not differ from either. One week standing counts for ObP were lower for one week than at end of treatment ($p = 0.016$), while baseline counts did not differ from either. No other within group differences were noted.

Table 9 Body weight, BCS, and intrusion meal intake by group and point.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>End of study</i>
Scale weight (kg)			
ObN [*]	16.5 ± 0.8 ^{a,#}	16.0 ± 0.8 ^{a,#}	12.9 ± 1.5 ^{a,\$}
ObP [*]	17.5 ± 1.6 ^{a,#}	17.0 ± 1.1 ^{a,#}	16.0 ± 0.4 ^{b,#}
WLD [*]	17.0 ± 1.4 ^{a,#}	15.3 ± 1.4 ^{a,#}	12.5 ± 0.9 ^{a,\$}
IBW [*]	10.6 ± 0.7 ^{b,#}	11.3 ± 0.7 ^{b,#}	11.8 ± 7.6 ^{a,#}
BCS (9 point)			
ObN	8.8 ± 0.4 ^{a,#}	8.8 ± 0.4 ^{a,#}	6.6 ± 1.1 ^{a,b,\$}
ObP	8.2 ± 1.3 ^{a,#}	8.0 ± 1.0 ^{a,#}	7.8 ± 1.3 ^{a,#}
WLD	7.4 ± 0.5 ^{a,#}	8.0 ± 1.2 ^{a,#}	5.2 ± 0.8 ^{b,\$}
IBW	4.3 ± 0.5 ^{b,#}	4.8 ± 0.4 ^{b,#}	5.2 ± 0.4 ^{b,#}
Food eaten (kcal)			
ObN	438.3 ± 218.3 ^{a,#}	649.9 ± 474.7 ^{a,#}	1203.4 ± 753.5 ^{a,#}
ObP	161.0 ± 218.3 ^{a,#}	633.5 ± 532.3 ^{a,#,\$}	1102.8 ± 212.6 ^{a,\$}
WLD	269.3 ± 255.5 ^{a,#}	612.0 ± 465.4 ^{a,#,\$}	995.2 ± 440.7 ^{a,\$}
IBW	1384.3 ± 319.9 ^{b,#}	1398.3 ± 164.0 ^{b,#}	1149.6 ± 510.5 ^{a,#}
Food eaten (kcal/BW _{kg})			
ObN	26.8 ± 13.6 ^{a,#}	40.0 ± 29.2 ^{a,#}	97.0 ± 65.1 ^{a,#}
ObP	10.2 ± 13.9 ^{a,#}	37.2 ± 30.1 ^{a,#,\$}	68.6 ± 11.9 ^{a,\$}
WLD	16.4 ± 15.6 ^{a,#}	38.9 ± 29.4 ^{a,#,\$}	83.3 ± 39.1 ^{a,\$}
IBW	130.3 ± 28.4 ^{b,#}	123.3 ± 11.1 ^{b,#}	98.0 ± 44.6 ^{a,#}
Food eaten (kcal/BW _{kg} ^{0.75})			
ObN	53.9 ± 27.1 ^{a,#}	80.2 ± 58.6 ^{a,#}	181.8 ± 119.3 ^{a,#}
ObP	20.3 ± 27.7 ^{a,#}	75.6 ± 61.7 ^{a,#,\$}	137.3 ± 24.4 ^{a,b,\$}
WLD	33.0 ± 31.3 ^{a,#}	77.4 ± 58.6 ^{a,#,\$}	156.0 ± 72.0 ^{a,\$}
IBW	235.2 ± 51.6 ^{b,#}	226.1 ± 21.4 ^{b,#}	181.3 ± 81.9 ^{a,#}

Numerical data presented as mean ± standard deviation.

^{*}ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a-b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

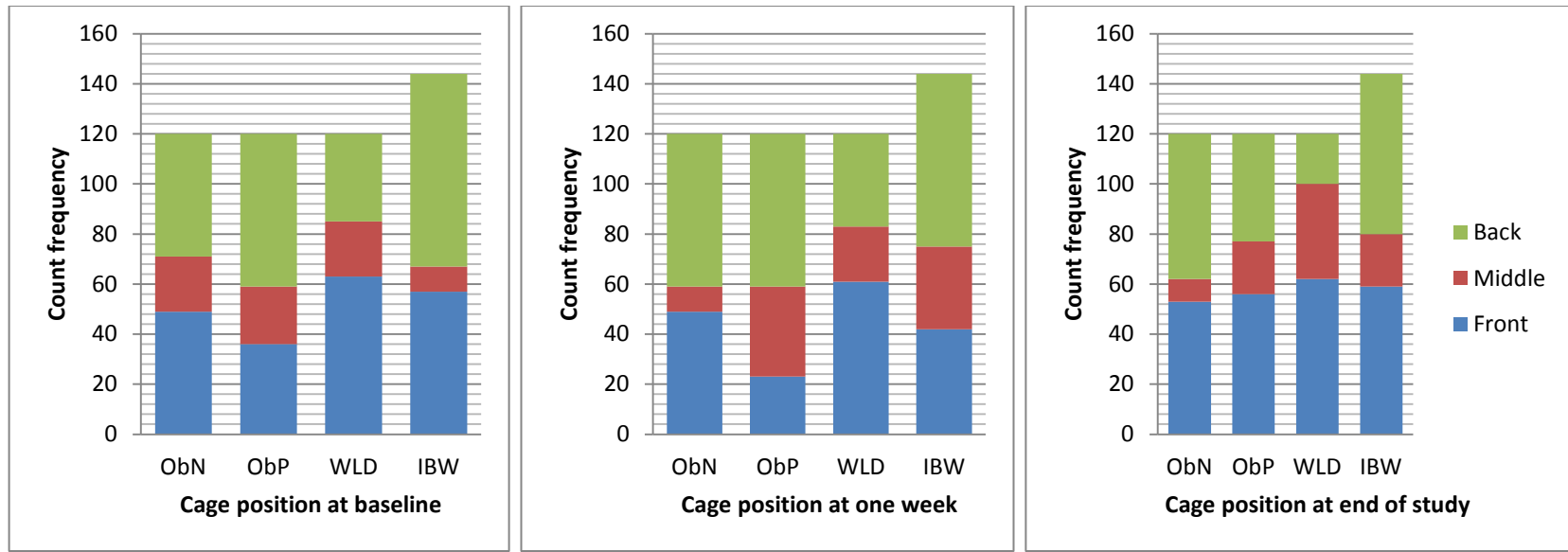


Figure 14 Cage position by group and point.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

Table 10 Selected instantaneous sampling of behavior related to medium term satiety intrusion meal.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>End of study</i>
Head in bowl/eating			
ObN*	3.2 ± 1.8 ^{a,#}	4.0 ± 1.6 ^{a,#}	4.0 ± 2.3 ^{a,#}
ObP*	1.4 ± 1.5 ^{a,#}	2.2 ± 1.5 ^{a,#,\$}	7.0 ± 2.3 ^{a,\$}
WLD*	2.4 ± 1.8 ^{a,#}	2.4 ± 2.1 ^{a,#}	4.2 ± 1.3 ^{a,#}
IBW*	2.8 ± 1.6 ^{a,#}	3.7 ± 1.0 ^{a,#}	4.0 ± 1.5 ^{a,#}
Vocalizing			
ObN	0.4 ± 0.9 ^{a,#}	0 ± 0 ^{a,#}	0.6 ± 0.9 ^{a,#}
ObP	0.2 ± 0.4 ^{a,#}	0 ± 0 ^{a,#}	0.4 ± 0.5 ^{a,#}
WLD	0 ± 0 ^{a,#}	0.6 ± 0.9 ^{a,b,#}	1.8 ± 3.5 ^{a,#}
IBW	2.0 ± 2.1 ^{a,#}	2.0 ± 2.5 ^{b,#}	1.7 ± 3.6 ^{a,#}
Resting, head down			
ObN	7.6 ± 3.0 ^{a,b,#}	6.8 ± 3.8 ^{a,#}	7.2 ± 6.4 ^{a,#}
ObP	10.6 ± 7.8 ^{a,#}	10.0 ± 5.6 ^{a,#}	8.0 ± 4.7 ^{a,#}
WLD	8.0 ± 8.5 ^{a,b,#}	9.0 ± 6.7 ^{a,#}	6.0 ± 4.8 ^{a,#}
IBW	4.2 ± 3.7 ^{a,b,#}	5.3 ± 5.9 ^{a,#}	7.8 ± 5.7 ^{a,#}
Lying, head up			
ObN	5.0 ± 2.2 ^{a,#}	4.0 ± 3.9 ^{a,#}	4.8 ± 0.8 ^{a,#}
ObP	5.0 ± 5.4 ^{a,#}	5.0 ± 3.2 ^{a,#}	2.0 ± 1.0 ^{a,#}
WLD	5.2 ± 5.4 ^{a,#}	4.6 ± 3.4 ^{a,#}	3.2 ± 1.5 ^{a,#}
IBW	5.2 ± 2.6 ^{a,#}	5.5 ± 4.8 ^{a,#}	4.2 ± 2.9 ^{a,#}
Sitting			
ObN	2.4 ± 1.7 ^{a,b,#}	4.0 ± 4.3 ^{a,#}	2.6 ± 2.2 ^{a,#}
ObP	0.8 ± 1.3 ^{a,#}	3.6 ± 3.8 ^{a,#}	2.0 ± 1.0 ^{a,#}
WLD	1.4 ± 1.7 ^{a,b,#}	1.8 ± 2.0 ^{a,#}	2.2 ± 3.2 ^{a,#}
IBW	5.3 ± 4.3 ^{b,#}	2.2 ± 1.9 ^{a,#,\$}	1.0 ± 1.5 ^{a,\$}
Standing			
ObN	7.0 ± 3.2 ^{a,#}	7.4 ± 3.2 ^{a,#}	7.4 ± 5.8 ^{a,#}
ObP	5.2 ± 4.0 ^{a,#,\$}	3.4 ± 2.7 ^{a,#}	11.4 ± 3.9 ^{a,\$}
WLD	7.2 ± 2.7 ^{a,#}	5.0 ± 3.7 ^{a,#}	9.0 ± 2.7 ^{a,#}
IBW	8.0 ± 3.3 ^{a,#}	10.0 ± 6.5 ^{a,#}	8.7 ± 3.6 ^{a,#}
Running/walking/jumping			
ObN	2.0 ± 1.6 ^{a,#}	1.8 ± 2.5 ^{a,#}	2.0 ± 2.3 ^{a,#}
ObP	2.4 ± 3.2 ^{a,#}	2.0 ± 1.2 ^{a,#}	2.4 ± 3.2 ^{a,#}
WLD	2.2 ± 2.2 ^{a,#}	3.6 ± 4.4 ^{a,#}	3.6 ± 2.3 ^{a,#}
IBW	1.3 ± 1.2 ^{a,#}	1.0 ± 0.9 ^{a,#}	2.3 ± 4.4 ^{a,#}

Numerical data presented as mean ± standard deviation.

*ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a,b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Gut hormones and endocrine factors

Data trends are shown by time point (baseline, one week, end of study), time of sample (0, 120, 420 min after intrusion meal), and by comparisons of baseline and end of study 420 minute plasma levels in Figures 15 – 21 and Tables 11 – 13.

A large proportion of GLP-1 results (123/270; 45.6%) were reported as < 2.4 pg/ml. For analysis, these values were recorded as 2.3 pg/ml. Four additional samples with results below 2.3 pg/ml were not adjusted. Ghrelin had 16 (5.9%) samples reported as <0.7 pg/ml and 0.6 pg/ml was used for analysis.

Obesification groups; ObN, ObP, WLD

Ghrelin ($p < 0.0367$), leptin ($p < 0.0001$), and insulin ($p < 0.0001$) levels differed by group for WLD vs. ObN and ObP. GLP-1 did not differ by group. ObP PYY levels differed from ObN and WLD ($p < 0.0032$). ObN glucose values differed from ObP ($p = 0.0106$) and WLD ($p = 0.0041$). When samples were isolated for 420 minutes post intrusion meal, there were no differences across groups for ghrelin, PYY, GLP-1, glucose, insulin:glucose ratio, and adiponectin at both baseline and end of study. There were across group differences for end of study insulin (WLD vs. ObN and ObP, $p < 0.024$) and leptin (WLD vs. ObP, $p = 0.0003$). Within groups, ghrelin 420 minute samples decreased in ObN ($p = 0.0002$) and ObP ($p = 0.0112$). PYY 420 minute samples were higher by study termination within all three groups ($p < 0.0091$). GLP-1 420 minute values increased over time within WLD ($p = 0.0011$) and insulin increased within ObP ($p = 0.0157$). Leptin 420 minute levels decreased over time within ObN ($p < 0.0001$) and WLD ($p = 0.0022$). There were no within group differences for glucose, insulin:glucose ratio, or adiponectin 420 minute samples.

Maintain ideal body weight group; IBW

Ghrelin and insulin levels differed from WLD ($p = 0.0201$ and $p < 0.0001$). GLP-1 ($p < 0.001$), leptin ($p < 0.0001$), and adiponectin ($p < 0.014$) differed from all other groups. PYY differed from ObP ($p < 0.0001$). When isolated for 420 minute samples, glucose decreased ($p < 0.0083$) and leptin increased ($p < 0.0126$) within IBW by 12 weeks. Ghrelin, insulin, insulin:glucose ratio, and adiponectin IBW values matched all other groups at both baseline and twelve weeks of treatment. PYY and GLP-1 differed from ObP and WLD (PYY, $p < 0.0001$; GLP-1, $p < 0.0171$) at baseline. Baseline glucose did not differ between groups. Leptin differed from all groups at baseline, and was lower than ObP by study termination ($p = 0.0184$).

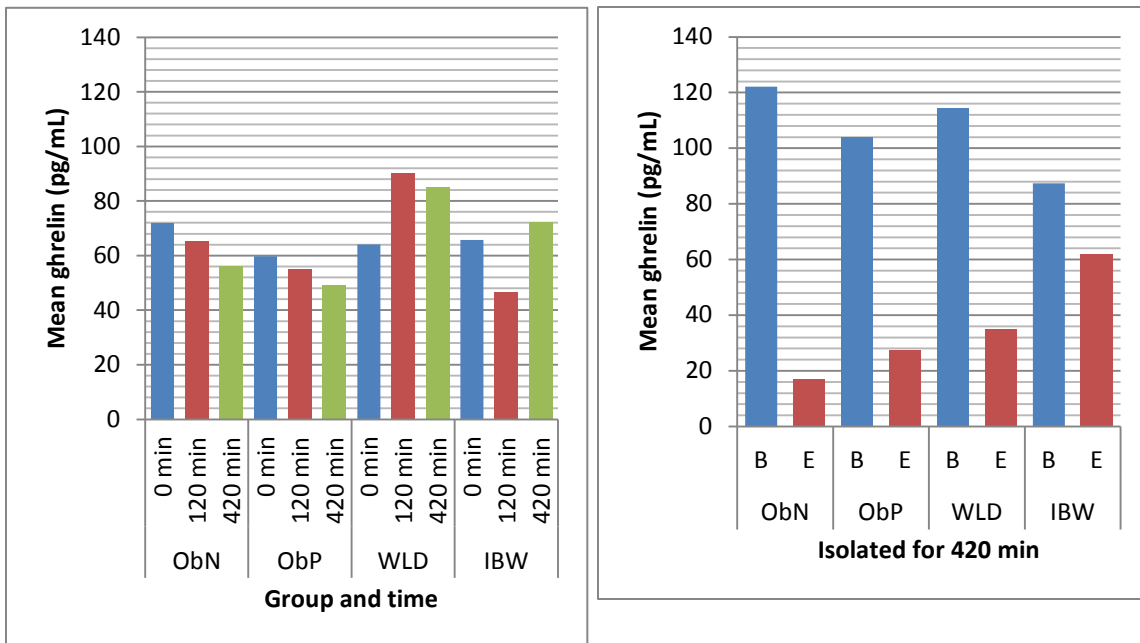
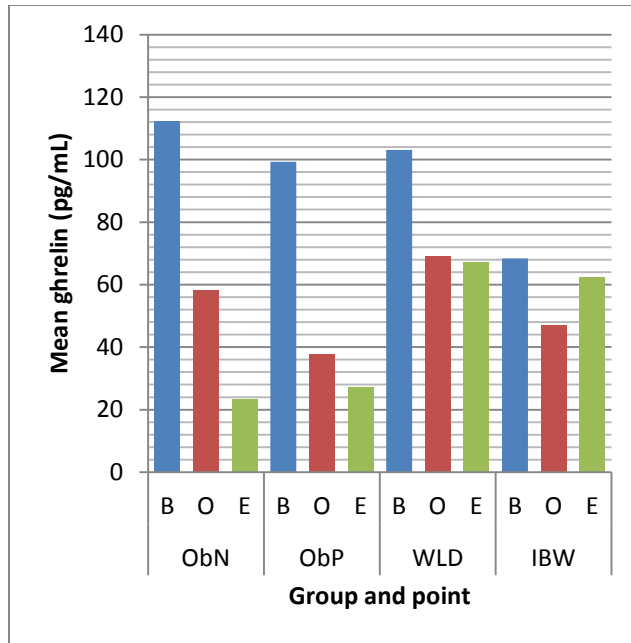


Figure 15 Ghrelin by point and time.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

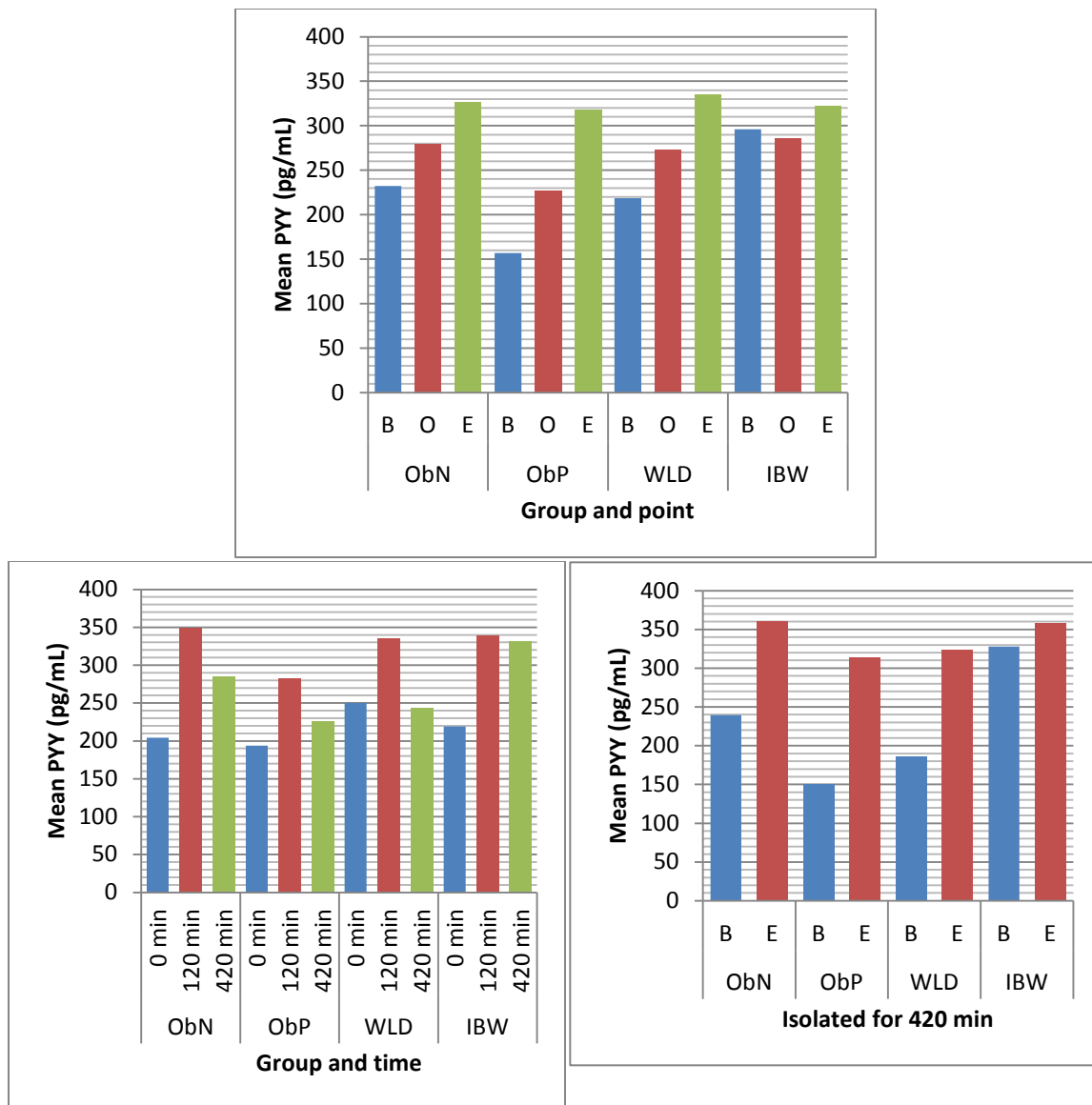


Figure 16 PYY by point and time.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

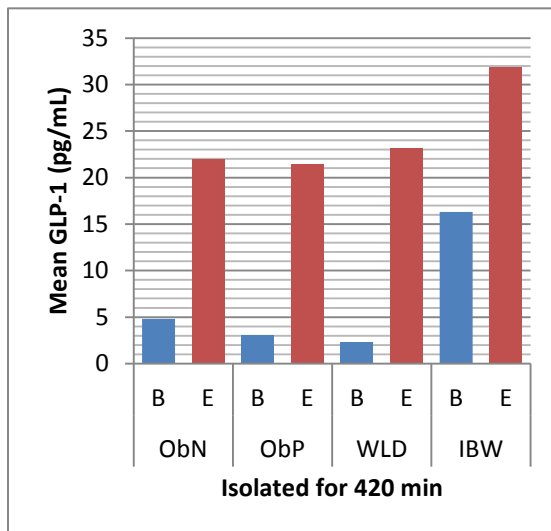
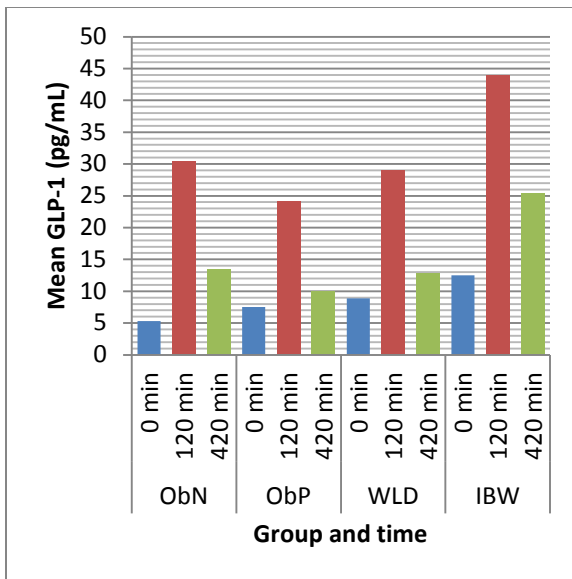
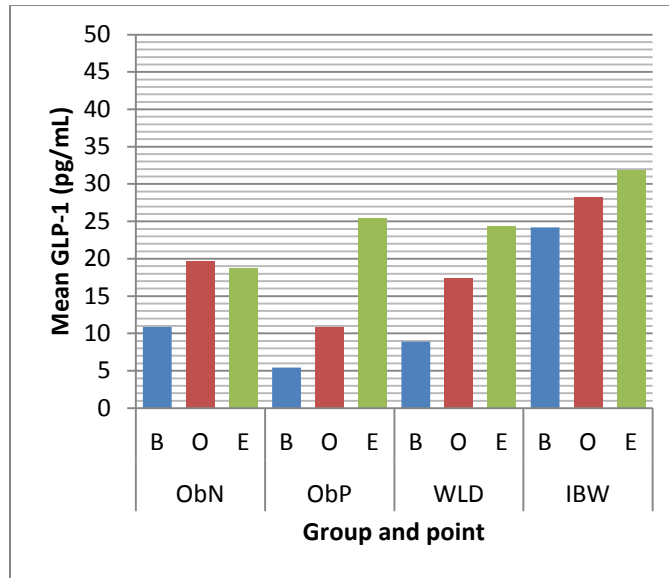


Figure 17 GLP-1 by point and time.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

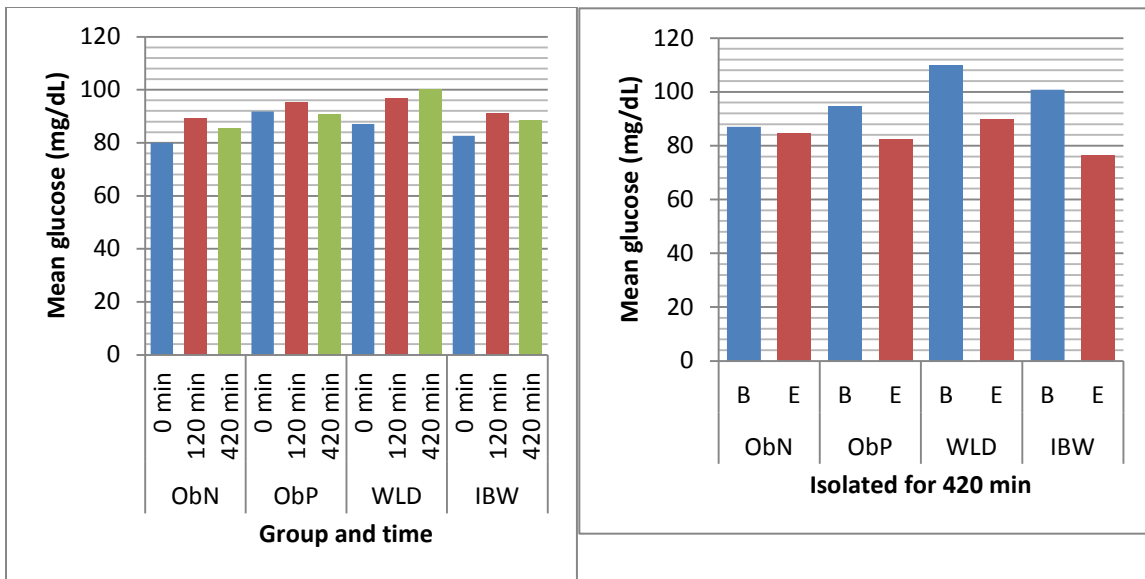
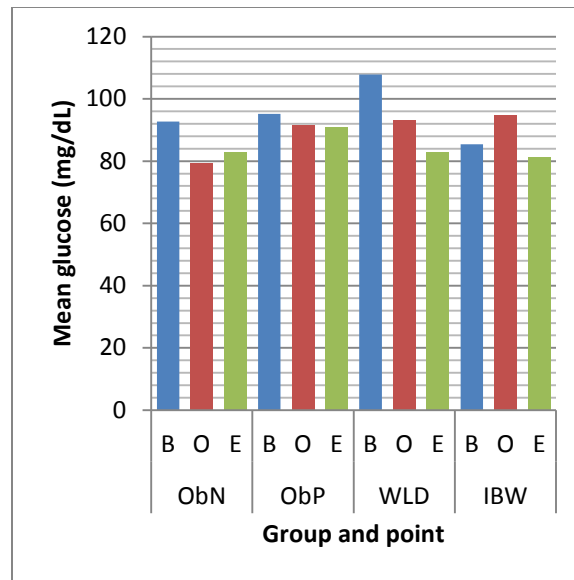


Figure 18 Glucose by point and time.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

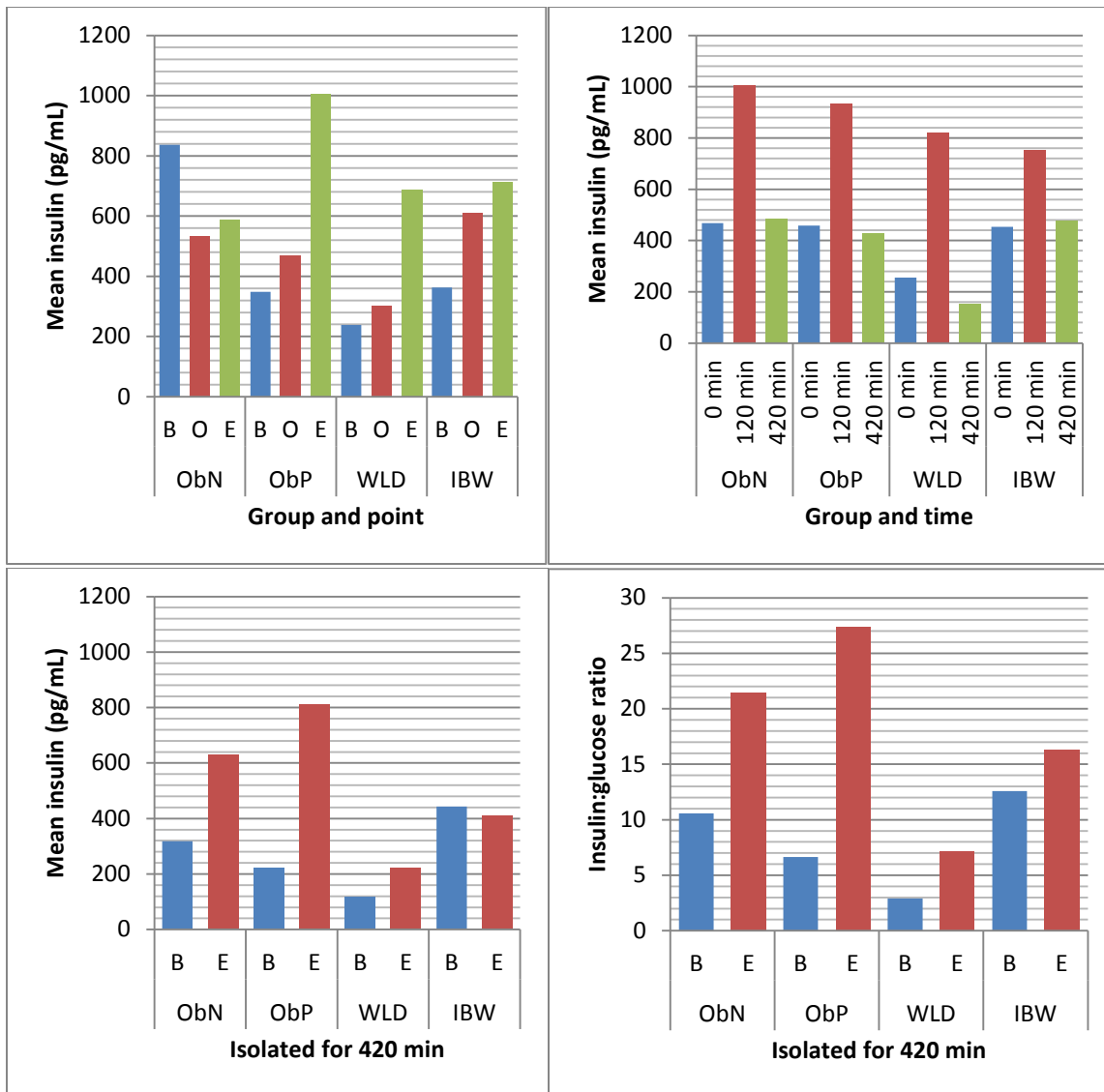


Figure 19 Insulin by point and time; insulin:glucose ratio by time.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

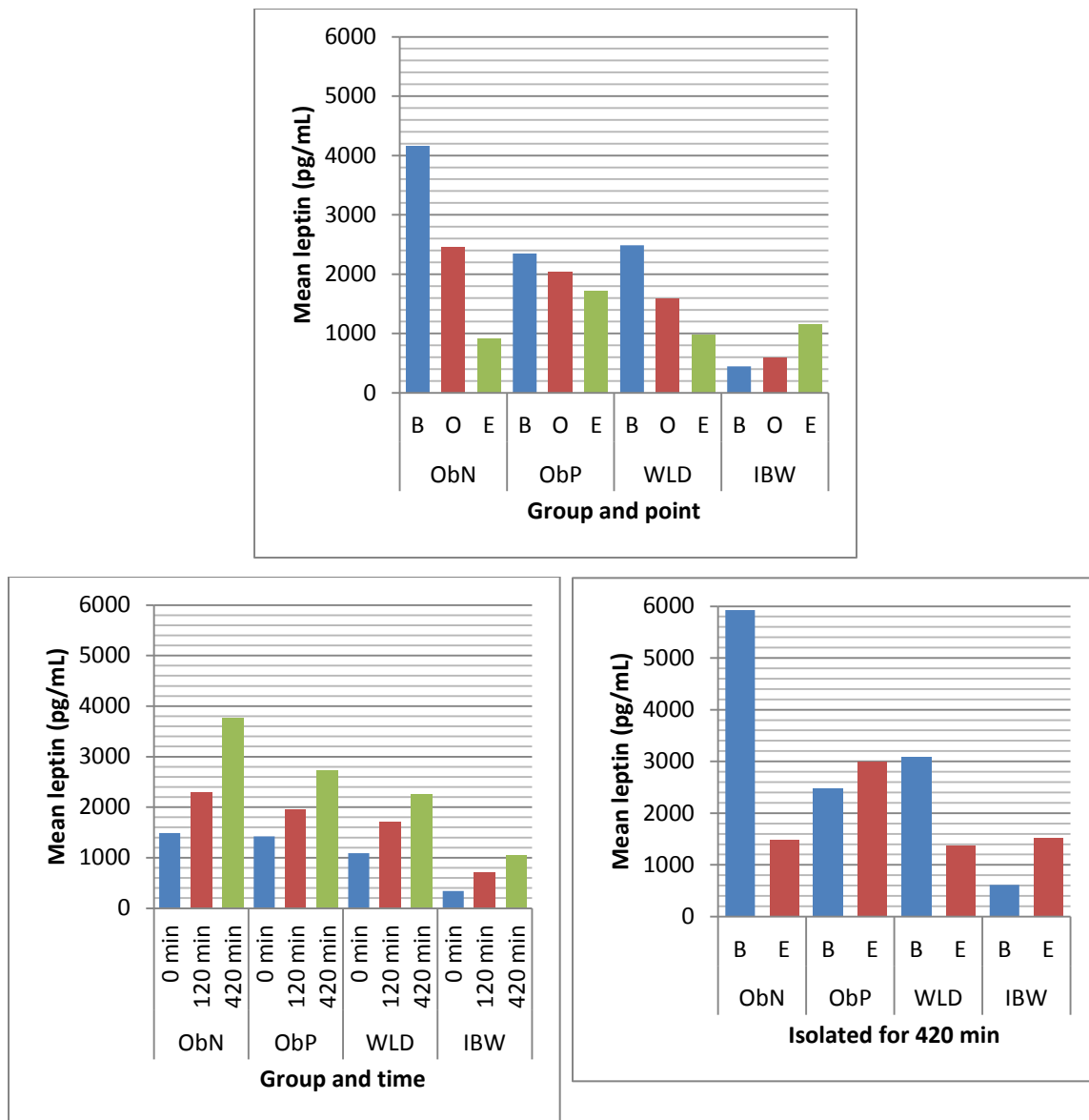


Figure 20 Leptin by point and time.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

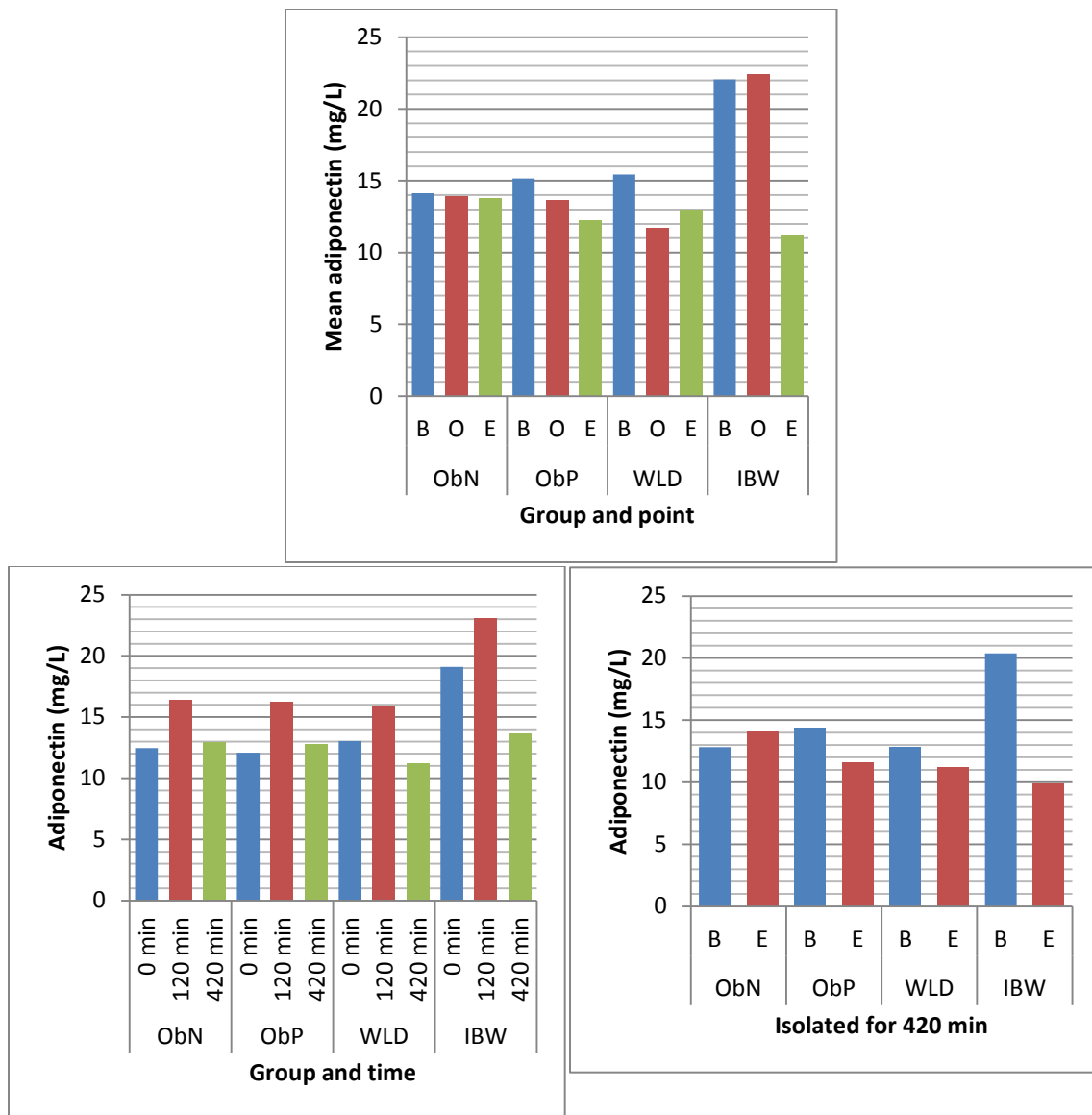


Figure 21 Adiponectin by point and time.

ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

Table 11 Gut hormone plasma levels 420 minutes following a 3 hour intrusion meal.

<i>Group</i>	<i>Baseline</i>	<i>End of study</i>
Time (min)	420	420
Ghrelin (pg/mL)		
ObN [*]	122.2 ± 65.8 ^{a,#}	16.9 ± 26.5 ^{a,\$}
ObP [*]	103.9 ± 61.9 ^{a,#}	27.4 ± 35.8 ^{a,\$}
WLD [*]	114.6 ± 82.6 ^{a,#}	35.2 ± 42.5 ^{a,#}
IBW [*]	87.4 ± 80.8 ^{a,#}	61.9 ± 61.5 ^{a,#}
PYY (pg/mL)		
ObN	239.5 ± 50.8 ^{a,b,#}	360.3 ± 114.5 ^{a,\$}
ObP	150.2 ± 42.0 ^{a,#}	314.1 ± 63.3 ^{a,\$}
WLD	186.1 ± 38.0 ^{a,#}	323.1 ± 94.9 ^{a,\$}
IBW	327.7 ± 66.1 ^{b,#}	358.0 ± 95.8 ^{a,#}
GLP-1 (pg/mL)		
ObN	4.8 ± 5.4 ^{a,b,#}	21.9 ± 18.2 ^{a,#}
ObP	3.0 ± 2.3 ^{a,#}	21.5 ± 19.1 ^{a,b,#}
WLD	2.3 ± 0.0 ^{a,#}	23.1 ± 18.2 ^{a,\$}
IBW	16.3 ± 0.4 ^{b,#}	24.8 ± 19.9 ^{a,#}

Numerical data presented as mean ± standard deviation.

^{*}ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$}Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 12 Insulin and glucose plasma levels 420 minutes following a 3 hour intrusion meal.

<i>Group</i>		<i>Baseline</i>	<i>End of study</i>
Time (min)		420	420
Glucose (mg/dL)			
	ObN*	87.0 ± 7.1 ^{a,#}	84.6 ± 10.5 ^{a,#}
	ObP*	94.6 ± 2.2 ^{a,#}	82.4 ± 10.0 ^{a,#}
	WLD*	110.0 ± 16.5 ^{a,#}	89.8 ± 7.3 ^{a,#}
	IBW*	100.8 ± 11.5 ^{a,#}	76.4 ± 7.8 ^{a,\$}
Insulin (pg/mL)			
	ObN	318.5 ± 151.6 ^{a,b,#}	631.0 ± 239.9 ^{a,#}
	ObP	221.0 ± 146.0 ^{a,b,#}	810.4 ± 672.2 ^{a,\$}
	WLD	116.3 ± 82.0 ^{a,#}	221.7 ± 104.3 ^{b,#}
	IBW	442.8 ± 151.7 ^{b,#}	410.6 ± 415.1 ^{a,b,#}
Insulin:glucose ratio			
	ObN	10.6 ± 5.3 ^{a,#}	21.5 ± 8.4 ^{a,#}
	ObP	6.6 ± 4.4 ^{a,#}	27.4 ± 21.7 ^{a,#}
	WLD	2.9 ± 1.8 ^{a,#}	7.1 ± 3.5 ^{a,#}
	IBW	12.6 ± 4.5 ^{a,#}	16.3 ± 17.5 ^{a,#}

Numerical data presented as mean ± standard deviation.

*ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a,b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 13 Leptin and adiponectin plasma levels 420 minutes following a 3 hour intrusion meal.

<i>Group</i>	<i>Baseline</i>	<i>End of study</i>
Time (min)	420	420
Leptin (pg/mL)		
ObN*	5924.6 ± 2818.2 ^{a,#}	1488.5 ± 477.0 ^{a,b,\$}
ObP*	2481.2 ± 1051.3 ^{a,#}	3002.4 ± 807.4 ^{a,#}
WLD*	3075.7 ± 1459.6 ^{a,#}	1382.3 ± 1166.4 ^{b,\$}
IBW*	611.1 ± 274.3 ^{b,#}	1513.2 ± 703.4 ^{b,\$}
Adiponectin (mg/L)		
ObN	12.8 ± 8.2 ^{a,#}	14.0 ± 5.2 ^{a,#}
ObP	14.4 ± 4.8 ^{a,#}	11.6 ± 3.8 ^{a,#}
WLD	12.8 ± 4.6 ^{a,#}	11.2 ± 3.8 ^{a,#}
IBW	20.4 ± 16.0 ^{a,#}	10.0 ± 1.8 ^{a,#}

Numerical data presented as mean ± standard deviation.

*ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a,b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{#, \$} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

PCR

Muscle

Obesification groups; ObN, ObP, WLD

Two dogs from group ObP did not have muscle samples from one week into treatment. One dog from group WLD did not have a baseline muscle sample. Since baseline samples are necessary for the $2^{-\Delta\Delta C_T}$ calculation, the average baseline ΔC_T for each gene representing groups ObN, ObP, WLD (excluding the 3 dogs dropped from all analyses) were used for that dog's subsequent calculations. There were no within group expression differences for all genes. There were no differences between groups for UCP3, PGC1 α , NRF1, or SIRT3. ObN had higher SIRT1 expression than WLD ($p = 0.0261$), but ObP expression did not differ from either group one week into treatment. By study end, there were no SIRT1 differences between groups (Table 14).

Maintain ideal body weight group; IBW

There were no within group IBW differences for all genes based on study arms. There were also no differences between IBW and all other groups for UCP3, PGC1 α , or NRF1. SIRT1 expression was greater for ObN than IBW ($p = 0.011$), but IBW did not differ from all other groups one week into treatment. There was

Table 14 Muscle PCR ($\Delta\Delta CT$) by group and point.

<i>Group</i>	<i>One week</i>	<i>End of study</i>
SIRT1		
ObN [*]	3.5 ± 2.6 ^{a,#}	2.1 ± 1.6 ^{a,#}
ObP [*]	1.2 ± 1.0 ^{a,b,#}	3.3 ± 3.6 ^{a,#}
WLD [*]	0.8 ± 0.5 ^{b,#}	1.4 ± 0.7 ^{a,#}
IBW [*]	0.7 ± 1.0 ^{b,#}	0.9 ± 0.6 ^{a,#}
UCP3		
ObN	3.1 ± 4.1 ^{a,#}	2.2 ± 3.4 ^{a,#}
ObP	4.2 ± 3.6 ^{a,#}	6.1 ± 6.5 ^{a,#}
WLD	0.9 ± 0.9 ^{a,#}	1.2 ± 0.8 ^{a,#}
IBW	1.1 ± 0.9 ^{a,#}	1.9 ± 2.0 ^{a,#}
PGC-1 α		
ObN	3.0 ± 2.9 ^{a,#}	4.5 ± 6.7 ^{a,#}
ObP	3.3 ± 2.9 ^{a,#}	10.2 ± 17.2 ^{a,#}
WLD	1.3 ± 1.2 ^{a,#}	2.6 ± 2.1 ^{a,#}
IBW	0.6 ± 0.6 ^{a,#}	1.3 ± 1.6 ^{a,#}
NRF1		
ObN	2.6 ± 2.3 ^{a,#}	2.7 ± 2.3 ^{a,#}
ObP	0.4 ± 0.5 ^{a,#}	5.8 ± 9.8 ^{a,#}
WLD	1.3 ± 1.2 ^{a,#}	1.5 ± 2.1 ^{a,#}
IBW	0.5 ± 0.7 ^{a,#}	2.7 ± 5.3 ^{a,#}
SIRT3		
ObN	3.0 ± 3.3 ^{a,#}	2.9 ± 2.7 ^{a,#}
ObP	2.3 ± 2.4 ^{a,b,#}	39.8 ± 84.6 ^{a,#}
WLD	1.0 ± 1.4 ^{a,b,#}	4.0 ± 4.0 ^{a,#}
IBW	0.2 ± 0.2 ^{b,#}	1.0 ± 1.0 ^{a,#}

Numerical data presented as mean ± standard deviation.

^{*}ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

[#]Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

no group SIRT1 expression difference by study termination. SIRT3 expression was greater for ObN than IBW ($p = 0.0357$), but IBW did not differ from all other groups one week into treatment. There was no group difference in SIRT3 expression by study termination (Table 14).

Fat

SIRT3 tissue expression was below the sensitivity of the assay. Due to insufficient fat samples from baseline and one week into treatment for group IBW, $2^{-\Delta\Delta CT}$ calculations could not be performed. NRF1 expression for group WLD was lower than ObN ($p = 0.0102$) and ObP ($p = 0.0072$) one week into

treatment. NRF1 expression remained lower by study termination for WLD vs. ObN ($p = 0.0059$). There were no other within or between group differences for all genes and time points tested for groups ObN, ObP, WLD (Table 15).

Cytokines

Many IL6 (61/180 samples; 33.9%) and IL15 (56/180 samples; 31.1%) results were reported as < 36.4 pg/ml. For analysis, these values were recorded as 36.3 pg/ml. Additional samples with results below 36.3 pg/ml (IL6, 73 samples; IL15, 28 samples) were not adjusted.

There were no differences between time 0 and time 420 for cytokine results, so only time 0 is shown, but significant group differences represent both sample times. There were no within group differences for either cytokine over time (Table 16).

Obesification groups; ObN, ObP, WLD

There were no differences between groups for IL6 at any time point. At baseline, IL15 plasma concentration was greater for ObN versus ObP ($p = 0.0071$), but did not differ from WLD. ObP and WLD also did not differ at baseline. There were no other between group differences for IL15.

Maintain ideal body weight group; IBW

There were no between group differences for IBW and all other groups for IL6. At baseline, IL15 plasma levels did not differ between IBW, ObP, and WLD, but IBW levels were lower than ObN ($p < 0.0001$). One week into treatment, IL15 was lower in IBW compared to WLD ($p 0.0255$), but did not differ from all other groups. At study termination, IBW IL15 did not differ from all other groups.

Table 15 Fat PCR ($\Delta\Delta\text{CT}$) by group and point

<i>Group</i>	<i>One week</i>	<i>End of study</i>
SIRT1		
ObN [*]	1.2 ± 0.2 ^{a,#}	7.1 ± 13.3 ^{a,#}
ObP [*]	1.7 ± 1.4 ^{a,#}	0.6 ± 0.4 ^{a,#}
WLD [*]	1.0 ± 0.8 ^{a,#}	1.2 ± 0.9 ^{a,#}
UCP2		
ObN	2.6 ± 1.2 ^{a,#}	48.9 ± 98.3 ^{a,#}
ObP	50.4 ± 60.0 ^{a,#}	4.9 ± 7.8 ^{a,#}
WLD	5.7 ± 6.7 ^{a,#}	2.1 ± 2.0 ^{a,#}
PGC-1 α		
ObN	1.0 ± 0.5 ^{a,#}	3.9 ± 4.8 ^{a,#}
ObP	1.6 ± 1.8 ^{a,#}	1.2 ± 1.1 ^{a,#}
WLD	0.8 ± 0.6 ^{a,#}	1.4 ± 0.5 ^{a,#}
NRF1		
ObN	2.8 ± 1.5 ^{a,#}	20.1 ± 31.6 ^{a,#}
ObP	6.3 ± 7.2 ^{a,#}	3.0 ± 3.2 ^{a,b,#}
WLD	1.2 ± 0.8 ^{b,#}	0.5 ± 0.4 ^{b,#}
FASN		
ObN	0.5 ± 0.4 ^{a,#}	2.7 ± 4.6 ^{a,#}
ObP	3.6 ± 6.5 ^{a,#}	1.5 ± 2.1 ^{a,#}
WLD	0.4 ± 0.4 ^{a,#}	1.1 ± 1.3 ^{a,#}

Numerical data presented as mean ± standard deviation.

^{*}ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a,b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

[#] Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 16 Cytokines by group and point.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>End of study</i>
Interleukin 6 (pg/mL)			
ObN [*]	149.4 ± 227.4 ^{a,#}	342.9 ± 662.4 ^{a,#}	48.6 ± 68.4 ^{a,#}
ObP [*]	133.2 ± 228.9 ^{a,#}	138.3 ± 254.1 ^{a,#}	144.0 ± 265.2 ^{a,#}
WLD [*]	45.0 ± 27.0 ^{a,#}	49.2 ± 58.8 ^{a,#}	26.1 ± 12.9 ^{a,#}
IBW [*]	36.3 ± 0 ^{a,#}	27.5 ± 13.2 ^{a,#}	27.9 ± 13.5 ^{a,#}
Interleukin 15 (pg/mL)			
ObN	648.0 ± 701.7 ^{a,#}	967.2 ± 1414.8 ^{a,b,#}	216.3 ± 296.7 ^{a,#}
ObP	236.7 ± 445.8 ^{b,#}	204.9 ± 411.3 ^{a,b,#}	207.6 ± 448.2 ^{a,#}
WLD	747.9 ± 1439.1 ^{a,b,#}	622.5 ± 1030.2 ^{a,#}	573.3 ± 1042.2 ^{a,#}
IBW	25.5 ± 13.2 ^{b,#}	35.1 ± 6.6 ^{b,#}	40.8 ± 24.6 ^{a,#}

Numerical data presented as mean ± standard deviation.

^{*}ObN, obese nutraceutical group; ObP, obese placebo group; WLD, weight loss diet group; IBW, ideal body weight group.

^{a-b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

[#] Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Discussion

These data show dogs eating lean maintenance levels of a canned adult diet with a leucine/pyridoxine nutraceutical can achieve weight loss similar to dogs consuming lean maintenance levels of a therapeutic weight loss diet. This is evident in the significantly reduced body weight and BCS achieved after 12 weeks of treatment, which did not differ between the two groups. Nutraceutical dogs lost 3.4 ± 0.6 kg body weight and 3.1 ± 0.6 kg fat mass compared to 4.4 ± 1.1 kg body weight and 3.9 ± 0.8 kg fat mass in dogs consuming a therapeutic weight loss diet. The proportion of weight lost as fat in both groups was similar, with nutraceutical dogs losing 91.2% as fat versus 88.6% in weight loss diet dogs. These results echo recent human data in which the nutraceutical blend, in a dose modified for people (2.25 mg leucine and 30mg pyridoxine), was associated with a total fat mass loss of 1.82 ± 0.70 kg versus no change of fat mass in the placebo group when consuming a maintenance amount of calories. When calorically restricted (500 kcal/day reduction), nutraceutical subjects lost significantly more total weight (8.15 ± 1.33 vs. 5.25 ± 1.13 kg, $p < 0.01$) and fat mass (7.00 ± 0.95 vs. 4.22 ± 0.74 kg, $p < 0.01$) than the placebo group over the 6 month time frame.³⁴⁷

The ability to induce weight loss without extreme energy restriction is an exciting prospect in dogs. Multiple recommendations regarding restriction levels in dogs undergoing weight loss plans have been published; including $0.5 - 0.75 \times \text{MER}_{\text{ideal}}$ ^{278,396,400}, $50 - 100 \text{ kcal/BW}_{\text{kg(ideal)}}^{0.75}$ ^{283,406} or $0.6 \times \text{MER}$ of a weight 15% below current weight.⁴⁰⁷ It is generally recommended for dogs to maintain a weight loss rate of 1 – 2 %/week on a restricted intake weight loss plan. Dogs in the current study averaged 1.7 % (nutraceutical), 2.2 % (weight loss diet), and 0.6% (placebo) weekly weight loss while consuming an ideal maintenance level of calories over 12 weeks. These results may differ from those seen in naturally obese client-owned dogs, however, since they have been reported to lose an average of 0.85% per week when fed $0.6 \times \text{MER}_{\text{ideal}}$.³⁹⁶

There are various reported maintenance energy requirements for dogs based on breed, age, housing, and activity level. Middle aged (3 – 10 year old) laboratory housed beagles have been reported to require $114 - 132 \text{ kcal/kg}^{0.75}$ ^{67,408-410} for maintenance. The requirement is even higher ($144 \text{ kcal/kg}^{0.75}$) when the beagles are one to two years old.^{67,409} At least two of these reports involved dogs that were group housed with 2 – 3 dogs per run.^{409,410} It is not clear if the other reports involved group housed beagles, but it is very common to maintain laboratory dogs with at least one other cage mate. The current study maintained the dogs in individual runs to remove any uncertainty regarding individual food consumption. It stands to reason that dogs housed together will have increased playing interactions compared to dogs housed alone, and therefore will have increased energy requirements, but this has not been supported by the literature. In fact, pair housed laboratory dogs have been shown to be less active and spend more time sleeping than when housed alone.⁴¹¹ The size of the cage

plays a factor as well with dogs pair housed in small cages (1 x 1.5 m) being more active than when in a larger cage (1 x 2 m).⁴¹² Compared to shelter animals housed in outdoor enclosures, pair housed dogs are less active and spend more time in a lying posture than dogs maintained in groups of 5 – 8 animals.⁴¹³ This is the opposite of what has been found in medium sized pet dogs living in multiple dog households. Their MER is $133 \pm 52 \text{ kcal/kg}^{0.75}$ versus the prototypical pet dog with a requirement of $94 - 105 \text{ kcal/kg}^{0.75}$.⁶⁷

Due to this known variability between dogs, a pre-study period was utilized to determine the ideal body weight maintenance requirement for each individual dog. Nutraceutical and maintain ideal weight dogs were fed for 4 weeks, while placebo and WLD dogs were fed for 3 weeks. The research schedule initially involved a staggered timeline in which groups were started based on personnel and facility availability. Using on a random number table, nutraceutical dogs were assigned to the first start phase. Towards the end of their first week, there was an unexpected access interruption to an imaging modality planned for the study. Since the lost modality made facility scheduling conflicts irrelevant, the decision was made to run all three obesification groups simultaneously, with placebo and therapeutic diet groups starting at the beginning of the second week. It could be argued the differences between groups for $\text{MER}_{\text{ideal}}$ are related to the shorter time frame reducing the ability to appropriately modify feeding amounts in the groups on the shorter schedule. While there were no group differences in body weight and BCS before starting the study, the initial weight changes in response to feeding seemed opposite in nature for nutraceutical versus all other dogs, suggesting a naturally lower MER in the nutraceutical group.

Starting weights during the establish $\text{MER}_{\text{ideal}}$ phase were $0.3 \pm 0.74 \text{ kg}$ above estimated ideal weight ($\sim 20\% \text{BF}$) for nutraceutical dogs and $0.2 \pm 0.31 \text{ kg}$ below for maintain ideal body weight dogs. All six nutraceutical dogs gained weight while consuming calculated $\text{MER}_{\text{ideal}}$ during the first week, and all six maintain ideal weight dogs lost weight. One week later, when the other two groups were started, groups were both above (ObN, $0.6 \pm 0.75 \text{ kg}$; WLD, $0.1 \pm 0.30 \text{ kg}$) and below (ObP, $0.2 \pm 0.52 \text{ kg}$; IBW, $0.8 \pm 0.38 \text{ kg}$) their estimated ideal weights. Reassessment 1.5 weeks later (1.5 or 2.5 weeks into establish $\text{MER}_{\text{ideal}}$ phase) revealed nutraceutical dogs were $0.2 \pm 0.57 \text{ kg}$ above and all other groups were below (ObP, $0.8 \pm 0.42 \text{ kg}$; WLD, $0.5 \pm 0.22 \text{ kg}$; IBW, $0.6 \pm 0.44 \text{ kg}$) their estimated ideal weights. Feeding amounts were increased for dogs that needed to gain weight (1/6 nutraceutical, 3/6 placebo, 3/6 WLD, 6/6 IBW) and they were decreased for those needing to lose weight (3/6 nutraceutical, 1/6 placebo, 2/6 WLD) to compensate for these weight changes.

During obesification, CAD amounts offered were increased in dogs that lost or maintained a consistent weight. By the end of obesification (baseline), three nutraceutical group dogs were being fed at or above calculated $\text{MER}_{\text{ideal}}$ ($1.0 - 2.2 \times \text{MER}_{\text{ideal}}$, $1.6 - 3.5 \times \text{RER}_{\text{ideal}}$), but three dogs were eating below ($0.5 - 0.9 \times \text{MER}_{\text{ideal}}$, $0.9 - 1.5 \times \text{RER}_{\text{ideal}}$). This is in comparison to the other

obesification groups, in which ten dogs were being fed at/above (ObP, $1.2 - 2.0 \times \text{MER}_{\text{ideal}}$, $1.8 - 3.3 \times \text{RER}_{\text{ideal}}$; WLD, $1.0 - 2.2 \times \text{MER}_{\text{ideal}}$, $1.6 - 3.5 \times \text{RER}_{\text{ideal}}$) and two were fed below (WLD, $0.9 \times \text{MER}_{\text{ideal}}$, $1.4 \times \text{RER}_{\text{ideal}}$) calculated $\text{MER}_{\text{ideal}}$. When compared against maintenance requirements of inactive pet dogs ($95 \times \text{BW}_{\text{kg}}^{0.75}$),⁶⁷ only one of the three dogs was still below this level. Dropping the lower dog from analysis as an outlier was considered, but this would have reduced group size to four, since a dog who did not reach the minimum level of obesity had to be removed as well. Another reason to not drop this dog is evidence supporting the existence of a naturally lower MER, rather than simple underfeeding. This dog achieved both high absolute (6.5 g) and percent (41.8 %) body fat levels by the end of obesification, despite being offered a relatively low energy level from CAD. During obesification, all dogs were fed the same level of oil supplementation and this dog was being offered less kitten food than 15 of the other obesification dogs, suggesting the excess calorie supplementation does not fully account for his efficient weight gain.

There are other protocol adjustments that could have been considered at this point, since dogs in the nutraceutical group appeared to have lower energy requirements than dogs in the other groups. All dogs were randomized into groups that did not differ in starting weight or BCS before the establish $\text{MER}_{\text{ideal}}$ phase. It would have been appropriate to re-randomize based on energy consumption after $\text{MER}_{\text{ideal}}$ had been established. There are a few reasons why this was not possible for this protocol, however. A behavior observation component of the project (Chapter III) could have been affected by animal movement in and out of rooms. Due to facility limitations, all dogs could not be housed in a single room, so housing assignments were carefully planned and considered prior to study initiation. Rodent data has shown cohort removal is associated with acute and chronic stress, evaluated via hyperthermia and changes in plasma ACTH concentrations.^{414–417} Other rodent data suggests routine cage-changing leads to transient hypertension, tachycardia, and increased cage movement and grooming.⁴¹⁸ Use of a device designed to separate pair-housed rats, while still allowing social stimulation, was associated with attenuation of 24 hour intakes that did not normalize until the third introduction of the device.⁴¹⁹ Similar research in laboratory housed dogs has not been performed, but acute effects of run/room reassignment should be considered a potential confounding factor to anxiety and food intake. This is especially true for this study, since most dogs were housed in runs allowing for communication with neighboring dogs through chain-link fencing, with an appearance similar to the cage dividing device associated with decreased voluntary food intake in pair-housed rats.

Just as a maximal calorie cap ($\sim 2 \times \text{RER}_{\text{ideal}}$) was put in place at the end of obesification, another protocol adjustment would have been to institute a minimal calorie level. Based on NRC assessment of the literature, $90 \text{ kcal/kg}^{0.75}$ (approximately $0.8 \times \text{MER}_{\text{ideal}}$) is the lowest maintenance energy requirement described for pet dogs and would have been an appropriate guideline to use for

minimum feeding amounts, but this would have only affected the aforementioned nutraceutical outlier at the end of obesification.⁶⁷ It also may have been useful to extend the length of the establish MER_{ideal} phase to better determine maintenance requirements. Based on the change in energy required for maintenance in ideal body weight dogs that developed over many weeks, however, this extra step may have taken much more time to be of use.

At the end of twelve weeks, the dogs receiving nutraceutical treatment in this study consumed $101.3 \pm 12.7 \text{ kcal/kg}^{0.75}$, placebo dogs consumed $134.1 \pm 17.3 \text{ kcal/kg}^{0.75}$, therapeutic weight loss diet dogs consumed $112.7 \pm 22.8 \text{ kcal/kg}^{0.75}$ ($127.9 \pm 35.5 \text{ kcal/kg}^{0.75}$ if the dog that finished at 8 weeks is included), and ideal body weight dogs consumed $139.7 \pm 38.9 \text{ kcal/kg}^{0.75}$. These values differ from baseline values, although only significantly for nutraceutical and maintain ideal body weight dogs. Based on the published requirements for laboratory beagles, the nutraceutical dogs were still consuming below average maintenance requirements when the study was terminated ($114 - 132 \text{ kcal/kg}^{0.75}$).^{67,408-410} This group of dogs may have been comprised of dogs with naturally lower MERs than other published information for laboratory dogs, but their collective MERs were still above the lowest MER described for pet dogs ($90 \text{ kcal/kg}^{0.75}$; approximately $0.8 \times MER_{ideal}$).⁶⁷ Placebo and ideal body weight dogs were being fed above maintenance needs for 3 – 10 year old beagles, but were below those for 1 – 2 year old beagles. An additional objective measure of energy requirements, such as calorimetry, would help confirm or refute these feeding amounts. Even though predictive equations are considered reliable enough for use, predicted resting energy expenditure (REE) only falls within 20% of the REE measure by indirect calorimetry in 51 – 57% of dogs.^{67,420}

Because indirect calorimetry measurements cannot be measured on every client-owned animal undergoing a weight loss plan, the predictive equations are used in practice. With these client-owned animals, compliance to restricted diet plans is inconsistent and can often be related back to owner supplied sources of food and treats. Therefore, identification of methods to increase satiety and encourage decreased voluntary food intake in dogs is warranted. Fiber has been investigated as a satiety inducing agent in dogs because gastric distension has been shown to cause a dose dependent reduction in food intake and some fiber types can increase GI transit time (i.e. psyllium and guar gum).^{421,422} Crude fiber (12 or 21% as fed) has previously been shown to decrease voluntary meal intake in dogs during regular meals. It also decreased intake from an intrusion meal provided 75 minutes after the morning meal.²⁸⁹ Fiber did not affect meal intake in dogs consuming 40% of MER during a weight loss plan.⁴²³ Crude fiber ranged from 0.2 – 1.3% and total dietary fiber (TDF) ranged from 0.9 – 2.4% as fed (17.6 – 42.3 g/1000 kcal) in the different diets fed to those dogs. In the current study, the WLD was the same formula used in the Jewell study, in which decreased food intake was found in relation to dietary fiber content. This diet was chosen because it has a similar palatability profile as the CAD, and would therefore not be expected to trigger hedonic tendencies in relation to novel diet exposure

during intrusion meal feedings (Jewell, DE; personal communication). The WLD itself was not used during intrusion meals to remove the risk of the lower energy density leading a decreased energy intake, even if volume consumption was comparable to other groups.

Nutraceutical, placebo, and therapeutic weight loss diet did not have an effect on medium term satiety, based on intrusion meal intake 3 hours after a standard morning meal. The higher fiber content of the WLD food did not result in significantly reduced intrusion meal intake compared to dogs who were maintaining an ideal weight or to dogs losing weight and consuming the CAD food. This is in contrast to the Jewell research in which dogs were also being offered maintenance levels of food, but were not in the process of losing weight.²⁸⁹ Average daily food consumption below maintenance offerings for obese dogs losing weight was not a consistent finding during the study and was only significantly different between groups during the first week of treatment. At this point, WLD dogs left behind a larger amount of food than obese nutraceutical dogs, and this effect is likely due to response to diet change as consumption improved for the duration of the study. Dogs maintaining ideal weight also did not leave food behind.

Another distinction between the two studies is that Jewell offered an intrusion meal 75 minutes after the morning meal, while the dogs reported here were fed 180 minutes after the standard meal. It is possible the satiating effects of fiber are active more immediately after a meal, rather than 3 hours later. Median time to empty the canine stomach of 50% of radiopaque markers was 3.5 hours in 2 – 5 year old dogs and ranged from 6.4 – 7.8 hours in 60 week old dogs.^{424,425} Using wireless motility capsules, total gastric emptying time has ranged from 385 – 897 minutes in multiple studies and 99.9 – 181.2 minutes represents the stomach emptying half time.^{426–428} Based on the half time information, a 75 minute intrusion meal should be considered an indicator of short term satiety, likely to be highly responsive to gastric distention. At 3 hours (180 minutes), the stomach emptying half time is approached and gastric distension is less likely a contributor to any perceived satiety effects.

An interesting, but not unexpected intrusion intake pattern emerged when obesification groups were compared to dogs maintaining ideal body weight. When dogs were being fed excess calories during obesification, intrusion meal consumption was lower than when fed to MER_{ideal}. Dogs maintaining ideal body weight ate similar amounts of food during intrusion feedings as other dogs being fed to MER_{ideal} during weight loss. So while nutraceutical, placebo, or WLD treatment did not affect satiety, overall average daily food consumption did have an effect, with MER feeding being associated with increased voluntary food intake.

In addition to intrusion meal intake, canine satiety may also be perceived based on food seeking behavior and other behavioral characteristics. Butterwick assessed feeding behavior via 30 minute videotape recordings starting at the introduction of the meal.⁴²³ Bosch and colleagues also used video recordings to

assess activity patterns within a 24 hour period and to assess interprandial behavior 30 minutes after the morning meal and 30 minutes before the evening meal.⁴²⁹ The ability to review recordings allowed for accurate accounting of the number of visits to the bowl, total time spent at the bowl, and occurrences of individual behaviors. In the current study, the recording design was for individual observers to focus on accurately accounting for the amount of time dogs spent eating and/or with their head in the food bowl, providing a total duration measure of food consumption over 45 minutes. For specific behavior information, instantaneous sampling every two minutes was employed. This type of protocol allows one to record several different categories of behavior and total duration information simultaneously.⁴³⁰ Several novel categories, along with behaviors previously described by Bosch et al, were assessed to gather information regarding behaviors related to canine food consumption.⁴²⁹

Unfortunately, due to recording inconsistencies in total duration observations, total time spent at the bowl could not be assessed. Instantaneous sampling of eating found all groups to be similar at all time points with the exception of obese placebo dogs. This group had significantly higher within group counts during treatment than at baseline, correlating with both intrusion meal and average daily consumption patterns. Clinical significance of this pattern is doubtful, however, because the nutraceutical and WLD obesification groups also consumed increasing volumes of food over the treatment period and at intrusion, but their eating counts were consistent. These results echo Butterwick's data, indicating caloric allotment and weight change status do not influence the time a dog spends eating a medium satiety intrusion meal.⁴³¹

While some other behavior categories showed significant differences, the importance of these differences is unclear. If these behaviors offered insight into actions more likely to be associated with satiety, or a lack thereof, one would expect differences between dogs being fed excess calorie during obesification and the other dogs, which all were being meal fed based on caloric needs. Since a consistent difference did not exist, a problem with the sampling method should be considered. Electronic recording of intrusion feedings and analysis by a single observer would be a more reliable method than datasheet recording by multiple observers. Because this study used various observers, between observer reliability should have been assessed. Observer fatigue due to the both the length of the session and the time between instantaneous sampling could have contributed to fatigue and loss of concentration. Finally, observer presence in the room during feedings could have altered dog behavior, despite attempts to habituate them before true recordings started. The existence of this effect is debatable, however, since total resting with head down counts within groups did not differ across all three observation sessions.

In relation to fixed meal times, the orexigenic hormone, ghrelin, is expected to be elevated with meal anticipation and should return to baseline levels postprandially.^{95,96} In chronically obese dogs, fasting ghrelin is lower versus lean dogs, but is significantly higher during weight loss. After maintaining

weight loss for six months, plasma ghrelin returns to levels comparable to those of lean animals.¹⁰³ In the current study, a fasting sample was not obtained, although 420 minute samples have been associated with return to fasting levels of ghrelin and glucose.⁹⁶ Because these dogs were habituated to 8am and 4pm feedings, ghrelin levels that did not decrease by 420 minutes may be due to anticipation of the afternoon meal, which was not provided until the final sample was collected and was 3 hours later than normal. In contrast to the Bhatti paper, obese dogs in the present study had higher ghrelin levels initially, which then decreased over 12 weeks. When isolated for 420 minute samples, all four groups actually had numerically decreased ghrelin levels by study termination, although this was only significant in the nutraceutical and placebo groups. The most plausible explanation is that by the third exposure to an intrusion meal and blood sampling protocol, the dogs had become habituated to afternoon feedings being provided much later than was part of the general daily routine.

GLP-1 is released after a meal to inhibit gastric acid secretion via an additive effect with PYY and to inhibit gastric emptying via the ileal brake mechanism.^{115,122,123} As body mass rises, circulating GLP-1 levels decrease, with obese people showing a blunted GLP-1 response.¹²⁶⁻¹²⁹ In dogs, however, GLP-1 has been shown to increase with weight gain and decrease after weight loss.^{130,131} Another study initially indicated GLP-1 levels were associated with the level of adiposity, but no significant effect remained after two extreme outliers were removed from analysis.¹³² The study reported here supports an inverse relationship between GLP-1 and the level of obesity, in agreement with data in people.¹²⁶⁻¹²⁹ All three groups undergoing weight loss followed this pattern, although the difference between baseline and end of study values was only significant for WLD when isolated for 420 minute collections. Dogs maintaining lean body weight had a significantly higher group affect for GLP-1 against all other groups, also supporting the idea that circulating GLP-1 decreases with obesity.

As PYY is associated with an anorexigenic effect, levels would be expected to be higher in groups exhibiting meal intake changes attributed to satiation. Since intrusion meal intake did not exhibit effects associated with medium term satiety in any groups, it is not surprising that there were few between group differences. Obese placebo dogs had significantly lower PYY levels than all other groups, attributable to their baseline values. Their average daily consumption was similar to that of other obesification dogs and was less than ideal weight groups at baseline. Their mean baseline intrusion meal consumption was also the lowest numerically, but was not significantly different from the other obesification groups. A modified picture emerges when samples were isolated for 420 minutes as an approximation of fasting values. There was a consistent pattern of lower 420 minute PYY levels when obese weight compared to when losing weight. Lower fasting PYY has been noted in obese people and levels increase in correlation to the level of weight loss, which is supported by the current study in dogs.^{110,117}

Glucose values exhibited a group effect for obese nutraceutical versus all other groups. This relationship was not seen when 420 minute samples were analyzed, however, and lean maintenance dogs actually had lower glucose values at the end of twelve weeks. Insulin is an adiposity signal released in a pulsatile fashion, leading to decreases in plasma glucose levels. When insulin binds its receptor, the GLUT4 transporter moves to the plasma membrane and allows adipose and striated muscle cells to move glucose intracellularly and decreases the amount of glucose present in plasma.^{139,140} Obese individuals show pulsatile patterns similar to healthy weight individuals (release following meals and during overnight fasting), but the amplitude of insulin pulses are larger during obesity.¹⁴³ Insulin exhibits a diurnal release pattern, with peak levels 2 to 5 hours postprandial in dogs.¹⁴⁴ Insulin resistance is a common manifestation in obese people and has also been found in dogs.¹⁴⁵⁻¹⁴⁸ The insulin:glucose ratio can be used as an indirect assessment of insulin resistance based on fasting samples.¹⁴⁵ While true fasted samples were not collected in the present project, samples obtained 420 minutes (7 hours) after a meal were used as an approximate representation of fasting conditions. Due to trend disagreements with other published research in dogs, the final analysis is considered nonvalid. In the current study, “fasting” insulin and insulin:glucose ratio were positively associated with weight loss, while the opposite relationship has been observed in dogs with properly fasted samples.^{145-148,251}

Leptin trends, on the other hand, did follow what has been previously published. Leptin is an adiposity signal secreted from adipocytes via the *ob* gene in direct proportion to the level of fat mass.¹⁵²⁻¹⁵⁷ In chronically obese mice, leptin is elevated and unable to assert its antiobesity effects. In people, serum leptin concentration is 4 times higher in obese individuals versus those with a normal weight, with a strong positive correlation to the level of fat mass.¹⁵³ Similar results are seen when lean dogs (BCS 3/5) are compared to obese dogs (BCS 5/5), regardless of gender or breed.^{17,156} In the dogs reported here, leptin levels were also associated with the level of fat mass, with a corresponding change as body mass evolved with treatment. In obese dogs, leptin levels decrease by 25% four weeks after consuming 45% less calories based on their target body weight, despite maintaining a consistent body weight over that time frame.¹⁵⁷ After weight loss is achieved, leptin levels decrease 74.5%, but weight maintenance values in dogs have not been determined.¹⁰³ Over twelve weeks, overall leptin values increased in current dogs maintaining body weight; even though their body weight and fat mass remained relatively stable. It exhibits diurnal variation, with lowest levels just prior to an accustomed feeding time, and highest levels 8 hours postprandial in dogs.¹⁴⁴ This overall pattern was also seen with the current dogs, regardless of treatment.

There is conflicting evidence regarding total adiponectin levels in obese dogs. Some have found obese levels to be similar to levels seen in lean dogs,^{145,248,249} while others have found lower levels in obese versus lean dogs.²⁵⁰⁻²⁵² A review of the two largest studies with conflicting results concluded

there is no sex-related difference in total adiponectin concentrations and obesity may decrease concentrations in intact but not in neutered dogs.²⁵³ Adiponectin was largely unchanged in the dogs from the current study, regardless of body mass, supporting the work of others.^{145,248,249}

While the gut hormone and endocrine factor plasma levels are interesting, they do not provide information regarding effectiveness of the leucine/pyridoxine nutraceutical at the cellular level. Select gene expression was determined in muscle and fat samples for this purpose. Leucine has been shown to increase muscle fatty acid oxidation and UCP3 expression and to decrease adipocyte fatty acid synthase (FASN) and PPAR γ expression *in vitro*.³⁴⁸ FASN is integral to fat production by catalyzing palmitate production from acetyl CoA and malonyl CoA. PPAR γ stimulates lipid uptake and production within adipocytes and UCP3 causes oxidative phosphorylation, mainly in skeletal muscle. PPAR γ expression was not measured in this study, but it has previously been shown to be decreased in visceral adipose tissue of obese and insulin resistant dogs compared to expression before obesity.⁴³² FASN (adipose tissue), UCP3 (skeletal muscle), and UCP2 (adipose tissue) were assessed in the current project, but expression levels were similar across and within all groups at both time points. Subcutaneous fat expression of FASN has been shown to increase numerically, although not significantly, in dogs after weight loss.⁴³³ The nutraceutical and therapeutic weight loss diet dogs reported here followed this pattern, while placebo dogs actually exhibited numerically lower FASN expression at study termination. The lack of expression changes may be related to the type of adipose tissue analyzed. Visceral adipose tissue, rather than subcutaneous tissue, has been associated with decreased FASN expression in dogs after weight loss.⁴³³ In people, subcutaneous adipose tissue is the source of > 80% of total body fat and is stored as large depots in abdominal, gluteal, and femoral regions.⁴³⁴ Visceral fat comprises a minority of total body fat and is found associated with internal organs, but increased adiposity of this region (central obesity) is associated with risk of metabolic comorbidities development.⁴³⁴ Obtaining visceral fat samples requires more invasive sampling procedures and was not completed in this study, but it should be considered for future study of adipocyte gene expression.

Leucine also increases mitochondrial mass in both muscle and fat cells *in vitro* with a corresponding increase in expression of mitochondrial biogenesis genes (SIRT1, PGC1 α , and NRF1) and mitochondrial component genes (UCP3, Cox, and NADH).^{349,355} Decreased adiposity has been attributed to increased UCP3 expression and improved insulin sensitivity in mice.³⁵¹ Adipocytes exposed to serum from overweight people consuming a high dairy diet exhibited increased UCP2, PGC1 α , NRF1, and UCP3 activity and expression, indicating increased mitochondrial biogenesis and component gene activation.³⁵⁵ UCP2 and UCP3 have been sequenced in dogs, but comparisons between expression levels based on body composition have not been published.²²⁴ SIRT1 adipose tissue expression in the current dogs did not differ by group or time point, while

muscle values were initially increased in the obese nutraceutical dogs, but normalized to all other groups by study completion. PGC1 α and NRF1 muscle and fat expression did not differ within or across groups.

Another function of leucine is its ability to stimulate protein synthesis in skeletal muscle via mammalian target of rapamycin (mTOR) dependent and independent pathways.^{357,357–362} It also maintains muscle mass via an antiproteolytic effect, supported by evidence of down regulated ubiquitination and proteasome activity in rats.^{372,374} When given to tumor bearing cachectic rats, leucine (3% of diet) over 20 days reduced protein degradation compared to control rats.³⁷⁵ The only objective *in vivo* measure of muscle in the current study was measurement of overall lean tissue mass by DXA. Nutraceutical dogs maintained muscle mass while losing weight, but there was not an advantage over a therapeutic weight loss diet. To better assess the protein synthesis capabilities of the nutraceutical, genes involved with mTOR activation and activity would need to be measured.

Pyridoxine, the other component of the nutraceutical, acts to attenuate calcium signaling, inhibiting calcium movement into adipocytes *in vitro*. This has been noted in research utilizing pyridoxine deficient rats, which have enhanced influx of calcium into vascular smooth muscle.^{384,385} Spontaneously hypertensive rats also exhibit increased intracellular calcium levels, which is reduced with dietary pyridoxine supplementation at both recommended and 20 x recommended dietary intake levels.³⁸⁶ The ability to limit intracellular calcium accumulation is important to discussions surrounding weight loss because calcium regulates adipocyte lipid metabolism. This relationship has been shown using human adipocytes exposed to agouti protein, which is associated with obesity and is expressed primarily in adipocytes. Agouti protein exposure increased adipocyte FASN expression in these adipocytes, indicating a lipogenic state.^{387,388} As previously discussed, FASN expression did not differ between groups utilized in this study, but further examination of visceral adipose tissue expression is warranted.

Another reason for a lack of expression difference between groups may be related to mRNA expression not necessarily acting as an accurate indication of functional protein level expression. This is illustrated by the existence of UCP2 mRNA, but not UCP2 protein expression within BAT, muscle, and cardiac tissues.^{219,435} If protein expression is found within a specific tissue in which gene expression is observed, changes within the gene expression over time also may not be a reflection of changes in protein expression.^{219,435,436} In the current study, it would have been beneficial to assess protein abundance as well to corroborate or refute gene expression results. Many factors contribute to protein abundance after mRNA is produced with a weak correlation between the two and this correlation may be affected by post-transcriptional regulation and measurement noise.⁴³⁷

Interleukin-6 (IL6) is a cytokine released from white adipose tissue (WAT), macrophages, fibroblasts, endothelial cells, and skeletal muscle cells.¹⁶⁶ Its

plasma levels correlate to the level of adiposity, it is proinflammatory when in WAT and hepatic tissue, and increases insulin resistance via downstream inhibition of insulin receptor and IRS1 phosphorylation.^{166–170} IL6 has been previously measured in dogs, but remained below the level of detection limit in most or all samples.^{145,251,252} Using the same multiple cytokine technique used in these other publications, approximately one third of the IL6 samples in the current study were below the standard curve expected concentration limit of 36.4 pg/ml, but were still included in the analysis. Overall, IL6 did not differ between dogs whether losing or maintaining body weight. This may corroborate the hypothesis that obesity is not indicative of an inflammatory state in dogs, based on inconsistent adiponectin, C-reactive protein, and resistin results.^{145,250–253,438,439} On the other hand, it may only indicate these are not appropriate markers of obesity-related inflammation in dogs as opposed to leptin and TNF α , which are elevated.^{17,145,156,440}

Interleukin-15 (IL15) is another cytokine that was measured as a marker of increased muscle fatty acid oxidation. It is involved in modulation of the cross-talk between muscle and adipose tissue, leading to decreased fat deposition in adipose tissue and increased skeletal muscle fiber growth.^{262–266} IL15 has not been measured in obese dogs, but it has been assessed in endurance racing sled dogs. In dogs competing in a 1650 km, multi-day race, IL15 plasma concentration did not change from 72 hours before, halfway through, and within 6 hours of race completion.⁴⁴¹ In obese rats, however, IL15 plasma and muscle tissue expression levels are reduced, but increase with treadmill running (26 m/min, 60 min/day, 5 days/week) over 8 weeks as compared to sedentary obese controls.⁴⁴² In the dogs reported here, lowest numerical IL15 baseline values were observed in the group maintaining ideal body weight at all time points, although the obese placebo dogs also had relatively low numbers compared to other groups. While IL15 assessment in rats increases to appreciable levels, based on both dogs of various weights and dogs undergoing intensive exercise, IL15 may not be a myokine that changes to appreciable levels.

In conclusion, these data show dogs eating lean maintenance levels of a canned adult diet with a leucine/pyridoxine nutraceutical can achieve weight loss similar to dogs consuming lean maintenance levels of a therapeutic weight loss diet. Both groups performed better than a placebo control, but all groups lost weight over twelve weeks. This supplement shows promise as an alternative method to inducing effective weight loss in dogs without excessive caloric restriction or changing to a therapeutic weight loss diet. There was no difference in medium term satiety, based on intrusion meal intake 3 hours after a standard morning meal and select behavior observations during feeding. This is true of all obese dogs losing weight on a lean maintenance level of calories, regardless of the type of diet fed. In general, plasma measurements of gut hormones and endocrine factors followed expected trends. Perhaps the most significant revelation is that adiponectin levels remained relatively consistent in these dogs, unrelated to the level of adiposity. There was also no effect of leucine/pyridoxine

nutraceutical, placebo, and therapeutic weight loss diet on tissue expression of genes involved in fat oxidation, oxidative phosphorylation, and mitochondrial biogenesis. Future work in dogs should include visceral adipose tissue samples and protein quantification for functional comparisons. Circulating plasma concentrations of IL6 and IL15 also did not differ between groups, suggesting they are not the most appropriate markers of obesity related inflammation and muscle fatty acid oxidation in dogs.

CHAPTER II
EFFECT OF A LEUCINE/PYRIDOXINE NUTRACEUTICAL ON
FOOD INTAKE AND BODY COMPOSITION OF LEAN DOGS
CONSUMING EXCESS CALORIES

Introduction

Various data indicate a global overweight and obesity prevalence of 22.9-59.3% in adult dogs.⁶⁻¹⁴ The greatest prevalence is when 6-10 years old, neutered, and when represented by specific breeds (i.e., Beagle, Labrador Retriever, and Rottweiler).⁶ Lean Labrador Retrievers have been found to live 1.8 years longer and require long-term treatment for osteoarthritis 3 years later than their overweight sex- and weight-matched siblings, giving credence to undertaking efforts to achieve weight loss.³³

Diet manipulations to decrease caloric intake have long been the treatment of choice for canine obesity, but compliance and long-term weight maintenance success has proven difficult to achieve.^{292,325,326,396-400} Most plans involve feeding specially designed therapeutic weight loss diets, typically providing an increased nutrient to calorie ratio, increased fiber and protein content, and reduced kcal/kg food content.^{282,292} The increased fiber content is largely employed to improve satiety and decrease total volume of meal consumption, although it has not always been successful in this regard.^{288,289,423,443}

Energy intake is generally considered to be influenced by either homeostatic or hedonic tendencies. Hedonic hunger refers to a subjective state in which satiety has little effect over the power of a highly palatable food item. When a food is highly palatable, the individual views that food as desirable and is more likely to consume it, regardless of how recently one has consumed other meals. Homeostatic hunger, on the other hand, is a response driven by prolonged lack of energy intake rather than the palatability factor of specific food items.⁷⁴ It is controlled by central and peripheral mechanisms that are capable of inducing the feeling of satiety, a lack of desire to eat. Assuming no influence of hedonic tendencies, satiation will cause decreased food intake. As satiety is difficult to measure in dogs, it is generally inferred by voluntary decreases in food consumption and decreased food-seeking activities.^{288,289,423,443}

In cases where switching the diet is not desirable, or where dietary modifications do not affect the pet's insatiable appetite, alternative methods are required. In people, a nutraceutical combining 2.25 g leucine and 30 mg pyridoxine (NuShape®, NuSirt Sciences, Nashville, TN) has shown promise as an effective aid to the management of obesity.^{347,354} The premise involves capitalizing on the synergistic ability of the two nutrients to encourage lipolysis while maintaining lean tissue mass. Leucine is an essential ketogenic branched chain amino acid (BCAA), with highest concentrations (g leucine/100 g food item) in eggs, soy-derived products, and dairy products.³⁴⁶ Leucine has been shown to modulate fat oxidation and energy partitioning between adipose tissue and skeletal muscle. The cross-talk that occurs causes diminished adipocyte lipid storage, increased net fat oxidation, and decreased overall adiposity.³⁴⁷⁻³⁵² Leucine also can affect food intake by activating the mTOR pathway, causing the arcuate nucleus of the hypothalamus to express anorexigenic neuropeptides and decreasing food intake.^{378,379} Pyridoxine (vitamin B₆) is a cofactor for various

macronutrient metabolism enzymes in its active form, pyridoxal 5'phosphate (PLP). It tends to be highest in fortified foods, but naturally occurring sources of pyridoxine with high concentrations (mg pyridoxine/100 g food item) are pistachios, wheat and rice bran, garlic, sunflower seeds, and various spices.³⁴⁶ PLP is specifically used in this supplement for its attenuation of calcium signaling and overall decreased net lipid storage.^{347,354}

The central aim of the study undertaken here was to determine if a leucine/pyridoxine supplement in a dose modified for dogs would prevent or minimize weight gain in lean dogs consuming excess calories compared to a negative placebo control. We hypothesize the nutraceutical will prevent or minimize weight gain compared to gains achieved by the placebo control.

The central aim of the study was to determine if a leucine/pyridoxine supplement in a dose modified for dogs would prevent or minimize weight gain in lean dogs consuming excess calories compared to a negative placebo control. A secondary goal was to describe any impact of treatment on medium term satiety. We hypothesized that the nutraceutical would prevent or minimize weight gain compared to gains achieved by the placebo control. A similar pattern would be expected for medium term satiety induction. The nutraceutical was expected to upregulate tissue expression of genes involved in fat oxidation, oxidative phosphorylation, and mitochondrial biogenesis, while decreasing genes associated with lipogenesis. It would increase circulating IL15, which has been implicated in muscle maintenance, glucose and lipid oxidation, while decreasing proinflammatory and insulin resistance promoting IL6. Dogs maintaining their weight were expected to have consistent results at all time points.

Materials and methods

Animals

Eighteen healthy two-year-old male castrated Beagles were used for this negatively controlled study. A random number table was used to assign dogs to three groups. Individual groups were maintained in the same room and all dogs were individually housed in runs within the laboratory animal facilities of the University of Tennessee College of Veterinary Medicine. Dogs were deemed healthy prior to inclusion based on physical examination, complete blood counts, plasma biochemical analysis, and urinalysis. The study protocol was reviewed and approved by The University of Tennessee Institutional Animal Care and Use Committee.

Diet and group assignments

Dogs were fed based on group assignments (excess calorie nutraceutical group, ExN; excess calorie placebo group, ExP; ideal body weight group, IBW; Figure 22).

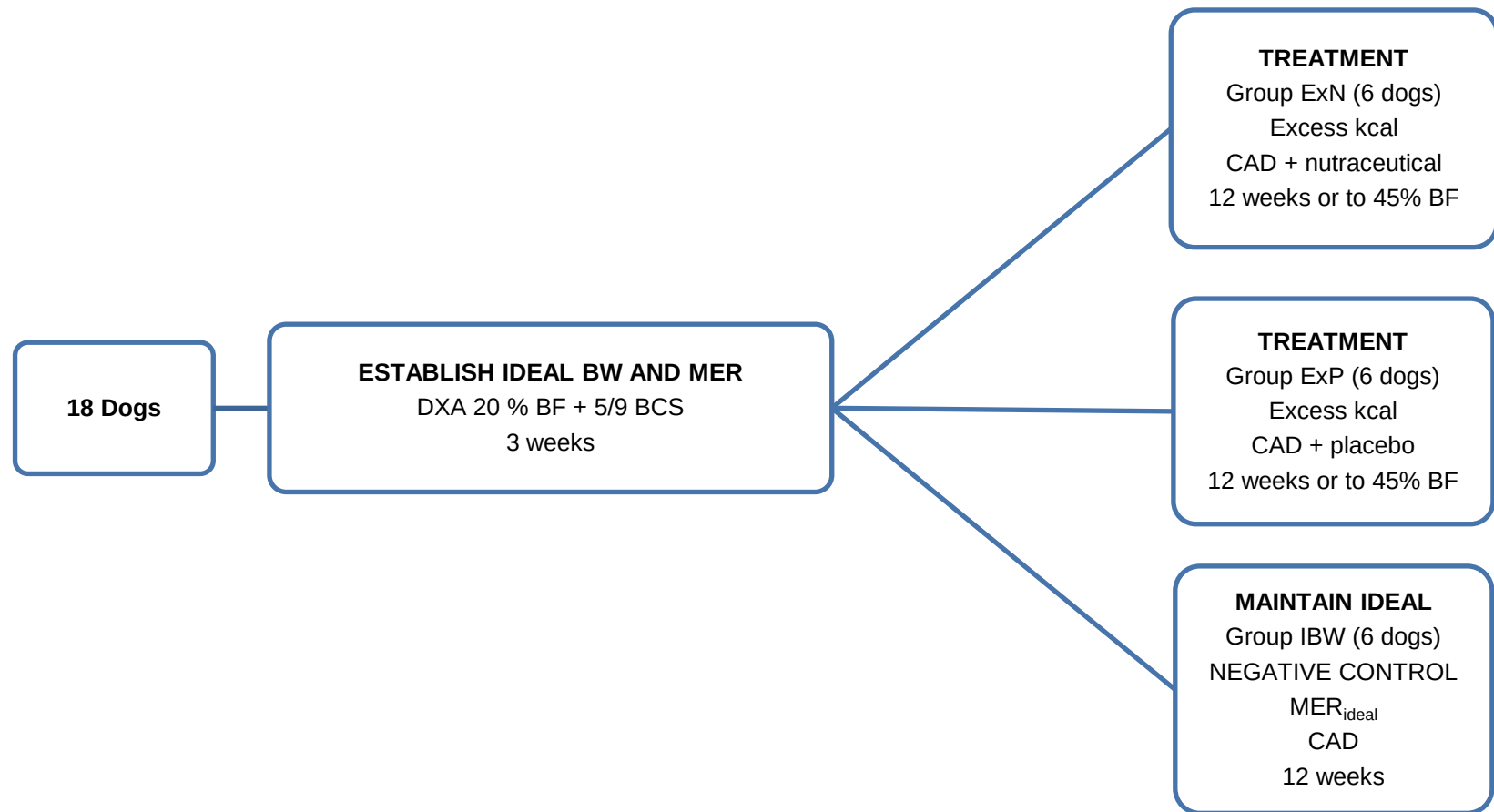


Figure 22 Group assignments

BW, body weight; MER, maintenance energy requirement; DXA, dual energy x-ray absorptiometry; % BF, percent body fat; BCS, body condition score; IBW, ideal body weight; ExN, excess calorie nutraceutical; ExP, excess calories placebo; CAD, canned adult diet.

Establish ideal BW and MER: 18 dogs

Resting energy requirement (RER; $70 \times \text{BW}_{\text{kg}}^{0.75}$) was calculated for each dog based on calculated ideal body weight. Ideal body weight [(current weight x current % lean) / ideal % lean] was calculated using the percent body fat (% BF) correlating to each dog's current body condition score (BCS) based on the 9-point scale. Each unit increase on the scale is associated with a change of approximately 5 percent body fat (%BF) where an ideal score of 5/9 equates to 20 – 25 %BF and 9/9 equals 40 – 45 %BF.^{46,401} Current % lean was determined by subtracting the current % BF from 100 and 20% was used as the ideal lean value. Maintenance energy requirement (MER; RER x lifestage factor) was calculated using a lifestage factor of 1.6, corresponding to the recommendation for a castrated adult dog.⁴⁹

Dogs were fed a canned adult diet (CAD; Table 17) at MER divided into two daily meals (8AM and 4PM) for four weeks and had access to food for 45 minutes at each feeding. Food was weighed before and after meal access five days a week (Monday – Friday). Weekend meals (Saturday and Sunday) were prepared Friday afternoon by the research staff, placed in Ziploc bags labeled for each dog, and refrigerated until fed. Weekday meals were prepared and fed by the investigators while weekend food was fed by the animal care staff. Body weight and BCS were recorded Monday, Wednesday, Friday and feeding amount was adjusted to establish the individual's ideal MER ($\text{MER}_{\text{ideal}}$) based on achieving or maintaining lean body weight and BCS.

Maintain ideal weight: 6 dogs

IBW dogs were maintained on CAD at established $\text{MER}_{\text{ideal}}$ as a negative control for an additional 12 weeks. Body weight and BCS were determined once a week (Monday). Feeding amount was adjusted in $\frac{1}{4}$ can increments as needed to maintain ideal body weight and condition.

Treatment: 12 dogs

Dogs were fed CAD in excess of what they were able to consume in one meal. To avoid excessive food wastage, the amount fed was adjusted after each feeding to ensure all dogs were offered at least $\frac{1}{2}$ can more than they consumed in the previous meal. ExN dogs received two nutraceutical capsules (1 g leucine + 13 mg pyridoxine total dose) and ExP dogs received two placebo capsules (corn starch) in a CAD meatball before getting access to their morning meal. The weight (g) of the capsule meatball was recorded as part of the morning meal weight. In the event a dog split open its capsules rather than swallowing them, capsule contents were rubbed into the meatball and fed to the dog until eaten, and before the morning meal was fed.

Table 17 Diet nutrient profile

<i>Nutrients (per 1000 kcal)</i>	<i>CAD diet</i>
Protein (g)	56
Fat (g)	38
Carbohydrate (g)	129
Crude fiber (g)	2
Leucine (mg)	5,000
Isoleucine (mg)	1,960
Valine (mg)	2,550
Pyridoxine (mg)	2.4
Metabolizable energy (kcal/kg)	1021

Information provided by manufacturer product guide average nutrient analysis. Values not listed in product guide were obtained directly from manufacturer.

CAD, canned adult diet (Science Diet Adult Gourmet Beef Entrée, Hill's); WLD, weight loss diet (Prescription Diet r/d, Hill's); kitten diet (Science Diet Kitten Healthy Development, Hill's).

Body weight and BCS determination was decreased to once a week. Treatment was continued for 12 weeks or until individual dogs reached > 45 %BF. For dogs reaching extreme obesity before twelve weeks, body fat level as estimated by BCS was confirmed using dual energy X-ray absorptiometry (DXA) prior to treatment termination.

Food consumption

To avoid confounding changes in food consumption due to fasting prior to DXA, food intake calculations were based on average food consumption over four days at baseline, one, four, eight, and twelve weeks into treatment. The fifth day of food recording was dropped to account for morning meal loss and poor afternoon meal consumption post anesthesia on DXA days.

Intrusion meal consumption

Medium term satiety based on food intake was determined at baseline, one week, and twelve weeks into treatment, or when end of treatment limits were achieved. On sample days, dogs were fed their standard 8AM meal in a random order as previously described. Each dog was provided with its meal in a two minute delay staggered pattern. Three hours later (12PM) a second intrusion meal was fed, also following the two minute staggered pattern. This meal provided more calories than each dog would consume in a single meal and was

provided in the same random order as the 8AM meal from that day. Meals were weighed before and after feeding and intrusion meal calories consumed was calculated. CAD was used for all intrusion meals, including dogs being fed WLD because both diets share a similar palatability profile and would therefore not be expected to trigger hedonic tendencies in relation to novel diet exposure (Jewell, DE; personal communication).

Body composition

Body composition was determined using HOLOGIC® fan-beam QDR 4500A DXA (Hologic, Inc., Bedford, MA) before starting treatment, serving as the baseline measurement. Dogs were fed their standard evening meal the day prior and then fasted the morning of analysis. An intravenous or intramuscular injection of butorphanol (0.2 mg/kg) and acepromazine (0.05 mg/kg) was given as premedication 10-20 minutes prior to induction. Propofol (2-8 mg/kg, to effect) was given intravenously and dogs were immediately placed in ventral recumbency on the DXA table. Scans were performed using the whole body fan beam setting and analyzed using APEX System Software version 2.3 (Hologic, Inc., Bedford, MA) by the same operator. DXA was performed under general anesthesia one, four, eight, and twelve weeks into treatment. Additional scans were performed as needed during treatment to confirm study termination in those dogs reaching extreme obesity body condition prior to twelve weeks.

Behavioral observations

Behavioral observations were obtained at baseline, one week, and twelve weeks into treatment, or when end of treatment limits were achieved. Six volunteers recorded behavior observations while dogs were consuming the intrusion meal. One group of dogs was observed per day and volunteers were randomly assigned to individual dogs prior to each session for which they volunteered. Each dog was fed in the same random order as the 8AM meal from that day. The general procedure was for all volunteers to quietly enter the room together. As the first dog was provided with its meal, the volunteer assigned to observe that dog sat down in front of the run and recorded specific behaviors for the next 46 minutes. Two minutes after this first dog was fed, the second dog was fed and the volunteer assigned to this dog sat down in front of the cage to record behaviors. This process continued every two minutes until all volunteers were sitting and recording behavior.

Observations were made every two minutes and all volunteers avoided communicating with the dogs or with other volunteers during this time. Recorded behaviors were eating meal/head in bowl, drinking, corprophagia, urinating/defecating, stretching, yawning/panting, body shaking, playing with toys, grooming, resting (head down), lying (head up), sitting, standing, walking/running/jumping, cage position (front, middle, back), and vocalizing. Due to the two minute staggered feeding pattern, the volunteers completed 46

minutes of observation in the same staggered pattern. They were instructed to remain quiet and as still as possible until the final volunteer finished recording. Once this final volunteer stood up, all other volunteers would stand and remove their dog's food bowl from the room.

To avoid reactions to novel situations, each volunteer trained at least once prior to observation days by observing the dogs during a standard morning or evening meal. This allowed the volunteer to become familiar with the behavior scoring sheet and also habituated the dogs to having personnel near their cages while eating. Volunteers were only allowed to have a cage liner to sit on, pen, paper, clipboard, and a timer. All cell phones and any other items capable of making noise or being distracting, were left in a staging room.

On observation days, signs were hung within the animal facility warning people that noise sensitive research was underway. Anyone approaching within close proximity to the room being observed was asked to make as little noise as possible.

Blood samples

Blood samples were obtained at baseline, one week, and twelve weeks into treatment, or when end of treatment limits were achieved. On sample days, dogs were fed their standard 8AM meal in a random order as previously described. Each dog was provided with its meal in a two minute delay staggered pattern. Just prior to being offered an intrusion meal three hours later (12PM), blood samples were collected (time 0) via jugular venipuncture and placed in BD Vacutainer® EDTA tubes (4ml, Becton, Dickinson and Company, Franklin Lakes, NJ). Additional samples were collected 60, 90, 120, 180, 420 minutes after the intrusion meal. Each dog's sample was collected in two minute increments, following the same random order as the morning feeding, in order to allow time for sample collection. The same two research personnel were responsible for all blood sample collections. The afternoon meal was not fed until after all 420 minute samples were collected.

Blood glucose was immediately determined after each collection with the AlphaTRAK® Blood Glucose Monitoring System companion animal specific glucometer (Abbott Laboratories, Abbott Park, IL). Samples were centrifuged at 3,500 x RPM for 10 minutes at room temperature. Serum was removed and frozen in Corning® polypropylene cryogenic vials (Corning, Inc., Amsterdam, The Netherlands) at -80°C for later analysis.

Biopsies, RNA extraction

Biopsies of subcutaneous adipose tissue and semitendinosus or semimembranosus muscle tissue were obtained under general anesthesia at baseline, one week, and end of treatment time periods for all dogs.

Approximately 100mg samples were collected, placed in RNAlater® (AMBION, Inc., Austin, TX), and frozen at -80°C for later analysis.

In preparation of RNA extraction, groupings of up to eight tissue samples were thawed to room temperature. Muscle samples were disrupted and homogenized using 20G sterile Monoject™ needles (Covidien™, Mansfield, MA) and the QIAGEN QIAshredder™ kit (QIAGEN, Valencia, CA). Fat samples were disrupted and homogenized using TRIzol® reagent (Invitrogen™, Carlsbad, CA) and a tissue homogenizer. Total RNA was extracted from homogenized samples using the RNeasy® Mini Kit (muscle) and RNeasy® Lipid Tissue Mini Kit (adipose; QIAGEN, Valencia, CA). Total RNA concentration, purity, and quality were assessed for initial samples by measuring the 260/280 ratio (1.8-2.0) using the ND-1000 Spectrophotometer (NanoDrop Technologies Inc., Wilmington, DE).

Reverse transcription and real-time PCR

Reverse transcription and real-time PCR of muscle tissue samples were carried out in a single reaction on the AB StepOne™ Real-Time PCR System (Applied Biosystems, Foster City, CA) in a 10 µl mixture containing 3 µl total RNA, 5.25 µl TaqMan® RNA-to-C_T™ 1-Step Kit (5 µl Taq, 0.25 µl enzyme; Applied Biosystems, Foster City, CA), 0.5 µl of each primer/probe mixture, and 1.25 µl RNase free water. The SIRT3 reaction varied slightly, with a 10 µl mixture containing 5 µl total RNA, 3.25 µl TaqMan® RNA-to-C_T™ 1-Step Kit (3 µl Taq, 0.25 µl enzyme), 0.5 µl primer/probe mixture, and 1.25 µl RNase free water. Reverse transcription and real-time PCR of fat tissue samples were carried out in a similar single reaction in a 10 µl mixture containing 3 µl total RNA, 5.25 µl TaqMan® RNA-to-C_T™ 1-Step Kit (5 µl Taq, 0.25 µl enzyme;), 0.5 µl of each primer/probe mixture, and 1.25 µl RNase free water. GAPDH reactions also contained 0.2 µl ROX Reference Dye (Clontech Laboratories, Inc.; Mountain View, CA) and corresponding reduced 1.05 µl RNase free water.

The real-time PCR conditions were 48°C for 30 minutes and 95°C for 10 minutes, followed by 45 cycles of 95°C for 15 seconds and 60°C for 1 minute. The relative amount of gene expression was obtained from the fluorescence cycle threshold (CT). Relative transcript levels were calculated by the $2^{-\Delta\Delta CT}$ method, and samples were normalized to the B2M (muscle) or GAPDH (fat) reference gene expression.⁴⁰³

Most primers and probes were obtained from Applied Biosystems TaqMan® Assays-on-Demand™ Gene Expression primers and probe set collection (Catalogue #4351372; Applied Biosystems, Foster City, CA; Table 18). GAPDH was designed using Integrated DNA Technologies PrimeTime® Std qPCR Assay (Integrated DNA Technologies, Coralville, IA) based on previously published sequences.⁴⁰⁴ The sequence information for GAPDH was as follows: 72-bp product sense, 5'-CTG GGG CTC ACT TGA AAG G-3', and antisense, 5'-CAA

Table 18 Sequences for primers and probes

Gene	Primers context (sense) sequence	Amplicon Length (Bp)	Assay number
B2M	5'GATCGTTAAGTGGGACCGAGACAAC-3'	59	Cf02659078
FASN	5'CCACTTACTGGGCATGGCCGTCTTC-3'	86	Cf02649409
NRF1	5'GCAGTGGCTGATGGAGAGGTGGAAC-3'	96	Cf02703906
PGC1A	5'AGAGGCAGAGGCAGAAGGCAATTGA-3'	93	Cf02707650
SIRT1	5'AAACGGCTTGATGGTAACCAGTATC-3'	84	Cf02666196
SIRT3	5'CTGGGGCCCGGCAGGGTGGAGGAGT-3'	139	Cf02664398
UCP2	5' TCATGACAGATGACCTCCCTTGCCA-3'	93	Cf02730413
UCP3	5'-GGATCAGACCACTCCAGCATCACTA-3'	91	Cf02621970

ACA TGG GGG CAT CAG-3'; and Taqman probe, 5'-AGC AGA GAT GAT GAC CCT CTT GGC-3' (Figure 23).

All samples were run in triplicate for each gene. Triplicates were averaged and analyzed together if the difference between CT values was <1. If the difference between CT values was >1, duplicate differences were calculated. If a duplicate had a difference between CT values <1, that pairing was kept and the outlier was dropped from analysis. If two or more duplicates had differences between CT values >1, a new analysis of that gene was performed. If the reference gene needed a new analysis based on these criteria, PCR was repeated for all genes corresponding to that RNA sample. If > 5 genes on a single reaction plate needed to be repeated, the entire reaction was performed again.

ELISA

Previously frozen serum samples were thawed to room temperature prior to use. Canine adiponectin was analyzed at three time points (0, 120, 420 minutes) from three sample dates (baseline, one week, twelve weeks into treatment) for all 18 dogs. Canine adiponectin sandwich ELISA kits were obtained from EMD Millipore (St. Charles, MO) and analysis was performed according to manufacturer instructions. All samples, controls, and standards were run in duplicate and no samples from the same collection date for a single dog were run on the same plate. Absorbance was read at 450 nm on an EL x 800 Universal Microplate Reader (Bio-Tek Instruments; Winooski, VT) and analyzed using Gen5 2.01.14 software (Bio-Tek Instruments; Winooski, VT).

Multiplex ELISA

Previously frozen serum samples were thawed to room temperature prior to use. Select canine gut hormones were analyzed at three time points (0, 120, 420 minutes). Select canine cytokines were analyzed at two time points (0, 420 minutes). Three sample dates (baseline, one week, twelve weeks into treatment) were analyzed for all 18 dogs. Multiple gut hormone (active ghrelin, active GLP1, insulin, leptin, total PYY) and cytokine (IL-6, IL-15) kits were obtained from EMD Millipore (St. Charles, MO) and analysis was performed according to manufacturer instructions. All samples, controls, and standards were run in duplicate and no samples from the same collection date for a single dog were run on the same plate. Kits were read using the Luminex reader version 100/200 (Austin, TX) and analyzed using Luminex xPONENT.3.1.971.0 (Austin, TX).

Parameter Set:

RT-qPCR (Primers with Probe) Amplicon length = 72

	Start	Stop	Length	Tm	GC%
Forward <u>CTGGGGCTCACTTGAAAGG (Sense)</u>	372	391	19	62	57.9
Probe <u>AGCAGAGATGATGACCCTCTTGGC</u> (AntiSense)	395	419	24	68	54
Reverse <u>CAAACATGGGGGCATCAG (AntiSense)</u>	426	444	18	61	55.6

>XM_003435649_2

GCCGACAGACAGCCGCGTCTTCTGGTGCTGCGCCAGGCGCGTCCCCGAGGCACGATGGT
 GAAGGTCGGAGTGAACGGATTTGGCCATATTGGGCGCCTGGTCACCAGGGCTGCTTTTAAC
 TCTGGCAAAGTGGATATTGTCGCCATCAATGACCCCTTCATTGATCTCAACTACATGGTGTAC
 ATGTTCCAGTATGATTCTACCCACAGCAAATTCCACGGCACAGTCAAGGCTGAGAACGGGAA
 ACTTGTCAACGGGAAGTCCATCTCCATCTTCCAGGAGCGAGATCCTGCCAACGTCAAAT
 GGGGTGATGCTGGTGCTGAGTATGTTGTGGAGTCCACTGGGGTCTTCACCACCATGGAGAA
 GGCTGGGGCTCACTTGAAAGGCGTG**GCCAAGAGGGTCATCATCTCTGCT**CCTTCTG**CTGAT**
GCCCCATGTTGTGATGGGCGTGAACCATGAGAAGTATGACAACTCCCTCAAGATTGTCAG
 CAATGCCTCCTGCACCACCAACTGCTTGGCTCCTCTAGCCAAAGTCATCCATGACCACTTCG
 GCATCGTGGAGGGCCTCATGACCACCGTCCATGCCATCACTGCCACCCAGAAGACCGTGGA
 GGGTCCCTCTGGGAAGCTGTGGCGTGACGGCCGAGGGGCTGCCCAGAACATCATCCCTGC
 TTCCACTGGCGCCGCCAAGGCTGTGGGCAAGGTCATCCCTGAGCTGAACGGGAAGCTCAC
 TGGCATGGCCTTCCGTGTCCCCACCCCAATGTATCAGTTGTGGATCTGACCTGCCGCCTG
 GAGAAAGCTGCCAAATATGACGACATCAAGAAGGTAGTGAAGCAGGCATCGGAGGGACCCC
 TCAAGGGCATCCTGGGCTACACTGAGGACCAGGTGGTCTCCTGTGACTTCAACAGTGACAC
 CCACTCTTCCACCTTCGACGCCGGGGCTGGCATTGCCCTCAATGACCACTTTGTCAAGCTCA
 TTTCTGGTATGACAATGAATTCGGCTACAGCAACCGGGTGGTGGACCTCATGGTCCACATG
 GCCTCCAAGGAGTAAGAGCCTCCTGGACCACCAGCCCCAGCAAGAACAAGAGGAAGAGAG
 AGGCCCTCAGCTGCTGGGGAGTCCCTGCCCCAACTTAATCCCCAACACACTGAGAATCTC
 CTGACCTCCAATTTACATCCTAGACCCCAAGGAAGGGGAGGGGCTTGGGGAGCCCTACCTT
 GTCATGTACCATCAATAAAGTATACTGTACCCAGCCAAAA

Figure 23 GAPDH primer/probe information.

Insulin:glucose ratio

The insulin:glucose ratio was calculated using the average of the 420 minute duplicate insulin results and the 420 minute glucose value. Unit conversion calculations were performed using the molecular weight of insulin (5808 g/mol) and a fixed conversion factor (1 μ U/ml insulin = 6 nmol/L) as follows:^{145,405}

$$\text{Insulin} \left(\frac{\text{pmol}}{\text{L}} \right) = \frac{\left[\text{Insulin} \left(\frac{\text{pg}}{\text{ml}} \right) \right]}{\left[5808 \frac{\text{g}}{\text{mol}} \right]}$$

$$\text{Insulin} \left(\frac{\mu\text{U}}{\text{ml}} \right) = \frac{\left[\text{insulin} \left(\frac{\text{pmol}}{\text{L}} \right) \right]}{\left[6 \left(\frac{\text{nmol}}{\text{L}} \right) \right]}$$

$$I:G = \frac{\left[\text{Insulin} \left(\frac{\mu\text{U}}{\text{ml}} \right) \times 100 \right]}{\text{Fasting glucose} \left(\frac{\text{mg}}{\text{dl}} \right)}$$

Statistical analysis

Based on a power calculation, six dogs per group was considered sufficient to demonstrate significant differences. The calculation utilized assumptions of a difference in mean body fat between treated (ExN) and untreated (ExP) dogs of 15% (increase in body fat from 15 to 25% in treated and 15 to 40% in untreated dogs), a within standard deviation of 25% in body fat, an alpha of 0.05, and a beta of 0.9.

Data was analyzed using MANOVA for repeated measures with SAS® version 9.4 (SAS Institute, Inc., Cary, NC). Multiple comparisons within group, time and their interaction effects were corrected with Tukey's HSD. P values less than 0.05 were reported as statistically significant.

Positive behavioral observations were counted and analyzed based on count number for all behaviors except cage position. Since one of three possible cage positions was recorded at all observation times, distribution of position was analyzed.

Gut hormone and endocrine factor plasma samples were further analyzed for 420-minute subgroup. The significant p value was adjusted using the Bonferroni procedure to control for the risk of type I error.

Results

Eighteen dogs started the study and were included in final data analysis. All dogs completed 12 weeks of their respective treatments.

Scale weight and BCS

There were no differences in body weight (BW) and BCS between groups over time. ExN and ExP gained BW and increased BCS over the twelve weeks ($p < 0.0001$, Table 19).

Food consumption

Consumption followed a similar significance pattern when analyzed as kcal, kcal/BW_{kg}, and kcal/BW_{kg}^{0.75}. As the metabolic body weight (BW_{kg}^{0.75}) is considered a more suitable way to describe the relationship between mass and energy in dogs, it will be used in reference to caloric intake discussions.⁶⁷ Kcal and kcal/BW_{kg} values are also provided in Table 19 for additional reference.

Food offered

Amounts offered to ExN were significantly greater than the amounts offered to ExP during baseline ($p < 0.0001$). Within groups, amounts offered increased from baseline to one week into treatment ($p < 0.0001$). All other kcal/BW_{kg}^{0.75} amounts offered showed no difference between groups. Amounts offered at week 12 were higher than those offered at baseline within groups ($p < 0.0001$).

Food not consumed

The amount of food left behind by ExN and ExP was similar between groups at all time points. The value not consumed increased within groups when switched from MER_{ideal} to excess calorie meals and remained consistent through end of treatment ($p < 0.0001$).

Food consumed

Amounts consumed by ExN were greater than the amounts consumed by ExP during baseline ($p < 0.0001$). One week into treatment, within group intake increased ($p < 0.0001$). Within group kcal/BW_{kg}^{0.75} intake declined back to baseline levels by end of treatment for ExN. ExP consumption was still elevated at 12 weeks compared to baseline ($p < 0.0001$), but did not differ from ExN. On a calorie basis, however, food intake remained similar from one week to end of treatment, between and within groups, despite the decline of kcal/BW_{kg}^{0.75} consumption values.

Body composition

Body composition data for obesification groups is listed in Table 20.

Fat mass

Between groups, fat mass (absolute and % body fat) did not differ for the duration of the study. Within groups, baseline and one week values were similar, while end of treatment levels were significantly higher than baseline on both a mass and percentage basis ($p < 0.0001$).

Table 19 Body weight, BCS, and food consumption by excess calorie group and time point.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks</i>
Scale weight (kg)					
ExN*	11.8 ± 1.0 ^{a,#}	13.0 ± 1.0 ^{a,#,\$}	14.0 ± 1.6 ^{a,\$,%}	14.9 ± 1.6 ^{a,%,^}	16.0 ± 1.8 ^{a,\$,^}
ExP*	11.9 ± 0.5 ^{a,#}	13.6 ± 0.8 ^{a,\$}	13.8 ± 0.8 ^{a,\$}	15.3 ± 1.4 ^{a,%}	15.8 ± 1.9 ^{a,%}
BCS (9-point)					
ExN	4.7 ± 0.5 ^{a,#}	4.2 ± 0.8 ^{a,#}	4.8 ± 0.4 ^{a,#}	6.2 ± 0.4 ^{a,\$}	7.0 ± 0.6 ^{a,\$}
ExP	5.3 ± 0.5 ^{a,#}	5.3 ± 0.5 ^{a,#}	6.0 ± 1.1 ^{a,#,\$}	7.2 ± 1.6 ^{a,\$,%}	8.2 ± 1.6 ^{a,%}
Food offered (kcal)					
ExN	1225.0 ± 102.8 ^{a,#}	3932.2 ± 79.1 ^{a,\$}	3171.2 ± 191.6 ^{a,%}	3487.7 ± 427.7 ^{a,\$,%}	3536.4 ± 455.0 ^{a,\$,%}
ExP	876.1 ± 266.0 ^{b,#}	3430.1 ± 455.7 ^{a,\$}	3076.0 ± 569.4 ^{a,\$}	3206.2 ± 401.3 ^{a,\$}	3223.4 ± 392.2 ^{a,\$}
Food intake (kcal)					
ExN	1224.9 ± 103.0 ^{a,#}	2063.7 ± 377.1 ^{a,\$}	1816.9 ± 146.7 ^{a,\$}	1614.7 ± 159.3 ^{a,\$}	1644.7 ± 175.4 ^{a,\$}
ExP	876.2 ± 282.0 ^{b,#}	2075.0 ± 457.2 ^{a,\$}	1814.9 ± 309.8 ^{a,\$}	1557.1 ± 322.4 ^{a,\$}	1585.4 ± 373.2 ^{a,\$}
Food not eaten (kcal)					
ExN	0.1 ± 0.4 ^{a,#}	1868.5 ± 362.0 ^{a,\$}	1354.4 ± 279.8 ^{a,\$}	1872.9 ± 444.0 ^{a,\$}	1891.8 ± 300.9 ^{a,\$}
ExP	-0.1 ± 0.4 ^{a,#}	1355.0 ± 155.3 ^{a,\$}	1261.1 ± 391.1 ^{a,\$}	1649.0 ± 204.9 ^{a,\$}	1638.0 ± 191.5 ^{a,\$}

Table 19 (Continued) Body weight, BCS, and food consumption by excess calorie group and time point.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks</i>
Food offered (kcal/BW _{kg})					
ExN	104.0 ± 10.8 ^{a,#}	303.6 ± 18.1 ^{a,\$}	228.9 ± 28.9 ^{a,%}	235.6 ± 33.7 ^{a,\$,%}	221.1 ± 21.5 ^{a,%}
ExP	73.8 ± 23.0 ^{b,#}	251.6 ± 23.2 ^{a,\$}	222.1 ± 29.5 ^{a,\$,%}	208.7 ± 10.7 ^{a,\$,%}	204.7 ± 11.3 ^{a,%}
Food intake (kcal/BW _{kg})					
ExN	104.0 ± 10.8 ^{a,#}	159.0 ± 28.0 ^{a,\$}	130.6 ± 13.1 ^{a,\$,%}	108.8 ± 10.3 ^{a,#,%}	103.2 ± 11.3 ^{a,#}
ExP	73.8 ± 23.0 ^{b,#}	151.7 ± 27.1 ^{a,\$}	131.2 ± 16.5 ^{a,\$}	100.7 ± 13.9 ^{a,%}	99.6 ± 12.7 ^{a,%}
Food offered (kcal/BW _{kg} ^{0.75})					
ExN	192.5 ± 17.8 ^{a,#}	575.7 ± 24.7 ^{a,\$}	441.2 ± 46.1 ^{a,%}	461.8 ± 60.8 ^{a,\$,%}	441.7 ± 41.6 ^{a,%}
ExP	137.0 ± 43.0 ^{b,#}	483.3 ± 48.8 ^{a,\$}	428.3 ± 62.5 ^{a,\$}	412.9 ± 27.5 ^{a,\$}	407.3 ± 22.9 ^{a,\$}
Food intake (kcal/BW _{kg} ^{0.75})					
ExN	192.5 ± 17.8 ^{a,#}	301.7 ± 53.0 ^{a,\$,%}	252.0 ± 21.1 ^{a,\$,%}	213.4 ± 17.8 ^{a,#,%}	206.0 ± 20.2 ^{a,#}
ExP	137.0 ± 43.0 ^{b,#}	291.6 ± 55.1 ^{a,\$}	252.9 ± 34.6 ^{a,\$}	199.6 ± 30.9 ^{a,%}	198.7 ± 30.4 ^{a,%}

Numerical data are expressed as mean ± standard deviation

^aExN, excess calorie nutraceutical group; ExP, excess calorie placebo group.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$,%^}Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 20 Body composition by excess calorie group and time point.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks</i>
Fat mass (kg)					
ExN	1.9 ± 0.4 ^{a,#}	2.4 ± 0.4 ^{a,#}	3.5 ± 0.6 ^{a,\$}	4.8 ± 0.8 ^{a,\$,%}	5.5 ± 0.7 ^{a,%}
ExP	2.3 ± 0.5 ^{a,#}	3.0 ± 0.5 ^{a,#,\$}	4.0 ± 0.7 ^{a,\$}	5.3 ± 1.3 ^{a,%}	5.9 ± 1.7 ^{a,%}
Body fat (%)					
ExN	16.7 ± 3.2 ^{a,#}	19.3 ± 2.8 ^{a,#}	25.8 ± 3.4 ^{a,\$}	32.5 ± 3.3 ^{a,%}	35.4 ± 2.6 ^{a,%}
ExP	19.9 ± 3.6 ^{a,#}	23.3 ± 3.4 ^{a,#}	28.7 ± 3.9 ^{a,\$}	35.7 ± 6.3 ^{a,%}	37.3 ± 7.7 ^{a,%}
Lean mass (kg)					
ExN	9.2 ± 0.8 ^{a,#}	9.6 ± 0.9 ^{a,#}	9.8 ± 0.9 ^{a,#}	9.4 ± 0.9 ^{a,#}	9.5 ± 1.0 ^{a,#}
ExP	8.9 ± 0.5 ^{a,#}	9.4 ± 0.5 ^{a,#}	9.4 ± 0.6 ^{a,#}	9.0 ± 0.5 ^{a,#}	9.2 ± 0.7 ^{a,#}
Lean (%)					
ExN	79.5 ± 3.2 ^{a,#}	77.2 ± 2.8 ^{a,#}	71.1 ± 3.4 ^{a,\$}	64.4 ± 3.2 ^{a,%}	61.7 ± 2.6 ^{a,%}
ExP	76.5 ± 3.4 ^{a,#}	73.3 ± 3.3 ^{a,#,\$}	68.2 ± 3.7 ^{a,\$}	61.3 ± 6.2 ^{a,%}	59.9 ± 7.4 ^{a,%}
DXA total mass (kg)					
ExN	11.5 ± 1.0 ^{a,#}	12.5 ± 1.0 ^{a,#}	13.7 ± 1.3 ^{a,\$}	14.6 ± 1.5 ^{a,\$,%}	15.5 ± 1.6 ^{a,%}
ExP	11.7 ± 0.6 ^{a,#}	12.8 ± 0.8 ^{a,#}	13.8 ± 1.0 ^{a,#}	14.7 ± 1.4 ^{a,#}	15.6 ± 2.0 ^{a,\$}

Numerical data are expressed as mean ± standard deviation

^aExN, excess calorie nutraceutical group; ExP, excess calorie placebo group.

^aWithin a column, values with different superscript letters differ significantly ($p < 0.05$).

^{#, \$, %} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Lean mass

Lean body mass did not differ between groups for the duration of the study. Absolute lean mass within both groups also remained static at all time points. Based on the percentage of lean mass, ExN and ExP had lower within group proportions of lean tissue at week 12 than they did at baseline ($p < 0.0001$).

Total mass

Total mass determined by DXA did not differ from BW recorded from digital scales. Group differences by BW are outlined above.

Negative control (Group IBW)

BW, AF, and %BF increased at eight weeks compared to baseline ($p < 0.008$) and decreased back to baseline levels at week 12. BCS, food not eaten, LM, and DXA total mass were consistent for the duration of the study. %LM decreased over time, although the twelve week level did not differ from baseline. Over time, food offered (and subsequent food intake; $p < 0.0001$) was significantly decreased to maintain ideal BW (Table 21). Compared to baseline, food offered ($\text{kcal/BW}_{\text{kg}}^{0.75}$) was decreased by approximately 35% at study termination in order to maintain ideal BW. This end of study value ($139.8 \pm 38.9 \text{kcal/BW}_{\text{kg}}^{0.75}$) was lower than voluntary food intake for ExN ($206.0 \pm 20.2 \text{kcal/BW}_{\text{kg}}^{0.75}$) and ExP ($198.7 \pm 30.4 \text{kcal/BW}_{\text{kg}}^{0.75}$; $p < 0.0001$). It was also lower than baseline values for ExN ($192.5 \pm 17.8 \text{kcal/BW}_{\text{kg}}^{0.75}$, $p < 0.0001$), but did not differ from baseline ExP ($137.0 \pm 43.0 \text{kcal/BW}_{\text{kg}}^{0.75}$) consumption.

Intrusion meal consumption

There were no $\text{kcal/BW}_{\text{kg}}^{0.75}$ consumption differences between group ExP and ExN at any time point. Within group baseline consumption was significantly greater than one week and end of study levels ($p < 0.0003$), which did not differ. Group IBW maintained intrusion food consumption levels for the duration of the study. At baseline, IBW consumption was similar to ExN and ExP, but was greater than ExN and ExP one week into treatment ($p < 0.0068$) and at study termination ($p < 0.003$; Table 22).

Table 21 Food consumption and body composition by ideal body weight group time point.

	<i>Baseline</i>	<i>One week</i>	<i>Four weeks</i>	<i>Eight weeks</i>	<i>Twelve weeks</i>
Scale weight (kg)	11.2 ± 0.8 [#]	11.3 ± 0.7 ^{#, \$}	12.2 ± 0.7 ^{#, \$}	12.5 ± 0.8 ^{\$}	11.8 ± 0.9 ^{#, \$}
BCS (9-point)	4.3 ± 0.8 [#]	4.5 ± 0.5 [#]	5.0 ± 0 ^{a, #}	5.0 ± 0 [#]	4.2 ± 0.4 [#]
Food offered (kcal)	1301.7 ± 200.9 [#]	1274.6 ± 208.4 [#]	1171.1 ± 221.3 ^{#, \$}	1037.1 ± 213.1 ^{\$, %}	887.6 ± 255.3 [%]
Food intake (kcal)	1301.5 ± 201.1 [#]	1274.6 ± 208.4 [#]	1171.1 ± 221.3 [#]	1037.1 ± 213.1 ^{#, \$}	887.5 ± 255.3 ^{\$}
Food not eaten (kcal)	0.2 ± 0.3 [#]	0 ± 0 [#]	0 ± 0 ^{a, #}	0 ± 0 ^{a, #}	0.1 ± 0.1 [#]
Food offered (kcal/BW _{kg})	118.2 ± 25.3 [#]	113.4 ± 23.3 [#]	96.2 ± 17.6 ^{#, \$}	83.4 ± 17.0 ^{\$, %}	75.5 ± 21.0 [%]
Food intake (kcal/BW _{kg})	118.1 ± 25.3 [#]	113.4 ± 23.3 [#]	96.2 ± 17.6 ^{#, \$}	83.4 ± 17.0 ^{\$, %}	75.5 ± 21.0 [%]
Food offered (kcal/BW _{kg} ^{0.75})	215.2 ± 42.6 [#]	207.6 ± 40.2 [#]	179.7 ± 32.7 ^{#, \$}	156.5 ± 31.6 ^{\$, %}	139.8 ± 38.9 [%]
Food intake (kcal/BW _{kg} ^{0.75})	215.1 ± 42.6 [#]	207.6 ± 40.2 [#]	179.7 ± 32.7 ^{#, \$}	156.5 ± 31.6 ^{\$, %}	139.7 ± 38.9 [%]
Fat mass (kg)	2.1 ± 0.5 [#]	2.2 ± 0.4 [#]	2.8 ± 0.4 ^{#, \$}	3.0 ± 0.4 ^{\$}	2.8 ± 0.3 ^{#, \$}
Body fat (%)	18.7 ± 4.0 [#]	19.4 ± 3.0 [#]	23.1 ± 2.7 ^{#, \$}	25.3 ± 2.5 ^{\$}	23.7 ± 2.2 ^{#, \$}
Lean mass (kg)	8.6 ± 0.8 [#]	8.7 ± 0.6 [#]	8.7 ± 0.6 [#]	8.6 ± 0.6 [#]	8.6 ± 0.5 [#]
Lean (%)	77.6 ± 4.0 [#]	76.9 ± 2.9 [#]	73.4 ± 2.8 ^{#, \$}	71.3 ± 2.5 ^{\$}	72.7 ± 2.3 ^{#, \$}
DXA total mass (kg)	11.1 ± 0.8 [#]	11.3 ± 0.7 [#]	11.9 ± 0.7 [#]	12.0 ± 0.7 [#]	11.8 ± 0.7 [#]

Numerical data presented as mean ± standard deviation.

^{#, \$, %} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 22 Body weight, BCS, and intrusion meal intake by group and point.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>End of study</i>
Scale weight (kg)			
ExN [*]	11.7 ± 1.0 ^{a,#}	13.0 ± 1.0 ^{a,#}	15.7 ± 1.8 ^{a,\$}
ExP [*]	12.0 ± 0.5 ^{a,#}	13.6 ± 0.7 ^{a,\$}	15.8 ± 1.9 ^{a,%}
IBW [*]	10.6 ± 0.7 ^{a,#}	11.3 ± 0.7 ^{b,#}	11.8 ± 7.6 ^{b,#}
BCS (9 point)			
ExN	4.5 ± 0.8 ^{a,#}	4.8 ± 0.4 ^{a,#}	7.5 ± 0.5 ^{a,\$}
ExP	5.0 ± 0.9 ^{a,#}	5.3 ± 0.5 ^{a,#}	8.0 ± 1.7 ^{a,\$}
IBW	4.3 ± 0.5 ^{a,#}	4.8 ± 0.4 ^{a,#}	5.2 ± 0.4 ^{b,#}
Food eaten (kcal)			
ExN	1521.8 ± 237.2 ^{a,#}	296.1 ± 181.5 ^{a,\$}	275.1 ± 219.7 ^{a,\$}
ExP	1357.2 ± 253.2 ^{a,#}	405.1 ± 309.0 ^{a,\$}	351.3 ± 69.4 ^{a,\$}
IBW	1384.3 ± 319.9 ^{a,#}	1398.3 ± 164.0 ^{b,#}	1149.6 ± 510.5 ^{b,#}
Food eaten (kcal/BW _{kg})			
ExN	130.1 ± 20.5 ^{a,#}	16.9 ± 12.3 ^{a,\$}	16.9 ± 12.3 ^{a,\$}
ExP	113.2 ± 21.2 ^{a,#}	29.1 ± 21.6 ^{a,\$}	22.3 ± 3.2 ^{a,\$}
IBW	130.3 ± 28.4 ^{a,#}	123.3 ± 11.1 ^{b,#}	98.0 ± 44.6 ^{b,#}
Food eaten (kcal/BW _{kg} ^{0.75})			
ExN	240.4 ± 36.6 ^{a,#}	43.7 ± 27.3 ^{a,\$}	33.9 ± 25.2 ^{a,\$}
ExP	210.7 ± 39.3 ^{a,#}	56.3 ± 42.0 ^{a,\$}	44.4 ± 6.7 ^{a,\$}
IBW	235.2 ± 51.6 ^{a,#}	226.1 ± 21.4 ^{b,#}	181.3 ± 81.9 ^{b,#}

Numerical data presented as mean ± standard deviation.

^{*}ExN, excess calories nutraceutical group; ExP, excess calories placebo group; IBW, ideal body weight group.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{#, \$, %}Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Behavioral observations

Any time point without a notation for resting, lying, sitting, standing, or walking/running/jumping was entered as standing. When cage position was not specified, two positions were marked, or a notation other than front, middle, or back was used, middle was recorded as the position for analysis. One dog from group IBW had lying and sitting both marked at the same time point. Lying was used as the count for analysis.

Volunteers did not consistently record total time spent eating meals, so this data could not be analyzed. There were no significant group differences for head in bowl/eating, drinking, urinating/defecating, yawning, body shaking, playing with toys, grooming, vocalizing, lying (head up), standing, or running/walking/jumping.

There were no recorded instances of corprophagia and no significant differences in cage position by group or time point (Figure 24).

Selected instantaneous sampling of behavior related to medium term satiety intrusion meal are listed in Table 23.

There were no across group differences for resting or sitting behaviors. Resting behavior was more common one week into treatment than it was at baseline for ExP ($p = 0.0143$). End of study values for ExP did not differ from baseline or one week measurements. IBW dogs sat more frequently at baseline than they did at the end of treatment ($p = 0.0299$), while one week values did not differ from either time point. No other within group differences were noted.

Gut hormones and endocrine factors

Data trends are shown by time point (baseline, one week, end of study), time of sample (0, 120, 420 min after intrusion meal), and by comparisons of baseline and end of study 420 minute plasma levels in Figures 25 – 31 and Tables 24 – 26.

Blood samples could not be obtained from one dog in group IBW at baseline (time 0) and end of study (time 0, 120, 420) or from one dog in group ExN one week into treatment (time 420).

A large proportion of GLP-1 results (111/314; 35.4%) were reported as < 2.4 pg/ml. For analysis, these values were recorded as 2.3 pg/ml. Six additional samples with results below 2.3 pg/ml were not adjusted. Ghrelin had 6 (1.9%) samples reported as < 0.7 pg/ml and 0.6 pg/ml was used for analysis.

Obesity prevention groups; ExN, ExP

There was no group effect for ghrelin, GLP-1, PYY, insulin, and glucose. There was a group difference for leptin and adiponectin ($p < 0.0001$). When isolated for 420 minute samples, the only differences between groups for were seen with insulin ($p = 0.0018$). Within groups, ghrelin and GLP-1 were lower for ExP at study completion ($p < 0.0122$) and PYY was lower in both groups ($p < 0.0001$). Insulin ($p = 0.0001$) and insulin:glucose ($p = 0.0128$) 420 minute samples were lower at study completion for group ExN. Leptin increased by study termination in both groups ($p < 0.0148$), while adiponectin decreased in ExN ($p = 0.01$) and did not differ in ExP.

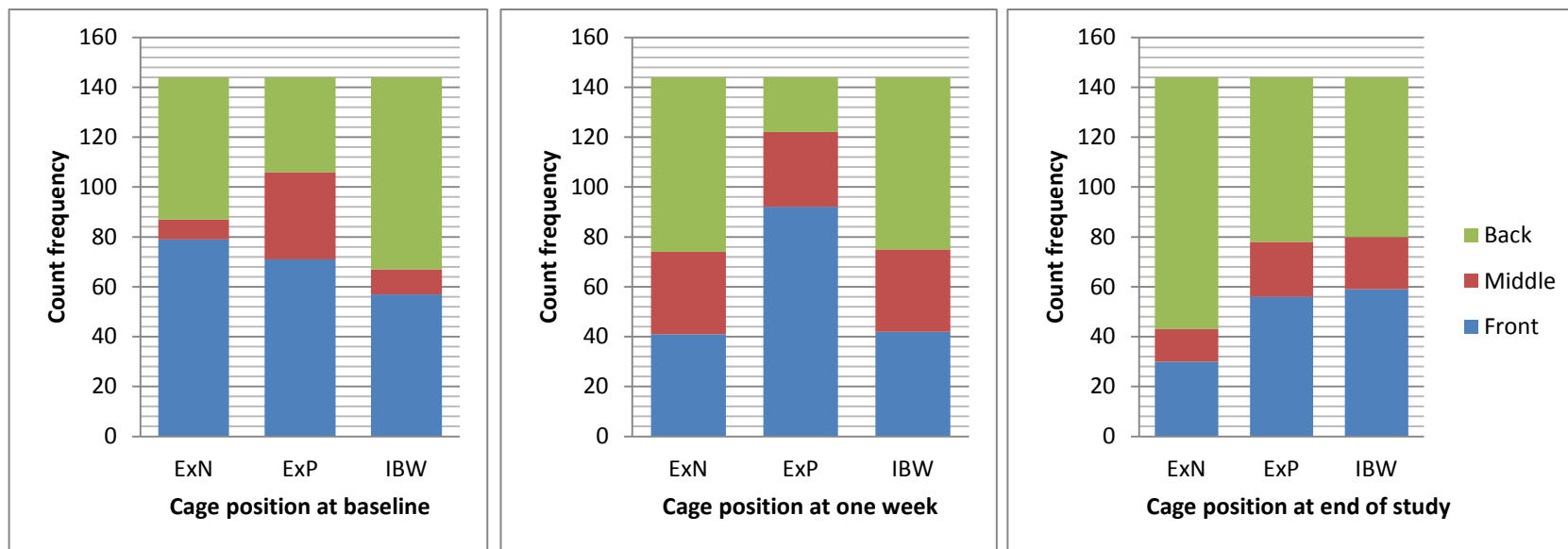


Figure 24 Cage position by group and point.

ExN, excess calories nutraceutical group; ExP, excess calories placebo group; IBW, ideal body weight group.

Table 23 Selected instantaneous sampling of behavior related to medium term satiety intrusion meal.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>End of study</i>
Head in bowl/eating			
ExN [*]	4.5 ± 3.4 ^{a,#}	1.3 ± 1.2 ^{a,#}	1.7 ± 1.4 ^{a,#}
ExP [*]	3.5 ± 2.1 ^{a,#}	2.8 ± 1.9 ^{a,#}	3.2 ± 1.6 ^{a,#}
IBW [*]	2.8 ± 1.6 ^{a,#}	3.7 ± 1.0 ^{a,#}	4.0 ± 1.5 ^{a,#}
Vocalizing			
ExN	0 ± 0 ^{a,#}	0.2 ± 0.4 ^{a,#}	0 ± 0 ^{a,#}
ExP	0.5 ± 1.2 ^{a,#}	0.2 ± 0.4 ^{a,#}	0 ± 0 ^{a,#}
IBW	2.0 ± 2.1 ^{a,#}	2.0 ± 2.5 ^{a,#}	1.7 ± 3.6 ^{a,#}
Resting, head down			
ExN	7.7 ± 6.4 ^{a,#}	13.3 ± 5.4 ^{a,#}	14.7 ± 5.5 ^{a,#}
ExP	1.8 ± 2.8 ^{a,#}	10.5 ± 6.1 ^{a,b,\$}	9.0 ± 6.5 ^{a,#,\$}
IBW	4.2 ± 3.7 ^{a,#}	5.3 ± 5.9 ^{b,#}	7.8 ± 5.7 ^{a,#}
Lying, head up			
ExN	4.3 ± 2.7 ^{a,#}	2.3 ± 0.8 ^{a,#}	5.2 ± 5.9 ^{a,#}
ExP	3.2 ± 2.1 ^{a,#}	2.7 ± 2.7 ^{a,#}	3.5 ± 2.5 ^{a,#}
IBW	5.2 ± 2.6 ^{a,#}	5.5 ± 4.8 ^{a,#}	4.2 ± 2.9 ^{a,#}
Sitting			
ExN	2.5 ± 4.3 ^{a,#}	0.8 ± 1.0 ^{a,#}	0.2 ± 0.4 ^{a,#}
ExP	3.7 ± 3.9 ^{a,#}	2.2 ± 2.6 ^{a,#}	2.3 ± 3.4 ^{a,#}
IBW	5.3 ± 4.3 ^{a,#}	2.2 ± 1.9 ^{a,#,\$}	1.0 ± 1.5 ^{a,\$}
Standing			
ExN	7.2 ± 4.1 ^{a,#}	5.2 ± 3.1 ^{a,#}	3.2 ± 1.2 ^{a,#}
ExP	10.0 ± 4.3 ^{a,#}	5.7 ± 2.3 ^{a,#}	6.3 ± 2.6 ^{a,#}
IBW	8.0 ± 3.3 ^{a,#}	10.0 ± 6.5 ^{a,#}	8.7 ± 3.6 ^{a,#}
Running/walking/jumping			
ExN	2.3 ± 2.1 ^{a,#}	2.3 ± 2.3 ^{a,#}	0.8 ± 1.0 ^{a,#}
ExP	5.3 ± 5.4 ^{a,#}	3.0 ± 5.4 ^{a,#}	2.8 ± 3.1 ^{a,#}
IBW	1.3 ± 1.2 ^{a,#}	1.0 ± 0.9 ^{a,#}	2.3 ± 4.4 ^{a,#}

Numerical data presented as mean ± standard deviation.

*ExN, excess calories nutraceutical group; ExP, excess calories placebo group; IBW, ideal body weight group.

^{a,b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

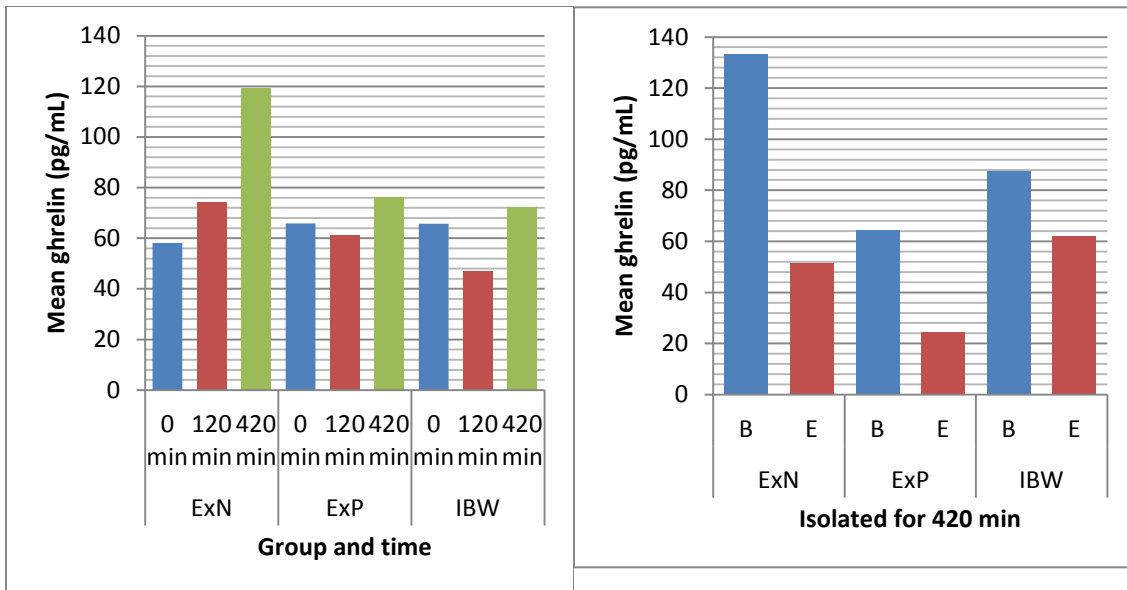
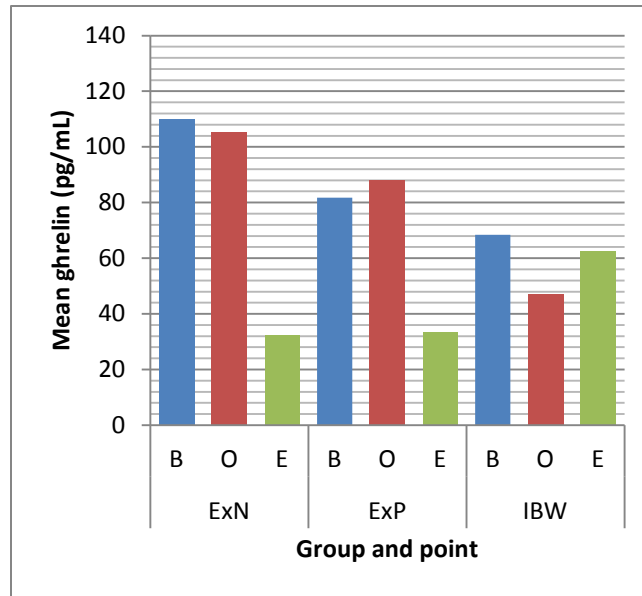


Figure 25 Ghrelin by point and time.

ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

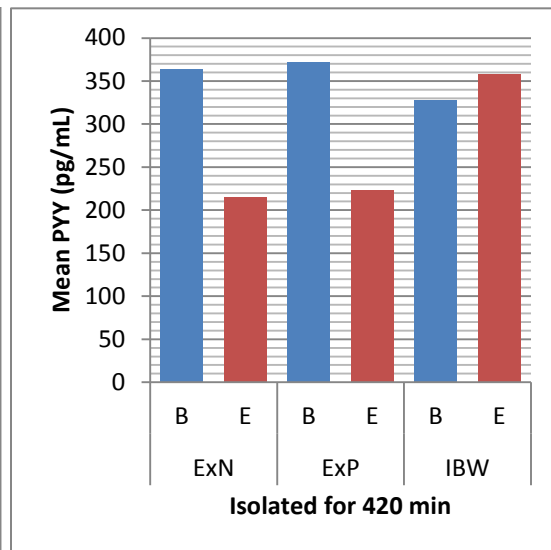
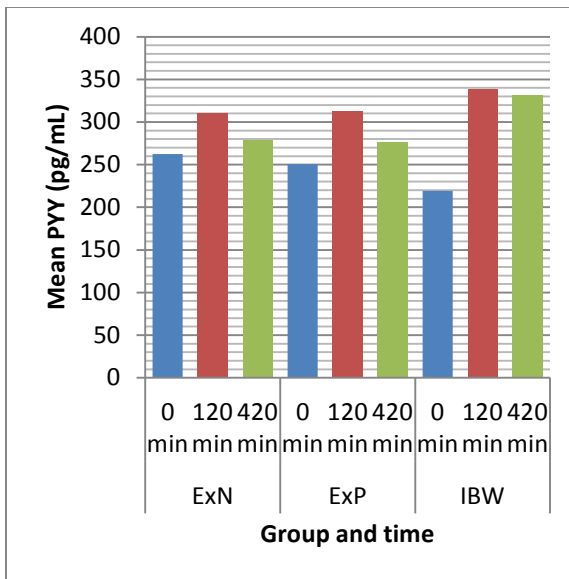
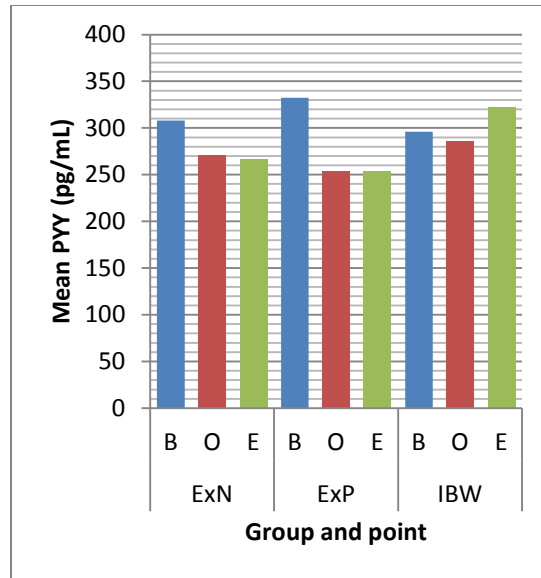


Figure 26 PYY by point and time.

ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

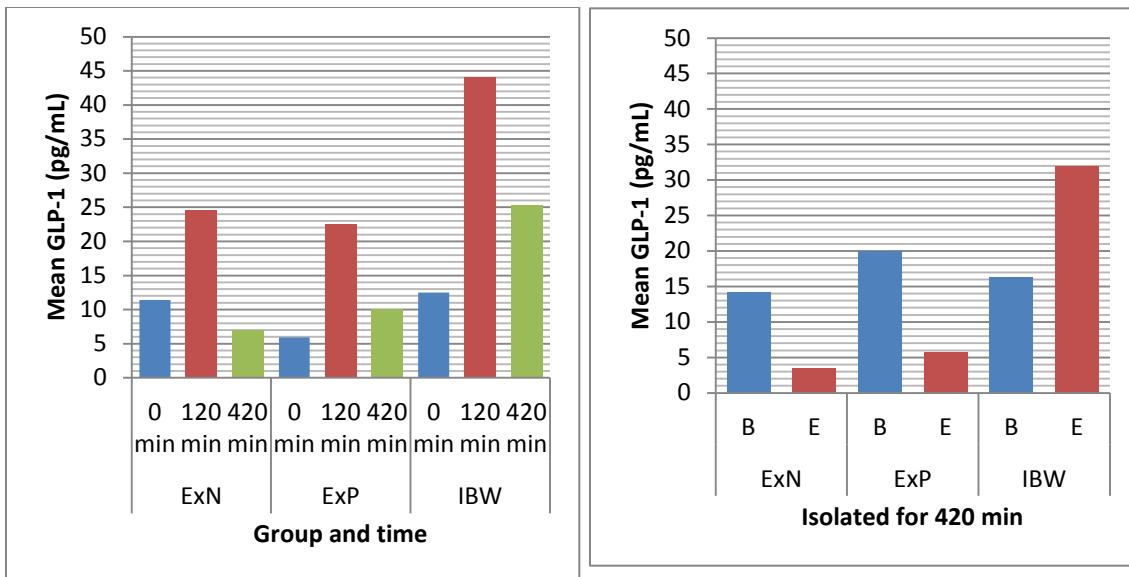
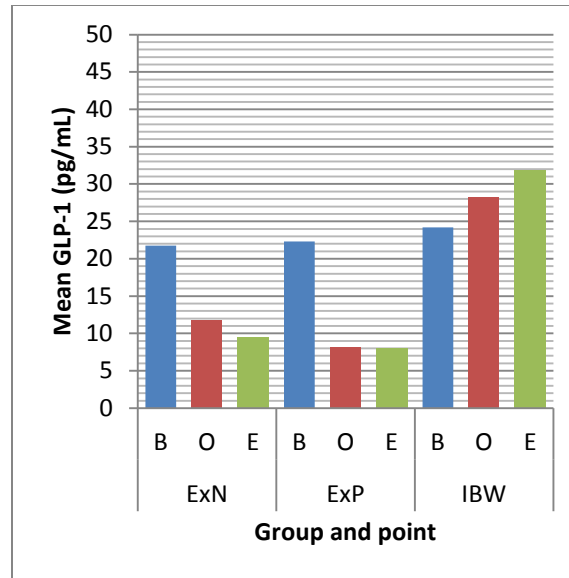


Figure 27 GLP-1 by point and time.

ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

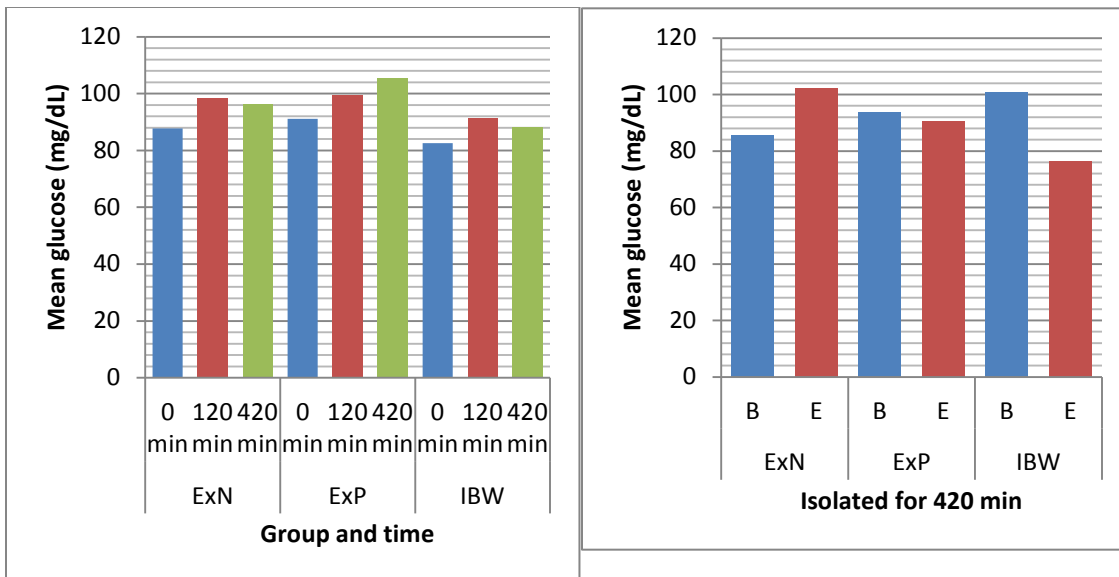
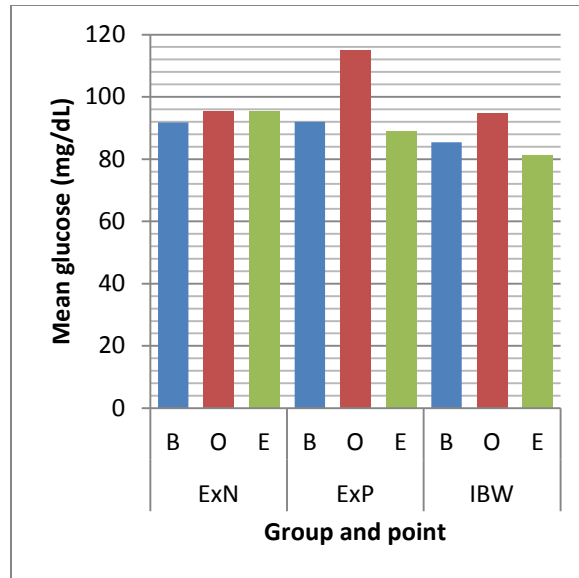


Figure 28 Glucose by point and time.

ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

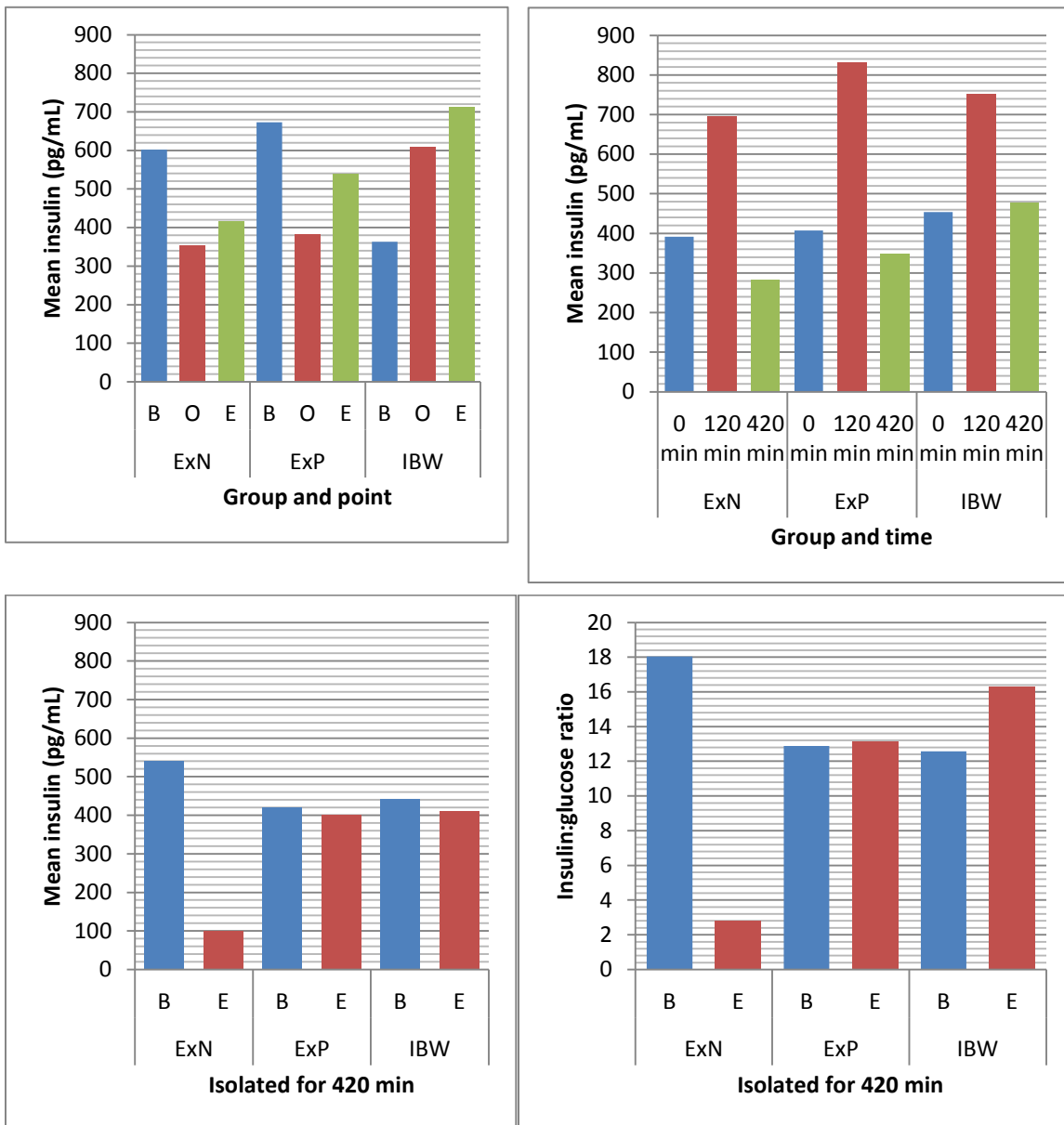


Figure 29 Insulin by point and time; insulin:glucose ratio by time.

ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

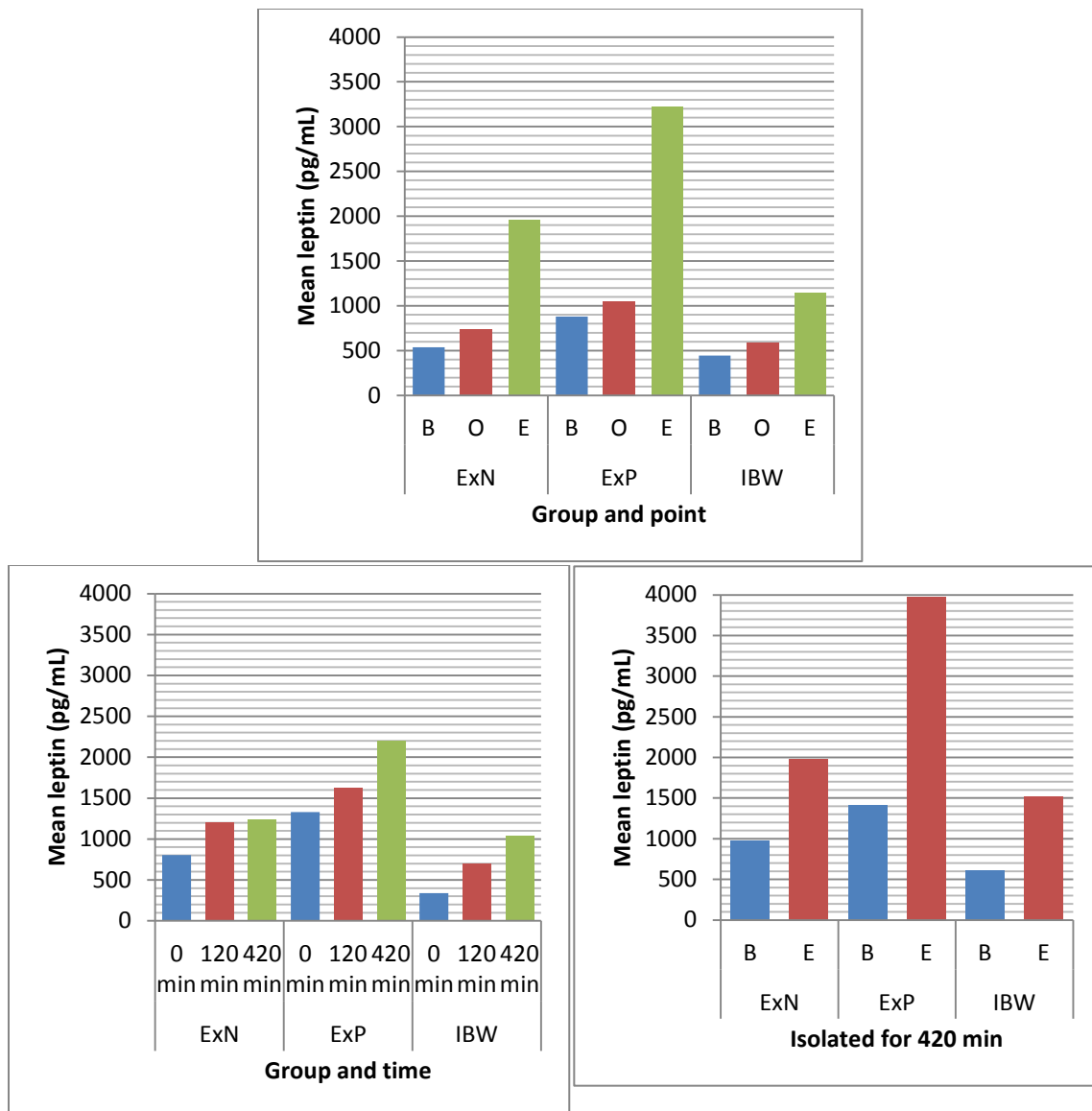


Figure 30 Leptin by point and time.

ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

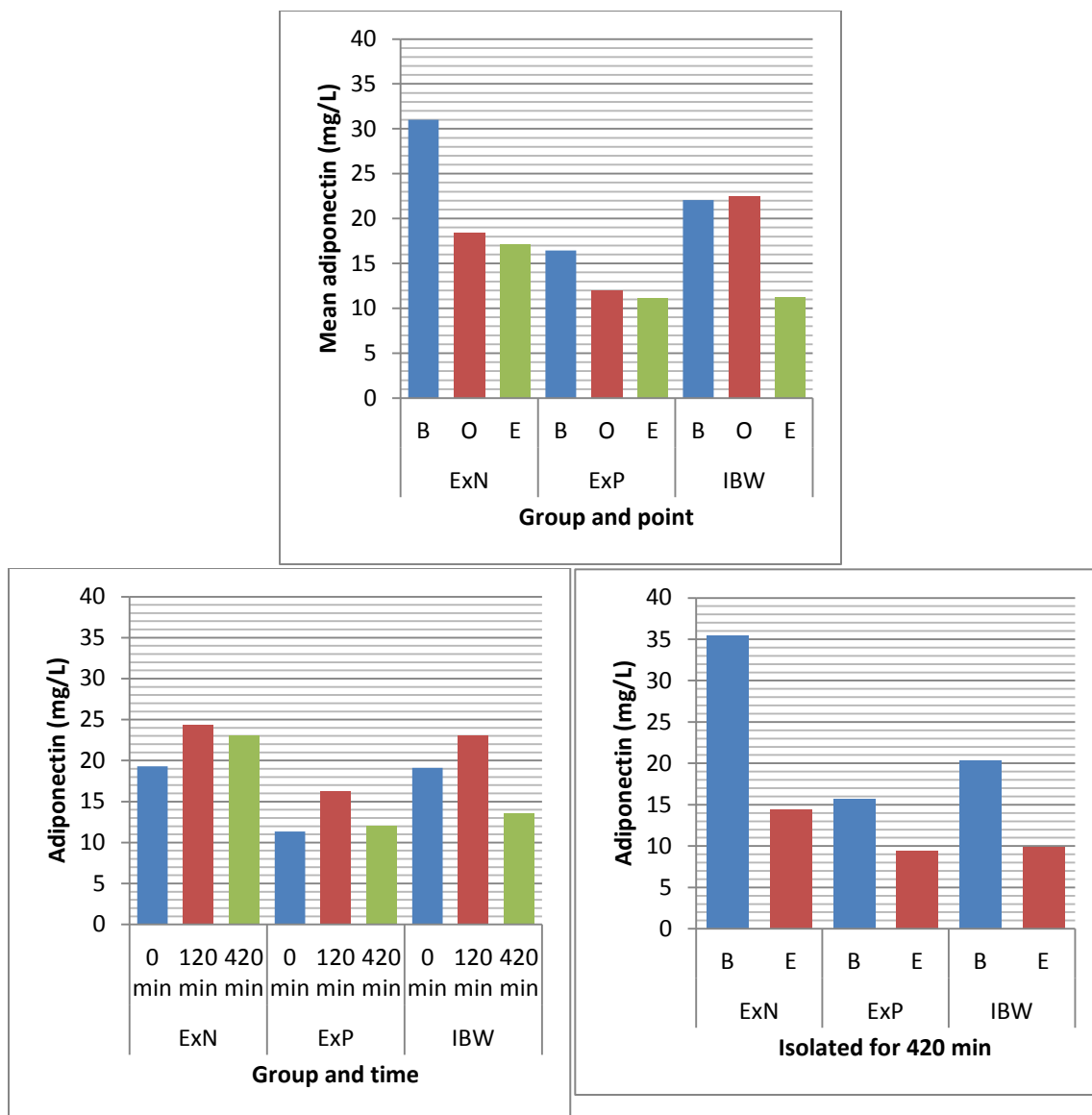


Figure 31 Adiponectin by point and time.

ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group; B, baseline; O, one week; E, end of treatment.

Table 24 Gut hormone plasma levels 420 minutes following a 3 hour intrusion meal.

<i>Group</i>	<i>Baseline</i>	<i>End of study</i>
Time (min)	420	420
Ghrelin (pg/mL)		
ExN [*]	133.1 ± 63.7 ^{a,#}	51.6 ± 60.7 ^{a,\$}
ExP [*]	64.3 ± 40.1 ^{a,#}	24.6 ± 19.0 ^{a,#}
IBW [*]	87.4 ± 80.8 ^{a,#}	61.9 ± 61.5 ^{a,#}
PYY (pg/mL)		
ExN	364.2 ± 59.4 ^{a,#}	214.7 ± 54.0 ^{a,\$}
ExP	372.0 ± 56.9 ^{a,#}	223.5 ± 55.4 ^{a,\$}
IBW	327.7 ± 66.1 ^{a,#}	358.0 ± 95.8 ^{b,#}
GLP-1 (pg/mL)		
ExN	14.2 ± 7.0 ^{a,#}	3.4 ± 3.9 ^{a,#}
ExP	19.9 ± 3.9 ^{a,#}	5.6 ± 7.9 ^{a,\$}
IBW	16.3 ± 0.4 ^{a,#}	24.8 ± 19.9 ^{b,#}

Numerical data presented as mean ± standard deviation.

^{*}ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group.

^{a,b}Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{,\$}Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 25 Insulin and glucose plasma levels 420 minutes following a 3 hour intrusion meal.

<i>Group</i>	<i>Baseline</i>	<i>End of study</i>
Time (min)	420	420
Glucose (mg/dL)		
ExN*	85.5 ± 10.7 ^{a,#}	102.0 ± 8.0 ^{a,#}
ExP*	93.7 ± 8.8 ^{a,#}	90.5 ± 9.0 ^{a,b,#}
IBW*	100.8 ± 11.5 ^{a,#}	76.4 ± 7.8 ^{b,\$}
Insulin (pg/mL)		
ExN	542.0 ± 414.4 ^{a,#}	99.2 ± 39.0 ^{a,\$}
ExP	420.1 ± 240.0 ^{a,#}	421.4 ± 322.8 ^{b,#}
IBW	442.8 ± 151.7 ^{a,#}	410.6 ± 415.1 ^{a,b,#}
Insulin:glucose ratio		
ExN	18.0 ± 15.5 ^{a,#}	2.8 ± 1.2 ^{a,\$}
ExP	12.9 ± 7.5 ^{a,#}	13.1 ± 11.5 ^{a,#}
IBW	12.6 ± 4.5 ^{a,#}	16.3 ± 17.5 ^{a,#}

Numerical data presented as mean ± standard deviation.

*ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group.

^{a,b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{#, \$, %} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Table 26 Leptin and adiponectin plasma levels 420 minutes following a 3 hour intrusion meal.

<i>Group</i>	<i>Baseline</i>	<i>End of study</i>
Time (min)	420	420
Leptin (pg/mL)		
ExN*	976.2 ± 251.9 ^{a,b,#}	1973.9 ± 1169.4 ^{a,b,\$}
ExP*	1410.8 ± 328.6 ^{a,#}	4168.6 ± 2275.6 ^{a,\$}
IBW*	611.1 ± 274.3 ^{b,#}	1513.2 ± 703.4 ^{b,\$}
Adiponectin (ng/mL)		
ExN	35.4 ± 9.6 ^{a,#}	14.4 ± 6.6 ^{a,\$}
ExP	15.8 ± 8.0 ^{a,#}	9.4 ± 3.4 ^{a,\$}
IBW	20.4 ± 16.0 ^{a,#}	10.0 ± 1.8 ^{a,#}

Numerical data presented as mean ± standard deviation.

*ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group.

^{a,b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

^{#, \$} Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Maintain ideal body weight group; IBW

Ghrelin and insulin levels differed from ExN ($p = 0.0245$ and $p = 0.0017$). GLP-1 ($p < 0.0001$), leptin ($p < 0.0001$), and adiponectin ($p < 0.0014$) differed from all other groups. PYY and glucose did not differ from other groups. When isolated for 420 minute samples, glucose decreased ($p = 0.0083$) and leptin increased ($p = 0.0126$) within IBW by 12 weeks. Ghrelin, insulin, insulin:glucose ratio, and adiponectin IBW values matched all other groups at both baseline and end of treatment. PYY and GLP-1 differed from ExN and ExP (PYY, $p < 0.0011$; GLP-1, $p < 0.0009$) at study termination. Baseline glucose did not differ between groups, but end of study levels were lower in IBW vs. ExN ($p = 0.0018$). Leptin differed from all groups at baseline, and was lower than ExP by study termination ($p = 0.0126$).

PCR

Muscle

Obesity prevention groups; ExN, ExP

One dog from group ExP did not have a baseline sample. The average baseline ΔC_T for each gene representing groups ExN, ExP, IBW were used for that dog's subsequent calculations. Another dog from group ExP needed to have the one week SIRT3 sample rerun due to CT variations, but there was not enough reserved RNA. There were no within group differences for SIRT1, UCP3, PGC1 α , or NRF1. There were no differences between groups for all genes. ExN had a higher SIRT3 expression at end of study compared to one week into treatment ($p = 0.006$; Table 27).

Maintain ideal body weight group; IBW

There were no within or between group IBW differences for all genes (Table 27).

Fat

SIRT3 tissue expression was below the sensitivity of the assay. Due to insufficient fat samples from baseline and one week into treatment for groups ExN, ExP, IBW, $2^{-\Delta\Delta C_T}$ calculations could not be performed.

Cytokines

Blood samples could not be obtained from one dog in group IBW at baseline (time 0) and end of study (time 0, 420) or from one dog in group ExN one week into treatment (time 420).

Many IL6 (78/208 samples; 37.5%) and IL15 (62/208 samples; 29.8%) results were reported as < 36.4 pg/ml. For analysis, these values were recorded as 36.3 pg/ml. Additional samples with results below 36.3 pg/ml (IL6, 61 samples; IL15, 28 samples) were not adjusted.

Table 27 Muscle PCR ($\Delta\Delta\text{CT}$) by group and point.

<i>Group</i>	<i>One week</i>	<i>End of study</i>
SIRT1		
ExN [*]	0.6 ± 0.6 ^{a,#}	0.6 ± 0.3 ^{a,#}
ExP [*]	0.8 ± 0.7 ^{a,#}	0.9 ± 0.8 ^{a,#}
IBW [*]	0.7 ± 1.0 ^{a,#}	0.9 ± 0.6 ^{a,#}
UCP3		
ExN	0.4 ± 0.4 ^{a,#}	1.1 ± 0.8 ^{a,#}
ExP	0.6 ± 0.7 ^{a,#}	0.6 ± 0.3 ^{a,#}
IBW	1.1 ± 0.9 ^{a,#}	1.9 ± 2.0 ^{a,#}
PGC-1 α		
ExN	0.4 ± 0.8 ^{a,#}	1.3 ± 1.0 ^{a,#}
ExP	0.3 ± 0.2 ^{a,#}	1.2 ± 1.0 ^{a,#}
IBW	0.6 ± 0.6 ^{a,#}	1.3 ± 1.6 ^{a,#}
NRF1		
ExN	1.2 ± 1.5 ^{a,#}	5.3 ± 8.4 ^{a,#}
ExP	0.4 ± 0.6 ^{a,#}	0.8 ± 0.8 ^{a,#}
IBW	0.5 ± 0.7 ^{a,#}	2.7 ± 5.3 ^{a,#}
SIRT3		
ExN	0.3 ± 0.4 ^{a,#}	2.5 ± 2.7 ^{a,\$}
ExP	0.1 ± 0.04 ^{a,#}	1.0 ± 0.8 ^{a,#}
IBW	0.2 ± 0.2 ^{a,#}	1.0 ± 1.0 ^{a,#}

Numerical data presented as mean ± standard deviation.

^{*}ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group.

^aWithin a column, values with different superscript letters differ significantly ($p < 0.05$).

[#]Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

There were no differences between time 0 and time 420 for cytokine results, so only time 0 is shown, but significant group differences represent both sample times. There were no within group differences for either cytokine over time (Table 28).

Obesity prevention groups; ExN, ExP

There were no differences between groups for either cytokine and any time point.

Maintain ideal body weight group; IBW

IL6 plasma concentration was lower for IBW versus ExP one week into treatment and at study completion ($p < 0.0078$). There were no other between group differences for IBW and all other groups for IL6. At baseline, IBW IL15 plasma levels were lower than ExN ($p = 0.0243$), and ExP ($p = 0.0007$). One week into treatment, IL15 did not differ from all other groups. At study termination, IL15 was lower than ExN ($p = 0.0334$), but did not differ from all other groups.

Table 28 Cytokines by group and point.

<i>Group</i>	<i>Baseline</i>	<i>One week</i>	<i>End of study</i>
Interleukin 6 (pg/mL)			
ExN [*]	42.9 ± 9.1 ^{a,#}	47.1 ± 44.1 ^{a,b,#}	74.1 ± 84.0 ^{a,b,#}
ExP [*]	383.7 ± 174.8 ^{a,#}	442.2 ± 528 ^{b,#}	367.2 ± 484.5 ^{a,#}
IBW [*]	36.3 ± 0 ^{a,#}	27.5 ± 13.2 ^{a,#}	27.9 ± 13.5 ^{b,#}
Interleukin 15 (pg/mL)			
ExN	221.4 ± 338.1 ^{a,#}	274.5 ± 294.3 ^{a,#}	430.2 ± 431.4 ^{a,#}
ExP	471.3 ± 633.3 ^{a,#}	624.9 ± 854.4 ^{a,#}	550.2 ± 745.2 ^{a,b,#}
IBW	25.5 ± 13.2 ^{b,#}	35.1 ± 6.6 ^{a,#}	40.8 ± 24.6 ^{b,#}

Numerical data presented as mean ± standard deviation.

^{*} ExN, excess calorie nutraceutical group; ExP, excess calorie placebo group; IBW, ideal body weight group.

^{a-b} Within a column, values with different superscript letters differ significantly ($p < 0.05$).

[#] Across columns, values with different superscript symbols differ significantly ($p < 0.05$).

Discussion

These data show when excess calories are offered to dogs, there is no difference in voluntary food intake or weight gain in dogs consuming a leucine/pyridoxine supplement compared to placebo. This refutes the idea of this nutraceutical containing a satiating effect when also given access to an excess volume of food. Centrally administered leucine has been shown to affect food intake by activating the mTOR pathway, causing the arcuate nucleus of the hypothalamus to express anorexigenic neuropeptides and decreasing food intake.^{378,379} Food intake decreases in mice fed a leucine-supplemented (6% leucine) diet compared to adequate protein diet controls (10% protein), and is comparable to intake by mice fed high protein diets (50% protein).^{444,445} This dose is equivalent to 60 g leucine/kg diet in a diet with 4204 kcal/kg ME or 14.72 g leucine/1000 kcal. The maintenance diet fed to the dogs in the current study contained 5 g leucine/1000 kcal. Even with the leucine/pyridoxine supplement, leucine levels would only increase to 6 g, still less than 50% of the concentration associated with decreased voluntary intake in mice.

While leucine/pyridoxine supplementation did not affect food intake, this data can also be described as NuShape not having an effect on appetite in dogs. This is significant when considering the only FDA-approved weight loss drug in dogs. Dirlotapide, (SLENTROL®, Zoetis, Florham Park, NJ) is an agent affecting fat absorption, with its main action through appetite reduction. It is a microsomal transport protein (MTP) inhibitor and results in enterocyte lipid accumulation and loss via normal intestinal sloughing. The intracellularly accumulated fat triggers release of intestinal PYY, which is anorexigenic.³²³ Weight loss occurs due to decreased food intake, which can be viewed as a negative side effect by owners. True side effects common to treatment are emesis, especially during initial therapy, and intermittent loose stools throughout use of the drug.³²⁶ Dirlotapide is contraindicated in dogs with evidence of liver dysfunction as it may cause minor elevations in alanine aminotransferase (ALT).³²⁷ Negative side effects were not noted in dogs receiving leucine/pyridoxine supplementation for twelve weeks in this trial while gaining weight, or in another trial while losing weight (Chapter I).

Other than the effects of the supplement, this research also provides interesting data regarding voluntary food intake in dogs. In a recent paper, Nagaoka and colleagues introduced obesity via *ad libitum* feeding of a dry extruded diet and a canola/soybean oil mixture with pecan shortbread cookies added in a few weeks later. The dogs voluntarily consumed 1875 – 2250 kcal/day and gained an average of 2.46 kg and approximately 8.1 %BF over 15 weeks.⁴⁰² In the dogs reported here, both groups gained more weight and %BF (ExN, 3.9 ± 0.9 kg, 18.7 ± 2.8 %BF; ExP, 4.1 ± 1.6 kg, 17.4 ± 7.7 %BF) over 12 weeks, while initially consuming an average of 3430.1 – 3932.2 kcal/day. By the 12th treatment week, consumption had decreased to 3223.4 – 3536.4 kcal/day (1.5 – 2.8 x MER), but was still well above the levels reported by Nagaoka. That

study used 2 – 6 year old, sexually intact female beagles with starting BCS of 6 – 8, while the current study utilized 2 year old castrated male beagles with starting BCS of 4 – 5. Nagaoka also reported *ad libitum* feeding during the first three weeks was associated with ~1.5 x MER consumption, which is much lower than the 1.7 – 3.1 x MER consumed by the present dogs at week four. It is not clear why the dogs in the current study consumed so much more food, but a pattern of very high initial consumption followed by a steady decline approaching MER levels was seen, which does match the overall pattern reported by Nagaoka. Perhaps the lower starting BCS triggered an elevated drive to consume calories, which then began to plateau as BW changes leveled off.

The Nagaoka dogs were also sexually intact, potentially explaining the intake difference between the current dogs, which had all been neutered less than 6 months prior to study inclusion. Ovariohysterectomy (OHE) is associated with voluntary food intake increases to 1.2 x MER (285 kcal/day), but restricted feeding to maintain ideal BW post OHE requires 0.7 x MER.^{446,447} This relationship is not consistent, however, based on a paper by Salmeri et al.⁴⁴⁸ No changes in voluntary food intake were noted in dogs undergoing gonadectomy at 7 weeks or 7 months old, and neutered dogs were judged to be more active than sexually intact dogs. Activity level is a factor that must be considered when feeding animals, as activity drives energy requirements beyond resting requirements. Based on accelerometry data, obese dogs have been shown to spend significantly less time in vigorous daily activity compared to ideal weight dogs (7 ± 3 vs. 21 ± 15 min/day).³¹⁵ Research utilizing pedometers found higher BCS was associated with fewer steps taken per day and modest correlation between steps recorded for both dogs and owners ($r = 0.469$).³¹⁶ Another pedometer project found every 1000 steps allowed dogs on a weight loss plan to consume 1 kcal/kg^{0.75} more while maintaining a loss of 2%/week.³¹⁷

It stands to reason that laboratory dogs housed together will have increased playing interactions compared to dogs housed alone, and therefore will have increased energy requirements, but this has not been supported by the literature. In fact, pair housed laboratory dogs have been shown to be less active and spend more time sleeping than when housed alone.⁴¹¹ The size of the cage plays a factor as well with dogs pair housed in small cages (1 x 1.5 m) being more active than when in a larger cage (1 x 2 m).⁴¹² Compared to shelter animals housed in outdoor enclosures, pair housed dogs are less active and spend more time in a lying posture than dogs maintained in groups of 5 – 8 animals.⁴¹³ This is the opposite of what has been found in medium sized pet dogs living in multiple dog households. Their MER is 133 ± 52 kcal/kg^{0.75} versus the prototypical pet dog with a requirement of 94 – 105 kcal/kg^{0.75}.⁶⁷ Since the dogs in this study were individually housed, an associated increase in activity level may have contributed to their extremely high energy intake when given access to excess calories. Since specific activities were only assessed during a few isolated behavior observation sessions, the true relationship between activity and intake in these dogs cannot be determined.

When increased level of activity is not utilized as a method to augment energy consumption on weight loss plans, insatiable begging behavior often contributes to decreased compliance to restricted diet plans in client-owned animals. Therefore, identification of methods to increase satiety and encourage decreased voluntary food intake in dogs is warranted. As discussed in Chapter I, fiber has been investigated as a satiety inducing agent in dogs with conflicting results.^{289,421–423} It has also been suggested that leucine has an effect on satiety, exhibited via decreased food intake. Ropelle et al showed decreased food intake when rats consumed a leucine and casein supplemented diet (50 g leucine and 202 g casein/kg diet).³⁷⁶ Other research confirms decreased food intake after intracerebroventricular injection with leucine.^{378,379} In the current study, nutraceutical and placebo did not have an appreciable effect on medium term satiety, based on intrusion meal intake 3 hours after a standard morning meal. Since the nutraceutical only contained 5 g leucine, compared to the 50g provided to rats in Ropelle's work, it seems likely the total leucine dose was not high enough to provide a satiating effect. The lack of distinction between nutraceutical and placebo food consumption when offered excess calories also illustrates use of the nutraceutical for 12 weeks does not affect appetite. This is an important distinction between the nutraceutical and dirlotapide (SLENTROL®, Zoetis, Florham Park, NJ), the only US Food and Drug Administration (FDA) approved medication for weight loss in dogs. It is an agent that inhibits fat absorption and promotes intestinal PYY release, which is anorexigenic.³²³ Weight loss primarily occurs due to decreased food intake. While decreased food intake is a necessary aspect of the drug's function, many owners view it as a negative side effect, diminishing its widespread use in a clinical setting. Since the leucine/pyridoxine nutraceutical does not affect food intake, it may offer greater utility as a weight loss agent for client-owned dogs.

In addition to intrusion meal intake, canine satiety may also be perceived based on food seeking behavior and other behavioral characteristics, typically via video recording.^{423,429} The ability to review recordings allows for accurate accounting of the number of visits to the bowl, total time spent at the bowl, and occurrences of individual behaviors. The current study employed individual observers to record a total duration measure of food consumption over 45 minutes and instantaneous sampling of specific behaviors every two minutes. Unfortunately, due to recording inconsistencies in total duration observations, total time spent at the bowl could not be assessed. Clinically, the few instantaneous sampling differences observed is unclear. If these behaviors offered insight into actions more likely to be associated with satiety, or a lack thereof, one would expect differences between excess calorie fed dogs and the dogs being meal fed based on caloric needs. Since a consistent difference did not exist, a problem with the sampling method should be considered. Electronic recording of intrusion feedings and analysis by a single observer would be a more reliable method than datasheet recording by multiple observers. Because this study used various observers, between observer reliability should have been

assessed. Observer fatigue due to the both the length of the session and the time between instantaneous sampling could have contributed to fatigue and loss of concentration. Finally, observer presence in the room during feedings could have altered dog behavior; despite attempts to habituate them before true recordings started. The existence of this effect is debatable, however, since total resting with head down counts within groups did not differ across all three observation sessions

In addition to voluntary food intake and behavior, the existence of satiating effect may also be inferred from changes in plasma gut hormone and endocrine factor levels. In relation to fixed meal times, the orexigenic hormone, ghrelin, is expected to be elevated with meal anticipation and should return to baseline levels postprandially.^{95,96} In chronically obese dogs, fasting ghrelin is lower versus lean dogs.¹⁰³ In the current study, a fasting sample was not obtained, although 420 minute samples have been associated with return to fasting levels of ghrelin and glucose.⁹⁶ Because these dogs were habituated to 8am and 4pm feedings, ghrelin levels that did not decrease by 420 minutes may be due to anticipation of the afternoon meal, which was not provided until the final sample was collected and was 3 hours later than normal. All of the dogs exhibited lower end point ghrelin compared to baseline, although when isolated for 420 minute samples, this was only significant nutraceutical dogs. The most plausible explanation is that by the third exposure to an intrusion meal and blood sampling protocol, the dogs had become habituated to afternoon feedings being provided much later than was part of the general daily routine.

GLP-1 is released after a meal to inhibit gastric acid secretion via an additive effect with PYY and to inhibit gastric emptying via the ileal brake mechanism.^{115,122,123} As body mass rises, circulating GLP-1 levels decrease, with obese people showing a blunted GLP-1 response.¹²⁶⁻¹²⁹ In dogs, however, GLP-1 has been shown to increase with weight gain and decrease after weight loss, but results have not been consistent.¹³⁰⁻¹³² The study reported here supports the pattern of GLP-1 response to obesity seen in people.¹²⁶⁻¹²⁹ Both excess calorie groups showed an inverse relationship between GLP-1 and body mass over time, with a significant change in placebo dogs when timed samples were isolated. Dogs maintaining lean body weight had a significantly higher group affect for GLP-1 against all other groups, also supporting the idea that circulating GLP-1 decreases with obesity. As PYY is associated with an anorexigenic effect, levels would be expected to be higher in groups exhibiting meal intake changes attributed to satiation. Since intrusion meal intake did not exhibit effects associated with medium term satiety in any groups, it is not surprising that there were few between group differences. There was a consistent pattern of lower 420 minute PYY levels when gaining weight compared to when lean, similar to what is reported in people.^{110,117}

There was no glucose effect by group, but when 420 minute samples were analyzed, lean maintenance dogs actually had lower glucose values at the end of twelve weeks than they did at baseline. These end of treatment values for ideal

weight dogs were also lower than the nutraceutical dogs. Insulin is an adiposity signal released in a pulsatile fashion, leading to decreases in plasma glucose levels. When insulin binds its receptor, the GLUT4 transporter moves to the plasma membrane and allows adipose and striated muscle cells to move glucose intracellularly and decreases the amount of glucose present in plasma.^{139,140} Obese individuals show pulsatile patterns similar to healthy weight individuals (release following meals and during overnight fasting), but the amplitude of insulin pulses are larger during obesity.¹⁴³ Insulin exhibits a diurnal release pattern, with peak levels 2 to 5 hours postprandial in dogs.¹⁴⁴ Insulin resistance is a common manifestation in obese people and has also been found in dogs.^{145–148} The insulin:glucose ratio can be used as an indirect assessment of insulin resistance based on fasting samples.¹⁴⁵ While true fasted samples were not collected in the present project, samples obtained 420 minutes (7 hours) after a meal were used as an approximate representation of fasting conditions. Due to trend disagreements with other published research in dogs, the final analysis is considered nonvalid. In the current study, “fasting” insulin and insulin:glucose ratio were either static or negatively associated with weight gain, while the opposite relationship has been observed in dogs with properly fasted samples.^{145–148,251}

Leptin trends, on the other hand, did follow what has been previously published. Leptin is an adiposity signal secreted from adipocytes via the *ob* gene in direct proportion to the level of fat mass.^{152–157} In chronically obese mice, leptin is elevated and unable to assert its antiobesity effects. In people, serum leptin concentration is 4 times higher in obese individuals versus those with a normal weight, with a strong positive correlation to the level of fat mass.¹⁵³ Similar results are seen when lean dogs (BCS 3/5) are compared to obese dogs (BCS 5/5), regardless of gender or breed.^{17,156} In the dogs reported here, leptin levels were also associated with the level of fat mass, with a corresponding change as body mass evolved with treatment. Over twelve weeks, overall leptin values increased in current dogs maintaining body weight; even though their body weight and fat mass remained relatively stable. It exhibits diurnal variation, with lowest levels just prior to an accustomed feeding time, and highest levels 8 hours postprandial in dogs.¹⁴⁴ This overall pattern was also seen with the current dogs, regardless of treatment.

There is conflicting evidence regarding total adiponectin levels in obese dogs. Some have found obese levels to be similar to levels seen in lean dogs,^{145,248,249} while others have found lower levels in obese versus lean dogs.^{250–252} A review of the two largest studies with conflicting results concluded there is no sex-related difference in total adiponectin concentrations and obesity may decrease concentrations in intact but not in neutered dogs.²⁵³ Adiponectin was largely unchanged in the dogs from the current study, although group differences did exist for nutraceutical and ideal maintenance dogs. Both of these groups had higher overall levels compared to placebo dogs, but also differed

from each other. Taken as a whole, dogs had similar total adiponectin levels, regardless of body mass, supporting the work of others.^{145,248,249}

While the gut hormone and endocrine factor plasma levels are interesting, they do not provide information regarding effectiveness of the leucine/pyridoxine nutraceutical at the cellular level. Select gene expression determination in muscle and fat samples was planned for this purpose, but only muscle samples were able to be analyzed. The only within or between group difference was in SIRT3 expression, which was higher at study termination for nutraceutical dogs. SIRT3 is a class I sirtuin located within the mitochondrial matrix rather than the nucleus like SIRT1.^{202,214} SIRT3 activity increases in liver, kidney, and muscle during calorie restriction, when in a glucose-poor state.^{214–217} As the major mitochondrial deacetylase, it has many targets, including genes involved in lipid metabolism. Long-chain acyl CoA dehydrogenase (LCAD) is one such gene, which is responsible for the first dehydrogenation step in fatty acid β -oxidation. During extended periods of fasting, SIRT3 activates LCAD, leading to increased oxidation of long-chain fatty acids into acetyl CoA.²¹⁴ It is possible the nutraceutical led to the resulting increase in SIRT3 expression, but this conclusion must be made with caution since none of the other gene expression levels differed. A full discussion of the expected expression changes expected from the nutraceutical, in both muscle and adipose tissue, is offered in Chapter I.

A possible explanation for a lack of expression difference between groups may be related to mRNA expression not necessarily acting as an accurate indication of functional protein level expression. This is illustrated by the existence of UCP2 mRNA, but not UCP2 protein expression within BAT, muscle, and cardiac tissues.^{219,435} If protein expression is found within a specific tissue in which gene expression is observed, changes within the gene expression over time also may not be a reflection of changes in protein expression.^{219,435,436} In the current study, it would have been beneficial to assess protein abundance as well to corroborate or refute gene expression results. Many factors contribute to protein abundance after mRNA is produced with a weak correlation between the two and this correlation may be affected by post-transcriptional regulation and measurement noise.⁴³⁷

Interleukin-6 (IL6) is a cytokine released from white adipose tissue (WAT), macrophages, fibroblasts, endothelial cells, and skeletal muscle cells.¹⁶⁶ Its plasma levels correlate to the level of adiposity, it is proinflammatory when in WAT and hepatic tissue, and increases insulin resistance via downstream inhibition of insulin receptor and IRS1 phosphorylation.^{166–170} IL6 has been previously measured in dogs, but remained below the level of detection limit in most or all samples.^{145,251,252} Using the same multiple cytokine technique used in these other publications, many samples (37.5%) were below the standard curve expected concentration limit of 36.4 pg/ml, but were still included in the analysis. Overall, IL6 did not differ between dogs whether gaining or maintaining body weight. This may corroborate the hypothesis that obesity is not indicative of an inflammatory state in dogs, based on inconsistent adiponectin, C-reactive

protein, and resistin results.^{145,250–253,438,439} On the other hand, it may only indicate these are not appropriate markers of obesity-related inflammation in dogs as opposed to leptin and TNF α , which are elevated.^{17,145,156,440}

Interleukin-15 (IL15) is another cytokine that was measured as a marker of increased muscle fatty acid oxidation. It is involved in modulation of the cross-talk between muscle and adipose tissue, leading to decreased fat deposition in adipose tissue and increased skeletal muscle fiber growth.^{262–266} IL15 has not been measured in obese dogs, but it has been assessed in endurance racing sled dogs. In dogs competing in a 1650 km, multi-day race, IL15 plasma concentration did not change from 72 hours before, halfway through, and within 6 hours of race completion.⁴⁴¹ In obese rats, however, IL15 plasma and muscle tissue expression levels are reduced, but increase with treadmill running (26 m/min, 60 min/day, 5 days/week) over 8 weeks as compared to sedentary obese controls.⁴⁴² In the dogs reported here, lowest numerical IL15 baseline values were observed in the group maintaining ideal body weight at all time points. While IL15 assessment in rats increases to appreciable levels, based on both dogs of various weights and dogs undergoing intensive exercise, IL15 may not be a myokine that changes to appreciable levels.

In conclusion, these data show when given access to unlimited calories, NuShape dogs gained as much as placebo dogs without a negative impact on appetite. This experiment shows a leucine/pyridoxine nutraceutical can be used without risk of hypo- or anorexia in dogs. It also indicates much is still unknown regarding voluntary food intake, but reinforces the fact that dogs will gain dramatic levels of total body and fat mass in a short period of time when given free access to food. There was no difference in medium term satiety between nutraceutical and placebo, based on intrusion meal intake 3 hours after a standard morning meal and select behavior observations during feeding. In general, plasma measurements of gut hormones and endocrine factors followed expected trends. Perhaps the most significant revelation is that adiponectin levels remained relatively consistent in these dogs, unrelated to the level of adiposity. There was also minimal effect of the leucine/pyridoxine nutraceutical on tissue expression of genes involved in fat oxidation, oxidative phosphorylation, and mitochondrial biogenesis. Future work in dogs should include adipose tissue samples and protein quantification for functional comparisons, especially of SIRT3. Circulating plasma concentrations of IL6 and IL15 also did not differ between groups, suggesting they are not the most appropriate markers of obesity related inflammation and muscle fatty acid oxidation in dogs.

CONCLUSION

Canine weight loss is often a difficult endeavor for both the dogs and their owners to achieve. Attempts to reduce body mass in overweight pets can be stymied by perceived high expense and reduced palatability of therapeutic weight loss diets, excessive begging/foraging behavior, lack of commitment to the prescribed weight loss plan by all members of a household, and metabolic conditions limiting the ability to change the diet being fed. For this reason, alternatives to the traditional weight loss plan of new diet, caloric restriction, and ignoring begging behavior must be sought.

In the work presented here, a nutraceutical containing 1 g leucine and 13 mg pyridoxine, designed to maintain lean muscle mass while decreasing adiposity, was investigated as an alternative to the traditional plan. There is previous research supporting its use in a dose-modified form (2.25 g leucine and 30 mg leucine) for successful weight loss in people,^{347,354} and the previously presented data substantiates its use in dogs. In obese dogs consuming a maintenance level of calories, the nutraceutical was associated with a rate of loss and body composition results similar to those seen in dogs consuming a traditional therapeutic weight loss diet. The nutraceutical was not associated with hypo- or anorexia or with weight gain when allowed access to excess levels of calories when compared to placebo. It is suspected the total leucine dose is too low for a satiety effect to be seen since rodents exhibited decreased food intake with a much higher dose.³⁷⁶

Plasma levels of many gut hormones and endocrine factors were analyzed and largely followed trends previously reported in the dog. GLP-1 and adiponectin, however, have not been consistent within the literature so a focus on their results is warranted. GLP-1 and adiponectin are generally accepted to both have an inverse relationship with body mass.^{126–129,238} In dogs, however, GLP-1 usually has a direct relationship with weight gain^{130–132} and adiponectin has either not been different between dogs of different body conditions,^{145,248,249} or has exhibited an inverse relationship with the level of adiposity.^{250–252} The current study revealed an inverse relationship between GLP-1 and adiposity, although dogs maintaining body weight also exhibited increased GLP-1 after 12 weeks. Adiponectin was largely unchanged over time and plasma levels were not associated with the level of adiposity. Truly fasted plasma samples were not obtained in the current study, although major analysis was based on samples collected 7 hours after a meal. These results are not enough to conclusively accept or refute previously published data in dogs, but they do indicate further investigation is warranted.

Finally, gene expression in muscle and subcutaneous adipose tissue was investigated to determine effects of the nutraceutical at the cellular level. The availability of published canine data in this regard is extremely limited and further work in this area should be pursued. Tissue gene expression may not necessarily reflect protein level activation, however, so additional proteomic work

to corroborate expression results is recommended. Based on the data presented in this work, a cellular effect of any treatment was not apparent.

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APPENDIX DATA

Table 29 Baseline complete blood count (CBC), part 1.

<i>Group</i>	<i>Dog</i>	<i>RBC Count (x10⁶/uL)</i>	<i>Hemoglobin (g/dL)</i>	<i>Hematocrit (%)</i>	<i>MCV (fL)</i>	<i>MCH (pg)</i>	<i>MCHC (g/dL)</i>	<i>Red Cell Distribution Width (&)</i>	<i>Platelet Count (x10³/uL)</i>	<i>WBC Count (x10³/uL)</i>
ObN	Garfield	6.95	16.4	50.2	72.2	23.6	32.7	12.3	334	13.4
ObN	Adams	7.78	17.1	50.6	65.0	22.0	33.8	13.4	207	14.3
ObN	Arthur	7.03	16.8	49.1	69.8	23.9	34.3	12.3	331	11.1
ObN	Polk	7.58	16.9	49.6	65.4	22.3	34.1	12.7	227	10.7
ObN	Taylor	7.65	18.2	53.2	69.5	23.8	34.3	12.3	308	8.2
ObN	Truman	7.5	17.8	52.0	69.3	23.7	34.2	12.9	338	8.1
ObP	Harding	7.64	17.1	49.7	65.0	22.3	34.4	12.1	403	6.5
ObP	Harrison	7.09	16.4	48.7	68.6	23.2	33.8	12.6	229	11.1
ObP	Hoover	7.69	17.4	51.4	66.8	22.6	33.8	12.7	331	8.2
ObP	Jackson	6.65	15.6	45.6	68.5	23.5	34.3	11.9	352	6.3
ObP	Lynden	7.9	18.3	53.5	67.7	23.1	34.2	11.8	166	18.5
ObP	Wilson	6.86	15.6	46.3	67.5	22.7	33.6	12.3	339	7.9
WLD	Carter	7.05	16.3	47.9	67.9	23.1	34.0	12.8	373	9.4
WLD	Clinton	7.37	16.9	49.9	67.8	22.9	33.8	12.6	370	9.8
WLD	Custer	8.27	19.2	56.3	68.0	23.2	34.1	12.4	346	8.9
WLD	Houston	6.86	16.1	47.3	69.0	23.4	34.0	13.1	395	8.6
WLD	King	8.36	18.2	52.6	62.8	21.8	34.7	13.3	377	8.1
WLD	Nixon	7.35	16.5	48.9	66.5	22.5	33.8	12.5	265	7.6
ExN	Lincoln	5.69	12.4	37.8	66.4	21.9	32.9	12.9	328	9.1
ExN	Madison	6.36	14.2	43.2	67.9	22.3	32.9	12.6	302	12.1
ExN	Monroe	5.77	13.1	39.6	68.6	22.7	33.0	13.2	447	6.5
ExN	Obama	4.74	10.7	31.7	66.9	22.5	33.7	13.8	365	10.2
ExN	Taft	5.60	12.7	37.6	67.0	22.6	33.7	12.0	338	14.8

Table 29: (Continued) Baseline complete blood count (CBC), part 1.

<i>Group</i>	<i>Dog</i>	<i>RBC Count (x10⁶/uL)</i>	<i>Hemoglobin (g/dL)</i>	<i>Hematocrit (%)</i>	<i>MCV (fL)</i>	<i>MCH (pg)</i>	<i>MCHC (g/dL)</i>	<i>Red Cell Distribution Width (&)</i>	<i>Platelet Count (x10³/uL)</i>	<i>WBC Count (x10³/uL)</i>
ExN	Tyler	6.69	15.1	45.4	68.0	22.6	33.3	12.9	522	11.6
ExP	Fillmore	5.28	12.3	36.4	68.9	23.2	33.7	12.0	437	7.4
ExP	Ford	6.11	13.8	41.8	68.4	22.5	32.9	13.5	509	15.5
ExP	Franklin	5.07	11.6	34.4	67.8	23.0	33.9	13.3	458	12.9
ExP	Grant	5.83	13.3	40.3	69.2	22.8	32.9	12.9	257	6.1
ExP	Quincy	5.07	11.8	35.1	69.3	23.3	33.6	12.4	415	8.1
ExP	Sherman	6.01	13.6	40.0	66.6	22.6	33.9	13.0	314	7.4
IBW	Bush	5.03	11.0	32.6	65.0	21.8	33.6	13.4	348	10.2
IBW	Ernie	5.39	12.3	36.3	67.3	22.8	33.9	13.0	312	10.0
IBW	Johnson	5.76	12.6	37.6	65.2	21.9	33.6	13.3	390	9.0
IBW	Kennedy	5.50	11.9	35.4	64.4	21.7	33.7	12.9	360	13.6
IBW	Pierce	5.14	11.8	34.5	67.1	22.9	34.1	12.8	368	13.9
IBW	York	4.71	10.1	30.1	64.0	21.5	33.6	13.1	341	12.8

Table 30 Baseline complete blood count, part 2.

<i>Group</i>	<i>Dog</i>	<i>Seg. Neut. Absolute (X10³/uL)</i>	<i>Band Neut. Absolute (x10³/uL)</i>	<i>Lymphocyte Absolute (x10³/uL)</i>	<i>Act. Lymphocyte Absolute (x10³/uL)</i>	<i>Monocyte Absolute (x10³/uL)</i>	<i>Eosinophil Absolute (x10³/uL)</i>	<i>Basophil Absolute (x10³/uL)</i>
ObN	Garfield	10.32	0.00	2.41	0.00	0.40	0.27	0.00
ObN	Adams	10.15	0.00	3.15	0.00	0.57	0.29	0.14
ObN	Arthur	6.99	0.00	3.22	0.00	0.44	0.44	0.00
ObN	Polk	8.45	0.00	1.61	0.00	0.32	0.21	0.11
ObN	Taylor	5.66	0.00	1.97	0.00	0.33	0.16	0.08
ObN	Truman	4.94	0.00	2.59	0.00	0.32	0.16	0.08
ObP	Harding	3.97	0.00	2.02	0.00	0.33	0.13	0.07
ObP	Harrison	6.55	0.00	3.55	0.00	0.67	0.33	0.00
ObP	Hoover	4.59	0.00	3.03	0.00	0.33	0.25	0.00
ObP	Jackson	4.35	0.00	1.39	0.00	0.25	0.32	0.00
ObP	Lynden	14.99	0.00	2.22	0.00	0.93	0.37	0.00
ObP	Wilson	4.66	0.08	2.61	0.00	0.40	0.16	0.00
WLD	Carter	6.02	0.00	2.54	0.00	0.47	0.28	0.09
WLD	Clinton	5.78	0.00	3.04	0.00	0.39	0.59	0.00
WLD	Custer	4.98	0.00	2.58	0.00	0.53	0.62	0.18
WLD	Houston	4.73	0.00	2.92	0.00	0.34	0.52	0.09
WLD	King	4.70	0.00	2.84	0.00	0.24	0.24	0.08
WLD	Nixon	4.56	0.00	2.20	0.00	0.53	0.23	0.08
ExN	Lincoln	6.83	0.00	1.55	0.00	0.55	0.18	0.00
ExN	Madison	9.08	0.00	2.18	0.00	0.24	0.61	0.00
ExN	Monroe	4.55	0.00	1.56	0.00	0.20	0.13	0.07
ExN	Obama	7.55	0.00	1.94	0.00	0.51	0.20	0.00

Table 30 (Continued) Baseline complete blood count, part 2.

<i>Group</i>	<i>Dog</i>	<i>Seg. Neut. Absolute (X10³/uL)</i>	<i>Band Neut. Absolute (x10³/uL)</i>	<i>Lymphocyte Absolute (x10³/uL)</i>	<i>Act. Lymphocyte Absolute (x10³/uL)</i>	<i>Monocyte Absolute (x10³/uL)</i>	<i>Eosinophil Absolute (x10³/uL)</i>	<i>Basophil Absolute (x10³/uL)</i>
ExN	Taft	11.99	0.00	1.63	0.00	0.89	0.30	0.00
ExN	Tyler	9.63	0.00	1.62	0.00	0.23	0.12	0.00
ExP	Fillmore	5.55	0.00	1.48	0.00	0.30	0.07	0.00
ExP	Ford	11.63	0.00	2.48	0.00	1.24	0.16	0.00
ExP	Franklin	10.06	0.00	2.19	0.00	0.52	0.13	0.00
ExP	Grant	4.58	0.00	0.92	0.00	0.18	0.43	0.00
ExP	Quincy	5.75	0.00	2.27	0.00	0.00	0.08	0.00
ExP	Sherman	4.51	0.00	2.44	0.00	0.37	0.07	0.00
IBW	Bush	7.96	0.00	1.53	0.00	0.41	0.31	0.00
IBW	Ernie	7.90	0.00	1.50	0.00	0.60	0.00	0.00
IBW	Johnson	7.83	0.00	0.99	0.00	0.09	0.09	0.00
IBW	Kennedy	10.20	0.00	1.90	0.00	0.54	0.95	0.00
IBW	Pierce	11.40	0.00	1.67	0.00	0.42	0.42	0.00
IBW	York	11.26	0.00	1.28	0.00	0.13	0.13	0.00

Table 31 Baseline complete blood count, part 3.

<i>Group</i>	<i>Dog</i>	<i>Other Absolute (x10³/uL)</i>	<i>Blast Absolute (x10³/uL)</i>	<i>Promyelocyte Absolute (x10³/uL)</i>	<i>Myelocyte Absolute (x10³/uL)</i>	<i>Metamyelocyte Absolute (x10³/uL)</i>	<i>Segmented Neutrophils (%)</i>
ObN	Garfield	0.00	0.00	0.00	0.00	0.00	77
ObN	Adams	0.00	0.00	0.00	0.00	0.00	71
ObN	Arthur	0.00	0.00	0.00	0.00	0.00	63
ObN	Polk	0.00	0.00	0.00	0.00	0.00	79
ObN	Taylor	0.00	0.00	0.00	0.00	0.00	69
ObN	Truman	0.00	0.00	0.00	0.00	0.00	61
ObP	Harding	0.00	0.00	0.00	0.00	0.00	61
ObP	Harrison	0.00	0.00	0.00	0.00	0.00	59
ObP	Hoover	0.00	0.00	0.00	0.00	0.00	56
ObP	Jackson	0.00	0.00	0.00	0.00	0.00	69
ObP	Lynden	0.00	0.00	0.00	0.00	0.00	81
ObP	Wilson	0.00	0.00	0.00	0.00	0.00	59
WLD	Carter	0.00	0.00	0.00	0.00	0.00	64
WLD	Clinton	0.00	0.00	0.00	0.00	0.00	59
WLD	Custer	0.00	0.00	0.00	0.00	0.00	56
WLD	Houston	0.00	0.00	0.00	0.00	0.00	55
WLD	King	0.00	0.00	0.00	0.00	0.00	58
WLD	Nixon	0.00	0.00	0.00	0.00	0.00	60
ExN	Lincoln	0.00	0.00	0.00	0.00	0.00	75
ExN	Madison	0.00	0.00	0.00	0.00	0.00	75
ExN	Monroe	0.00	0.00	0.00	0.00	0.00	70
ExN	Obama	0.00	0.00	0.00	0.00	0.00	74
ExN	Taft	0.00	0.00	0.00	0.00	0.00	81

Table 31 (Continued) Baseline complete blood count, part 3.

<i>Group</i>	<i>Dog</i>	<i>Other Absolute (x10³/uL)</i>	<i>Blast Absolute (x10³/uL)</i>	<i>Promyelocyte Absolute (x10³/uL)</i>	<i>Myelocyte Absolute (x10³/uL)</i>	<i>Metamyelocyte Absolute (x10³/uL)</i>	<i>Segmented Neutrophils (%)</i>
ExN	Tyler	0.07	0.07	0.07	0.07	0.07	83
ExP	Fillmore	0.00	0.00	0.00	0.00	0.00	75
ExP	Ford	0.00	0.00	0.00	0.00	0.00	75
ExP	Franklin	0.00	0.00	0.00	0.00	0.00	78
ExP	Grant	0.00	0.00	0.00	0.00	0.00	75
ExP	Quincy	0.00	0.00	0.00	0.00	0.00	71
ExP	Sherman	0.00	0.00	0.00	0.00	0.00	61
IBW	Bush	0.00	0.00	0.00	0.00	0.00	78
IBW	Ernie	0.00	0.00	0.00	0.00	0.00	79
IBW	Johnson	0.00	0.00	0.00	0.00	0.00	87
IBW	Kennedy	0.00	0.00	0.00	0.00	0.00	75
IBW	Pierce	0.00	0.00	0.00	0.00	0.00	82
IBW	York	0.00	0.00	0.00	0.00	0.00	88

Table 32 Baseline complete blood count, part 4.

<i>Group</i>	<i>Dog</i>	<i>Band Neutrophils (%)</i>	<i>Lymphocytes (%)</i>	<i>Monocytes (%)</i>	<i>Eosinophils (%)</i>	<i>Basophils (%)</i>
ObN	Garfield	0	18	3	2	0
ObN	Adams	0	22	4	2	1
ObN	Arthur	0	29	4	4	0
ObN	Polk	0	15	3	2	1
ObN	Taylor	0	24	4	2	1
ObN	Truman	0	32	4	2	1
ObP	Harding	0	31	5	2	1
ObP	Harrison	0	32	6	3	0
ObP	Hoover	0	37	4	3	0
ObP	Jackson	0	22	4	5	0
ObP	Lynden	0	12	5	2	0
ObP	Wilson	1	33	5	2	0
WLD	Carter	0	27	5	3	1
WLD	Clinton	0	31	4	6	0
WLD	Custer	0	29	6	7	2
WLD	Houston	0	34	4	6	1
WLD	King	0	35	3	3	1
WLD	Nixon	0	29	7	3	1
ExN	Lincoln	0	17	6	2	0
ExN	Madison	0	18	2	5	0
ExN	Monroe	0	24	3	2	1
ExN	Obama	0	19	5	2	0
ExN	Taft	0	11	6	2	0
ExN	Tyler	0	14	2	1	0
ExP	Fillmore	0	20	4	1	0
ExP	Ford	0	16	8	1	0
ExP	Franklin	0	17	4	1	0
ExP	Grant	0	15	3	7	0
ExP	Quincy	0	28	0	1	0
ExP	Sherman	0	33	5	1	0
IBW	Bush	0	15	4	3	0
IBW	Ernie	0	15	6	0	0
IBW	Johnson	0	11	1	1	0
IBW	Kennedy	0	14	4	7	0
IBW	Pierce	0	12	3	3	0
IBW	York	0	10	1	1	0

Table 33 Baseline chemistry, part 1.

<i>Group</i>	<i>Dog</i>	<i>Glucose (mg/dL)</i>	<i>AST (GOT) (U/L)</i>	<i>ALT (GPT) (U/L)</i>	<i>Alk. Ptase (U/L)</i>	<i>Total Bilirubin (mg/dL)^a</i>	<i>Cholesterol (mg/dL)</i>	<i>Total Protein (g/dL)</i>	<i>Albumin (g/dL)</i>
ObN	Garfield	94	32	35	41	0.1	176	5.4	2.9
ObN	Adams	92	43	47	38	0.1	159	5.4	3.0
ObN	Arthur	96	25	38	43	0.1	254	5.9	3.0
ObN	Polk	101	24	39	44	0.1	160	5.6	3.3
ObN	Taylor	96	40	33	25	0.1	179	5.5	3.3
ObN	Truman	103	34	30	31	0.1	144	5.0	3.1
ObP	Harding	100	26	31	89	0.09	183	5.6	3.1
ObP	Harrison	111	40	50	66	0.09	139	5.5	3.0
ObP	Hoover	106	42	37	68	0.1	159	5.3	3.0
ObP	Jackson	90	30	43	64	0.1	171	5.6	3.2
ObP	Lynden	100	47	51	49	0.1	159	5.0	2.8
ObP	Wilson	103	54	51	83	0.1	193	5.6	3.1
WLD	Carter	103	40	48	72	0.1	174	5.3	3.2
WLD	Clinton	105	30	42	30	0.1	143	5.3	3.0
WLD	Custer	106	50	37	43	0.1	137	5.4	3.0
WLD	Houston	91	40	53	62	0.1	159	5.2	2.9
WLD	King	94	46	42	62	0.1	165	5.2	3.0
WLD	Nixon	113	74	43	24	0.1	182	5.5	3.3
ExN	Lincoln	89	38	43	59	0.1	238	5.7	2.9
ExN	Madison	84	33	19	33	0.1	184	5.6	3.0
ExN	Monroe	111	40	28	46	0.1	215	4.8	2.6
ExN	Obama	90	38	38	27	0.1	193	5.1	2.8
ExN	Taft	91	33	40	35	0.09	198	5.1	2.8

Table 33 (Continued) Baseline chemistry, part 1.

<i>Group</i>	<i>Dog</i>	<i>Glucose (mg/dL)</i>	<i>AST (GOT) (U/L)</i>	<i>ALT (GPT) (U/L)</i>	<i>Alk. Ptase (U/L)</i>	<i>Total Bilirubin (mg/dL)^a</i>	<i>Cholesterol (mg/dL)</i>	<i>Total Protein (g/dL)</i>	<i>Albumin (g/dL)</i>
ExN	Tyler	102	32	32	40	0.09	181	5.1	2.8
ExP	Fillmore	94	28	26	40	0.09	174	5.0	2.7
ExP	Ford	111	34	23	48	0.1	213	5.3	3.1
ExP	Franklin	101	35	27	26	0.1	161	5.2	2.7
ExP	Grant	92	24	27	39	0.1	182	5.0	3.0
ExP	Quincy	86	37	29	30	0.1	173	5.3	2.7
ExP	Sherman	138	32	37	25	0.1	187	5.0	2.7
IBW	Bush	87	36	24	37	0.1	202	5.0	2.7
IBW	Ernie	100	34	36	39	0.1	246	5.3	2.9
IBW	Johnson	116	44	35	59	0.09	220	5.3	3.1
IBW	Kennedy	73	42	29	53	0.1	190	5.5	2.7
IBW	Pierce	81	54	42	62	0.1	273	5.3	2.8
IBW	York	84	46	30	76	0.1	224	5.0	2.7

^a <0.1 entered as 0.09

Table 34 Baseline chemistry, part 2.

<i>Group</i>	<i>Dog</i>	<i>Globulin (g/dL)</i>	<i>Urea N (mg/dL)</i>	<i>Creatinine (mg/dL)</i>	<i>Phosphorus (mg/dL)</i>	<i>Calcium (mg/dL)</i>	<i>Sodium (mmol/L)</i>	<i>Potassium (mmol/L)</i>
ObN	Garfield	2.5	13	0.8	4.2	9.4	142	5.1
ObN	Adams	2.4	11	0.8	4.7	10.0	145	4.9
ObN	Arthur	2.9	13	0.9	4.6	10.0	144	5.2
ObN	Polk	2.3	9	0.7	4.3	10.2	146	5
ObN	Taylor	2.2	12	0.8	4.7	9.1	146	4.7
ObN	Truman	1.9	10	0.7	4.6	9.4	143	4.9
ObP	Harding	2.5	12	0.6	4.7	9.8	144	4.8
ObP	Harrison	2.5	10	0.8	4.4	10.1	145	4.7
ObP	Hoover	2.3	12	0.9	4.8	9.8	142	4.9
ObP	Jackson	2.4	10	0.6	4.9	9.7	143	4.7
ObP	Lynden	2.2	12	0.7	4.3	9.2	143	4.6
ObP	Wilson	2.5	15	0.9	3.9	9.8	147	5.8
WLD	Carter	2.1	13	0.8	4.2	10.1	144	5.0
WLD	Clinton	2.3	11	0.8	4.1	9.6	145	4.7
WLD	Custer	2.4	14	0.9	4.1	10.2	146	5.2
WLD	Houston	2.3	16	0.8	4.7	9.6	143	4.9
WLD	King	2.2	11	0.7	5.1	10.0	145	4.7
WLD	Nixon	2.2	13	0.8	4.3	10.0	142	4.6
ExN	Lincoln	2.8	11	0.7	5.6	10.7	149	4.0
ExN	Madison	2.6	12	0.8	4.6	10.1	148	4.1
ExN	Monroe	2.2	11	0.7	4.0	9.8	149	3.7
ExN	Obama	2.3	10	0.6	4.6	10.5	147	4.4
ExN	Taft	2.3	11	0.6	4.7	9.6	150	3.7

Table 34 (Continued) Baseline chemistry, part 2.

<i>Group</i>	<i>Dog</i>	<i>Globulin (g/dL)</i>	<i>Urea N (mg/dL)</i>	<i>Creatinine (mg/dL)</i>	<i>Phosphorus (mg/dL)</i>	<i>Calcium (mg/dL)</i>	<i>Sodium (mmol/L)</i>	<i>Potassium (mmol/L)</i>
ExN	Tyler	2.3	10	0.7	4.7	9.7	147	4.6
ExP	Fillmore	2.3	11	0.7	5.2	9.8	146	4.5
ExP	Ford	2.2	9	0.8	4.0	9.9	147	3.8
ExP	Franklin	2.5	10	0.7	5.0	10.2	148	4.3
ExP	Grant	2.0	10	0.8	5.1	10.1	148	4.4
ExP	Quincy	2.6	13	0.6	5.9	10.1	146	4.1
ExP	Sherman	2.3	7	0.7	4.5	9.8	146	3.5
IBW	Bush	2.3	13	0.7	4.2	10.1	146	4.2
IBW	Ernie	2.4	11	0.7	4.1	10.2	145	4.0
IBW	Johnson	2.2	16	0.8	4.3	10.4	148	3.9
IBW	Kennedy	2.8	11	0.7	4.5	10.0	147	4.4
IBW	Pierce	2.5	16	0.6	3.4	9.8	146	4.1
IBW	York	2.3	17	0.6	4.7	10.1	146	3.8

Table 35 Baseline chemistry, part 3.

<i>Group</i>	<i>Dog</i>	<i>Chloride (mmol/L)</i>	<i>Bicarbonate (mmol/L)</i>	<i>Anion Gap (mmol/L)</i>	<i>GGT (U/L)^a</i>	<i>A/G Ratio</i>
ObN	Garfield	114	21	12	2.99	1.2
ObN	Adams	111	26	13	2.99	1.3
ObN	Arthur	110	25	14	2.99	1.0
ObN	Polk	113	23	15	2.99	1.4
ObN	Taylor	113	23	15	2.99	1.5
ObN	Truman	112	21	15	2.99	1.6
ObP	Harding	110	26	13	2.99	1.2
ObP	Harrison	110	26	14	2.99	1.2
ObP	Hoover	112	21	14	2.99	1.3
ObP	Jackson	112	22	14	2.99	1.3
ObP	Lynden	114	22	12	2.99	1.3
ObP	Wilson	116	26	11	2.99	1.2
WLD	Carter	111	25	13	2.99	1.5
WLD	Clinton	114	23	13	2.99	1.3
WLD	Custer	115	23	13	2.99	1.3
WLD	Houston	113	22	13	2.99	1.3
WLD	King	111	26	13	2.99	1.4
WLD	Nixon	113	19	15	2.99	1.5
ExN	Lincoln	113	23	17	2.99	1
ExN	Madison	115	21	16	2.99	1.2
ExN	Monroe	114	24	15	2.99	1.2
ExN	Obama	114	22	15	2.99	1.2
ExN	Taft	116	23	15	2.99	1.2
ExN	Tyler	115	22	15	2.99	1.2
ExP	Fillmore	114	23	14	3	1.2
ExP	Ford	114	22	15	4	1.4
ExP	Franklin	114	24	14	2.99	1.1
ExP	Grant	116	22	14	2.99	1.5
ExP	Quincy	113	20	17	2.99	1.0
ExP	Sherman	113	23	14	2.99	1.2
IBW	Bush	115	25	10	3	1.2
IBW	Ernie	112	22	15	2.99	1.2
IBW	Johnson	113	24	15	2.99	1.4
IBW	Kennedy	112	25	14	3	1.0
IBW	Pierce	113	22	15	2.99	1.1
IBW	York	115	21	14	3	1.2

^a <3 entered as 2.99

Table 36 Baseline urinalysis.

<i>Group</i>	<i>Dog</i>	<i>Sp-Gr.</i>	<i>pH</i>	<i>Prot. (mg/dL)</i>	<i>Uro.</i>	<i>Bilirubin</i>	<i>Bld.</i>
ObN	Garfield	1.014	5.0	Negative	Norm.	Negative	Negative
ObN	Adams	1.033	6.5	trace	Elevated	positive	Negative
ObN	Arthur	1.068	6.5	30	Elevated	Positive	Negative
ObN	Polk	1.018	8.0	Negative	Norm.	Negative	Negative
ObN	Taylor	1.015	6.5	Negative	Norm.	Positive	Negative
ObN	Truman	1.028	8.0	Negative	Norm.	Positive	Negative
ObP	Harding	1.013	5.0	Negative	Norm.	Negative	Negative
ObP	Harrison	1.032	6.5	trace	Elevated	Positive	Negative
ObP	Hoover	1.036	7.0	trace	Elevated	Positive	Negative
ObP	Jackson	1.038	6.0	trace	Elevated	Positive	3+
ObP	Lynden	1.029	6.0	Negative	Norm.	Positive	Negative
ObP	Wilson	1.030	5.0	30	Elevated	Positive	3+
WLD	Carter	1.047	7.0	30	Elevated	Positive	Negative
WLD	Clinton	1.032	6.5	Negative	Elevated	Positive	Negative
WLD	Custer	1.050	8.0	trace	Elevated	Positive	2+
WLD	Houston	1.038	7.0	Negative	Norm.	Positive	Negative
WLD	King	1.030	6.0	Negative	Elevated	Positive	Negative
WLD	Nixon	1.007	6.0	Negative	Norm.	Negative	Negative
ExN	Lincoln	1.023	6.5	Negative	Elevated	Positive	Negative
ExN	Madison	1.038	7.0	trace	Elevated	Positive	Negative
ExN	Monroe	1.028	8.0	Negative	Norm.	Negative	Negative
ExN	Obama	1.017	5.0	Negative	Norm.	Positive	Negative
ExN	Taft	1.014	5.0	Negative	Norm.	Negative	Negative
ExN	Tyler	1.031	6.0	Negative	Elevated	Positive	Negative
ExP	Fillmore	1.015	7.0	Negative	Norm.	Negative	Negative
ExP	Ford	1.006	8.0	Negative	Norm.	Negative	Negative
ExP	Franklin	1.027	6.5	Negative	Elevated	Positive	Negative
ExP	Grant	1.006	8.0	Negative	Norm.	Negative	Negative
ExP	Quincy	1.011	6.0	Negative	Norm.	Negative	Negative
ExP	Sherman	1.008	6.5	Negative	Norm.	Negative	Negative
IBW	Bush	1.013	8.0	Negative	Norm.	Negative	Negative
IBW	Ernie	1.009	6.0	Negative	Norm.	Negative	Negative
IBW	Johnson	1.042	7.0	trace	Elevated	Positive	trace
IBW	Kennedy	1.013	7.0	Negative	Norm.	Negative	Negative
IBW	Pierce	1.037	8.0	Negative	Norm.	Positive	Negative
IBW	York	1.021	6.0	Negative	Norm.	Negative	Negative

Table 37 Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
ObN	Adams	B	16.80	8	683.69	40.70	82.39	640.88	38.15	77.23	42.81
ObN	Adams	O	16.20	9	694.28	42.86	85.98	694.28	42.86	85.98	0.00
ObN	Adams	M1	15.20	8	687.52	45.23	89.31	687.52	45.23	89.31	0.00
ObN	Adams	M2	14.20	7	659.57	46.45	90.17	659.57	46.45	90.17	0.00
ObN	Adams	E	13.20	6	621.02	47.05	89.68	621.02	47.05	89.68	0.00
ObN	Arthur	B	15.40	9	365.52	23.73	47.02	365.52	23.73	47.02	0.00
ObN	Arthur	O	14.80	8	403.30	27.25	53.45	403.30	27.25	53.45	0.00
ObN	Arthur	M1	13.40	7	431.37	32.19	61.59	431.37	32.19	61.59	0.00
ObN	Arthur	M2	11.60	6	488.80	42.14	77.77	488.80	42.14	77.77	0.00
ObN	Arthur	E	10.40	5	611.83	58.83	105.65	611.83	58.83	105.65	0.00
ObN	Garfield	B	12.60	5	1405.66	111.56	210.19	635.69	50.45	95.05	769.98
ObN	Garfield	O	12.40	5	1138.80	91.84	172.34	876.15	70.66	132.59	262.65
ObN	Garfield	M1	12.60	5	1142.37	90.66	170.82	1094.77	86.89	163.70	47.60
ObN	Garfield	M2	12.40	5	1165.22	93.97	176.34	1165.22	93.97	176.34	0.00
ObN	Garfield	E	12.60	6	1160.75	92.12	173.56	1160.75	92.12	173.56	0.00
ObN	Polk	B	16.80	9	755.28	44.96	91.02	431.62	25.69	52.01	323.66
ObN	Polk	O	17.00	9	789.36	46.43	94.28	789.36	46.43	94.28	0.00
ObN	Polk	M1	16.40	8	796.76	48.58	97.77	796.76	48.58	97.77	0.00
ObN	Polk	M2	15.20	8	797.78	52.49	103.63	797.78	52.49	103.63	0.00
ObN	Polk	E	14.40	7	798.68	55.46	108.04	798.68	55.46	108.04	0.00
ObN	Taylor	B	17.00	9	594.60	34.98	71.02	467.01	27.47	55.78	127.59
ObN	Taylor	O	16.20	9	610.43	37.68	75.60	610.43	37.68	75.60	0.00
ObN	Taylor	M1	15.40	9	587.33	38.14	75.55	587.33	38.14	75.55	0.00

Table 37 (Continued) Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
ObN	Taylor	M2	14.20	8	600.09	42.26	82.04	600.09	42.26	82.04	0.00
ObN	Taylor	E	13.40	7	607.75	45.35	86.78	607.75	45.35	86.78	0.00
ObN	Truman	B	16.20	9	673.09	41.55	83.36	672.91	41.54	83.33	0.19
ObN	Truman	O	16.00	9	710.49	44.41	88.81	710.49	44.41	88.81	0.00
ObN	Truman	M1	14.80	8	706.53	47.74	93.63	706.53	47.74	93.63	0.00
ObN	Truman	M2	13.40	8	704.75	52.59	100.62	704.75	52.59	100.62	0.00
ObN	Truman	E	13.00	7	797.40	61.34	116.47	797.40	61.34	116.47	0.00
ObP	Harding	B	15.40	7	1520.91	98.76	195.64	698.99	45.39	89.91	821.92
ObP	Harding	O	15.80	7	1176.19	74.44	148.42	1176.19	74.44	148.42	0.00
ObP	Harding	M1	15.60	7	1142.12	73.21	145.50	1142.12	73.21	145.50	0.00
ObP	Harding	M2	15.40	7	1151.18	74.75	148.08	1151.18	74.75	148.08	0.00
ObP	Harding	E	15.60	7	1165.98	74.74	148.54	1165.98	74.74	148.54	0.00
ObP	Harrison	B	18.00	8	913.03	50.72	104.48	708.23	39.35	81.04	204.80
ObP	Harrison	O	17.40	9	980.93	56.38	115.14	786.04	45.17	92.26	194.88
ObP	Harrison	M1	17.20	9	970.84	56.44	114.95	970.84	56.44	114.95	0.00
ObP	Harrison	M2	16.40	9	974.16	59.40	119.54	974.16	59.40	119.54	0.00
ObP	Harrison	E	16.60	9	981.69	59.14	119.37	981.69	59.14	119.37	0.00
ObP	Hoover	B	18.20	9	851.51	46.79	96.64	721.46	39.64	81.88	130.06
ObP	Hoover	O	17.60	9	890.57	50.60	103.64	847.56	48.16	98.64	43.01
ObP	Hoover	M1	17.20	8	878.32	51.06	103.99	839.64	48.82	99.41	38.67
ObP	Hoover	M2	15.80	9	893.63	56.56	112.76	893.63	56.56	112.76	0.00
ObP	Hoover	E	15.80	7	884.19	55.96	111.57	884.19	55.96	111.57	0.00
ObP	Jackson	B	18.20	9	1302.16	71.55	147.78	1035.05	56.87	117.46	267.11

Table 37 (Continued) Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
ObP	Jackson	O	18.20	7	1156.41	63.54	131.24	1156.41	63.54	131.24	0.00
ObP	Jackson	M1	17.80	8	1182.19	66.42	136.42	1182.19	66.42	136.42	0.00
ObP	Jackson	M2	16.20	6	1155.64	71.34	143.12	1155.64	71.34	143.12	0.00
ObP	Jackson	E	16.20	7	1173.77	72.45	145.36	1173.77	72.45	145.36	0.00
ObP	Lynden	B	13.20	6	1228.90	93.10	177.45	357.01	27.05	51.55	871.89
ObP	Lynden	O	13.40	5	1040.14	77.62	148.51	798.29	59.57	113.98	241.85
ObP	Lynden	M1	13.60	5	1094.26	80.46	154.51	1094.26	80.46	154.51	0.00
ObP	Lynden	M2	13.20	6	1062.48	80.49	153.42	1062.48	80.49	153.42	0.00
ObP	Lynden	E	13.80	6	1080.86	78.32	150.96	1080.86	78.32	150.96	0.00
ObP	Wilson	B	16.00	8	1299.22	81.20	162.40	583.04	36.44	72.88	716.18
ObP	Wilson	O	15.80	8	1150.79	72.84	145.21	1037.59	65.67	130.93	113.20
ObP	Wilson	M1	16.20	8	1165.98	71.97	144.40	1165.98	71.97	144.40	0.00
ObP	Wilson	M2	15.60	9	1151.94	73.84	146.75	1151.94	73.84	146.75	0.00
ObP	Wilson	E	16.00	7	1166.24	72.89	145.78	1166.24	72.89	145.78	0.00
WLD	Carter	B	12.50	6	954.89	76.39	143.64	440.79	35.26	66.31	514.10
WLD	Carter	O1	10.90	5	939.52	86.19	156.62	64.87	5.95	10.81	874.65
WLD	Carter	M1	10.80	5	945.57	87.55	158.72	945.57	87.55	158.72	0.00
WLD	Carter	M2	.	.	.	.	.	.	.	.	.
WLD	Carter	E	.	.	.	.	.	.	.	.	.
WLD	Clinton	B	18.10	9	667.73	36.89	76.09	643.90	35.57	73.38	23.83
WLD	Clinton	O	17.20	9	622.50	36.19	73.70	580.17	33.73	68.69	42.33
WLD	Clinton	M1	16.10	9	632.03	39.26	78.64	632.03	39.26	78.64	0.00
WLD	Clinton	M2	15.20	8	634.05	41.71	82.36	634.05	41.71	82.36	0.00

Table 37 (Continued) Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
WLD	Clinton	E	13.20	6	612.79	46.42	88.49	612.24	46.38	88.41	0.55
WLD	Custer	B	16.60	9	632.51	38.10	76.91	538.99	32.47	65.54	93.52
WLD	Custer	O	15.70	9	625.98	39.87	79.37	625.98	39.87	79.37	0.00
WLD	Custer	M1	14.60	8	620.85	42.52	83.12	620.85	42.52	83.12	0.00
WLD	Custer	M2	13.20	6	637.34	48.28	92.03	637.34	48.28	92.03	0.00
WLD	Custer	E	11.30	4	626.90	55.48	101.72	626.90	55.48	101.72	0.00
WLD	Houston	B	16.20	9	1327.30	81.93	164.37	752.01	46.42	93.13	575.29
WLD	Houston	O	15.30	8	1120.02	73.20	144.78	654.57	42.78	84.61	465.46
WLD	Houston	M1	14.80	8	1120.02	75.68	148.43	1097.30	74.14	145.42	22.72
WLD	Houston	M2	14.70	8	1151.73	78.35	153.41	1151.73	78.35	153.41	0.00
WLD	Houston	E	13.40	6	1120.02	83.58	159.92	987.72	73.71	141.03	132.31
WLD	King	B	14.10	6	1502.91	106.59	206.55	943.03	66.88	129.60	559.88
WLD	King	O	13.20	6	1129.74	85.59	163.13	782.84	59.31	113.04	346.89
WLD	King	M1	13.20	6	1120.57	84.89	161.81	1120.57	84.89	161.81	0.00
WLD	King	M2	13.00	5	1159.24	89.17	169.32	1159.24	89.17	169.32	0.00
WLD	King	E	.	.	.	.	.	.	.	.	.
WLD	Nixon	B	16.30	9	756.56	46.41	93.26	602.14	36.94	74.23	154.42
WLD	Nixon	O	15.30	8	745.28	48.71	96.34	719.62	47.03	93.02	25.66
WLD	Nixon	M1	14.60	8	742.35	50.85	99.39	742.35	50.85	99.39	0.00
WLD	Nixon	M2	13.60	7	752.61	55.34	106.27	752.61	55.34	106.27	0.00
WLD	Nixon	E	11.80	5	762.87	64.65	119.82	761.77	64.56	119.65	1.10
ExN	Lincoln	B	13.60	5	1328.07	97.65	187.53	1328.07	97.65	187.53	0.00
ExN	Lincoln	O	14.80	5	4023.00	271.82	533.15	2043.40	138.07	270.81	1979.59

Table 37 (Continued) Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
ExN	Lincoln	M1	16.40	5	2998.55	182.84	367.94	1861.16	113.49	228.38	1137.39
ExN	Lincoln	M2	17.60	6	3476.63	197.54	404.60	1784.71	101.40	207.70	1691.92
ExN	Lincoln	E	18.80	7	3793.78	201.80	420.20	1606.29	85.44	177.91	2187.49
ExN	Madison	B	12.20	5	1134.33	92.98	173.77	1134.46	92.99	173.79	-0.13
ExN	Madison	O	12.60	5	3990.96	316.74	596.76	1672.65	132.75	250.11	2318.31
ExN	Madison	M1	13.80	5	3320.93	240.65	463.82	1830.27	132.63	255.63	1490.66
ExN	Madison	M2	14.20	7	4150.88	292.32	567.44	1468.96	103.45	200.81	2681.91
ExN	Madison	E	16.60	7	4168.49	251.11	506.87	1912.46	115.21	232.55	2256.03
ExN	Monroe	B	11.80	4	1306.11	110.69	205.15	1306.50	110.72	205.21	-0.38
ExN	Monroe	O	13.20	4	3995.56	302.69	576.96	2759.64	209.06	398.49	1235.92
ExN	Monroe	M1	15.40	5	3331.27	216.32	428.52	1951.26	126.71	251.00	1380.01
ExN	Monroe	M2	16.00	6	3795.44	237.21	474.43	1768.37	110.52	221.05	2027.07
ExN	Monroe	E	17.20	8	3775.79	219.52	447.06	1792.62	104.22	212.25	1983.16
ExN	Obama	B	10.80	4	1321.56	122.37	221.83	1321.30	122.34	221.79	0.26
ExN	Obama	O	12.00	3	3873.16	322.76	600.73	2023.75	168.65	313.89	1849.41
ExN	Obama	M1	12.60	4	3083.80	244.75	461.11	1895.10	150.41	283.37	1188.70
ExN	Obama	M2	13.80	6	3035.05	219.93	423.89	1637.94	118.69	228.76	1397.11
ExN	Obama	E	14.40	6	3038.88	211.03	411.09	1481.22	102.86	200.38	1557.66
ExN	Taft	B	11.00	5	1129.23	102.66	186.95	1128.72	102.61	186.87	0.51
ExN	Taft	O	12.40	4	3844.32	310.03	581.77	1796.70	144.90	271.90	2047.62
ExN	Taft	M1	12.60	5	3366.36	267.17	503.37	1532.01	121.59	229.08	1834.35
ExN	Taft	M2	13.40	6	3386.02	252.69	483.46	1641.39	122.49	234.36	1744.63
ExN	Taft	E	14.00	7	3401.72	242.98	470.00	1605.39	114.67	221.81	1796.32

Table 37 (Continued) Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
ExN	Tyler	B	11.60	5	1130.63	97.47	179.88	1130.12	97.42	179.80	0.51
ExN	Tyler	O	13.00	4	3866.27	297.41	564.72	2086.29	160.48	304.73	1779.99
ExN	Tyler	M1	13.20	5	2926.44	221.70	422.58	1831.29	138.73	264.44	1095.15
ExN	Tyler	M2	14.40	6	3082.02	214.03	416.93	1387.03	96.32	187.63	1694.99
ExN	Tyler	E	15.20	7	3039.90	199.99	394.89	1469.98	96.71	190.95	1569.92
ExP	Fillmore	B	11.20	5	751.84	67.13	122.80	751.58	67.11	122.76	0.26
ExP	Fillmore	O	12.40	5	2907.30	234.46	439.97	1456.97	117.50	220.49	1450.33
ExP	Fillmore	M1	12.20	5	2243.14	183.86	343.63	1271.66	104.23	194.80	971.48
ExP	Fillmore	M2	12.80	5	2615.55	204.34	386.50	1054.95	82.42	155.89	1560.60
ExP	Fillmore	E	12.60	5	2662.77	211.33	398.16	1155.64	91.72	172.80	1507.12
ExP	Ford	B	11.40	5	847.81	74.37	136.65	847.81	74.37	136.65	0.00
ExP	Ford	O	13.00	5	3301.02	253.92	482.16	2033.70	156.44	297.05	1267.32
ExP	Ford	M1	13.60	6	2622.95	192.86	370.37	1988.65	146.22	280.80	634.30
ExP	Ford	M2	15.40	7	3030.71	196.80	389.86	1755.10	113.97	225.77	1275.61
ExP	Ford	E	16.00	9	3021.52	188.85	377.69	1415.62	88.48	176.95	1605.91
ExP	Franklin	B	12.20	5	1216.39	99.70	186.34	1216.14	99.68	186.30	0.26
ExP	Franklin	O	14.40	5	3814.71	264.91	516.05	2515.74	174.70	340.33	1298.97
ExP	Franklin	M1	14.20	5	3418.31	240.73	467.30	1877.49	132.22	256.66	1540.82
ExP	Franklin	M2	15.80	7	3382.70	214.09	426.85	1622.37	102.68	204.72	1760.33
ExP	Franklin	E	15.40	8	3404.52	221.07	437.94	1442.42	93.66	185.55	1962.11
ExP	Grant	B	11.80	6	566.91	48.04	89.04	566.91	48.04	89.04	0.00
ExP	Grant	O	13.60	6	2997.78	220.43	423.30	1851.71	136.16	261.47	1146.07
ExP	Grant	M1	13.80	6	2990.64	216.71	417.69	1740.42	126.12	243.08	1250.21

Table 37 (Continued) Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
ExP	Grant	M2	15.00	9	3021.90	201.46	396.47	1291.18	86.08	169.40	1730.72
ExP	Grant	E	15.20	9	3030.94	199.40	393.73	1402.06	92.24	182.13	1628.88
ExP	Quincy	B	12.00	5	1221.88	101.82	189.51	1222.52	101.88	189.61	-0.64
ExP	Quincy	O	14.20	5	4070.34	286.64	556.44	2695.82	189.85	368.53	1374.52
ExP	Quincy	M1	14.60	8	3775.28	258.58	505.46	2195.92	150.41	294.00	1579.36
ExP	Quincy	M2	16.60	9	3768.00	226.99	458.17	1923.56	115.88	233.90	1844.44
ExP	Quincy	E	18.00	9	3760.09	208.89	430.27	2042.38	113.47	233.71	1717.70
ExP	Sherman	B	12.60	6	651.53	51.71	97.42	651.65	51.72	97.44	-0.13
ExP	Sherman	O	14.00	6	3489.27	249.23	482.10	1896.25	135.45	262.00	1593.02
ExP	Sherman	M1	14.20	6	3405.93	239.85	465.61	1815.34	127.84	248.17	1590.59
ExP	Sherman	M2	16.40	6	3418.05	208.42	419.42	1695.63	103.39	208.06	1722.43
ExP	Sherman	E	17.40	9	3460.81	198.90	406.22	2054.51	118.08	241.15	1406.30
IBW	Bush	B	11.50	3	1503.68	130.75	240.79	1503.68	130.75	240.79	0.00
IBW	Bush	O	11.60	4	1507.51	129.96	239.84	1507.51	129.96	239.84	0.00
IBW	Bush	M1	13.10	5	1503.68	114.78	218.37	1503.68	114.78	218.37	0.00
IBW	Bush	M2	13.80	5	1271.40	92.13	177.57	1271.40	92.13	177.57	0.00
IBW	Bush	E	13.20	5	1147.35	86.92	165.68	1147.35	86.92	165.68	0.00
IBW	Ernie	B	12.30	5	1037.08	84.32	157.90	1036.70	84.28	157.84	0.38
IBW	Ernie	O	12.40	5	1025.59	82.71	155.21	1025.59	82.71	155.21	0.00
IBW	Ernie	M1	12.90	5	935.24	72.50	137.40	935.24	72.50	137.40	0.00
IBW	Ernie	M2	12.80	5	802.25	62.68	118.55	802.25	62.68	118.55	0.00
IBW	Ernie	E	12.30	4	572.02	46.51	87.09	572.02	46.51	87.09	0.00
IBW	Johnson	B	11.40	5	1129.23	99.05	182.01	1128.59	99.00	181.91	0.64

Table 37 (Continued) Average daily food consumption.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
IBW	Johnson	O	11.30	5	1115.95	98.76	181.07	1115.95	98.76	181.07	0.00
IBW	Johnson	M1	11.60	5	933.70	80.49	148.55	933.70	80.49	148.55	0.00
IBW	Johnson	M2	11.80	5	805.82	68.29	126.57	805.82	68.29	126.57	0.00
IBW	Johnson	E	10.70	4	592.95	55.42	100.23	592.95	55.42	100.23	0.00
IBW	Kennedy	B	11.30	5	1220.10	107.97	197.96	1219.97	107.96	197.94	0.13
IBW	Kennedy	O	11.40	4	1129.74	99.10	182.10	1129.74	99.10	182.10	0.00
IBW	Kennedy	M1	12.00	5	1127.18	93.93	174.83	1127.18	93.93	174.83	0.00
IBW	Kennedy	M2	12.30	5	984.24	80.02	149.86	984.24	80.02	149.86	0.00
IBW	Kennedy	E	11.70	4	916.35	78.32	144.85	916.09	78.30	144.81	0.26
IBW	Pierce	B	10.50	4	1413.32	134.60	242.30	1413.32	134.60	242.30	0.00
IBW	Pierce	O	11.00	5	1390.35	126.40	230.19	1390.35	126.40	230.19	0.00
IBW	Pierce	M1	12.20	5	1222.39	100.20	187.26	1222.39	100.20	187.26	0.00
IBW	Pierce	M2	12.30	5	1078.94	87.72	164.27	1078.94	87.72	164.27	0.00
IBW	Pierce	E	11.50	4	949.53	82.57	152.05	949.27	82.55	152.01	0.26
IBW	York	B	9.90	4	1506.87	152.21	269.99	1506.74	152.20	269.97	0.13
IBW	York	O	10.30	4	1478.15	143.51	257.09	1478.15	143.51	257.09	0.00
IBW	York	M1	11.30	5	1304.58	115.45	211.67	1304.58	115.45	211.67	0.00
IBW	York	M2	11.70	5	1280.08	109.41	202.35	1280.08	109.41	202.35	0.00
IBW	York	E	11.10	4	1147.35	103.36	188.67	1147.35	103.36	188.67	0.00

Table 38 Change in average daily food consumption, part 1.

Group	Dog	Point	Change weight (kg)	% Change weight (kg)	Change BCS	% Change BCS	Change Amt Offered (kcal)	% Change Amt Offered (kcal)	Change Amt Offered (kcal/kg BW)	% Change Amt Offered (kcal/kg BW)	Change Amt offered (kcal/kg BW ^{0.75})
ObN	Adams	M1	1.60	0.10	0.00	0.00	-3.83	-0.01	-4.54	-0.11	-6.92
ObN	Adams	M2	2.60	0.15	1.00	0.13	24.12	0.04	-5.75	-0.14	-7.78
ObN	Adams	E	3.60	0.21	2.00	0.25	62.66	0.09	-6.35	-0.16	-7.29
ObN	Arthur	M1	2.00	0.13	2.00	0.22	-65.85	-0.18	-8.46	-0.36	-14.57
ObN	Arthur	M2	3.80	0.25	3.00	0.33	-123.29	-0.34	-18.40	-0.78	-30.75
ObN	Arthur	E	5.00	0.32	4.00	0.44	-246.32	-0.67	-35.10	-1.48	-58.63
ObN	Garfield	M1	0.00	0.00	0.00	0.00	263.29	0.19	20.90	0.19	39.37
ObN	Garfield	M2	0.20	0.02	0.00	0.00	240.45	0.17	17.59	0.16	33.85
ObN	Garfield	E	0.00	0.00	-1.00	-0.20	244.91	0.17	19.44	0.17	36.62
ObN	Polk	M1	0.40	0.02	1.00	0.11	-41.48	-0.05	-3.63	-0.08	-6.75
ObN	Polk	M2	1.60	0.10	1.00	0.11	-42.50	-0.06	-7.53	-0.17	-12.62
ObN	Polk	E	2.40	0.14	2.00	0.22	-43.39	-0.06	-10.51	-0.23	-17.03
ObN	Taylor	M1	1.60	0.09	0.00	0.00	7.27	0.01	-3.16	-0.09	-4.53
ObN	Taylor	M2	2.80	0.16	1.00	0.11	-5.49	-0.01	-7.28	-0.21	-11.01
ObN	Taylor	E	3.60	0.21	2.00	0.22	-13.15	-0.02	-10.38	-0.30	-15.75
ObN	Truman	M1	1.40	0.09	1.00	0.11	-33.44	-0.05	-6.19	-0.15	-10.28
ObN	Truman	M2	2.80	0.17	1.00	0.11	-31.65	-0.05	-11.04	-0.27	-17.27
ObN	Truman	E	3.20	0.20	2.00	0.22	-124.31	-0.18	-19.79	-0.48	-33.11
ObP	Harding	M1	-0.20	-0.01	0.00	0.00	378.79	0.25	25.55	0.26	50.14
ObP	Harding	M2	0.00	0.00	0.00	0.00	369.73	0.24	24.01	0.24	47.56
ObP	Harding	E	-0.20	-0.01	0.00	0.00	354.93	0.23	24.02	0.24	47.10
ObP	Harrison	M1	0.80	0.04	-1.00	-0.13	-57.81	-0.06	-5.72	-0.11	-10.47

Table 38 (Continued) Change in average daily food consumption, part 1.

Group	Dog	Point	Change weight (kg)	% Change weight (kg)	Change BCS	% Change BCS	Change Amt Offered (kcal)	% Change Amt Offered (kcal)	Change Amt Offered (kcal/kg BW)	% Change Amt Offered (kcal/kg BW)	Change Amt offered (kcal/kg BW ^{0.75})
ObP	Harrison	M2	1.60	0.09	-1.00	-0.13	-61.13	-0.07	-8.68	-0.17	-15.06
ObP	Harrison	E	1.40	0.08	-1.00	-0.13	-68.66	-0.08	-8.41	-0.17	-14.89
ObP	Hoover	M1	1.00	0.05	1.00	0.11	-26.80	-0.03	-4.28	-0.09	-7.36
ObP	Hoover	M2	2.40	0.13	0.00	0.00	-42.12	-0.05	-9.77	-0.21	-16.13
ObP	Hoover	E	2.40	0.13	2.00	0.22	-32.67	-0.04	-9.17	-0.20	-14.94
ObP	Jackson	M1	0.40	0.02	1.00	0.11	119.97	0.09	5.13	0.07	11.36
ObP	Jackson	M2	2.00	0.11	3.00	0.33	146.51	0.11	0.21	0.00	4.66
ObP	Jackson	E	2.00	0.11	2.00	0.22	128.39	0.10	-0.91	-0.01	2.42
ObP	Lynden	M1	-0.40	-0.03	1.00	0.17	134.64	0.11	12.64	0.14	22.94
ObP	Lynden	M2	0.00	0.00	0.00	0.00	166.42	0.14	12.61	0.14	24.03
ObP	Lynden	E	-0.60	-0.05	0.00	0.00	148.05	0.12	14.78	0.16	26.50
ObP	Wilson	M1	-0.20	-0.01	0.00	0.00	133.24	0.10	9.23	0.11	18.01
ObP	Wilson	M2	0.40	0.03	-1.00	-0.13	147.28	0.11	7.36	0.09	15.65
ObP	Wilson	E	0.00	0.00	1.00	0.13	132.99	0.10	8.31	0.10	16.62
WLD	Carter	M1	1.70	0.14	1.00	0.17	9.32	0.01	-11.16	-0.15	-15.08
WLD	Carter	M2	.	.	.	.	.	.	.	.	.
WLD	Carter	E	.	.	.	.	.	.	.	.	.
WLD	Clinton	M1	2.00	0.11	0.00	0.00	35.70	0.05	-2.37	-0.06	-2.54
WLD	Clinton	M2	2.90	0.16	1.00	0.11	33.69	0.05	-4.82	-0.13	-6.27
WLD	Clinton	E	4.90	0.27	3.00	0.33	54.95	0.08	-9.53	-0.26	-12.39
WLD	Custer	M1	2.00	0.12	1.00	0.11	11.66	0.02	-4.42	-0.12	-6.21
WLD	Custer	M2	3.40	0.20	3.00	0.33	-4.83	-0.01	-10.18	-0.27	-15.12

Table 38 (Continued) Change in average daily food consumption, part 1.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
WLD	Custer	E	5.30	0.32	5.00	0.56	5.61	0.01	-17.37	-0.46	-24.81
WLD	Houston	M1	1.40	0.09	1.00	0.11	207.28	0.16	6.25	0.08	15.94
WLD	Houston	M2	1.50	0.09	1.00	0.11	175.57	0.13	3.58	0.04	10.96
WLD	Houston	E	2.80	0.17	3.00	0.33	207.28	0.16	-1.65	-0.02	4.46
WLD	King	M1	0.90	0.06	0.00	0.00	382.34	0.25	21.70	0.20	44.74
WLD	King	M2	1.10	0.08	1.00	0.17	343.67	0.23	17.42	0.16	37.22
WLD	King	E									
WLD	Nixon	M1	1.70	0.10	1.00	0.11	14.22	0.02	-4.43	-0.10	-6.13
WLD	Nixon	M2	2.70	0.17	2.00	0.22	3.95	0.01	-8.92	-0.19	-13.01
WLD	Nixon	E	4.50	0.28	4.00	0.44	-6.31	-0.01	-18.24	-0.39	-26.56
ExN	Lincoln	M1	-2.80	-0.21	0.00	0.00	-1670.48	-1.26	-85.19	-0.87	-180.41
ExN	Lincoln	M2	-4.00	-0.29	-1.00	-0.20	-2148.57	-1.62	-99.88	-1.02	-217.07
ExN	Lincoln	E	-5.20	-0.38	-2.00	-0.40	-2465.72	-1.86	-104.14	-1.07	-232.67
ExN	Madison	M1	-1.60	-0.13	0.00	0.00	-2186.60	-1.93	-147.67	-1.59	-290.05
ExN	Madison	M2	-2.00	-0.16	-2.00	-0.40	-3016.54	-2.66	-199.34	-2.14	-393.68
ExN	Madison	E	-4.40	-0.36	-2.00	-0.40	-3034.16	-2.67	-158.14	-1.70	-333.10
ExN	Monroe	M1	-3.60	-0.31	-1.00	-0.25	-2025.15	-1.55	-105.63	-0.95	-223.37
ExN	Monroe	M2	-4.20	-0.36	-2.00	-0.50	-2489.33	-1.91	-126.53	-1.14	-269.28
ExN	Monroe	E	-5.40	-0.46	-4.00	-1.00	-2469.67	-1.89	-108.83	-0.98	-241.91
ExN	Obama	M1	-1.80	-0.17	0.00	0.00	-1762.25	-1.33	-122.38	-1.00	-239.29
ExN	Obama	M2	-3.00	-0.28	-2.00	-0.50	-1713.49	-1.30	-97.56	-0.80	-202.06
ExN	Obama	E	-3.60	-0.33	-2.00	-0.50	-1717.32	-1.30	-88.67	-0.72	-189.27
ExN	Taft	M1	-1.60	-0.15	0.00	0.00	-2237.14	-1.98	-164.51	-1.60	-316.41

Table 38 (Continued) Change in average daily food consumption, part 1.

Group	Dog	Point	Weight (kg)	BCS	Amount offered (kcal)	Amount offered (kcal/kg BW)	Amount offered (kcal/kg BW ^{0.75})	Amount consumed (kcal)	Consumption (kcal/kg BW)	Consumption (kcal/kg BW ^{0.75})	Amount not consumed (kcal)
ExN	Taft	M2	-2.40	-0.22	-1.00	-0.20	-2256.79	-2.00	-150.03	-1.46	-296.51
ExN	Taft	E	-3.00	-0.27	-2.00	-0.40	-2272.49	-2.01	-140.32	-1.37	-283.05
ExN	Tyler	M1	-1.60	-0.14	0.00	0.00	-1795.81	-1.59	-124.23	-1.27	-242.70
ExN	Tyler	M2	-2.80	-0.24	-1.00	-0.20	-1951.39	-1.73	-116.56	-1.20	-237.05
ExN	Tyler	E	-3.60	-0.31	-2.00	-0.40	-1909.27	-1.69	-102.53	-1.05	-215.01
ExP	Fillmore	M1	-1.00	-0.09	0.00	0.00	-1491.30	-1.98	-116.74	-1.74	-220.82
ExP	Fillmore	M2	-1.60	-0.14	0.00	0.00	-1863.71	-2.48	-137.21	-2.04	-263.70
ExP	Fillmore	E	-1.40	-0.13	0.00	0.00	-1910.93	-2.54	-144.20	-2.15	-275.35
ExP	Ford	M1	-2.20	-0.19	-1.00	-0.20	-1775.14	-2.09	-118.49	-1.59	-233.72
ExP	Ford	M2	-4.00	-0.35	-2.00	-0.40	-2182.90	-2.57	-122.43	-1.65	-253.20
ExP	Ford	E	-4.60	-0.40	-4.00	-0.80	-2173.71	-2.56	-114.48	-1.54	-241.04
ExP	Franklin	M1	-2.00	-0.16	0.00	0.00	-2201.91	-1.81	-141.02	-1.41	-280.96
ExP	Franklin	M2	-3.60	-0.30	-2.00	-0.40	-2166.31	-1.78	-114.39	-1.15	-240.51
ExP	Franklin	E	-3.20	-0.26	-3.00	-0.60	-2188.13	-1.80	-121.37	-1.22	-251.60
ExP	Grant	M1	-2.00	-0.17	0.00	0.00	-2423.73	-4.28	-168.67	-3.51	-328.65
ExP	Grant	M2	-3.20	-0.27	-3.00	-0.50	-2454.99	-4.33	-153.42	-3.19	-307.43
ExP	Grant	E	-3.40	-0.29	-3.00	-0.50	-2464.03	-4.35	-151.36	-3.15	-304.68
ExP	Quincy	M1	-2.60	-0.22	-3.00	-0.60	-2553.39	-2.09	-156.76	-1.54	-315.94
ExP	Quincy	M2	-4.60	-0.38	-4.00	-0.80	-2546.12	-2.08	-125.16	-1.23	-268.66
ExP	Quincy	E	-6.00	-0.50	-4.00	-0.80	-2538.21	-2.08	-107.07	-1.05	-240.76
ExP	Sherman	M1	-1.60	-0.13	0.00	0.00	-2754.40	-4.23	-188.15	-3.64	-368.19
ExP	Sherman	M2	-3.80	-0.30	0.00	0.00	-2766.53	-4.25	-156.71	-3.03	-322.00
ExP	Sherman	E	-4.80	-0.38	-3.00	-0.50	-2809.28	-4.31	-147.19	-2.85	-308.80

Table 38 (Continued) Change in average daily food consumption, part 1.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Weight (kg)</i>	<i>BCS</i>	<i>Amount offered (kcal)</i>	<i>Amount offered (kcal/kg BW)</i>	<i>Amount offered (kcal/kg BW^{0.75})</i>	<i>Amount consumed (kcal)</i>	<i>Consumption (kcal/kg BW)</i>	<i>Consumption (kcal/kg BW^{0.75})</i>	<i>Amount not consumed (kcal)</i>
IBW	Bush	M1	-1.60	-0.14	-2.00	-0.67	0.00	0.00	15.97	0.12	22.41
IBW	Bush	M2	-2.30	-0.20	-2.00	-0.67	232.28	0.15	38.62	0.30	63.21
IBW	Bush	E	-1.70	-0.15	-2.00	-0.67	356.33	0.24	43.83	0.34	75.11
IBW	Ernie	M1	-0.60	-0.05	0.00	0.00	101.84	0.10	11.82	0.14	20.50
IBW	Ernie	M2	-0.50	-0.04	0.00	0.00	234.83	0.23	21.64	0.26	39.35
IBW	Ernie	E	0.00	0.00	1.00	0.20	465.07	0.45	37.81	0.45	70.81
IBW	Johnson	M1	-0.20	-0.02	0.00	0.00	195.52	0.17	18.56	0.19	33.47
IBW	Johnson	M2	-0.40	-0.04	0.00	0.00	323.40	0.29	30.76	0.31	55.44
IBW	Johnson	E	0.70	0.06	1.00	0.20	536.28	0.47	43.64	0.44	81.79
IBW	Kennedy	M1	-0.70	-0.06	0.00	0.00	92.91	0.08	14.04	0.13	23.14
IBW	Kennedy	M2	-1.00	-0.09	0.00	0.00	235.85	0.19	27.95	0.26	48.11
IBW	Kennedy	E	-0.40	-0.04	1.00	0.20	303.75	0.25	29.65	0.27	53.11
IBW	Pierce	M1	-1.70	-0.16	-1.00	-0.25	190.93	0.14	34.41	0.26	55.04
IBW	Pierce	M2	-1.80	-0.17	-1.00	-0.25	334.38	0.24	46.88	0.35	78.02
IBW	Pierce	E	-1.00	-0.10	0.00	0.00	463.79	0.33	52.03	0.39	90.25
IBW	York	M1	-1.40	-0.14	-1.00	-0.25	202.29	0.13	36.76	0.24	58.32
IBW	York	M2	-1.80	-0.18	-1.00	-0.25	226.79	0.15	42.80	0.28	67.64
IBW	York	E	-1.20	-0.12	0.00	0.00	359.52	0.24	48.84	0.32	81.32

Table 38 (Continued) Change in average daily food consumption, part 1.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Weight (kg)</i>	<i>BCS</i>	<i>Amount offered (kcal)</i>	<i>Amount offered (kcal/kg BW)</i>	<i>Amount offered (kcal/kg BW^{0.75})</i>	<i>Amount consumed (kcal)</i>	<i>Consumption (kcal/kg BW)</i>	<i>Consumption (kcal/kg BW^{0.75})</i>	<i>Amount not consumed (kcal)</i>
IBW	Johnson	O	11.30	5	1115.95	98.76	181.07	1115.95	98.76	181.07	0.00
IBW	Johnson	M1	11.60	5	933.70	80.49	148.55	933.70	80.49	148.55	0.00
IBW	Johnson	M2	11.80	5	805.82	68.29	126.57	805.82	68.29	126.57	0.00
IBW	Johnson	E	10.70	4	592.95	55.42	100.23	592.95	55.42	100.23	0.00
IBW	Kennedy	B	11.30	5	1220.10	107.97	197.96	1219.97	107.96	197.94	0.13
IBW	Kennedy	O	11.40	4	1129.74	99.10	182.10	1129.74	99.10	182.10	0.00
IBW	Kennedy	M1	12.00	5	1127.18	93.93	174.83	1127.18	93.93	174.83	0.00
IBW	Kennedy	M2	12.30	5	984.24	80.02	149.86	984.24	80.02	149.86	0.00
IBW	Kennedy	E	11.70	4	916.35	78.32	144.85	916.09	78.30	144.81	0.26
IBW	Pierce	B	10.50	4	1413.32	134.60	242.30	1413.32	134.60	242.30	0.00
IBW	Pierce	O	11.00	5	1390.35	126.40	230.19	1390.35	126.40	230.19	0.00
IBW	Pierce	M1	12.20	5	1222.39	100.20	187.26	1222.39	100.20	187.26	0.00
IBW	Pierce	M2	12.30	5	1078.94	87.72	164.27	1078.94	87.72	164.27	0.00
IBW	Pierce	E	11.50	4	949.53	82.57	152.05	949.27	82.55	152.01	0.26
IBW	York	B	9.90	4	1506.87	152.21	269.99	1506.74	152.20	269.97	0.13
IBW	York	O	10.30	4	1478.15	143.51	257.09	1478.15	143.51	257.09	0.00
IBW	York	M1	11.30	5	1304.58	115.45	211.67	1304.58	115.45	211.67	0.00
IBW	York	M2	11.70	5	1280.08	109.41	202.35	1280.08	109.41	202.35	0.00
IBW	York	E	11.10	4	1147.35	103.36	188.67	1147.35	103.36	188.67	0.00

Table 39 Change in average daily food consumption, part 2.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Change consumption (kcal)</i>	<i>% change consumption (kcal)</i>	<i>Change consumption (kcal/kg BW)</i>	<i>% change consumption (kcal/kg BW)</i>	<i>Change consumption (kcal/kg BW^{0.75})</i>	<i>% Change consumption (kcal/kg BW^{0.75})</i>
ObN	Adams	M1	-46.63	-0.07	-7.08	-0.19	-12.08	-0.16
ObN	Adams	M2	-18.68	-0.03	-8.30	-0.22	-12.93	-0.17
ObN	Adams	E	19.86	0.03	-8.90	-0.23	-12.44	-0.16
ObN	Arthur	M1	-65.85	-0.18	-8.46	-0.36	-14.57	-0.31
ObN	Arthur	M2	-123.29	-0.34	-18.40	-0.78	-30.75	-0.65
ObN	Arthur	E	-246.32	-0.67	-35.10	-1.48	-58.63	-1.25
ObN	Garfield	M1	-459.08	-0.72	-36.44	-0.72	-68.65	-0.72
ObN	Garfield	M2	-529.53	-0.83	-43.52	-0.86	-81.28	-0.86
ObN	Garfield	E	-525.06	-0.83	-41.67	-0.83	-78.51	-0.83
ObN	Polk	M1	-365.14	-0.85	-22.89	-0.89	-45.75	-0.88
ObN	Polk	M2	-366.16	-0.85	-26.79	-1.04	-51.62	-0.99
ObN	Polk	E	-367.05	-0.85	-29.77	-1.16	-56.03	-1.08
ObN	Taylor	M1	-120.32	-0.26	-10.67	-0.39	-19.77	-0.35
ObN	Taylor	M2	-133.08	-0.28	-14.79	-0.54	-26.25	-0.47
ObN	Taylor	E	-140.74	-0.30	-17.88	-0.65	-30.99	-0.56
ObN	Truman	M1	-33.63	-0.05	-6.20	-0.15	-10.30	-0.12
ObN	Truman	M2	-31.84	-0.05	-11.06	-0.27	-17.29	-0.21
ObN	Truman	E	-124.50	-0.19	-19.80	-0.48	-33.14	-0.40
ObP	Harding	M1	-443.13	-0.63	-27.82	-0.61	-55.59	-0.62
ObP	Harding	M2	-452.19	-0.65	-29.36	-0.65	-58.17	-0.65
ObP	Harding	E	-467.00	-0.67	-29.35	-0.65	-58.63	-0.65
ObP	Harrison	M1	-262.62	-0.37	-17.10	-0.43	-33.90	-0.42
ObP	Harrison	M2	-265.93	-0.38	-20.05	-0.51	-38.49	-0.47

Table 39 (Continued) Change in average daily food consumption, part 2.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Change consumption (kcal)</i>	<i>% change consumption (kcal)</i>	<i>Change consumption (kcal/kg BW)</i>	<i>% change consumption (kcal/kg BW)</i>	<i>Change consumption (kcal/kg BW^{0.75})</i>	<i>% Change consumption (kcal/kg BW^{0.75})</i>
ObP	Harrison	E	-273.46	-0.39	-19.79	-0.50	-38.33	-0.47
ObP	Hoover	M1	-118.19	-0.16	-9.18	-0.23	-17.54	-0.21
ObP	Hoover	M2	-172.17	-0.24	-16.92	-0.43	-30.89	-0.38
ObP	Hoover	E	-162.73	-0.23	-16.32	-0.41	-29.69	-0.36
ObP	Jackson	M1	-147.14	-0.14	-9.54	-0.17	-18.95	-0.16
ObP	Jackson	M2	-120.60	-0.12	-14.47	-0.25	-25.65	-0.22
ObP	Jackson	E	-138.72	-0.13	-15.58	-0.27	-27.90	-0.24
ObP	Lynden	M1	-737.25	-2.07	-53.41	-1.97	-102.96	-2.00
ObP	Lynden	M2	-705.47	-1.98	-53.44	-1.98	-101.87	-1.98
ObP	Lynden	E	-723.85	-2.03	-51.28	-1.90	-99.41	-1.93
ObP	Wilson	M1	-582.94	-1.00	-35.53	-0.98	-71.52	-0.98
ObP	Wilson	M2	-568.90	-0.98	-37.40	-1.03	-73.87	-1.01
ObP	Wilson	E	-583.20	-1.00	-36.45	-1.00	-72.90	-1.00
WLD	Carter	M1	-504.78	-1.15	-52.29	-1.48	-92.41	-1.39
WLD	Carter	M2	.	.	.	.	.	.
WLD	Carter	E	.	.	.	.	.	.
WLD	Clinton	M1	11.88	0.02	-3.68	-0.10	-5.26	-0.07
WLD	Clinton	M2	9.86	0.02	-6.14	-0.17	-8.99	-0.12
WLD	Clinton	E	31.67	0.05	-10.81	-0.30	-15.03	-0.20
WLD	Custer	M1	-81.86	-0.15	-10.05	-0.31	-17.58	-0.27
WLD	Custer	M2	-98.36	-0.18	-15.81	-0.49	-26.49	-0.40
WLD	Custer	E	-87.91	-0.16	-23.01	-0.71	-36.18	-0.55
WLD	Houston	M1	-345.29	-0.46	-27.72	-0.60	-52.29	-0.56

Table 39 (Continued) Change in average daily food consumption, part 2.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Change consumption (kcal)</i>	<i>% change consumption (kcal)</i>	<i>Change consumption (kcal/kg BW)</i>	<i>% change consumption (kcal/kg BW)</i>	<i>Change consumption (kcal/kg BW^{0.75})</i>	<i>% Change consumption (kcal/kg BW^{0.75})</i>
WLD	Houston	M2	-399.71	-0.53	-31.93	-0.69	-60.28	-0.65
WLD	Houston	E	-235.70	-0.31	-27.29	-0.59	-47.90	-0.51
WLD	King	M1	-177.54	-0.19	-18.01	-0.27	-32.21	-0.25
WLD	King	M2	-216.21	-0.23	-22.29	-0.33	-39.72	-0.31
WLD	King	E						
WLD	Nixon	M1	-140.21	-0.23	-13.90	-0.38	-25.16	-0.34
WLD	Nixon	M2	-150.47	-0.25	-18.40	-0.50	-32.04	-0.43
WLD	Nixon	E	-159.63	-0.27	-27.62	-0.75	-45.42	-0.61
ExN	Lincoln	M1	-533.09	-0.40	-15.83	-0.16	-40.85	-0.22
ExN	Lincoln	M2	-456.64	-0.34	-3.75	-0.04	-20.17	-0.11
ExN	Lincoln	E	-278.22	-0.21	12.21	0.13	9.62	0.05
ExN	Madison	M1	-695.81	-0.61	-39.64	-0.43	-81.84	-0.47
ExN	Madison	M2	-334.51	-0.29	-10.46	-0.11	-27.03	-0.16
ExN	Madison	E	-778.00	-0.69	-22.22	-0.24	-58.76	-0.34
ExN	Monroe	M1	-644.76	-0.49	-15.99	-0.14	-45.79	-0.22
ExN	Monroe	M2	-461.87	-0.35	0.20	0.00	-15.84	-0.08
ExN	Monroe	E	-486.12	-0.37	6.50	0.06	-7.04	-0.03
ExN	Obama	M1	-573.80	-0.43	-28.06	-0.23	-61.58	-0.28
ExN	Obama	M2	-316.64	-0.24	3.65	0.03	-6.98	-0.03
ExN	Obama	E	-159.91	-0.12	19.48	0.16	21.41	0.10
ExN	Taft	M1	-403.30	-0.36	-18.98	-0.18	-42.21	-0.23
ExN	Taft	M2	-512.67	-0.45	-19.88	-0.19	-47.49	-0.25

Table 39 (Continued) Change in average daily food consumption, part 2.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Change consumption (kcal)</i>	<i>% change consumption (kcal)</i>	<i>Change consumption (kcal/kg BW)</i>	<i>% change consumption (kcal/kg BW)</i>	<i>Change consumption (kcal/kg BW^{0.75})</i>	<i>% Change consumption (kcal/kg BW^{0.75})</i>
ExN	Taft	E	-476.68	-0.42	-12.06	-0.12	-34.94	-0.19
ExN	Tyler	M1	-701.17	-0.62	-41.31	-0.42	-84.64	-0.47
ExN	Tyler	M2	-256.91	-0.23	1.10	0.01	-7.84	-0.04
ExN	Tyler	E	-339.87	-0.30	0.71	0.01	-11.16	-0.06
ExP	Fillmore	M1	-520.07	-0.69	-37.13	-0.55	-72.04	-0.59
ExP	Fillmore	M2	-303.36	-0.40	-15.31	-0.23	-33.13	-0.27
ExP	Fillmore	E	-404.06	-0.54	-24.61	-0.37	-50.04	-0.41
ExP	Ford	M1	-1140.84	-1.35	-71.85	-0.97	-144.15	-1.05
ExP	Ford	M2	-907.29	-1.07	-39.60	-0.53	-89.11	-0.65
ExP	Ford	E	-567.80	-0.67	-14.11	-0.19	-40.30	-0.29
ExP	Franklin	M1	-661.35	-0.54	-32.53	-0.33	-70.36	-0.38
ExP	Franklin	M2	-406.23	-0.33	-3.00	-0.03	-18.42	-0.10
ExP	Franklin	E	-226.28	-0.19	6.02	0.06	0.75	0.00
ExP	Grant	M1	-1173.51	-2.07	-78.07	-1.63	-154.03	-1.73
ExP	Grant	M2	-724.27	-1.28	-38.04	-0.79	-80.36	-0.90
ExP	Grant	E	-835.15	-1.47	-44.20	-0.92	-93.09	-1.05
ExP	Quincy	M1	-973.40	-0.80	-48.53	-0.48	-104.39	-0.55
ExP	Quincy	M2	-701.04	-0.57	-14.00	-0.14	-44.28	-0.23
ExP	Quincy	E	-819.86	-0.67	-11.59	-0.11	-44.10	-0.23
ExP	Sherman	M1	-1163.68	-1.79	-76.12	-1.47	-150.73	-1.55
ExP	Sherman	M2	-1043.97	-1.60	-51.67	-1.00	-110.62	-1.14
ExP	Sherman	E	-1402.85	-2.15	-66.36	-1.28	-143.71	-1.47
IBW	Bush	M1	0.00	0.00	15.97	0.12	22.41	0.09

Table 39 (Continued) Change in average daily food consumption, part 2.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Change consumption (kcal)</i>	<i>% change consumption (kcal)</i>	<i>Change consumption (kcal/kg BW)</i>	<i>% change consumption (kcal/kg BW)</i>	<i>Change consumption (kcal/kg BW^{0.75})</i>	<i>% Change consumption (kcal/kg BW^{0.75})</i>
IBW	Bush	M2	232.28	0.15	38.62	0.30	63.21	0.26
IBW	Bush	E	356.33	0.24	43.83	0.34	75.11	0.31
IBW	Ernie	M1	101.46	0.10	11.79	0.14	20.44	0.13
IBW	Ernie	M2	234.45	0.23	21.61	0.26	39.29	0.25
IBW	Ernie	E	464.68	0.45	37.78	0.45	70.75	0.45
IBW	Johnson	M1	194.88	0.17	18.51	0.19	33.36	0.18
IBW	Johnson	M2	322.76	0.29	30.71	0.31	55.34	0.30
IBW	Johnson	E	535.64	0.47	43.58	0.44	81.68	0.45
IBW	Kennedy	M1	92.78	0.08	14.03	0.13	23.12	0.12
IBW	Kennedy	M2	235.72	0.19	27.94	0.26	48.09	0.24
IBW	Kennedy	E	303.88	0.25	29.66	0.27	53.13	0.27
IBW	Pierce	M1	190.93	0.14	34.41	0.26	55.04	0.23
IBW	Pierce	M2	334.38	0.24	46.88	0.35	78.02	0.32
IBW	Pierce	E	464.04	0.33	52.06	0.39	90.29	0.37
IBW	York	M1	202.16	0.13	36.75	0.24	58.30	0.22
IBW	York	M2	226.66	0.15	42.79	0.28	67.62	0.25
IBW	York	E	359.39	0.24	48.83	0.32	81.30	0.30

Table 40 Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm2)</i>	<i>BMD (g/cm2)</i>
1	Adams	12	B	16.8	8	494.53	6616.70	39.20	9772.50	0.58	10267.00	16883.70	719.03	0.69
1	Adams	13	O	16.2	8	481.18	6247.50	39.30	9161.50	0.58	9642.70	15890.20	707.82	0.68
1	Adams	16	M1	15.2	8	520.77	5678.10	37.40	8968.00	0.59	9488.80	15166.90	733.83	0.71
1	Adams	20	M2	14.2	7	487.84	4773.70	33.90	8819.10	0.63	9306.90	14080.60	706.62	0.69
1	Adams	24	E	13.2	6	509.80	3547.60	27.40	8868.60	0.69	9378.40	12926.00	741.03	0.69
1	Arthur	12	B	14.5	9	437.12	6521.70	41.80	8656.80	0.55	9093.90	15615.60	705.02	0.62
1	Arthur	13	O	14.8	9	443.36	6208.60	42.40	7980.70	0.55	8424.00	14632.70	687.42	0.65
1	Arthur	16	M1	13.4	8	425.01	4931.00	36.90	7997.30	0.60	8422.30	13353.30	671.81	0.63
1	Arthur	20	M2	11.6	7	425.63	3730.90	32.30	7389.90	0.64	7815.60	11546.50	665.81	0.64
1	Arthur	24	E	10.4	5	404.46	2466.00	23.40	7686.10	0.73	8090.60	10556.60	655.81	0.62
1	Garfield	12	B	12.6	6	393.47	3234.20	26.60	8543.10	0.70	8936.50	12170.70	625.40	0.63
1	Garfield	13	O	12.4	6	368.92	3231.70	26.30	8663.90	0.71	9032.80	12264.50	600.19	0.62
1	Garfield	16	M1	12.6	6	395.82	3321.40	27.30	8466.10	0.69	8861.90	12183.40	636.20	0.62
1	Garfield	20	M2	12.4	6	379.11	3318.60	27.40	8432.80	0.70	8811.90	12130.50	617.80	0.61
1	Garfield	24	E	12.6	6	400.89	3533.00	28.50	8483.00	0.68	8883.80	12416.80	652.21	0.62
1	Polk	12	B	16.8	9	458.44	7310.30	42.50	9427.40	0.55	9885.80	17196.10	739.43	0.62
1	Polk	13	O	17	9	423.30	6822.30	41.10	9334.10	0.56	9757.40	16579.70	680.62	0.62
1	Polk	16	M1	16.4	8	441.14	6268.20	39.00	9345.60	0.58	9786.80	16055.00	701.02	0.63
1	Polk	20	M2	15.2	7	438.20	5321.20	34.70	9578.00	0.62	10016.20	15337.40	717.03	0.61
1	Polk	24	E	14.4	7	440.60	4815.20	33.40	9163.80	0.64	9604.40	14419.60	719.03	0.61
1	Taylor	12	B	17	9	404.01	7266.70	43.70	8948.90	0.54	9352.90	16619.70	665.81	0.61
1	Taylor	13	O	16.2	9	418.78	7150.40	44.80	8393.30	0.53	8812.10	15962.50	682.22	0.61
1	Taylor	16	M1	15.4	9	422.17	6244.20	41.20	8477.40	0.56	8899.50	15143.80	670.21	0.63
1	Taylor	20	M2	14.2	8	416.83	5339.00	37.70	8417.50	0.59	8834.30	14173.30	667.01	0.63

Table 40 (Continued) Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm²)</i>	<i>BMD (g/cm²)</i>
1	Taylor	24	E	13.4	7	409.97	4307.40	32.80	8409.70	0.64	8819.70	13127.00	679.02	0.60
1	Truman	12	B	16.2	9	456.18	7722.30	47.20	8183.90	0.50	8640.10	16362.30	707.02	0.65
1	Truman	13	O	16	9	456.35	7246.30	46.90	7763.90	0.50	8220.20	15466.50	708.62	0.64
1	Truman	16	M1	14.8	9	463.16	6274.80	42.90	7877.70	0.54	8340.90	14615.60	700.22	0.66
1	Truman	20	M2	13.4	8	451.59	5321.70	39.50	7683.30	0.57	8134.90	13456.60	682.22	0.66
1	Truman	24	E	13	8	425.72	4755.90	37.00	7677.70	0.60	8103.40	12859.30	660.21	0.65
2	Harding	12	B	16	8	486.63	5545.00	35.80	9457.90	0.61	9944.50	15489.50	719.43	0.68
2	Harding	13	O	15.8	7	502.75	5703.00	37.20	9108.80	0.59	9611.50	15314.60	750.24	0.67
2	Harding	16	M1	15.6	8	475.07	5491.10	35.20	9619.90	0.62	10095.00	15586.10	717.83	0.66
2	Harding	20	M2	15.4	7	486.45	5367.40	34.90	9536.10	0.62	10022.60	15390.00	735.83	0.66
2	Harding	24	E	15.6	7	472.96	5182.80	34.10	9554.90	0.63	10027.80	15210.60	724.63	0.65
2	Harrison	12	B	18	9	475.41	7304.30	41.10	10006.50	0.56	10481.90	17786.20	694.22	0.69
2	Harrison	13	O	17.4	8	471.68	6830.30	39.40	10018.40	0.58	10490.10	17320.40	701.42	0.67
2	Harrison	16	M1	17.2	9	486.68	7099.90	41.10	9695.60	0.56	10182.30	17282.20	717.83	0.68
2	Harrison	20	M2	16.4	8	492.93	6625.90	39.50	9647.90	0.58	10140.90	16766.80	722.63	0.68
2	Harrison	24	E	16.6	9	487.00	6631.40	40.00	9454.60	0.57	9941.60	16573.00	718.23	0.68
2	Hoover	12	B	18.2	9	436.80	7985.10	42.80	10237.40	0.55	10674.20	18659.40	717.83	0.61
2	Hoover	13	O	17.4	9	452.50	7265.60	41.00	9983.70	0.56	10436.20	17701.80	727.83	0.62
2	Hoover	16	M1	17.2	9	475.07	6887.50	40.50	9628.40	0.57	10103.50	16990.90	755.04	0.63
2	Hoover	20	M2	15.8	8	462.55	6163.10	37.70	9700.90	0.59	10163.40	16326.50	735.83	0.63
2	Hoover	24	E	15.8	8	467.85	5766.60	36.50	9554.60	0.61	10022.50	15789.10	750.24	0.62
2	Jackson	12	B	18.2	7	524.73	6277.90	34.20	11570.20	0.63	12095.00	18372.90	732.63	0.72
2	Jackson	13	O	18.2	7	501.06	5696.60	31.70	11760.20	0.65	12261.30	17957.90	725.43	0.69
2	Jackson	16	M1	17.8	7	517.31	5768.40	33.30	11042.50	0.64	11559.80	17328.20	745.44	0.69

Table 40 (Continued) Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm2)</i>	<i>BMD (g/cm2)</i>
2	Jackson	20	M2	16.2	7	495.70	4956.30	30.00	11094.50	0.67	11590.20	16546.40	704.22	0.70
2	Jackson	24	E	16.2	6	513.97	4618.00	28.70	10978.00	0.68	11492.00	16110.00	740.23	0.69
2	Lynden	12	B	13.2	5	431.32	3292.30	24.90	9503.20	0.72	9934.50	13226.80	702.22	0.61
2	Lynden	13	O	13.4	5	424.43	3091.60	23.70	9531.60	0.73	9956.00	13047.60	698.62	0.61
2	Lynden	16	M1	13.6	6	431.53	3546.90	26.30	9515.90	0.71	9947.40	13494.30	695.02	0.62
2	Lynden	20	M2	13.2	6	438.68	3928.00	29.60	8885.80	0.67	9324.50	13252.50	717.03	0.61
2	Lynden	24	E	13.8	6	438.42	3956.80	29.10	9207.30	0.68	9645.70	13602.50	697.02	0.63
2	Wilson	12	B	16	8	474.77	6234.90	39.40	9130.10	0.58	9604.90	15839.80	710.23	0.67
2	Wilson	13	O	15.8	8	478.41	5837.00	37.40	9272.60	0.59	9751.00	15588.00	721.03	0.66
2	Wilson	16	M1	16.2	8	468.85	6295.60	39.70	9084.00	0.57	9552.90	15848.50	720.63	0.65
2	Wilson	20	M2	15.6	8	478.75	6134.10	39.40	8938.10	0.57	9416.80	15551.00	727.03	0.66
2	Wilson	24	E	16	9	484.55	6450.10	40.80	8862.90	0.56	9347.40	15797.50	740.23	0.66
3	Carter	12	B	12.5	6	390.16	3632.60	29.10	8475.10	0.68	8865.30	12497.80	660.21	0.59
3	Carter	13	O	10.9	5	396.08	2466.70	22.50	8118.50	0.74	8514.60	10981.30	689.02	0.58
3	Carter	16	M1	10.8	4	392.24	1841.50	17.50	8269.30	0.79	8661.50	10503.00	653.41	0.60
3	Carter	20	M2	.	.	.	.	.	.	.	.	.	.	.
3	Carter	24	E	.	.	.	.	.	.	.	.	.	.	.
3	Clinton	12	B	18.1	9	454.69	7973.30	43.00	10112.30	0.55	10567.00	18540.30	729.83	0.62
3	Clinton	13	O	17.2	9	481.85	7465.70	43.00	9406.00	0.54	9887.80	17353.50	751.84	0.64
3	Clinton	16	M1	16.1	9	476.15	6392.60	40.40	8943.50	0.57	9419.60	15812.20	745.44	0.64
3	Clinton	20	M2	15.2	8	493.50	5116.20	35.60	8746.40	0.61	9239.90	14356.10	765.44	0.65
3	Clinton	24	E	13.2	6	454.01	3897.30	29.00	9073.40	0.68	9527.40	13424.70	714.63	0.64
3	Custer	12	B	16.6	9	429.97	7200.00	43.00	9121.10	0.54	9551.10	16751.10	722.23	0.60

Table 40 (Continued) Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm²)</i>	<i>BMD (g/cm²)</i>
3	Custer	13	O	15.7	9	410.64	6760.10	42.20	8864.90	0.55	9275.60	16035.60	691.02	0.59
3	Custer	16	M1	14.6	8	415.90	5076.80	35.10	8980.80	0.62	9396.70	14473.50	691.82	0.60
3	Custer	20	M2	13.2	6	411.95	3425.10	26.90	8879.70	0.70	9291.70	12716.80	710.63	0.58
3	Custer	24	E	11.3	4	393.94	2286.10	19.70	8926.70	0.77	9320.60	11606.70	696.62	0.57
3	Houston	12	B	16.2	8	481.11	6462.70	39.50	9403.30	0.58	9884.40	16347.10	717.43	0.67
3	Houston	13	O	15.3	8	479.52	5665.50	36.80	9264.20	0.60	9743.70	15409.20	714.23	0.67
3	Houston	16	M1	14.8	7	492.05	5108.00	34.60	9184.20	0.62	9676.20	14784.20	728.23	0.68
3	Houston	20	M2	14.7	6	493.87	4085.30	29.20	9408.60	0.67	9902.50	13987.80	727.03	0.68
3	Houston	24	E	13.4	6	461.53	3614.90	26.80	9426.20	0.70	9887.70	13502.60	696.62	0.66
3	King	12	B	14.1	7	464.49	4269.20	30.10	9469.70	0.67	9934.20	14203.40	741.44	0.63
3	King	13	O	13.2	6	446.95	3727.10	27.80	9212.30	0.69	9659.20	13386.30	709.42	0.63
3	King	16	M1	13.2	5	455.17	3185.20	24.40	9392.00	0.72	9847.10	13032.30	730.63	0.62
3	King	20	M2	13	4	450.12	2723.60	18.20	9724.70	0.77	9952.40	12676.00	727.83	0.62
3	King	24	E	.	.	.	.	.	.	.	.	.	.	.
3	Nixon	12	B	16.3	8	407.22	6310.00	38.40	9716.80	0.59	10124.10	16434.10	643.00	0.63
3	Nixon	13	O	15.3	8	431.73	5874.10	37.70	9273.50	0.60	9705.20	15579.30	679.42	0.64
3	Nixon	16	M1	14.6	7	421.77	4757.40	33.30	9105.90	0.64	9527.60	14285.00	686.22	0.62
3	Nixon	20	M2	13.6	6	442.25	3301.60	25.40	9237.50	0.71	9679.70	12981.30	705.02	0.63
3	Nixon	24	E	11.8	5	419.38	2444.70	20.40	9134.50	0.76	9553.90	11998.60	686.22	0.61
4	Lincoln	4	B	13.6	4	523.41	2213.50	16.70	10524.90	0.79	11048.30	13261.80	757.44	0.69
4	Lincoln	5	O	14.8	4	527.60	2609.90	18.30	11115.80	0.78	11643.40	14253.30	758.64	0.70
4	Lincoln	8	M1	16.4	6	532.99	4250.20	26.80	11088.00	0.70	11621.00	15871.20	762.24	0.70
4	Lincoln	12	M2	17.6	7	527.06	5742.20	33.60	10818.70	0.63	11345.70	17087.90	744.24	0.71

Table 40 (Continued) Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm2)</i>	<i>BMD (g/cm2)</i>
4	Lincoln	16	E	18.4	7	529.56	6256.20	34.70	11226.80	0.62	11756.40	18012.60	747.84	0.71
4	Madison	4	B	12.2	4	449.85	1973.00	16.70	9399.60	0.80	9849.40	11822.40	709.02	0.63
4	Madison	5	O	12.6	4	434.79	2260.10	18.10	9778.90	0.78	10213.70	12473.80	689.02	0.63
4	Madison	8	M1	13.8	5	443.50	2893.70	21.40	10169.30	0.75	10612.80	13506.50	702.62	0.63
4	Madison	12	M2	14.2	6	475.37	4046.20	28.60	9633.00	0.68	10108.40	14154.60	726.23	0.66
4	Madison	16	E	16.2	8	487.03	5817.60	36.90	9468.20	0.60	9955.20	15772.80	745.44	0.65
4	Monroe	4	B	11.8	3	416.72	1416.90	12.50	9522.10	0.84	9938.80	11355.70	677.41	0.62
4	Monroe	5	O	13.2	4	424.76	2136.90	17.10	9903.30	0.79	10328.10	12465.00	684.22	0.62
4	Monroe	8	M1	15.4	7	411.51	4091.40	31.10	8667.70	0.66	9079.20	13170.60	673.01	0.61
4	Monroe	12	M2	16	8	459.20	5471.10	35.40	9539.50	0.62	9998.70	15469.80	726.23	0.63
4	Monroe	16	E	16.8	8	441.92	5841.40	35.70	10057.10	0.62	10499.00	16340.50	701.02	0.63
4	Obama	4	B	10.8	3	420.30	1459.20	13.90	8584.70	0.82	9005.00	10464.20	653.81	0.64
4	Obama	5	O	12	4	399.14	1949.80	16.90	9161.70	0.80	9560.90	11510.70	628.20	0.64
4	Obama	8	M1	12.6	5	419.92	2862.00	22.60	9401.80	0.74	9821.80	12683.80	663.41	0.63
4	Obama	12	M2	13.8	6	406.64	3846.10	28.50	9265.70	0.69	9672.30	13518.50	640.60	0.64
4	Obama	16	E	14.4	7	408.23	4538.30	32.10	9201.20	0.65	9609.40	14147.70	642.20	0.64
4	Taft	4	B	11	4	386.63	2023.00	18.70	8415.40	0.78	8802.10	10825.10	679.82	0.57
4	Taft	5	O	12.4	5	398.12	2491.10	21.50	8718.50	0.75	9116.70	11607.70	683.82	0.58
4	Taft	8	M1	12.6	6	392.26	3309.00	26.40	8850.50	0.71	9242.80	12551.80	685.02	0.57
4	Taft	12	M2	13.4	7	420.51	4309.10	33.00	8339.90	0.64	8760.40	13069.50	728.63	0.58
4	Taft	16	E	13.6	7	420.67	4595.90	33.50	8693.00	0.63	9113.70	13709.60	721.83	0.58
4	Tyler	4	B	11.6	5	422.70	2440.00	21.50	8464.60	0.75	8887.30	11327.30	697.82	0.61
4	Tyler	5	O	13	5	417.23	2986.30	24.00	9019.40	0.73	9436.60	12423.00	668.61	0.62

Table 40 (Continued) Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm2)</i>	<i>BMD (g/cm2)</i>
4	Tyler	8	M1	13.2	6	410.77	3850.30	26.30	10376.90	0.71	10787.60	14638.00	673.01	0.61
4	Tyler	12	M2	14.4	8	429.89	5150.20	36.10	8681.40	0.61	9111.30	14261.50	706.22	0.61
4	Tyler	16	E	15	8	441.67	5874.70	39.40	8590.80	0.58	9032.50	14907.10	713.83	0.62
5	Fillmore	4	B	11	5	412.75	2226.70	20.20	8374.80	0.76	8787.60	11014.30	693.82	0.60
5	Fillmore	5	O	11.8	5	416.66	2543.40	22.00	8582.80	0.74	8999.50	11542.90	679.82	0.61
5	Fillmore	8	M1	12.2	5	401.10	2753.00	23.10	8789.00	0.74	9190.10	11943.20	647.01	0.62
5	Fillmore	12	M2	12.8	5	380.51	2881.00	23.80	8851.00	0.73	9231.50	12112.50	624.20	0.61
5	Fillmore	16	E	12.6	5	398.25	2928.90	24.00	8854.50	0.73	9252.80	12181.70	659.01	0.60
5	Ford	4	B	11.2	4	389.00	1768.80	16.10	8820.20	0.80	9209.20	10978.00	596.99	0.65
5	Ford	5	O	12.4	4	403.25	2275.90	18.70	9499.50	0.78	9902.70	12178.60	653.41	0.62
5	Ford	8	M1	13.6	6	423.96	3687.60	27.20	9429.60	0.70	9853.60	13541.10	695.02	0.61
5	Ford	12	M2	15.4	8	415.12	5274.00	36.00	8947.60	0.61	9362.70	14636.70	657.41	0.63
5	Ford	16	E	16	9	431.52	6363.20	40.70	8845.10	0.57	9276.60	15639.80	712.23	0.61
5	Franklin	4	B	12.2	4	471.35	2024.50	17.00	9406.50	0.79	9877.80	11902.30	712.23	0.66
5	Franklin	5	O	14.2	5	482.28	3081.40	22.90	9908.60	0.74	10390.90	13472.30	698.62	0.69
5	Franklin	8	M1	14.2	6	464.60	3943.10	27.50	9909.10	0.69	10373.70	14316.80	685.82	0.68
5	Franklin	12	M2	15.8	7	438.32	5309.60	34.90	9461.30	0.62	9899.60	15209.20	649.01	0.68
5	Franklin	16	E	15.4	7	447.85	4837.40	31.90	9869.70	0.65	10317.50	15154.60	668.21	0.67
5	Grant	4	B	11.6	6	377.04	2951.20	25.10	8435.10	0.72	8812.10	11763.30	656.61	0.57
5	Grant	5	O	13.2	6	385.24	3618.70	27.80	8997.20	0.69	9382.40	13001.20	661.81	0.58
5	Grant	8	M1	13.8	7	400.46	4802.30	34.70	8625.90	0.62	9026.40	13828.70	687.42	0.58
5	Grant	12	M2	15	9	395.35	6161.00	41.80	8174.30	0.55	8569.70	14730.60	669.41	0.59
5	Grant	16	E	15.2	9	394.50	6503.70	43.20	8161.00	0.54	8555.50	15059.20	668.61	0.59

Table 40 (Continued) Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm2)</i>	<i>BMD (g/cm2)</i>
5	Quincy	4	B	12	4	449.65	2120.60	17.80	9309.70	0.78	9759.40	11879.90	704.62	0.64
5	Quincy	5	O	13.4	5	457.29	2896.90	21.70	9975.00	0.75	10432.30	13329.20	732.63	0.62
5	Quincy	8	M1	14.6	6	480.77	4228.10	28.90	9941.00	0.68	10421.80	14649.90	735.03	0.65
5	Quincy	12	M2	16.6	8	491.78	6199.40	39.30	9077.50	0.58	9569.30	15768.80	751.44	0.65
5	Quincy	16	E	18	9	489.77	7639.80	42.70	9742.00	0.55	10231.70	17871.50	726.23	0.67
5	Sherman	4	B	12.2	5	436.19	2889.90	23.10	9206.20	0.73	9642.40	12532.20	678.62	0.64
5	Sherman	5	O	14	6	441.49	3582.70	26.70	9376.10	0.70	9817.60	13400.40	708.62	0.62
5	Sherman	8	M1	14.2	7	429.57	4434.00	30.60	9641.40	0.66	10071.00	14505.00	681.82	0.63
5	Sherman	12	M2	16.4	8	464.88	6156.30	38.50	9364.10	0.59	9829.00	15985.40	728.23	0.64
5	Sherman	16	E	17.4	9	466.47	7157.90	41.00	9816.10	0.56	10282.60	17440.50	733.43	0.64
6	Bush	4	B	11.5	3	406.97	1361.30	11.90	9710.50	0.85	10117.50	11478.80	629.80	0.65
6	Bush	5	O	11.6	4	431.31	1820.30	15.70	9369.00	0.81	9800.30	11620.60	677.01	0.64
6	Bush	8	M1	13.1	4	432.41	2502.90	19.80	9683.20	0.77	10115.60	12618.50	685.02	0.63
6	Bush	12	M2	13.8	6	442.98	3312.30	25.50	9253.60	0.71	9696.60	13008.80	690.62	0.64
6	Bush	16	E	13.2	5	438.32	3098.30	23.80	9481.00	0.73	9919.30	13017.70	693.82	0.63
6	Ernie	4	B	12.3	5	442.62	2502.00	20.40	9301.70	0.76	9744.30	12246.30	701.42	0.63
6	Ernie	5	O	12.4	5	439.38	2549.70	20.80	9291.10	0.76	9730.50	12280.20	690.62	0.64
6	Ernie	8	M1	12.9	5	432.38	3145.50	24.50	9261.40	0.72	9693.70	12839.20	698.22	0.62
6	Ernie	12	M2	12.8	5	438.48	2968.50	23.60	9175.80	0.73	9614.30	12582.80	679.82	0.65
6	Ernie	16	E	12.3	5	453.81	2678.50	22.50	8769.60	0.74	9223.40	11901.90	710.23	0.64
6	Johnson	4	B	11.4	5	403.44	2565.70	23.30	8051.60	0.73	8455.10	11020.70	688.62	0.59
6	Johnson	5	O	11.3	5	398.52	2704.20	24.00	8150.20	0.72	8548.80	11253.00	647.01	0.62
6	Johnson	8	M1	11.6	6	409.43	3099.80	26.80	8051.80	0.70	8461.20	11561.00	687.42	0.60

Table 40 (Continued) Body composition, part 1.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt (kg)</i>	<i>BCS (1-9)</i>	<i>BMC (g)</i>	<i>Fat (g)</i>	<i>BF (%)</i>	<i>Lean (g)</i>	<i>Lean (%)</i>	<i>Lean + BMC (g)</i>	<i>Total Mass (g)</i>	<i>Area (cm2)</i>	<i>BMD (g/cm2)</i>
6	Johnson	12	M2	11.8	6	407.82	3026.80	26.60	7930.70	0.70	8338.50	11365.40	693.02	0.59
6	Johnson	16	E	10.7	5	395.25	2441.30	22.40	8049.50	0.74	8444.70	10886.00	668.21	0.59
6	Kennedy	4	B	11.3	5	399.61	2327.40	20.60	8585.30	0.76	8984.90	11312.30	642.20	0.62
6	Kennedy	5	O	11.4	4	415.46	2203.10	19.30	8813.70	0.77	9229.20	11432.30	673.81	0.62
6	Kennedy	8	M1	12	5	389.73	2583.90	21.70	8918.30	0.75	9308.10	11892.00	645.00	0.60
6	Kennedy	12	M2	12.3	5	382.65	2938.90	24.60	8609.20	0.72	8991.90	11930.70	629.80	0.61
6	Kennedy	16	E	11.7	5	416.90	2712.10	23.00	8640.00	0.73	9056.90	11769.10	672.61	0.62
6	Pierce	4	B	10.5	4	410.44	2063.50	19.40	8144.90	0.77	8555.30	10618.80	689.82	0.60
6	Pierce	5	O	11	5	417.48	2176.50	20.00	8307.70	0.76	8725.10	10901.60	702.22	0.60
6	Pierce	8	M1	12.2	6	421.92	2952.10	25.10	8365.20	0.71	8787.20	11739.30	720.23	0.59
6	Pierce	12	M2	12.3	6	426.90	3513.10	29.30	8065.00	0.67	8491.90	12005.00	726.63	0.59
6	Pierce	16	E	11.5	6	443.68	3311.00	28.00	8056.00	0.68	8499.70	11810.80	725.83	0.61
6	York	4	B	9.9	4	393.34	1636.00	16.60	7828.60	0.79	8221.90	9857.90	629.00	0.63
6	York	5	O	10.3	4	393.48	1692.50	16.60	8111.30	0.80	8504.80	10197.30	633.80	0.62
6	York	8	M1	11.3	5	387.26	2247.50	20.80	8189.70	0.76	8576.90	10824.40	638.20	0.61
6	York	12	M2	11.7	5	405.83	2477.60	22.00	8363.20	0.74	8769.10	11246.70	649.81	0.63
6	York	16	E	11.1	5	394.62	2499.50	22.30	8320.40	0.74	8715.10	11214.60	626.20	0.63

Table 41 Body composition, part 2.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt Change (kg)</i>	<i>% Scale Wt Change (%)</i>	<i>BMC Change (g)</i>	<i>% BMC Change (%)</i>	<i>Fat Change (g)</i>	<i>% Fat Change (%)</i>	<i>BF Change (%)</i>	<i>% BF Change (%)</i>
1	Adams	16	M1	1.60	0.10	-26.24	-0.05	938.60	0.14	1.80	0.05
1	Adams	20	M2	2.60	0.15	6.69	0.01	1843.00	0.28	5.30	0.14
1	Adams	24	E	3.60	0.21	-15.27	-0.03	3069.10	0.46	11.80	0.30
1	Arthur	16	M1	1.10	0.08	12.11	0.03	1590.70	0.24	4.90	0.12
1	Arthur	20	M2	2.90	0.20	11.49	0.03	2790.80	0.43	9.50	0.23
1	Arthur	24	E	4.10	0.28	32.66	0.07	4055.70	0.62	18.40	0.44
1	Garfield	16	M1	0.00	0.00	-2.35	-0.01	-87.20	-0.03	-0.70	-0.03
1	Garfield	20	M2	0.20	0.02	14.36	0.04	-84.40	-0.03	-0.80	-0.03
1	Garfield	24	E	0.00	0.00	-7.42	-0.02	-298.80	-0.09	-1.90	-0.07
1	Polk	16	M1	0.40	0.02	17.30	0.04	1042.10	0.14	3.50	0.08
1	Polk	20	M2	1.60	0.10	20.24	0.04	1989.10	0.27	7.80	0.18
1	Polk	24	E	2.40	0.14	17.84	0.04	2495.10	0.34	9.10	0.21
1	Taylor	16	M1	1.60	0.09	-18.16	-0.04	1022.50	0.14	2.50	0.06
1	Taylor	20	M2	2.80	0.16	-12.82	-0.03	1927.70	0.27	6.00	0.14
1	Taylor	24	E	3.60	0.21	-5.96	-0.01	2959.30	0.41	10.90	0.25
1	Truman	16	M1	1.40	0.09	-6.98	-0.02	1447.50	0.19	4.30	0.09
1	Truman	20	M2	2.80	0.17	4.59	0.01	2400.60	0.31	7.70	0.16
1	Truman	24	E	3.20	0.20	30.46	0.07	2966.40	0.38	10.20	0.22
2	Harding	16	M1	0.40	0.03	11.56	0.02	53.90	0.01	0.60	0.02
2	Harding	20	M2	0.60	0.04	0.18	0.00	177.60	0.03	0.90	0.03
2	Harding	24	E	0.40	0.03	13.67	0.03	362.20	0.07	1.70	0.05
2	Harrison	16	M1	0.80	0.04	-11.27	-0.02	204.40	0.03	0.00	0.00
2	Harrison	20	M2	1.60	0.09	-17.52	-0.04	678.40	0.09	1.60	0.04

Table 41 (Continued) Body composition, part 2.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt Change (kg)</i>	<i>% Scale Wt Change (%)</i>	<i>BMC Change (g)</i>	<i>% BMC Change (%)</i>	<i>Fat Change (g)</i>	<i>% Fat Change (%)</i>	<i>BF Change (%)</i>	<i>% BF Change (%)</i>
2	Harrison	24	E	1.40	0.08	-11.59	-0.02	672.90	0.09	1.10	0.03
2	Hoover	16	M1	1.00	0.05	-38.27	-0.09	1097.60	0.14	2.30	0.05
2	Hoover	20	M2	2.40	0.13	-25.75	-0.06	1822.00	0.23	5.10	0.12
2	Hoover	24	E	2.40	0.13	-31.05	-0.07	2218.50	0.28	6.30	0.15
2	Jackson	16	M1	0.40	0.02	7.42	0.01	509.50	0.08	0.90	0.03
2	Jackson	20	M2	2.00	0.11	29.03	0.06	1321.60	0.21	4.20	0.12
2	Jackson	24	E	2.00	0.11	10.76	0.02	1659.90	0.26	5.50	0.16
2	Lynden	16	M1	-0.40	-0.03	-0.21	0.00	-254.60	-0.08	-1.40	-0.06
2	Lynden	20	M2	0.00	0.00	-7.36	-0.02	-635.70	-0.19	-4.70	-0.19
2	Lynden	24	E	-0.60	-0.05	-7.10	-0.02	-664.50	-0.20	-4.20	-0.17
2	Wilson	16	M1	-0.20	-0.01	5.92	0.01	-60.70	-0.01	-0.30	-0.01
2	Wilson	20	M2	0.40	0.03	-3.98	-0.01	100.80	0.02	0.00	0.00
2	Wilson	24	E	0.00	0.00	-9.78	-0.02	-215.20	-0.03	-1.40	-0.04
3	Carter	16	M1	1.70	0.14	-2.08	-0.01	1791.10	0.49	11.60	0.40
3	Carter	20	M2	.	.	.	.	.	.	.	.
3	Carter	24	E	.	.	.	.	.	.	.	.
3	Clinton	16	M1	2.00	0.11	-21.46	-0.05	1580.70	0.20	2.60	0.06
3	Clinton	20	M2	2.90	0.16	-38.81	-0.09	2857.10	0.36	7.40	0.17
3	Clinton	24	E	4.90	0.27	0.68	0.00	4076.00	0.51	14.00	0.33
3	Custer	16	M1	2.00	0.12	14.07	0.03	2123.20	0.29	7.90	0.18
3	Custer	20	M2	3.40	0.20	18.02	0.04	3774.90	0.52	16.10	0.37
3	Custer	24	E	5.30	0.32	36.03	0.08	4913.90	0.68	23.30	0.54
3	Houston	16	M1	1.40	0.09	-10.94	-0.02	1354.70	0.21	4.90	0.12

Table 41 (Continued) Body composition, part 2.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt Change (kg)</i>	<i>% Scale Wt Change (%)</i>	<i>BMC Change (g)</i>	<i>% BMC Change (%)</i>	<i>Fat Change (g)</i>	<i>% Fat Change (%)</i>	<i>BF Change (%)</i>	<i>% BF Change (%)</i>
1	Adams	16	M1	1.60	0.10	-26.24	-0.05	938.60	0.14	1.80	0.05
1	Adams	20	M2	2.60	0.15	6.69	0.01	1843.00	0.28	5.30	0.14
1	Adams	24	E	3.60	0.21	-15.27	-0.03	3069.10	0.46	11.80	0.30
1	Arthur	16	M1	1.10	0.08	12.11	0.03	1590.70	0.24	4.90	0.12
1	Arthur	20	M2	2.90	0.20	11.49	0.03	2790.80	0.43	9.50	0.23
1	Arthur	24	E	4.10	0.28	32.66	0.07	4055.70	0.62	18.40	0.44
1	Garfield	16	M1	0.00	0.00	-2.35	-0.01	-87.20	-0.03	-0.70	-0.03
1	Garfield	20	M2	0.20	0.02	14.36	0.04	-84.40	-0.03	-0.80	-0.03
1	Garfield	24	E	0.00	0.00	-7.42	-0.02	-298.80	-0.09	-1.90	-0.07
1	Polk	16	M1	0.40	0.02	17.30	0.04	1042.10	0.14	3.50	0.08
1	Polk	20	M2	1.60	0.10	20.24	0.04	1989.10	0.27	7.80	0.18
1	Polk	24	E	2.40	0.14	17.84	0.04	2495.10	0.34	9.10	0.21
1	Taylor	16	M1	1.60	0.09	-18.16	-0.04	1022.50	0.14	2.50	0.06
1	Taylor	20	M2	2.80	0.16	-12.82	-0.03	1927.70	0.27	6.00	0.14
1	Taylor	24	E	3.60	0.21	-5.96	-0.01	2959.30	0.41	10.90	0.25
1	Truman	16	M1	1.40	0.09	-6.98	-0.02	1447.50	0.19	4.30	0.09
1	Truman	20	M2	2.80	0.17	4.59	0.01	2400.60	0.31	7.70	0.16
1	Truman	24	E	3.20	0.20	30.46	0.07	2966.40	0.38	10.20	0.22
2	Harding	16	M1	0.40	0.03	11.56	0.02	53.90	0.01	0.60	0.02
2	Harding	20	M2	0.60	0.04	0.18	0.00	177.60	0.03	0.90	0.03
2	Harding	24	E	0.40	0.03	13.67	0.03	362.20	0.07	1.70	0.05
2	Harrison	16	M1	0.80	0.04	-11.27	-0.02	204.40	0.03	0.00	0.00
2	Harrison	20	M2	1.60	0.09	-17.52	-0.04	678.40	0.09	1.60	0.04

Table 41 (Continued) Body composition, part 2.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt Change (kg)</i>	<i>% Scale Wt Change (%)</i>	<i>BMC Change (g)</i>	<i>% BMC Change (%)</i>	<i>Fat Change (g)</i>	<i>% Fat Change (%)</i>	<i>BF Change (%)</i>	<i>% BF Change (%)</i>
2	Harrison	24	E	1.40	0.08	-11.59	-0.02	672.90	0.09	1.10	0.03
2	Hoover	16	M1	1.00	0.05	-38.27	-0.09	1097.60	0.14	2.30	0.05
2	Hoover	20	M2	2.40	0.13	-25.75	-0.06	1822.00	0.23	5.10	0.12
2	Hoover	24	E	2.40	0.13	-31.05	-0.07	2218.50	0.28	6.30	0.15
2	Jackson	16	M1	0.40	0.02	7.42	0.01	509.50	0.08	0.90	0.03
2	Jackson	20	M2	2.00	0.11	29.03	0.06	1321.60	0.21	4.20	0.12
2	Jackson	24	E	2.00	0.11	10.76	0.02	1659.90	0.26	5.50	0.16
2	Lynden	16	M1	-0.40	-0.03	-0.21	0.00	-254.60	-0.08	-1.40	-0.06
2	Lynden	20	M2	0.00	0.00	-7.36	-0.02	-635.70	-0.19	-4.70	-0.19
2	Lynden	24	E	-0.60	-0.05	-7.10	-0.02	-664.50	-0.20	-4.20	-0.17
2	Wilson	16	M1	-0.20	-0.01	5.92	0.01	-60.70	-0.01	-0.30	-0.01
2	Wilson	20	M2	0.40	0.03	-3.98	-0.01	100.80	0.02	0.00	0.00
2	Wilson	24	E	0.00	0.00	-9.78	-0.02	-215.20	-0.03	-1.40	-0.04
3	Carter	16	M1	1.70	0.14	-2.08	-0.01	1791.10	0.49	11.60	0.40
3	Carter	20	M2	.	.	.	.	.	.	.	.
3	Carter	24	E	.	.	.	.	.	.	.	.
3	Clinton	16	M1	2.00	0.11	-21.46	-0.05	1580.70	0.20	2.60	0.06
3	Clinton	20	M2	2.90	0.16	-38.81	-0.09	2857.10	0.36	7.40	0.17
3	Clinton	24	E	4.90	0.27	0.68	0.00	4076.00	0.51	14.00	0.33
3	Custer	16	M1	2.00	0.12	14.07	0.03	2123.20	0.29	7.90	0.18
3	Custer	20	M2	3.40	0.20	18.02	0.04	3774.90	0.52	16.10	0.37
3	Custer	24	E	5.30	0.32	36.03	0.08	4913.90	0.68	23.30	0.54
3	Houston	16	M1	1.40	0.09	-10.94	-0.02	1354.70	0.21	4.90	0.12

Table 41 (Continued) Body composition, part 2.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt Change (kg)</i>	<i>% Scale Wt Change (%)</i>	<i>BMC Change (g)</i>	<i>% BMC Change (%)</i>	<i>Fat Change (g)</i>	<i>% Fat Change (%)</i>	<i>BF Change (%)</i>	<i>% BF Change (%)</i>
3	Houston	20	M2	1.50	0.09	-12.76	-0.03	2377.40	0.37	10.30	0.26
3	Houston	24	E	2.80	0.17	19.58	0.04	2847.80	0.44	12.70	0.32
3	King	16	M1	0.90	0.06	9.32	0.02	1084.00	0.25	5.70	0.19
3	King	20	M2	1.10	0.08	14.37	0.03	1545.60	0.36	11.90	0.40
3	King	24	E								
3	Nixon	16	M1	1.70	0.10	-14.55	-0.04	1552.60	0.25	5.10	0.13
3	Nixon	20	M2	2.70	0.17	-35.03	-0.09	3008.40	0.48	13.00	0.34
3	Nixon	24	E	4.50	0.28	-12.16	-0.03	3865.30	0.61	18.00	0.47
4	Lincoln	8	M1	-2.80	-0.21	-9.58	-0.02	-2036.70	-0.92	-10.10	-0.60
4	Lincoln	12	M2	-4.00	-0.29	-3.65	-0.01	-3528.70	-1.59	-16.90	-1.01
4	Lincoln	16	E	-4.80	-0.35	-6.15	-0.01	-4042.70	-1.83	-18.00	-1.08
4	Madison	8	M1	-1.60	-0.13	6.35	0.01	-920.70	-0.47	-4.70	-0.28
4	Madison	12	M2	-2.00	-0.16	-25.52	-0.06	-2073.20	-1.05	-11.90	-0.71
4	Madison	16	E	-4.00	-0.33	-37.18	-0.08	-3844.60	-1.95	-20.20	-1.21
4	Monroe	8	M1	-3.60	-0.31	5.21	0.01	-2674.50	-1.89	-18.60	-1.49
4	Monroe	12	M2	-4.20	-0.36	-42.48	-0.10	-4054.20	-2.86	-22.90	-1.83
4	Monroe	16	E	-5.00	-0.42	-25.20	-0.06	-4424.50	-3.12	-23.20	-1.86
4	Obama	8	M1	-1.80	-0.17	0.38	0.00	-1402.80	-0.96	-8.70	-0.63
4	Obama	12	M2	-3.00	-0.28	13.66	0.03	-2386.90	-1.64	-14.60	-1.05
4	Obama	16	E	-3.60	-0.33	12.07	0.03	-3079.10	-2.11	-18.20	-1.31
4	Taft	8	M1	-1.60	-0.15	-5.63	-0.01	-1286.00	-0.64	-7.70	-0.41
4	Taft	12	M2	-2.40	-0.22	-33.88	-0.09	-2286.10	-1.13	-14.30	-0.76

Table 41 (Continued) Body composition, part 2.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt Change (kg)</i>	<i>% Scale Wt Change (%)</i>	<i>BMC Change (g)</i>	<i>% BMC Change (%)</i>	<i>Fat Change (g)</i>	<i>% Fat Change (%)</i>	<i>BF Change (%)</i>	<i>% BF Change (%)</i>
4	Taft	16	E	-2.60	-0.24	-34.04	-0.09	-2572.90	-1.27	-14.80	-0.79
4	Tyler	8	M1	-1.60	-0.14	11.93	0.03	-1410.30	-0.58	-4.80	-0.22
4	Tyler	12	M2	-2.80	-0.24	-7.19	-0.02	-2710.20	-1.11	-14.60	-0.68
4	Tyler	16	E	-3.40	-0.29	-18.97	-0.04	-3434.70	-1.41	-17.90	-0.83
5	Fillmore	8	M1	-1.20	-0.11	11.65	0.03	-526.30	-0.24	-2.90	-0.14
5	Fillmore	12	M2	-1.80	-0.16	32.24	0.08	-654.30	-0.29	-3.60	-0.18
5	Fillmore	16	E	-1.60	-0.15	14.50	0.04	-702.20	-0.32	-3.80	-0.19
5	Ford	8	M1	-2.40	-0.21	-34.96	-0.09	-1918.80	-1.08	-11.10	-0.69
5	Ford	12	M2	-4.20	-0.38	-26.12	-0.07	-3505.20	-1.98	-19.90	-1.24
5	Ford	16	E	-4.80	-0.43	-42.52	-0.11	-4594.40	-2.60	-24.60	-1.53
5	Franklin	8	M1	-2.00	-0.16	6.75	0.01	-1918.60	-0.95	-10.50	-0.62
5	Franklin	12	M2	-3.60	-0.30	33.03	0.07	-3285.10	-1.62	-17.90	-1.05
5	Franklin	16	E	-3.20	-0.26	23.50	0.05	-2812.90	-1.39	-14.90	-0.88
5	Grant	8	M1	-2.20	-0.19	-23.42	-0.06	-1851.10	-0.63	-9.60	-0.38
5	Grant	12	M2	-3.40	-0.29	-18.31	-0.05	-3209.80	-1.09	-16.70	-0.67
5	Grant	16	E	-3.60	-0.31	-17.46	-0.05	-3552.50	-1.20	-18.10	-0.72
5	Quincy	8	M1	-2.60	-0.22	-31.12	-0.07	-2107.50	-0.99	-11.10	-0.62
5	Quincy	12	M2	-4.60	-0.38	-42.13	-0.09	-4078.80	-1.92	-21.50	-1.21
5	Quincy	16	E	-6.00	-0.50	-40.12	-0.09	-5519.20	-2.60	-24.90	-1.40
5	Sherman	8	M1	-2.00	-0.16	6.62	0.02	-1544.10	-0.53	-7.50	-0.32
5	Sherman	12	M2	-4.20	-0.34	-28.69	-0.07	-3266.40	-1.13	-15.40	-0.67
5	Sherman	16	E	-5.20	-0.43	-30.28	-0.07	-4268.00	-1.48	-17.90	-0.77

Table 41 (Continued) Body composition, part 2.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Scale Wt Change (kg)</i>	<i>% Scale Wt Change (%)</i>	<i>BMC Change (g)</i>	<i>% BMC Change (%)</i>	<i>Fat Change (g)</i>	<i>% Fat Change (%)</i>	<i>BF Change (%)</i>	<i>% BF Change (%)</i>
6	Bush	8	M1	-1.60	-0.14	-25.44	-0.06	-1141.60	-0.84	-7.90	-0.66
6	Bush	12	M2	-2.30	-0.20	-36.01	-0.09	-1951.00	-1.43	-13.60	-1.14
6	Bush	16	E	-1.70	-0.15	-31.35	-0.08	-1737.00	-1.28	-11.90	-1.00
6	Ernie	8	M1	-0.60	-0.05	10.24	0.02	-643.50	-0.26	-4.10	-0.20
6	Ernie	12	M2	-0.50	-0.04	4.14	0.01	-466.50	-0.19	-3.20	-0.16
6	Ernie	16	E	0.00	0.00	-11.19	-0.03	-176.50	-0.07	-2.10	-0.10
6	Johnson	8	M1	-0.20	-0.02	-5.99	-0.01	-534.10	-0.21	-3.50	-0.15
6	Johnson	12	M2	-0.40	-0.04	-4.38	-0.01	-461.10	-0.18	-3.30	-0.14
6	Johnson	16	E	0.70	0.06	8.19	0.02	124.40	0.05	0.90	0.04
6	Kennedy	8	M1	-0.70	-0.06	9.88	0.02	-256.50	-0.11	-1.10	-0.05
6	Kennedy	12	M2	-1.00	-0.09	16.96	0.04	-611.50	-0.26	-4.00	-0.19
6	Kennedy	16	E	-0.40	-0.04	-17.29	-0.04	-384.70	-0.17	-2.40	-0.12
6	Pierce	8	M1	-1.70	-0.16	-11.48	-0.03	-888.60	-0.43	-5.70	-0.29
6	Pierce	12	M2	-1.80	-0.17	-16.46	-0.04	-1449.60	-0.70	-9.90	-0.51
6	Pierce	16	E	-1.00	-0.10	-33.24	-0.08	-1247.50	-0.60	-8.60	-0.44
6	York	8	M1	-1.40	-0.14	6.08	0.02	-611.50	-0.37	-4.20	-0.25
6	York	12	M2	-1.80	-0.18	-12.49	-0.03	-841.60	-0.51	-5.40	-0.33
6	York	16	E	-1.20	-0.12	-1.28	0.00	-863.50	-0.53	-5.70	-0.34

Table 42 Body composition, part 3.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Lean Change (g)</i>	<i>% Lean Change (g)</i>	<i>Lean Change (%)</i>	<i>% Lean Change (%)</i>	<i>Lean + BMC Change (g)</i>	<i>% Lean + BMC Change (%)</i>	<i>Total Mass Change (g)</i>	<i>% Total Mass Change (%)</i>
1	Adams	16	M1	804.50	0.08	-0.01	-0.02	778.20	0.08	1716.80	0.10
1	Adams	20	M2	953.40	0.10	-0.05	-0.08	960.10	0.09	2803.10	0.17
1	Adams	24	E	903.90	0.09	-0.11	-0.19	888.60	0.09	3957.70	0.23
1	Arthur	16	M1	659.50	0.08	-0.04	-0.08	671.60	0.07	2262.30	0.14
1	Arthur	20	M2	1266.90	0.15	-0.09	-0.15	1278.30	0.14	4069.10	0.26
1	Arthur	24	E	970.70	0.11	-0.17	-0.31	1003.30	0.11	5059.00	0.32
1	Garfield	16	M1	77.00	0.01	0.01	0.01	74.60	0.01	-12.70	0.00
1	Garfield	20	M2	110.30	0.01	0.01	0.01	124.60	0.01	40.20	0.00
1	Garfield	24	E	60.10	0.01	0.02	0.03	52.70	0.01	-246.10	-0.02
1	Polk	16	M1	81.80	0.01	-0.03	-0.06	99.00	0.01	1141.10	0.07
1	Polk	20	M2	-150.60	-0.02	-0.08	-0.14	-130.40	-0.01	1858.70	0.11
1	Polk	24	E	263.60	0.03	-0.09	-0.16	281.40	0.03	2776.50	0.16
1	Taylor	16	M1	471.50	0.05	-0.02	-0.04	453.40	0.05	1475.90	0.09
1	Taylor	20	M2	531.40	0.06	-0.06	-0.10	518.60	0.06	2446.40	0.15
1	Taylor	24	E	539.20	0.06	-0.10	-0.19	533.20	0.06	3492.70	0.21
1	Truman	16	M1	306.20	0.04	-0.04	-0.08	299.20	0.03	1746.70	0.11
1	Truman	20	M2	500.60	0.06	-0.07	-0.14	505.20	0.06	2905.70	0.18
1	Truman	24	E	506.20	0.06	-0.10	-0.19	536.70	0.06	3503.00	0.21
2	Harding	16	M1	-162.00	-0.02	-0.01	-0.01	-150.50	-0.02	-96.60	-0.01
2	Harding	20	M2	-78.20	-0.01	-0.01	-0.01	-78.10	-0.01	99.50	0.01
2	Harding	24	E	-97.00	-0.01	-0.02	-0.03	-83.30	-0.01	278.90	0.02
2	Harrison	16	M1	310.90	0.03	0.00	0.00	299.60	0.03	504.00	0.03
2	Harrison	20	M2	358.60	0.04	-0.01	-0.02	341.00	0.03	1019.40	0.06

Table 42 (Continued) Body composition, part 3.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Lean Change (g)</i>	<i>% Lean Change (g)</i>	<i>Lean Change (%)</i>	<i>% Lean Change (%)</i>	<i>Lean + BMC Change (g)</i>	<i>% Lean + BMC Change (%)</i>	<i>Total Mass Change (g)</i>	<i>% Total Mass Change (%)</i>
2	Harrison	24	E	551.90	0.06	-0.01	-0.01	540.30	0.05	1213.20	0.07
2	Hoover	16	M1	609.00	0.06	-0.02	-0.03	570.70	0.05	1668.50	0.09
2	Hoover	20	M2	536.50	0.05	-0.05	-0.08	510.80	0.05	2332.90	0.13
2	Hoover	24	E	682.80	0.07	-0.06	-0.10	651.70	0.06	2870.30	0.15
2	Jackson	16	M1	527.70	0.05	-0.01	-0.01	535.20	0.04	1044.70	0.06
2	Jackson	20	M2	475.70	0.04	-0.04	-0.06	504.80	0.04	1826.50	0.10
2	Jackson	24	E	592.20	0.05	-0.05	-0.08	603.00	0.05	2262.90	0.12
2	Lynden	16	M1	-12.70	0.00	0.01	0.02	-12.90	0.00	-267.50	-0.02
2	Lynden	20	M2	617.40	0.06	0.05	0.07	610.00	0.06	-25.70	0.00
2	Lynden	24	E	295.90	0.03	0.04	0.06	288.80	0.03	-375.70	-0.03
2	Wilson	16	M1	46.10	0.01	0.00	0.01	52.00	0.01	-8.70	0.00
2	Wilson	20	M2	192.00	0.02	0.00	0.00	188.10	0.02	288.80	0.02
2	Wilson	24	E	267.20	0.03	0.02	0.03	257.50	0.03	42.30	0.00
3	Carter	16	M1	205.80	0.02	-0.11	-0.16	203.80	0.02	1994.80	0.16
3	Carter	20	M2	.	.	.	.	.	.	.	.
3	Carter	24	E	.	.	.	.	.	.	.	.
3	Clinton	16	M1	1168.80	0.12	-0.02	-0.04	1147.40	0.11	2728.10	0.15
3	Clinton	20	M2	1365.90	0.14	-0.06	-0.12	1327.10	0.13	4184.20	0.23
3	Clinton	24	E	1038.90	0.10	-0.13	-0.24	1039.60	0.10	5115.60	0.28
3	Custer	16	M1	140.30	0.02	-0.08	-0.14	154.40	0.02	2277.60	0.14
3	Custer	20	M2	241.40	0.03	-0.15	-0.28	259.40	0.03	4034.30	0.24
3	Custer	24	E	194.40	0.02	-0.22	-0.41	230.50	0.02	5144.40	0.31
3	Houston	16	M1	219.10	0.02	-0.05	-0.08	208.20	0.02	1562.90	0.10

Table 42 (Continued) Body composition, part 3.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Lean Change (g)</i>	<i>% Lean Change (g)</i>	<i>Lean Change (%)</i>	<i>% Lean Change (%)</i>	<i>Lean + BMC Change (g)</i>	<i>% Lean + BMC Change (%)</i>	<i>Total Mass Change (g)</i>	<i>% Total Mass Change (%)</i>
3	Houston	20	M2	-5.30	0.00	-0.10	-0.17	-18.10	0.00	2359.30	0.14
3	Houston	24	E	-22.90	0.00	-0.12	-0.21	-3.30	0.00	2844.50	0.17
3	King	16	M1	77.70	0.01	-0.05	-0.08	87.10	0.01	1171.10	0.08
3	King	20	M2	-255.00	-0.03	-0.10	-0.15	-18.20	0.00	1527.40	0.11
3	King	24	E								
3	Nixon	16	M1	610.90	0.06	-0.05	-0.08	596.50	0.06	2149.10	0.13
3	Nixon	20	M2	479.30	0.05	-0.12	-0.20	444.40	0.04	3452.80	0.21
3	Nixon	24	E	582.30	0.06	-0.17	-0.29	570.20	0.06	4435.50	0.27
4	Lincoln	8	M1	-563.10	-0.05	0.10	0.12	-572.70	-0.05	-2609.40	-0.20
4	Lincoln	12	M2	-293.80	-0.03	0.16	0.20	-297.40	-0.03	-3826.10	-0.29
4	Lincoln	16	E	-701.90	-0.07	0.17	0.21	-708.10	-0.06	-4750.80	-0.36
4	Madison	8	M1	-769.70	-0.08	0.04	0.05	-763.40	-0.08	-1684.10	-0.14
4	Madison	12	M2	-233.40	-0.02	0.11	0.14	-259.00	-0.03	-2332.20	-0.20
4	Madison	16	E	-68.60	-0.01	0.19	0.24	-105.80	-0.01	-3950.40	-0.33
4	Monroe	8	M1	854.40	0.09	0.18	0.22	859.60	0.09	-1814.90	-0.16
4	Monroe	12	M2	-17.40	0.00	0.22	0.26	-59.90	-0.01	-4114.10	-0.36
4	Monroe	16	E	-535.00	-0.06	0.22	0.27	-560.20	-0.06	-4984.80	-0.44
4	Obama	8	M1	-817.10	-0.10	0.08	0.10	-816.80	-0.09	-2219.60	-0.21
4	Obama	12	M2	-681.00	-0.08	0.13	0.16	-667.30	-0.07	-3054.30	-0.29
4	Obama	16	E	-616.50	-0.07	0.17	0.21	-604.40	-0.07	-3683.50	-0.35
4	Taft	8	M1	-435.10	-0.05	0.07	0.09	-440.70	-0.05	-1726.70	-0.16
4	Taft	12	M2	75.50	0.01	0.14	0.18	41.70	0.00	-2244.40	-0.21

Table 42 (Continued) Body composition, part 3.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Lean Change (g)</i>	<i>% Lean Change (g)</i>	<i>Lean Change (%)</i>	<i>% Lean Change (%)</i>	<i>Lean + BMC Change (g)</i>	<i>% Lean + BMC Change (%)</i>	<i>Total Mass Change (g)</i>	<i>% Total Mass Change (%)</i>
4	Taft	16	E	-277.60	-0.03	0.14	0.18	-311.60	-0.04	-2884.50	-0.27
4	Tyler	8	M1	-1912.30	-0.23	0.04	0.05	-1900.30	-0.21	-3310.70	-0.29
4	Tyler	12	M2	-216.80	-0.03	0.14	0.19	-224.00	-0.03	-2934.20	-0.26
4	Tyler	16	E	-126.20	-0.01	0.17	0.23	-145.20	-0.02	-3579.80	-0.32
5	Fillmore	8	M1	-414.20	-0.05	0.02	0.03	-402.50	-0.05	-928.90	-0.08
5	Fillmore	12	M2	-476.20	-0.06	0.03	0.04	-443.90	-0.05	-1098.20	-0.10
5	Fillmore	16	E	-479.70	-0.06	0.03	0.04	-465.20	-0.05	-1167.40	-0.11
5	Ford	8	M1	-609.40	-0.07	0.11	0.13	-644.40	-0.07	-2563.10	-0.23
5	Ford	12	M2	-127.40	-0.01	0.19	0.24	-153.50	-0.02	-3658.70	-0.33
5	Ford	16	E	-24.90	0.00	0.24	0.30	-67.40	-0.01	-4661.80	-0.42
5	Franklin	8	M1	-502.60	-0.05	0.10	0.12	-495.90	-0.05	-2414.50	-0.20
5	Franklin	12	M2	-54.80	-0.01	0.17	0.21	-21.80	0.00	-3306.90	-0.28
5	Franklin	16	E	-463.20	-0.05	0.14	0.18	-439.70	-0.04	-3252.30	-0.27
5	Grant	8	M1	-190.80	-0.02	0.09	0.13	-214.30	-0.02	-2065.40	-0.18
5	Grant	12	M2	260.80	0.03	0.16	0.23	242.40	0.03	-2967.30	-0.25
5	Grant	16	E	274.10	0.03	0.18	0.24	256.60	0.03	-3295.90	-0.28
5	Quincy	8	M1	-631.30	-0.07	0.11	0.13	-662.40	-0.07	-2770.00	-0.23
5	Quincy	12	M2	232.20	0.02	0.21	0.27	190.10	0.02	-3888.90	-0.33
5	Quincy	16	E	-432.30	-0.05	0.24	0.30	-472.30	-0.05	-5991.60	-0.50
5	Sherman	8	M1	-435.20	-0.05	0.07	0.10	-428.60	-0.04	-1972.80	-0.16
5	Sherman	12	M2	-157.90	-0.02	0.15	0.20	-186.60	-0.02	-3453.20	-0.28
5	Sherman	16	E	-609.90	-0.07	0.17	0.23	-640.20	-0.07	-4908.30	-0.39

Table 42 (Continued) Body composition, part 3.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Lean Change (g)</i>	<i>% Lean Change (g)</i>	<i>Lean Change (%)</i>	<i>% Lean Change (%)</i>	<i>Lean + BMC Change (g)</i>	<i>% Lean + BMC Change (%)</i>	<i>Total Mass Change (g)</i>	<i>% Total Mass Change (%)</i>
6	Bush	8	M1	27.30	0.00	0.08	0.09	1.90	0.00	-1139.70	-0.10
6	Bush	12	M2	456.90	0.05	0.13	0.16	420.90	0.04	-1530.00	-0.13
6	Bush	16	E	229.50	0.02	0.12	0.14	198.20	0.02	-1538.90	-0.13
6	Ernie	8	M1	40.30	0.00	0.04	0.05	50.60	0.01	-592.90	-0.05
6	Ernie	12	M2	125.90	0.01	0.03	0.04	130.00	0.01	-336.50	-0.03
6	Ernie	16	E	532.10	0.06	0.02	0.03	520.90	0.05	344.40	0.03
6	Johnson	8	M1	-0.20	0.00	0.03	0.05	-6.10	0.00	-540.30	-0.05
6	Johnson	12	M2	120.90	0.02	0.03	0.04	116.60	0.01	-344.70	-0.03
6	Johnson	16	E	2.10	0.00	-0.01	-0.01	10.40	0.00	134.70	0.01
6	Kennedy	8	M1	-333.00	-0.04	0.01	0.01	-323.20	-0.04	-579.70	-0.05
6	Kennedy	12	M2	-23.90	0.00	0.04	0.05	-7.00	0.00	-618.40	-0.05
6	Kennedy	16	E	-54.70	-0.01	0.02	0.03	-72.00	-0.01	-456.80	-0.04
6	Pierce	8	M1	-220.30	-0.03	0.05	0.07	-231.90	-0.03	-1120.50	-0.11
6	Pierce	12	M2	79.90	0.01	0.10	0.12	63.40	0.01	-1386.20	-0.13
6	Pierce	16	E	88.90	0.01	0.08	0.11	55.60	0.01	-1192.00	-0.11
6	York	8	M1	-361.10	-0.05	0.04	0.05	-355.00	-0.04	-966.50	-0.10
6	York	12	M2	-534.60	-0.07	0.05	0.06	-547.20	-0.07	-1388.80	-0.14
6	York	16	E	-491.80	-0.06	0.05	0.07	-493.20	-0.06	-1356.70	-0.14

Table 43 Body composition, part 4.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Area Change (cm2)</i>	<i>% Area Change (%)</i>	<i>BMD Change (g/cm2)</i>	<i>% BMD Change (%)</i>
1	Adams	16	M1	-14.80	-0.02	-0.02	-0.03
1	Adams	20	M2	12.41	0.02	0.00	0.00
1	Adams	24	E	-22.00	-0.03	0.00	0.00
1	Arthur	16	M1	33.21	0.05	-0.01	-0.02
1	Arthur	20	M2	39.21	0.06	-0.02	-0.03
1	Arthur	24	E	49.21	0.07	0.00	0.00
1	Garfield	16	M1	-10.80	-0.02	0.01	0.01
1	Garfield	20	M2	7.60	0.01	0.02	0.02
1	Garfield	24	E	-26.81	-0.04	0.01	0.02
1	Polk	16	M1	38.41	0.05	-0.01	-0.01
1	Polk	20	M2	22.40	0.03	0.01	0.01
1	Polk	24	E	20.40	0.03	0.01	0.01
1	Taylor	16	M1	-4.40	-0.01	-0.02	-0.04
1	Taylor	20	M2	-1.20	0.00	-0.02	-0.03
1	Taylor	24	E	-13.21	-0.02	0.00	0.00
1	Truman	16	M1	6.80	0.01	-0.02	-0.02
1	Truman	20	M2	24.80	0.04	-0.02	-0.03
1	Truman	24	E	46.81	0.07	0.00	0.00
2	Harding	16	M1	1.60	0.00	0.01	0.02
2	Harding	20	M2	-16.40	-0.02	0.02	0.02
2	Harding	24	E	-5.20	-0.01	0.02	0.03
2	Harrison	16	M1	-23.61	-0.03	0.01	0.01
2	Harrison	20	M2	-28.41	-0.04	0.00	0.00
2	Harrison	24	E	-24.01	-0.03	0.01	0.01
2	Hoover	16	M1	-37.21	-0.05	-0.02	-0.03

Table 43 (Continued) Body composition, part 4.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Area Change (cm2)</i>	<i>% Area Change (%)</i>	<i>BMD Change (g/cm2)</i>	<i>% BMD Change (%)</i>
2	Hoover	20	M2	-18.00	-0.03	-0.02	-0.03
2	Hoover	24	E	-32.41	-0.05	-0.02	-0.02
2	Jackson	16	M1	-12.81	-0.02	0.02	0.03
2	Jackson	20	M2	28.41	0.04	0.01	0.02
2	Jackson	24	E	-7.60	-0.01	0.02	0.03
2	Lynden	16	M1	7.20	0.01	-0.01	-0.01
2	Lynden	20	M2	-14.81	-0.02	0.00	0.00
2	Lynden	24	E	5.20	0.01	-0.02	-0.02
2	Wilson	16	M1	-10.40	-0.01	0.02	0.03
2	Wilson	20	M2	-16.80	-0.02	0.01	0.01
2	Wilson	24	E	-30.00	-0.04	0.01	0.02
3	Carter	16	M1	6.80	0.01	-0.01	-0.02
3	Carter	20	M2	.	.	.	.
3	Carter	24	E	.	.	.	.
3	Clinton	16	M1	-15.61	-0.02	-0.02	-0.03
3	Clinton	20	M2	-35.61	-0.05	-0.02	-0.04
3	Clinton	24	E	15.20	0.02	-0.01	-0.02
3	Custer	16	M1	30.41	0.04	-0.01	-0.01
3	Custer	20	M2	11.60	0.02	0.02	0.03
3	Custer	24	E	25.61	0.04	0.03	0.05
3	Houston	16	M1	-10.80	-0.02	-0.01	-0.01
3	Houston	20	M2	-9.60	-0.01	-0.01	-0.01
3	Houston	24	E	20.81	0.03	0.01	0.01
3	King	16	M1	10.81	0.01	0.00	0.00

Table 43 (Continued) Body composition, part 4.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Area Change (cm2)</i>	<i>% Area Change (%)</i>	<i>BMD Change (g/cm2)</i>	<i>% BMD Change (%)</i>
3	King	20	M2	13.61	0.02	0.01	0.01
3	King	24	E				
3	Nixon	16	M1	-43.22	-0.07	0.02	0.03
3	Nixon	20	M2	-62.02	-0.10	0.01	0.01
3	Nixon	24	E	-43.22	-0.07	0.02	0.03
4	Lincoln	8	M1	-4.80	-0.01	-0.01	-0.01
4	Lincoln	12	M2	13.20	0.02	-0.02	-0.02
4	Lincoln	16	E	9.60	0.01	-0.02	-0.02
4	Madison	8	M1	6.40	0.01	0.00	0.00
4	Madison	12	M2	-17.21	-0.02	-0.02	-0.03
4	Madison	16	E	-36.42	-0.05	-0.02	-0.03
4	Monroe	8	M1	4.40	0.01	0.00	0.01
4	Monroe	12	M2	-48.82	-0.07	-0.02	-0.03
4	Monroe	16	E	-23.61	-0.03	-0.02	-0.02
4	Obama	8	M1	-9.60	-0.01	0.01	0.02
4	Obama	12	M2	13.21	0.02	0.01	0.01
4	Obama	16	E	11.61	0.02	0.01	0.01
4	Taft	8	M1	-5.20	-0.01	0.00	-0.01
4	Taft	12	M2	-48.81	-0.07	-0.01	-0.01
4	Taft	16	E	-42.01	-0.06	-0.01	-0.02
4	Tyler	8	M1	24.81	0.04	0.00	-0.01
4	Tyler	12	M2	-8.40	-0.01	0.00	0.00
4	Tyler	16	E	-16.01	-0.02	-0.01	-0.02
5	Fillmore	8	M1	46.81	0.07	-0.03	-0.04

Table 43 (Continued) Body composition, part 4.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Area Change (cm2)</i>	<i>% Area Change (%)</i>	<i>BMD Change (g/cm2)</i>	<i>% BMD Change (%)</i>
5	Fillmore	12	M2	69.62	0.10	-0.02	-0.03
5	Fillmore	16	E	34.81	0.05	-0.01	-0.02
5	Ford	8	M1	-98.03	-0.16	0.04	0.06
5	Ford	12	M2	-60.42	-0.10	0.02	0.03
5	Ford	16	E	-115.24	-0.19	0.05	0.07
5	Franklin	8	M1	26.41	0.04	-0.02	-0.02
5	Franklin	12	M2	63.22	0.09	-0.01	-0.02
5	Franklin	16	E	44.02	0.06	-0.01	-0.01
5	Grant	8	M1	-30.81	-0.05	-0.01	-0.02
5	Grant	12	M2	-12.80	-0.02	-0.02	-0.03
5	Grant	16	E	-12.00	-0.02	-0.02	-0.03
5	Quincy	8	M1	-30.41	-0.04	-0.02	-0.03
5	Quincy	12	M2	-46.82	-0.07	-0.02	-0.03
5	Quincy	16	E	-21.61	-0.03	-0.04	-0.06
5	Sherman	8	M1	-3.20	0.00	0.01	0.02
5	Sherman	12	M2	-49.61	-0.07	0.01	0.01
5	Sherman	16	E	-54.81	-0.08	0.01	0.01
6	Bush	8	M1	-55.22	-0.09	0.02	0.02
6	Bush	12	M2	-60.82	-0.10	0.01	0.01
6	Bush	16	E	-64.02	-0.10	0.01	0.02
6	Ernie	8	M1	3.20	0.00	0.01	0.02
6	Ernie	12	M2	21.60	0.03	-0.01	-0.02
6	Ernie	16	E	-8.81	-0.01	-0.01	-0.01
6	Johnson	8	M1	1.20	0.00	-0.01	-0.02

Table 43 (Continued) Body composition, part 4.

<i>Group</i>	<i>Dog</i>	<i>Week</i>	<i>Point</i>	<i>Area Change (cm2)</i>	<i>% Area Change (%)</i>	<i>BMD Change (g/cm2)</i>	<i>% BMD Change (%)</i>
6	Johnson	12	M2	-4.40	-0.01	0.00	0.00
6	Johnson	16	E	20.41	0.03	-0.01	-0.01
6	Kennedy	8	M1	-2.80	0.00	0.02	0.03
6	Kennedy	12	M2	12.40	0.02	0.01	0.02
6	Kennedy	16	E	-30.41	-0.05	0.00	0.00
6	Pierce	8	M1	-30.41	-0.04	0.01	0.02
6	Pierce	12	M2	-36.81	-0.05	0.01	0.01
6	Pierce	16	E	-36.01	-0.05	-0.02	-0.03
6	York	8	M1	-9.20	-0.01	0.02	0.03
6	York	12	M2	-20.81	-0.03	0.00	0.00
6	York	16	E	2.80	0.00	-0.01	-0.01

Table 44 Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	1	Adams	B	0	1	24.09744406	80.42424572
1	1	Adams	B	0	2	55.98084152	172.1373449
1	1	Adams	O	0	2	36.3	12.34658029
1	1	Adams	O	0	1	36.3	36.3
1	1	Adams	E	0	2	6.145728939	36.3
1	1	Adams	E	0	1	15.47638316	36.3
1	1	Adams	B	420	2	11.89162585	41.75899164
1	1	Adams	B	420	1	28.20384137	62.37864093
1	1	Adams	O	420	1	1.349092018	36.3
1	1	Adams	O	420	2	1.349092018	36.3
1	1	Adams	E	420	2	731.8312743	1405.321092
1	1	Adams	E	420	1	857.5522143	1488.455066
1	1	Adams	B	180	1	36.3	36.3
1	1	Adams	B	180	2	36.3	36.3
1	1	Adams	O	180	1	.	.
1	1	Adams	O	180	2	.	.
1	1	Adams	E	180	1	.	.
1	1	Adams	E	180	2	.	.
1	1	Arthur	B	0	1	36.3	1395.509572
1	1	Arthur	B	0	2	16.79382715	1528.380868
1	1	Arthur	O	0	2	10.99228413	1174.891675
1	1	Arthur	O	0	1	10.99228413	1496.708065
1	1	Arthur	E	0	2	22.72889905	556.0318595
1	1	Arthur	E	0	1	28.20384137	852.8369429
1	1	Arthur	B	420	2	78.61557922	3097.382939
1	1	Arthur	B	420	1	93.37274627	3520.792456
1	1	Arthur	O	420	1	45.26038854	1640.993361
1	1	Arthur	O	420	2	32.18909145	1668.744838
1	1	Arthur	E	420	2	55.98084152	1784.878014
1	1	Arthur	E	420	1	55.98084152	1980.8952
1	1	Arthur	B	180	1	.	.
1	1	Arthur	B	180	2	.	.
1	1	Arthur	O	180	1	.	.
1	1	Arthur	O	180	2	.	.
1	1	Arthur	E	180	1	4.358087247	983.9970553
1	1	Arthur	E	180	2	4.358087247	1005.178165
1	1	Garfield	B	0	1	1.349092018	309.6448271
1	1	Garfield	B	0	2	6.559001821	352.9063785

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	1	Garfield	O	0	2	22.72889905	404.3047171
1	1	Garfield	O	0	1	33.70672677	547.6795245
1	1	Garfield	E	0	2	274.5267549	1217.743607
1	1	Garfield	E	0	1	348.1262223	1419.09932
1	1	Garfield	B	420	1	3.803730696	373.573015
1	1	Garfield	B	420	2	36.3	405.9225563
1	1	Garfield	O	420	1	32.18909145	494.5234053
1	1	Garfield	O	420	2	47.46225465	535.7461593
1	1	Garfield	E	420	2	179.1192555	912.3817214
1	1	Garfield	E	420	1	302.6562394	1064.074723
1	1	Garfield	B	180	1	.	.
1	1	Garfield	B	180	2	.	.
1	1	Garfield	O	180	1	36.3	409.1888581
1	1	Garfield	O	180	2	36.3	417.0605172
1	1	Garfield	E	180	1	.	.
1	1	Garfield	E	180	2	.	.
1	1	Polk	B	0	2	524.088591	1225.810665
1	1	Polk	B	0	1	629.7872622	1660.166781
1	1	Polk	O	0	2	1501.386351	3200.623584
1	1	Polk	O	0	1	1691.795426	3674.230166
1	1	Polk	E	0	2	55.84274465	123.5532129
1	1	Polk	E	0	1	239.2572494	449.5165991
1	1	Polk	B	420	2	510.4631307	1004.228996
1	1	Polk	B	420	1	1291.371591	2294.511235
1	1	Polk	O	420	2	325.551012	1114.533092
1	1	Polk	O	420	1	1112.661676	2412.577281
1	1	Polk	E	420	2	17.28812107	62.37864093
1	1	Polk	E	420	1	28.20384137	101.7169683
1	1	Polk	B	180	1	.	.
1	1	Polk	B	180	2	.	.
1	1	Polk	O	180	1	1688.858839	2374.618078
1	1	Polk	O	180	2	2465.706407	3202.983013
1	1	Polk	E	180	2	83.18824548	156.6525678
1	1	Polk	E	180	1	123.7401529	362.7189442
1	1	Taylor	B	0	2	36.3	24.84622543
1	1	Taylor	B	0	1	36.3	132.0704946
1	1	Taylor	O	0	2	36.3	19.89497179
1	1	Taylor	O	0	1	36.3	36.3

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	1	Taylor	E	0	1	36.3	36.3
1	1	Taylor	E	0	2	36.3	36.3
1	1	Taylor	B	420	1	11.16559786	29.80711226
1	1	Taylor	B	420	2	15.26214845	56.88382791
1	1	Taylor	O	420	1	36.3	90.9479702
1	1	Taylor	O	420	2	36.3	90.9479702
1	1	Taylor	E	420	1	36.3	24.84622543
1	1	Taylor	E	420	2	36.3	69.7661986
1	1	Taylor	B	180	1	.	.
1	1	Taylor	B	180	2	.	.
1	1	Taylor	O	180	1	36.3	36.3
1	1	Taylor	O	180	2	36.3	36.3
1	1	Taylor	E	180	2	36.3	30.05338269
1	1	Taylor	E	180	1	36.3	54.70033813
1	1	Truman	B	0	2	67.13660866	120.7784641
1	1	Truman	B	0	1	67.13660866	139.5509602
1	1	Truman	O	0	2	22.3068199	0.050704408
1	1	Truman	O	0	1	46.46765393	19.37725848
1	1	Truman	E	0	1	27.24991768	0.050704408
1	1	Truman	E	0	2	17.28101273	35.91923454
1	1	Truman	B	420	2	3.803730696	36.3
1	1	Truman	B	420	1	36.3	36.3
1	1	Truman	O	420	2	3.803730696	36.3
1	1	Truman	O	420	1	36.3	36.3
1	1	Truman	E	420	2	34.34930337	50.10586536
1	1	Truman	E	420	1	36.51735849	70.45320318
1	1	Truman	B	180	1	4.358087247	36.3
1	1	Truman	B	180	2	15.7195226	36.3
1	1	Truman	O	180	1	.	.
1	1	Truman	O	180	2	.	.
1	1	Truman	E	180	2	23.21436701	45.45972434
1	1	Truman	E	180	1	41.0198518	76.81266584
1	2	Harding	B	0	2	518.0767162	893.6235403
1	2	Harding	B	0	1	611.6029861	1241.941
1	2	Harding	O	0	2	355.3524145	496.5252341
1	2	Harding	O	0	1	798.5017106	1298.965595
1	2	Harding	E	0	2	285.2225526	329.2885221
1	2	Harding	E	0	1	865.0759851	1456.249208

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	2	Harding	B	420	1	393.9419432	584.9806416
1	2	Harding	B	420	2	355.994476	657.3302759
1	2	Harding	O	420	2	669.5233293	1239.203133
1	2	Harding	O	420	1	718.8188919	1356.849131
1	2	Harding	E	420	2	477.1388238	698.4366469
1	2	Harding	E	420	1	877.0606837	1507.72477
1	2	Harding	B	180	1	.	.
1	2	Harding	B	180	2	.	.
1	2	Harding	O	180	1	755.6395206	1263.596435
1	2	Harding	O	180	2	1004.827989	1436.019314
1	2	Harding	E	180	1	#VALUE!	#VALUE!
1	2	Harding	E	180	2	#VALUE!	#VALUE!
1	2	Harrison	B	0	2	6.833491929	0.050704408
1	2	Harrison	B	0	1	36.3	36.3
1	2	Harrison	O	0	1	36.3	0.050704408
1	2	Harrison	O	0	2	36.3	36.3
1	2	Harrison	E	0	1	36.3	36.3
1	2	Harrison	E	0	2	36.3	36.3
1	2	Harrison	B	420	1	7.15511589	16.31731027
1	2	Harrison	B	420	2	15.26214845	29.80711226
1	2	Harrison	O	420	1	36.3	36.3
1	2	Harrison	O	420	2	36.3	36.3
1	2	Harrison	E	420	2	22.72889905	19.89497179
1	2	Harrison	E	420	1	22.72889905	41.75899164
1	2	Harrison	B	180	1	.	.
1	2	Harrison	B	180	2	.	.
1	2	Harrison	O	180	1	.	.
1	2	Harrison	O	180	2	.	.
1	2	Harrison	E	180	2	36.3	36.3
1	2	Harrison	E	180	1	4.358087247	42.7828247
1	2	Hoover	B	0	1	36.3	36.3
1	2	Hoover	B	0	2	36.3	36.3
1	2	Hoover	O	0	2	1.349092018	36.3
1	2	Hoover	O	0	1	9.215373384	36.3
1	2	Hoover	E	0	1	36.3	36.3
1	2	Hoover	E	0	2	36.3	36.3
1	2	Hoover	B	420	2	7.15511589	9.594432807
1	2	Hoover	B	420	1	15.26214845	16.31731027

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	2	Hoover	O	420	1	36.3	36.3
1	2	Hoover	O	420	2	36.3	36.3
1	2	Hoover	E	420	1	36.3	36.3
1	2	Hoover	E	420	2	36.3	36.3
1	2	Hoover	B	180	1	.	.
1	2	Hoover	B	180	2	.	.
1	2	Hoover	O	180	1	36.3	36.3
1	2	Hoover	O	180	2	36.3	36.3
1	2	Hoover	E	180	1	36.3	36.3
1	2	Hoover	E	180	2	36.3	36.3
1	2	Jackson	B	0	2	36.3	15.07407751
1	2	Jackson	B	0	1	1.907994252	36.3
1	2	Jackson	O	0	1	36.3	36.3
1	2	Jackson	O	0	2	36.3	36.3
1	2	Jackson	E	0	1	36.3	36.3
1	2	Jackson	E	0	2	36.3	36.3
1	2	Jackson	B	420	1	36.3	36.3
1	2	Jackson	B	420	2	36.3	36.3
1	2	Jackson	O	420	2	36.3	2.901020502
1	2	Jackson	O	420	1	7.15511589	9.594432807
1	2	Jackson	E	420	2	7.15511589	9.594432807
1	2	Jackson	E	420	1	3.275666595	16.31731027
1	2	Jackson	B	180	1	36.3	15.8715595
1	2	Jackson	B	180	2	36.3	54.70033813
1	2	Jackson	O	180	1	36.3	36.3
1	2	Jackson	O	180	2	36.3	36.3
1	2	Jackson	E	180	1	.	.
1	2	Jackson	E	180	2	.	.
1	2	Lynden	B	0	2	55.84274465	519.8375969
1	2	Lynden	B	0	1	83.35653228	747.3892045
1	2	Lynden	O	0	2	84.04355157	522.5751094
1	2	Lynden	O	0	1	109.5794661	597.6838378
1	2	Lynden	E	0	2	55.84274465	956.6298342
1	2	Lynden	E	0	1	83.35653228	1161.144396
1	2	Lynden	B	420	2	75.57700895	705.2442559
1	2	Lynden	B	420	1	72.76051236	762.7995387
1	2	Lynden	O	420	2	27.89410392	275.1018046
1	2	Lynden	O	420	1	45.26038854	370.9988478

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	2	Lynden	E	420	1	72.76051236	1047.986236
1	2	Lynden	E	420	2	89.70130876	1096.564489
1	2	Lynden	B	180	1	.	.
1	2	Lynden	B	180	2	.	.
1	2	Lynden	O	180	1	.	.
1	2	Lynden	O	180	2	.	.
1	2	Lynden	E	180	1	55.38043483	827.2489773
1	2	Lynden	E	180	2	63.30621521	877.4210401
1	2	Wilson	B	0	2	11.89162585	36.3
1	2	Wilson	B	0	1	36.3	36.3
1	2	Wilson	O	0	1	36.3	36.3
1	2	Wilson	O	0	2	36.3	36.3
1	2	Wilson	E	0	1	36.3	36.3
1	2	Wilson	E	0	2	36.3	36.3
1	2	Wilson	B	420	1	36.3	36.3
1	2	Wilson	B	420	2	36.3	36.3
1	2	Wilson	O	420	1	36.3	36.3
1	2	Wilson	O	420	2	36.3	36.3
1	2	Wilson	E	420	1	7.15511589	2.901020502
1	2	Wilson	E	420	2	11.16559786	16.31731027
1	2	Wilson	B	180	1	36.3	36.3
1	2	Wilson	B	180	2	36.3	36.3
1	2	Wilson	O	180	1	.	.
1	2	Wilson	O	180	2	.	.
1	2	Wilson	E	180	1	36.3	36.3
1	2	Wilson	E	180	2	36.3	36.3
1	3	Carter	B	0	1	12.14326305	0.050704408
1	3	Carter	B	0	2	17.28101273	36.3
1	3	Carter	O	0	2	27.24991768	66.60731967
1	3	Carter	O	0	1	74.27094545	150.7552079
1	3	Carter	E	0	2	74.27094545	35.91923454
1	3	Carter	E	0	1	87.87223745	137.2354123
1	3	Carter	B	420	2	19.42345073	23.05649909
1	3	Carter	B	420	1	34.34930337	56.88382791
1	3	Carter	O	420	2	3.803730696	36.3
1	3	Carter	O	420	1	36.3	36.3
1	3	Carter	E	420	1	3.803730696	36.3
1	3	Carter	E	420	2	3.803730696	36.3

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	3	Carter	B	180	1	.	.
1	3	Carter	B	180	2	.	.
1	3	Carter	O	180	1	15.7195226	36.3
1	3	Carter	O	180	2	36.3	36.3
1	3	Carter	E	180	1	.	.
1	3	Carter	E	180	2	.	.
1	3	Clinton	B	0	2	28.20384137	82.29068899
1	3	Clinton	B	0	1	50.34621296	158.0861495
1	3	Clinton	O	0	2	123.4698943	304.6697112
1	3	Clinton	O	0	1	188.423758	401.9361331
1	3	Clinton	E	0	2	6.833491929	35.91923454
1	3	Clinton	E	0	1	36.3	66.60731967
1	3	Clinton	B	420	2	3.803730696	36.3
1	3	Clinton	B	420	1	36.3	36.3
1	3	Clinton	O	420	2	15.26214845	70.45320318
1	3	Clinton	O	420	1	27.89410392	97.63494729
1	3	Clinton	E	420	2	11.89162585	41.75899164
1	3	Clinton	E	420	1	6.559001821	52.17836202
1	3	Clinton	B	180	1	.	.
1	3	Clinton	B	180	2	.	.
1	3	Clinton	O	180	1	.	.
1	3	Clinton	O	180	2	.	.
1	3	Clinton	E	180	1	36.3	54.70033813
1	3	Clinton	E	180	2	36.3	77.02216499
1	3	Custer	B	0	1	36.3	36.3
1	3	Custer	B	0	2	36.3	36.3
1	3	Custer	O	0	1	17.28812107	36.3
1	3	Custer	O	0	2	28.20384137	41.75899164
1	3	Custer	E	0	1	36.3	36.3
1	3	Custer	E	0	2	36.3	36.3
1	3	Custer	B	420	1	15.26214845	29.80711226
1	3	Custer	B	420	2	15.26214845	56.88382791
1	3	Custer	O	420	2	15.47638316	36.3
1	3	Custer	O	420	1	36.3	36.3
1	3	Custer	E	420	1	36.3	36.3
1	3	Custer	E	420	2	36.3	36.3
1	3	Custer	B	180	1	36.3	36.3
1	3	Custer	B	180	2	36.3	36.3

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	3	Custer	O	180	1	.	.
1	3	Custer	O	180	2	.	.
1	3	Custer	E	180	1	36.3	36.3
1	3	Custer	E	180	2	36.3	36.3
1	3	Houston	B	0	1	33.70672677	3330.921194
1	3	Houston	B	0	2	33.70672677	3616.878775
1	3	Houston	O	0	2	36.95141804	2533.146259
1	3	Houston	O	0	1	17.28101273	2592.866728
1	3	Houston	E	0	2	36.3	2091.862016
1	3	Houston	E	0	1	17.28101273	2929.627463
1	3	Houston	B	420	2	18.59480068	2887.647565
1	3	Houston	B	420	1	13.86660417	3158.779889
1	3	Houston	O	420	2	13.20473708	1377.620748
1	3	Houston	O	420	1	23.63689493	1724.263512
1	3	Houston	E	420	1	36.3	1709.765327
1	3	Houston	E	420	2	3.803730696	1780.618831
1	3	Houston	B	180	1	.	.
1	3	Houston	B	180	2	.	.
1	3	Houston	O	180	1	4.358087247	1750.491213
1	3	Houston	O	180	2	36.3	1940.829197
1	3	Houston	E	180	1	.	.
1	3	Houston	E	180	2	.	.
1	3	King	B	0	1	36.3	15.07407751
1	3	King	B	0	2	10.99228413	29.18205688
1	3	King	O	0	1	19.65522844	69.95273851
1	3	King	O	0	2	33.70855264	103.074244
1	3	King	E	0	1	16.79382715	42.95720134
1	3	King	E	0	2	33.70855264	69.95273851
1	3	King	B	420	2	71.14775017	111.675755
1	3	King	B	420	1	32.35989927	121.9093156
1	3	King	O	420	2	19.8442327	111.675755
1	3	King	O	420	1	55.98084152	152.2074068
1	3	King	E	420	2	40.87539609	56.88382791
1	3	King	E	420	1	45.26038854	84.03771273
1	3	King	B	180	2	49.65687332	131.3526631
1	3	King	B	180	1	83.18824548	156.6525678
1	3	King	O	180	1	.	.
1	3	King	O	180	2	.	.

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
1	3	King	E	180	1	25.45388681	36.3
1	3	King	E	180	2	34.48224069	66.06668794
1	3	Nixon	B	0	1	84.04355157	52.17836202
1	3	Nixon	B	0	2	101.0464737	120.7784641
1	3	Nixon	O	0	1	10.99228413	69.95273851
1	3	Nixon	O	0	2	16.79382715	69.95273851
1	3	Nixon	E	0	2	6.145728939	191.8967299
1	3	Nixon	E	0	1	36.3	231.0064858
1	3	Nixon	B	420	1	55.98084152	24.84622543
1	3	Nixon	B	420	2	86.02118389	90.9479702
1	3	Nixon	O	420	2	36.3	152.2074068
1	3	Nixon	O	420	1	55.98084152	250.3944984
1	3	Nixon	E	420	1	32.18909145	165.7636799
1	3	Nixon	E	420	2	15.26214845	179.4118911
1	3	Nixon	B	180	1	74.92326587	36.3
1	3	Nixon	B	180	2	66.58860891	45.45972434
1	3	Nixon	O	180	2	20.70265649	98.01983144
1	3	Nixon	O	180	1	34.48224069	118.1140941
1	3	Nixon	E	180	1	.	.
1	3	Nixon	E	180	2	.	.
2	4	Lincoln	B	0	2	10.99228413	83.26632579
2	4	Lincoln	B	0	1	28.12921971	161.6969742
2	4	Lincoln	O	0	2	10.99228413	29.18205688
2	4	Lincoln	O	0	1	36.3	29.18205688
2	4	Lincoln	E	0	2	28.12921971	42.95720134
2	4	Lincoln	E	0	1	39.24483573	42.95720134
2	4	Lincoln	B	420	1	48.25007874	355.6381434
2	4	Lincoln	B	420	2	100.6768722	590.0837713
2	4	Lincoln	O	420	1	6.145728939	24.84622543
2	4	Lincoln	O	420	2	36.3	47.90824433
2	4	Lincoln	E	420	2	47.46225465	70.45320318
2	4	Lincoln	E	420	1	45.26038854	84.03771273
2	4	Lincoln	B	180	1	.	.
2	4	Lincoln	B	180	2	.	.
2	4	Lincoln	O	180	1	.	.
2	4	Lincoln	O	180	2	.	.
2	4	Lincoln	E	180	1	59.36759528	98.01983144
2	4	Lincoln	E	180	2	74.87199888	137.5342894

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
2	4	Madison	B	0	1	36.95141804	35.91923454
2	4	Madison	B	0	2	36.95141804	35.91923454
2	4	Madison	O	0	2	106.7329416	335.6534059
2	4	Madison	O	0	1	115.278867	404.3047171
2	4	Madison	E	0	2	230.8399201	461.3193454
2	4	Madison	E	0	1	256.0338011	577.6169071
2	4	Madison	B	420	2	32.22551084	36.3
2	4	Madison	B	420	1	41.0198518	76.81266584
2	4	Madison	O	420	2	131.8975727	473.9204877
2	4	Madison	O	420	1	124.8897963	563.2399866
2	4	Madison	E	420	2	83.18824548	205.0589586
2	4	Madison	E	420	1	107.6503453	296.6775045
2	4	Madison	B	180	1	.	.
2	4	Madison	B	180	2	.	.
2	4	Madison	O	180	1	86.12698469	279.442442
2	4	Madison	O	180	2	146.1524627	369.4666731
2	4	Madison	E	180	1	172.9648778	271.033225
2	4	Madison	E	180	2	172.9648778	377.4623946
2	4	Monroe	B	0	2	36.3	0.050704408
2	4	Monroe	B	0	1	22.3068199	66.60731967
2	4	Monroe	O	0	2	33.70672677	101.7169683
2	4	Monroe	O	0	1	44.78060043	203.6093421
2	4	Monroe	E	0	2	110.2195695	967.4990908
2	4	Monroe	E	0	1	74.27094545	1043.238462
2	4	Monroe	B	420	2	36.51735849	70.45320318
2	4	Monroe	B	420	1	49.67002482	97.63494729
2	4	Monroe	O	420	2	36.3	36.3
2	4	Monroe	O	420	1	3.803730696	118.313459
2	4	Monroe	E	420	1	89.70130876	811.96688
2	4	Monroe	E	420	2	101.0464737	1096.564489
2	4	Monroe	B	180	1	36.3	30.05338269
2	4	Monroe	B	180	2	36.3	36.3
2	4	Monroe	O	180	1	.	.
2	4	Monroe	O	180	2	.	.
2	4	Monroe	E	180	1	.	.
2	4	Monroe	E	180	2	.	.
2	4	Obama	B	0	1	106.7329416	158.0861495
2	4	Obama	B	0	2	89.70130876	176.4214068

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
2	4	Obama	O	0	2	82.57194113	187.4834544
2	4	Obama	O	0	1	109.1262191	238.722078
2	4	Obama	E	0	1	16.79382715	49.76350344
2	4	Obama	E	0	2	22.49641581	69.95273851
2	4	Obama	B	420	2	171.9784972	260.0531732
2	4	Obama	B	420	1	213.838626	327.1261165
2	4	Obama	O	420	2	40.38934377	90.9479702
2	4	Obama	O	420	1	171.9784972	269.6902682
2	4	Obama	E	420	2	19.42345073	43.33316664
2	4	Obama	E	420	1	23.63689493	56.88382791
2	4	Obama	B	180	1	.	.
2	4	Obama	B	180	2	.	.
2	4	Obama	O	180	2	166.3248004	210.7480187
2	4	Obama	O	180	1	139.3341983	228.2553274
2	4	Obama	E	180	1	.	.
2	4	Obama	E	180	2	.	.
2	4	Taft	B	0	1	36.3	36.3
2	4	Taft	B	0	2	36.3	36.3
2	4	Taft	O	0	1	1.349092018	36.3
2	4	Taft	O	0	2	3.930359096	36.3
2	4	Tyler	O	0	2	10.99228413	804.7562443
2	4	Tyler	O	0	1	10.99228413	886.1836992
2	4	Tyler	E	0	2	1.349092018	901.7715836
2	4	Tyler	E	0	1	36.3	934.3348942
2	4	Tyler	B	420	1	36.3	1246.78672
2	4	Tyler	B	420	2	36.3	1330.028516
2	4	Tyler	O	420	2	11.16559786	976.6142649
2	4	Tyler	O	420	1	30.03718428	1356.849131
2	4	Tyler	E	420	1	36.3	886.5136637
2	4	Tyler	E	420	2	36.3	978.8829919
2	4	Tyler	B	180	2	36.3	827.2489773
2	4	Tyler	B	180	1	36.3	855.9561342
2	4	Tyler	O	180	1	.	.
2	4	Tyler	O	180	2	.	.
2	4	Tyler	E	180	2	36.3	547.917355
2	4	Tyler	E	180	1	36.3	681.958069
2	5	Fillmore	B	0	1	36.3	41.75899164
2	5	Fillmore	B	0	2	1.349092018	62.37864093

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
2	5	Fillmore	O	0	1	36.3	29.18205688
2	5	Fillmore	O	0	2	36.3	42.95720134
2	5	Fillmore	E	0	1	5.023794016	42.95720134
2	5	Fillmore	E	0	2	36.3	42.95720134
2	5	Fillmore	B	420	2	36.3	69.7661986
2	5	Fillmore	B	420	1	24.09744406	172.1373449
2	5	Fillmore	O	420	2	36.3	12.34658029
2	5	Fillmore	O	420	1	36.3	24.84622543
2	5	Fillmore	E	420	2	36.3	50.10586536
2	5	Fillmore	E	420	1	7.15511589	70.45320318
2	5	Fillmore	B	180	1	.	.
2	5	Fillmore	B	180	2	.	.
2	5	Fillmore	O	180	2	36.3	30.05338269
2	5	Fillmore	O	180	1	36.3	36.3
2	5	Fillmore	E	180	1	36.3	45.45972434
2	5	Fillmore	E	180	2	36.3	76.81266584
2	5	Ford	B	0	2	700.1514132	1193.086726
2	5	Ford	B	0	1	1315.23993	1725.259933
2	5	Ford	O	0	2	872.8942163	1404.010332
2	5	Ford	O	0	1	1727.669457	2949.358151
2	5	Ford	E	0	2	396.1920905	657.4460618
2	5	Ford	E	0	1	477.1444872	791.912057
2	5	Ford	B	420	2	321.5576372	688.7572401
2	5	Ford	B	420	1	386.6385422	836.4994264
2	5	Ford	O	420	1	356.9997341	497.3949757
2	5	Ford	O	420	2	327.4549211	622.5936209
2	5	Ford	E	420	2	200.6496983	350.4349332
2	5	Ford	E	420	1	246.5117386	384.7121436
2	5	Ford	B	180	1	.	.
2	5	Ford	B	180	2	.	.
2	5	Ford	O	180	1	.	.
2	5	Ford	O	180	2	.	.
2	5	Ford	E	180	1	366.735514	517.568735
2	5	Ford	E	180	2	384.7175447	637.6849943
2	5	Franklin	B	0	1	36.3	36.3
2	5	Franklin	B	0	2	36.3	36.3
2	5	Franklin	O	0	2	638.8891635	688.7572401

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
2	5	Franklin	O	0	1	626.7547372	721.711616
2	5	Franklin	E	0	1	362.9201127	387.2278444
2	5	Franklin	E	0	2	356.9997341	404.3047171
2	5	Franklin	B	420	1	268.4236829	343.5819552
2	5	Franklin	B	420	2	315.0337275	377.8551021
2	5	Franklin	O	420	1	549.0977714	534.1803333
2	5	Franklin	O	420	2	658.5512453	701.4958795
2	5	Franklin	E	420	2	344.4577462	421.7625171
2	5	Franklin	E	420	1	399.0633911	421.7625171
2	5	Franklin	B	180	1	432.2701802	440.5433884
2	5	Franklin	B	180	2	414.5008571	456.0950395
2	5	Franklin	O	180	2	824.1112816	605.7126176
2	5	Franklin	O	180	1	835.4512313	841.3372218
2	5	Franklin	E	180	1	.	.
2	5	Franklin	E	180	2	.	.
2	5	Grant	B	0	2	36.3	0.050704408
2	5	Grant	B	0	1	36.3	35.91923454
2	5	Grant	O	0	1	36.3	36.3
2	5	Grant	O	0	2	36.3	36.3
2	5	Grant	E	0	1	36.3	36.3
2	5	Grant	E	0	2	36.3	36.3
2	5	Grant	B	420	1	36.3	36.3
2	5	Grant	B	420	2	36.3	36.3
2	5	Grant	O	420	1	3.275666595	36.3
2	5	Grant	O	420	2	36.3	36.3
2	5	Grant	E	420	1	36.3	36.3
2	5	Grant	E	420	2	36.3	36.3
2	5	Grant	B	180	2	36.3	30.05338269
2	5	Grant	B	180	1	36.3	36.3
2	5	Grant	O	180	1	.	.
2	5	Grant	O	180	2	.	.
2	5	Grant	E	180	1	13.86660417	36.3
2	5	Grant	E	180	2	23.21436701	36.3
2	5	Quincy	B	0	1	265.062752	295.977963
2	5	Quincy	B	0	2	326.7009839	333.9832572
2	5	Quincy	O	0	2	28.12921971	69.95273851
2	5	Quincy	O	0	1	30.92482253	142.2624638

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
2	5	Quincy	E	0	1	22.49641581	56.52772049
2	5	Quincy	E	0	2	10.99228413	63.25591341
2	5	Quincy	B	420	2	32.35989927	58.94282565
2	5	Quincy	B	420	1	32.35989927	111.675755
2	5	Quincy	O	420	1	63.02887833	97.63494729
2	5	Quincy	O	420	2	67.52040102	118.0509881
2	5	Quincy	E	420	1	36.3	36.3
2	5	Quincy	E	420	2	36.3	36.3
2	5	Quincy	B	180	1	.	.
2	5	Quincy	B	180	2	.	.
2	5	Quincy	O	180	2	89.820475	77.02216499
2	5	Quincy	O	180	1	59.36759528	98.01983144
2	5	Quincy	E	180	1	.	.
2	5	Quincy	E	180	2	.	.
2	5	Sherman	B	0	2	297.6716101	365.8223485
2	5	Sherman	B	0	1	1515.7923	1529.091123
2	5	Sherman	O	0	2	383.968442	496.5252341
2	5	Sherman	O	0	1	849.4310187	880.1711311
2	5	Sherman	E	0	2	1297.183422	1949.227771
2	5	Sherman	E	0	1	1367.101501	2134.012242
2	5	Sherman	B	420	2	528.273525	880.014192
2	5	Sherman	B	420	1	763.1269293	1087.111013
2	5	Sherman	O	420	2	499.7831463	636.7171224
2	5	Sherman	O	420	1	1066.900367	1477.459499
2	5	Sherman	E	420	2	147.6268081	251.5208465
2	5	Sherman	E	420	1	233.5376818	318.8856598
2	5	Sherman	B	180	1	.	.
2	5	Sherman	B	180	2	.	.
2	5	Sherman	O	180	2	256.4918206	393.3751837
2	5	Sherman	O	180	1	578.1457604	645.089553
2	5	Sherman	E	180	2	212.0833922	201.8948786
2	5	Sherman	E	180	1	589.6848946	652.4835452
3	6	Bush	B	0	1	36.3	15.07407751
3	6	Bush	B	0	2	36.3	15.07407751
3	6	Bush	O	0	1	10.99228413	36.10061487
3	6	Bush	O	0	2	5.023794016	42.95720134
3	6	Bush	E	0	1	16.79382715	69.95273851

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
3	6	Bush	E	0	2	33.70855264	96.49059245
3	6	Bush	B	420	2	1.422844593	2.901020502
3	6	Bush	B	420	1	23.63689493	56.88382791
3	6	Bush	O	420	1	32.35989927	132.0704946
3	6	Bush	O	420	2	24.09744406	152.2074068
3	6	Bush	E	420	2	15.47638316	69.7661986
3	6	Bush	E	420	1	24.09744406	90.9479702
3	6	Bush	B	180	1	4.358087247	36.3
3	6	Bush	B	180	2	25.45388681	42.7828247
3	6	Bush	O	180	2	13.86660417	36.3
3	6	Bush	O	180	1	36.3	36.3
3	6	Bush	E	180	1	.	.
3	6	Bush	E	180	2	.	.
3	6	Ernie	B	0	1	36.3	36.3
3	6	Ernie	B	0	2	36.3	36.3
3	6	Ernie	O	0	1	36.3	36.3
3	6	Ernie	O	0	2	36.3	36.3
3	6	Ernie	E	0	1	36.3	15.07407751
3	6	Ernie	E	0	2	36.3	15.07407751
3	6	Ernie	B	420	1	36.3	36.3
3	6	Ernie	B	420	2	36.3	36.3
3	6	Ernie	O	420	2	36.3	36.3
3	6	Ernie	O	420	1	36.3	47.90824433
3	6	Ernie	E	420	2	3.275666595	16.31731027
3	6	Ernie	E	420	1	11.16559786	70.45320318
3	6	Ernie	B	180	1	.	.
3	6	Ernie	B	180	2	.	.
3	6	Ernie	O	180	1	36.3	36.3
3	6	Ernie	O	180	2	36.3	36.3
3	6	Ernie	E	180	1	36.3	36.3
3	6	Ernie	E	180	2	36.3	36.3
3	6	Johnson	B	0	1	36.3	15.07407751
3	6	Johnson	B	0	2	36.3	29.18205688
3	6	Johnson	O	0	2	36.3	15.07407751
3	6	Johnson	O	0	1	36.3	36.3
3	6	Johnson	E	0	1	5.023794016	29.18205688
3	6	Johnson	E	0	2	5.023794016	36.10061487

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
3	6	Johnson	B	420	1	36.3	36.3
3	6	Johnson	B	420	2	36.3	36.3
3	6	Johnson	O	420	1	15.26214845	43.33316664
3	6	Johnson	O	420	2	15.26214845	56.88382791
3	6	Johnson	E	420	2	36.3	36.3
3	6	Johnson	E	420	1	6.145728939	90.9479702
3	6	Johnson	B	180	2	13.86660417	36.3
3	6	Johnson	B	180	1	36.3	36.3
3	6	Johnson	O	180	1	.	.
3	6	Johnson	O	180	2	.	.
3	6	Johnson	E	180	1	.	.
3	6	Johnson	E	180	2	.	.
3	6	Kennedy	B	0	2	36.3	0.050704408
3	6	Kennedy	B	0	1	36.3	36.3
3	6	Kennedy	O	0	1	17.28101273	36.3
3	6	Kennedy	O	0	2	36.3	36.3
3	6	Kennedy	E	0	1	36.3	36.3
3	6	Kennedy	E	0	2	36.3	36.3
3	6	Kennedy	B	420	1	36.3	36.3
3	6	Kennedy	B	420	2	36.3	36.3
3	6	Kennedy	O	420	1	36.3	36.3
3	6	Kennedy	O	420	2	36.3	36.3
3	6	Kennedy	E	420	1	3.275666595	36.3
3	6	Kennedy	E	420	2	3.275666595	36.3
3	6	Kennedy	B	180	1	36.3	36.3
3	6	Kennedy	B	180	2	36.3	36.3
3	6	Kennedy	O	180	1	.	.
3	6	Kennedy	O	180	2	.	.
3	6	Kennedy	E	180	1	36.3	36.3
3	6	Kennedy	E	180	2	36.3	36.3
3	6	Pierce	B	0	1	.	.
3	6	Pierce	B	0	2	.	.
3	6	Pierce	O	0	1	6.833491929	35.91923454
3	6	Pierce	O	0	2	36.3	36.3
3	6	Pierce	E	0	1	.	.
3	6	Pierce	E	0	2	.	.
3	6	Pierce	B	420	1	3.275666595	36.3

Table 44 (Continued) Interleukin plasma concentrations.

<i>Study</i>	<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>IL6 (pg/mL)</i>	<i>IL15 (pg/mL)</i>
3	6	Pierce	B	420	2	5.194195677	36.3
3	6	Pierce	O	420	1	1.422844593	36.3
3	6	Pierce	O	420	2	3.275666595	36.3
3	6	Pierce	E	420	1	.	.
3	6	Pierce	E	420	2	.	.
3	6	Pierce	B	180	1	.	.
3	6	Pierce	B	180	2	.	.
3	6	Pierce	O	180	1	36.3	36.3
3	6	Pierce	O	180	2	36.3	36.3
3	6	Pierce	E	180	1	.	.
3	6	Pierce	E	180	2	.	.
3	6	York	B	0	1	36.3	36.3
3	6	York	B	0	2	36.3	36.3
3	6	York	O	0	1	36.3	36.3
3	6	York	O	0	2	36.3	36.3
3	6	York	E	0	1	36.3	36.3
3	6	York	E	0	2	36.3	36.3
3	6	York	B	420	1	36.3	36.3
3	6	York	B	420	2	36.3	36.3
3	6	York	O	420	2	11.89162585	36.3
3	6	York	O	420	1	36.3	36.3
3	6	York	E	420	1	36.3	36.3
3	6	York	E	420	2	36.3	36.3
3	6	York	B	180	1	.	.
3	6	York	B	180	2	.	.
3	6	York	O	180	1	.	.
3	6	York	O	180	2	.	.
3	6	York	E	180	1	36.3	36.3
3	6	York	E	180	2	36.3	36.3

< 36.4 entered as 36.3

Table 45 Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
1	Adams	B	0	1	79.57194	13.14534	933.1403	1383.502	195.8069	23.316	98	
1	Adams	B	0	2	94.69026	13.14534	972.7364	1556.65	238.0999	23.736	.	
1	Adams	B	120	1	172.1166	21.93043	1119.212	3167.413	276.8163	33.984	102	
1	Adams	B	120	2	118.4561	12.83838	817.5685	2311.874	179.3945	36.056	.	
1	Adams	B	180	1	67.6265	2.3	174.4354	2924.951	118.563	23.546	81	
1	Adams	B	180	2	75.58132	2.3	190.2856	3415.263	141.0996	23.372	.	
1	Adams	B	420	1	132.0625	2.3	123.4944	3574.39	256.6529	28.896	93	3.838031
1	Adams	B	420	2	114.6928	2.3	125.2763	3238.66	219.2594	25.61	.	
1	Adams	O	0	1	153.0088	2.3	526.4555	1075.293	230.7487	23.596	76	
1	Adams	O	0	2	140.6061	2.3	718.221	1262.523	315.1994	22.97	.	
1	Adams	O	120	1	58.72101	42.12451	1198.255	1526.848	358.0795	32.064	88	
1	Adams	O	120	2	69.08377	38.26852	1077.424	1483.831	314.2617	30.892	.	
1	Adams	O	180	1	.	.	.	.	.	.	71	
1	Adams	O	180	2	.	.	.	.	.	.	.	
1	Adams	O	420	1	47.13235	14.48404	705.4672	2928.01	225.447	20.578	92	21.47726
1	Adams	O	420	2	51.34365	16.86372	671.6616	3253.418	288.7245	19.36	.	
1	Adams	E	0	1	39.06111	2.3	425.14	250.8093	196.8307	16.054	89	
1	Adams	E	0	2	37.63078	2.3	348.1487	254.3783	198.8925	16.23	.	
1	Adams	E	120	1	34.99109	24.55979	727.7931	736.452	562.1428	29.128	86	
1	Adams	E	120	2	28.4953	28.00444	612.0538	566.4886	526.5205	28.166	.	
1	Adams	E	180	1	.	.	.	.	.	.	96	
1	Adams	E	180	2	.	.	.	.	.	.	.	
1	Adams	E	420	1	0.6	15.67559	976.3285	1101.461	379.9426	21.19	88	30.34695
1	Adams	E	420	2	0.6	17.78607	884.9253	1057.469	310.0681	21.442	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
1	Arthur	B	0	1	38.24855	15.70498	1117.051	3241.762	164.402	7.08	98	
1	Arthur	B	0	2	48.17965	17.23999	1095.71	3285.817	208.6536	6.428	.	
1	Arthur	B	120	1	57.70168	48.07524	1605.703	3934.213	357.3948	8.792	91	
1	Arthur	B	120	2	63.80094	40.86486	1307.975	3841.272	314.773	8.922	.	
1	Arthur	B	180	1	.	.	.	.	.	.	82	
1	Arthur	B	180	2	.	.	.	.	.	.	.	
1	Arthur	B	420	1	63.59873	17.42245	506.9972	10189.82	298.7235	9.966	79	16.62592
1	Arthur	B	420	2	59.24447	12.16203	408.4232	10067.84	283.0065	9.212	.	
1	Arthur	O	0	1	19.60792	9.865679	532.1286	1844.899	174.7482	8.81	79	
1	Arthur	O	0	2	21.827	12.10886	523.6265	1767.728	219.0822	8.536	.	
1	Arthur	O	120	1	3.174408	45.06261	821.9978	2416.291	402.6324	11.35	80	
1	Arthur	O	120	2	3.174408	49.11669	790.5301	2383.787	383.149	11.266	.	
1	Arthur	O	180	1	.	.	.	.	.	.	82	
1	Arthur	O	180	2	.	.	.	.	.	.	.	
1	Arthur	O	420	1	0.6	17.78607	347.948	4852.294	300.2608	6.784	83	12.68459
1	Arthur	O	420	2	0.6	17.78607	385.8262	5219.787	327.0219	7.544	.	
1	Arthur	E	0	1	0.6	2.3	166.4227	161.2545	164.5486	8.28	89	
1	Arthur	E	0	2	0.6	2.3	162.4767	115.6057	114.9037	7.338	.	
1	Arthur	E	120	1	3.598262	40.86486	663.2598	536.3642	590.9934	14.61	108	
1	Arthur	E	120	2	0.6	36.30611	554.8435	310.8639	508.4782	14.278	.	
1	Arthur	E	180	1	0.289358	43.82835	194.9352	690.4505	416.7875	11.626	89	
1	Arthur	E	180	2	0.695881	42.89814	224.5733	594.97	383.6763	11.668	.	
1	Arthur	E	420	1	0.6	52.75395	549.1878	967.69	518.2791	15.66	92	16.83804
1	Arthur	E	420	2	0.6	52.32772	530.4727	1229.181	539.2122	15.98	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
1	Garfield	B	0	1	149.6185	2.3	73.41772	455.6198	183.0236	19.172	98	
1	Garfield	B	0	2	155.6829	2.3	65.57121	577.7166	209.6794	18.468	.	
1	Garfield	B	120	1	193.3663	2.3	92.97053	336.4155	138.982	15.176	88	
1	Garfield	B	120	2	178.4131	2.3	87.17909	279.4792	115.1978	15.65	.	
1	Garfield	B	180	1	.	.	.	.	.	.	93	
1	Garfield	B	180	2	.	.	.	.	.	.	.	
1	Garfield	B	420	1	140.2543	2.3	150.3445	395.6562	132.8524	16.996	86	4.991597
1	Garfield	B	420	2	140.119	2.3	148.8447	402.6562	111.3647	16.266	.	
1	Garfield	O	0	1	73.77669	2.3	377.7039	755.5502	214.8258	10.398	61	
1	Garfield	O	0	2	66.98891	2.3	389.5646	647.8444	121.1491	9.856	.	
1	Garfield	O	120	1	21.43173	2.3	354.9201	928.6826	160.2468	19.176	88	
1	Garfield	O	120	2	25.33247	2.3	305.0668	919.0492	141.2696	19.958	.	
1	Garfield	O	180	1	27.7461	2.3	469.2494	882.8434	97.64931	14.99	92	
1	Garfield	O	180	2	28.87544	2.3	481.7589	885.9603	91.71821	13.78	.	
1	Garfield	O	420	1	10.45669	2.3	62.86102	930.5142	137.1062	18.1	82	2.324765
1	Garfield	O	420	2	9.100568	2.3	70.00096	1039.834	176.4749	18.042	.	
1	Garfield	E	0	1	2.088344	2.3	272.5753	749.2352	232.6864	8.914	81	
1	Garfield	E	0	2	0.6	2.3	275.7061	755.5502	219.6892	9.15	.	
1	Garfield	E	120	1	8.465806	2.3	2167.382	1536.328	370.5618	15.534	97	
1	Garfield	E	120	2	5.04823	2.3	1731.513	1285.471	331.4295	15.044	.	
1	Garfield	E	180	1	.	.	.	.	.	.	101	
1	Garfield	E	180	2	.	.	.	.	.	.	.	
1	Garfield	E	420	1	4.441412	2.3	132.2482	1322.444	192.3491	13.662	90	4.16823
1	Garfield	E	420	2	4.760256	2.3	129.2099	1435.318	185.6569	13.246	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
1	Polk	B	0	1	154.3762	2.3	62.00332	1887.081	104.6527	15.564	94	
1	Polk	B	0	2	147.3821	2.3	62.00332	2106.253	108.0413	14.696	.	
1	Polk	B	120	1	174.674	1.25909	446.5035	2569.605	119.0986	15.936	118	
1	Polk	B	120	2	170.2048	2.3	442.1843	2682.847	116.871	16.09	.	
1	Polk	B	180	1	.	.	.	.	.	.	93	
1	Polk	B	180	2	.	.	.	.	.	.	.	
1	Polk	B	420	1	166.0369	2.3	460.0466	2605.765	146.8291	14.644	94	14.12406
1	Polk	B	420	2	171.2885	2.3	465.2803	2780.039	163.3181	14.136	.	
1	Polk	O	0	1	149.2075	11.32414	75.67403	1330.989	254.2361	22.448	60	
1	Polk	O	0	2	146.5568	10.34764	59.25378	1164.36	214.0461	21.752	.	
1	Polk	O	120	1	92.40425	43.32592	524.8193	2116.465	338.4927	19.718	81	
1	Polk	O	120	2	89.00406	40.24797	441.1818	2131.385	290.8931	18.542	.	
1	Polk	O	180	1	.	.	.	.	.	.	79	
1	Polk	O	180	2	.	.	.	.	.	.	.	
1	Polk	O	420	1	28.03763	2.3	296.4611	3222.708	154.9456	19.212	91	9.170814
1	Polk	O	420	2	38.11062	8.789526	285.1828	3097.735	131.3758	18.282	.	
1	Polk	E	0	1	5.417801	5.012327	108.0692	514.9959	272.541	16.328	61	
1	Polk	E	0	2	8.748731	5.012327	105.3881	494.5236	253.5677	16.438	.	
1	Polk	E	120	1	48.73076	38.24014	404.5794	1360.826	395.3285	19.944	79	
1	Polk	E	120	2	52.37975	35.28249	375.427	1188.936	365.9206	20.702	.	
1	Polk	E	180	1	.	.	.	.	.	.	75	
1	Polk	E	180	2	.	.	.	.	.	.	.	
1	Polk	E	420	1	71.93474	10.93692	248.9008	1315.887	270.5217	15.106	81	9.375677
1	Polk	E	420	2	60.66294	11.71809	280.3915	1444.842	336.5927	15.986	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
1	Taylor	B	0	1	98.53493	2.3	345.3731	3526.282	248.9319	8.506	86	
1	Taylor	B	0	2	111.1517	2.3	342.5956	3545.416	280.3091	8.876	.	
1	Taylor	B	120	1	85.14868	36.16646	2581.962	4752.885	327.499	10.956	98	
1	Taylor	B	120	2	83.48345	36.88225	2554.033	4600.012	322.1975	11.664	.	
1	Taylor	B	180	1	.	.	.	.	.	.	87	
1	Taylor	B	180	2	.	.	.	.	.	.	.	
1	Taylor	B	420	1	46.65031	2.3	182.709	6470.871	270.3818	6.04	80	6.336263
1	Taylor	B	420	2	46.8221	2.3	170.5807	6664.293	250.4377	6.128	.	
1	Taylor	O	0	1	48.12034	2.3	190.4488	1349.715	328.6758	9.012	67	
1	Taylor	O	0	2	45.97687	2.3	193.7668	1211.068	322.8188	8.954	.	
1	Taylor	O	120	1	16.17901	66.01	441.1818	1972.782	459.7101	11.34	60	
1	Taylor	O	120	2	20.85992	67.524	366.9571	1906.64	438.0286	11.062	.	
1	Taylor	O	180	1	16.70991	68.74274	286.9785	2060.118	352.096	6.13	58	
1	Taylor	O	180	2	14.7939	65.99118	254.9461	2143.817	332.2034	5.672	.	
1	Taylor	O	420	1	11.79484	24.22521	961.9528	4200.874	397.6583	7.944	72	38.81648
1	Taylor	O	420	2	12.81133	28.55623	985.9014	4613.475	399.1515	7.672	.	
1	Taylor	E	0	1	63.94443	2.3	528.5851	499.5765	173.8272	5.852	68	
1	Taylor	E	0	2	55.92313	2.3	592.7739	507.1377	147.4808	5.8	.	
1	Taylor	E	120	1	28.34212	52.41456	1716.686	799.9442	323.088	15.17	79	
1	Taylor	E	120	2	27.77106	52.95597	1823.365	902.6479	385.5714	14.168	.	
1	Taylor	E	180	1	11.95179	39.85396	1731.689	1681.922	399.9397	9.404	71	
1	Taylor	E	180	2	12.19275	36.63663	1887.447	1685.115	382.7083	8.782	.	
1	Taylor	E	420	1	11.23654	26.79527	612.9839	2508.275	460.0719	10.936	68	26.81489
1	Taylor	E	420	2	9.82116	26.79527	657.8616	1945.512	344.4359	11.264	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
1	Truman	B	0	1	93.49425	2.3	1002.432	3304.934	235.536	13.368	82	
1	Truman	B	0	2	95.89153	2.3	969.1191	3383.768	204.5658	12.698	.	
1	Truman	B	120	1	132.025	2.3	2171.483	5924.59	312.9699	9.406	89	
1	Truman	B	120	2	124.6142	2.3	1972.164	4668.538	254.0942	9.644	.	
1	Truman	B	180	1	.	.	.	.	.	.	81	
1	Truman	B	180	2	.	.	.	.	.	.	.	
1	Truman	B	420	1	210.9985	2.3	385.1237	6780.171	227.9796	6.604	89	11.96085
1	Truman	B	420	2	210.3506	2.3	356.8012	6874.285	278.297	6.94	.	
1	Truman	O	0	1	134.4579	2.3	777.3946	1545.808	194.6167	4.98	79	
1	Truman	O	0	2	87.55033	2.3	726.4984	1298.225	92.22469	4.908	.	
1	Truman	O	120	1	70.76642	2.3	475.2969	2876.791	277.2651	7.498	93	
1	Truman	O	120	2	78.08805	2.3	417.4417	2654.629	232.9631	7.638	.	
1	Truman	O	180	1	.	.	.	.	.	.	80	
1	Truman	O	180	2	.	.	.	.	.	.	.	
1	Truman	O	420	1	56.98919	2.3	229.6945	3885.254	167.542	6.274	86	7.202647
1	Truman	O	420	2	52.50001	2.3	202.0218	3268.172	134.8167	5.874	.	
1	Truman	E	0	1	12.64582	2.3	200.4628	476.9888	150.2809	5.578	73	
1	Truman	E	0	2	26.39847	2.3	166.4227	386.5987	119.1684	5.762	.	
1	Truman	E	120	1	26.17482	2.3	878.2825	1247.755	382.4862	6.38	88	
1	Truman	E	120	2	25.34507	2.3	795.8882	1116.476	344.6013	6.38	.	
1	Truman	E	180	1	7.741582	2.3	257.6987	1237.386	164.6914	5.704	81	
1	Truman	E	180	2	7.584687	2.3	307.9393	1360.701	184.2816	5.486	.	
1	Truman	E	420	1	6.178725	2.3	772.9648	1522.068	200.3165	6.666	94	23.95185
1	Truman	E	420	2	7.007146	2.3	796.2223	1792.605	243.6597	6.388	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
2	Harding	B	0	1	79.08646	2.3	285.8569	1039.684	116.2465	11.042	97	
2	Harding	B	0	2	76.04711	2.3	262.6891	891.6343	105.222	10.826	.	
2	Harding	B	120	1	72.46329	2.3	688.8208	1977.751	216.0783	20.262	112	
2	Harding	B	120	2	60.70115	2.3	641.6215	1619.839	196.277	20.02	.	
2	Harding	B	180	1	.	.	.	.	.	.	96	
2	Harding	B	180	2	.	.	.	.	.	.	.	
2	Harding	B	420	1	123.9918	2.3	503.6436	1981.484	128.6629	21.288	98	14.13525
2	Harding	B	420	2	117.6985	2.3	461.8231	2089.233	133.9195	18.83	.	
2	Harding	O	0	1	12.9555	2.3	425.9964	959.6831	169.7088	15.136	94	
2	Harding	O	0	2	8.370746	2.3	415.8732	661.6473	97.81614	14.928	.	
2	Harding	O	120	1	3.344183	2.3	931.8418	1739.425	205.0459	18.642	88	
2	Harding	O	120	2	4.616611	2.3	833.6328	1573.508	209.1603	17.824	.	
2	Harding	O	180	1	.	.	.	.	.	.	81	
2	Harding	O	180	2	.	.	.	.	.	.	.	
2	Harding	O	420	1	0.6	2.3	470.5059	3295.102	235.2505	12.542	103	12.46745
2	Harding	O	420	2	4.279824	2.402382	424.4935	2867.409	216.4905	12.364	.	
2	Harding	E	0	1	8.560776	2.3	666.7849	561.8471	127.687	9.17	91	
2	Harding	E	0	2	11.36723	2.3	743.8881	514.9959	118.1109	9.27	.	
2	Harding	E	120	1	17.02234	2.3	1678.942	1418.267	312.1805	14.562	98	
2	Harding	E	120	2	13.15589	2.3	1459.918	1099.08	252.1656	14.396	.	
2	Harding	E	180	1	.	.	.	.	.	.	93	
2	Harding	E	180	2	.	.	.	.	.	.	.	
2	Harding	E	420	1	2.71	2.3	2084.801	2708.166	255.7661	15.106	93	61.46241
2	Harding	E	420	2	1.280499	2.3	1899.025	2580.044	280.5497	14.402	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
2	Harrison	B	0	1	87.5835	13.88847	354.9264	1429.371	138.2987	23.866	96	
2	Harrison	B	0	2	94.98654	13.0828	360.02	1325.031	140.2188	25.926	.	
2	Harrison	B	120	1	104.8334	0.419444	286.9785	2742.659	73.02452	25.414	87	
2	Harrison	B	120	2	85.02373	2.3	250.3555	2395.629	50.92033	24.65	.	
2	Harrison	B	180	1	.	.	.	.	.	.	82	
2	Harrison	B	180	2	.	.	.	.	.	.	.	
2	Harrison	B	420	1	47.47343	2.3	100.8137	2293.441	90.72187	17.1	95	2.790223
2	Harrison	B	420	2	44.95769	2.3	83.93031	1996.776	96.52242	19.366	.	
2	Harrison	O	0	1	87.38438	12.23127	365.1107	1486.075	216.1696	20.784	103	
2	Harrison	O	0	2	101.1444	10.34764	375.2839	1707.302	188.4775	19.662	.	
2	Harrison	O	120	1	17.26053	5.091327	901.1243	2065.38	177.0425	18.51	110	
2	Harrison	O	120	2	19.56232	12.83838	625.9308	1891.821	129.5902	20.14	.	
2	Harrison	O	180	1	.	.	.	.	.	.	116	
2	Harrison	O	180	2	.	.	.	.	.	.	.	
2	Harrison	O	420	1	37.5505	2.3	160.8039	1445.259	91.40888	23.244	104	4.375229
2	Harrison	O	420	2	34.84821	2.3	156.3295	1289.169	76.0308	22.054	.	
2	Harrison	E	0	1	9.660261	8.090992	303.8228	1090.115	201.2184	13.296	87	
2	Harrison	E	0	2	9.660261	9.281109	297.4115	998.1867	161.2733	12.138	.	
2	Harrison	E	120	1	21.18707	67.70777	1614.984	1823.872	417.0983	21.6	95	
2	Harrison	E	120	2	22.78762	65.9299	1484.187	1967.283	416.3076	20.908	.	
2	Harrison	E	180	1	.	.	.	.	.	.	85	
2	Harrison	E	180	2	.	.	.	.	.	.	.	
2	Harrison	E	420	1	36.69684	43.82644	992.6252	3677.167	318.9971	14.958	75	36.74823
2	Harrison	E	420	2	52.39222	43.31473	928.2781	3164.826	319.1714	13.3	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
2	Hoover	B	0	1	54.45148	10.24999	1412.569	3120.266	167.9383	5.92	99	
2	Hoover	B	0	2	51.37555	15.0979	1416.276	3340.202	165.2133	5.364	.	
2	Hoover	B	120	1	154.5725	23.49879	273.7399	3934.598	219.1495	9.374	84	
2	Hoover	B	120	2	181.9322	23.49879	264.1474	3957.441	238.379	9.702	.	
2	Hoover	B	180	1	.	.	.	.	.	.	87	
2	Hoover	B	180	2	.	.	.	.	.	.	.	
2	Hoover	B	420	1	209.1981	2.3	216.8961	4540.315	164.8764	7.05	94	6.643717
2	Hoover	B	420	2	210.915	2.3	218.362	4008.338	161.8421	6.898	.	
2	Hoover	O	0	1	168.2828	23.12719	163.7925	1545.808	338.9678	7.72	66	
2	Hoover	O	0	2	169.2734	22.0863	142.6813	1509.963	212.5613	7.756	.	
2	Hoover	O	120	1	23.90976	46.84905	910.5154	2600.707	423.8523	8.478	93	
2	Hoover	O	120	2	16.94223	50.14787	737.3594	2110.986	356.2849	8.206	.	
2	Hoover	O	180	1	6.072892	34.31536	625.7214	3280.967	315.5035	5.908	88	
2	Hoover	O	180	2	5.891375	30.90309	600.9295	2804.459	246.9115	5.766	.	
2	Hoover	O	420	1	26.7956	9.52726	279.5286	2566.497	196.9341	4.662	97	8.248516
2	Hoover	O	420	2	27.27719	2.3	278.1134	1781.64	176.0353	4.326	.	
2	Hoover	E	0	1	16.21864	15.70498	455.1303	939.1556	342.8824	4.966	83	
2	Hoover	E	0	2	16.21864	13.09465	404.5794	866.0521	319.0352	4.792	.	
2	Hoover	E	120	1	25.73501	88.18105	1515.494	1350.341	585.2479	7.672	91	
2	Hoover	E	120	2	27.03697	89.52917	1466.387	1237.447	596.4321	7.638	.	
2	Hoover	E	180	1	.	.	.	.	.	.	89	
2	Hoover	E	180	2	.	.	.	.	.	.	.	
2	Hoover	E	420	1	90.42502	39.70829	278.1134	2895.397	445.2454	5.336	69	12.21072
2	Hoover	E	420	2	82.02817	42.9786	309.1031	3126.594	402.3132	5.086	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
2	Jackson	B	0	1	116.0081	6.981628	231.9589	1282.213	163.561	11.69	103	
2	Jackson	B	0	2	122.5012	1.25909	221.2018	1371.524	169.8609	11.648	.	
2	Jackson	B	120	1	183.052	2.3	226.2616	1559.824	172.2831	16.856	93	
2	Jackson	B	120	2	168.5428	2.3	193.901	1319.656	135.1797	17.596	.	
2	Jackson	B	180	1	184.3014	2.3	117.8735	2034.39	109.1127	.	84	
2	Jackson	B	180	2	174.6488	2.3	120.7291	1912.349	81.08935	.	.	
2	Jackson	B	420	1	59.29136	2.3	174.1583	1392.207	156.993	13.776	94	5.541431
2	Jackson	B	420	2	62.9604	9.52726	188.8843	1475.064	175.9241	13.512	.	
2	Jackson	O	0	1	96.91247	6.981628	113.3173	1199.72	242.4162	10.636	74	
2	Jackson	O	0	2	87.86508	6.981628	93.36305	1120.498	180.6799	10.574	.	
2	Jackson	O	120	1	63.66514	25.77491	622.8364	1990.789	369.3151	16.442	91	
2	Jackson	O	120	2	51.55466	28.79361	599.7332	1822.178	288.0207	16.188	.	
2	Jackson	O	180	1	.	.	.	.	.	13.802	80	
2	Jackson	O	180	2	.	.	.	.	.	13.082	.	
2	Jackson	O	420	1	5.076226	14.47831	235.8352	3727.378	320.3609	12.216	80	8.146041
2	Jackson	O	420	2	2.813785	15.67559	218.362	3413.055	319.4346	12.288	.	
2	Jackson	E	0	1	86.12833	2.3	528.5851	457.8631	178.0548	10.94	110	
2	Jackson	E	0	2	103.4981	7.650032	471.6869	514.6922	239.2497	10.796	.	
2	Jackson	E	120	1	32.09925	52.1374	997.3449	979.9494	482.4817	18.792	94	
2	Jackson	E	120	2	26.22937	44.94564	907.8331	747.3695	316.5605	19.49	.	
2	Jackson	E	180	1	.	.	.	.	.	.	101	
2	Jackson	E	180	2	.	.	.	.	.	.	.	
2	Jackson	E	420	1	2.296891	18.65742	332.7625	1827.377	304.4191	14.288	87	11.58287
2	Jackson	E	420	2	4.590585	17.23999	369.5711	1858.909	295.4617	13.584	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
2	Lynden	B	0	1	48.00695	2.3	119.9179	387.5126	101.1612	25.732	86	
2	Lynden	B	0	2	41.41467	2.3	116.3236	351.6211	86.63108	27.264	.	
2	Lynden	B	120	1	67.72846	2.3	591.1806	811.2686	42.0724	29.176	105	
2	Lynden	B	120	2	70.05912	2.3	685.8035	907.7906	42.51518	28.774	.	
2	Lynden	B	180	1	.	.	.	.	.	.	97	
2	Lynden	B	180	2	.	.	.	.	.	.	.	
2	Lynden	B	420	1	121.5895	2.3	274.1414	809.1315	117.8252	30.38	100	7.776765
2	Lynden	B	420	2	138.8674	2.3	267.8681	934.5803	125.4542	28.808	.	
2	Lynden	O	0	1	29.80384	2.3	242.5265	539.3016	117.2152	20.382	72	
2	Lynden	O	0	2	43.21013	2.3	272.5753	631.9384	219.7966	20.908	.	
2	Lynden	O	120	1	24.11922	2.3	399.3004	957.7613	112.0448	34.508	90	
2	Lynden	O	120	2	24.28276	2.3	417.28	985.9129	118.1773	29.638	.	
2	Lynden	O	180	1	.	.	.	.	.	.	85	
2	Lynden	O	180	2	.	.	.	.	.	.	.	
2	Lynden	O	420	1	23.35221	2.3	167.527	1028.064	123.7935	19.412	100	4.496794
2	Lynden	O	420	2	22.05	2.3	145.8816	983.8275	108.5604	17.536	.	
2	Lynden	E	0	1	17.45501	2.3	339.6848	720.1447	205.4675	22.586	84	
2	Lynden	E	0	2	13.5828	2.3	318.3057	533.5496	134.6708	22.518	.	
2	Lynden	E	120	1	36.54609	2.3	679.7884	1489.222	376.9547	24.992	105	
2	Lynden	E	120	2	31.15627	2.3	623.1577	1374.155	333.2609	28.146	.	
2	Lynden	E	180	1	12.07262	2.3	482.6519	1259.487	142.968	18.014	88	
2	Lynden	E	180	2	14.03169	2.3	487.1162	1656.389	202.0524	17.902	.	
2	Lynden	E	420	1	4.924149	2.3	103.5936	1731.605	398.0509	21.344	80	3.911867
2	Lynden	E	420	2	5.1049	2.3	114.5197	1752.868	402.8078	20.316	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
2	Wilson	B	0	1	53.34249	2.3	122.7647	3489.946	200.2558	16.718	88	
2	Wilson	B	0	2	58.65528	2.3	140.0332	3590.113	209.0096	16.606	.	
2	Wilson	B	120	1	70.88776	2.3	341.4961	2883.613	206.7404	14.302	95	
2	Wilson	B	120	2	64.17787	2.3	279.2201	2337.674	118.1418	13.58	.	
2	Wilson	B	180	1	.	.	.	.	.	.	96	
2	Wilson	B	180	2	.	.	.	.	.	.	.	
2	Wilson	B	420	1	78.17449	2.3	107.7375	2017.427	154.4613	12.95	92	4.071677
2	Wilson	B	420	2	84.44437	2.3	153.3397	3017.512	237.7652	12.93	.	
2	Wilson	O	0	1	2.661314	2.3	355.2553	1970.263	228.6927	11.02	87	
2	Wilson	O	0	2	2.661314	2.3	352.4307	1830.617	239.0826	11.112	.	
2	Wilson	O	120	1	14.62011	2.3	1274.049	2376.326	243.7116	15.842	93	
2	Wilson	O	120	2	15.86558	2.3	1279.273	2058.857	182.0023	17.622	.	
2	Wilson	O	180	1	.	.	.	.	.	.	91	
2	Wilson	O	180	2	.	.	.	.	.	.	.	
2	Wilson	O	420	1	9.82116	2.3	157.8223	3267.519	244.5591	9.45	91	4.669058
2	Wilson	O	420	2	11.15175	2.3	138.3051	3145.827	235.1961	9.734	.	
2	Wilson	E	0	1	0.6	2.3	1129.13	936.6595	206.9834	9.444	99	
2	Wilson	E	0	2	0.6	2.3	1121.615	951.2215	225.7252	8.822	.	
2	Wilson	E	120	1	45.0732	36.30611	2462.653	1549.759	454.5211	16.012	103	
2	Wilson	E	120	2	47.17186	32.44184	2310.685	1603.363	440.4888	16.674	.	
2	Wilson	E	180	1	16.60957	10.49206	1047.367	1449.495	230.4878	8.306	77	
2	Wilson	E	180	2	16.60957	6.456269	1049.116	1452.67	244.4634	8.092	.	
2	Wilson	E	420	1	0.6	2.3	439.0269	3975.348	254.9997	9.914	88	14.82955
2	Wilson	E	420	2	0.6	2.3	470.5059	4209.924	263.8935	10.022	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
3	Carter	B	0	1	113.1463	2.3	546.0516	1023.835	214.1514	8.66	118	
3	Carter	B	0	2	116.7847	2.3	559.4446	1106.962	240.1672	9.528	.	
3	Carter	B	120	1	318.3856	2.3	283.7107	2430.986	311.0799	14.302	91	
3	Carter	B	120	2	277.3666	2.3	189.2358	1835.825	216.5087	13.774	.	
3	Carter	B	180	1	.	.	.	.	.	.	85	
3	Carter	B	180	2	.	.	.	.	.	.	.	
3	Carter	B	420	1	184.6583	2.3	483.7785	1116.889	210.5	9.462	116	10.82614
3	Carter	B	420	2	158.5719	2.3	391.4864	1001.027	184.0456	9.012	.	
3	Carter	O	0	1	172.6523	2.3	505.6445	427.383	302.5785	9.762	91	
3	Carter	O	0	2	167.7424	2.3	459.3929	503.358	279.8762	9.214	.	
3	Carter	O	120	1	153.534	2.3	855.8938	651.6283	294.8538	9.74	122	
3	Carter	O	120	2	145.731	2.3	910.9488	654.9447	311.2746	9.148	.	
3	Carter	O	180	1	112.7568	2.3	1600.942	839.2492	239.2621	7.512	171	
3	Carter	O	180	2	94.89031	2.3	1477.458	798.8443	180.0838	7.39	.	
3	Carter	O	420	1	232.8212	2.3	81.12783	837.4312	263.0077	6.486	104	2.132138
3	Carter	O	420	2	212.7758	2.3	73.41772	768.1729	235.3817	6.544	.	
3	Carter	E	0	1	209.3744	2.3	104.181	145.0858	305.1708	11.48	68	
3	Carter	E	0	2	216.8	2.3	95.82152	120.5084	316.8104	11.088	.	
3	Carter	E	120	1	135.8784	2.3	4836.754	303.4043	364.2053	13.244	124	
3	Carter	E	120	2	94.79772	2.3	2934.317	152.3827	228.6755	13.546	.	
3	Carter	E	180	1	.	.	.	.	.	.	133	
3	Carter	E	180	2	.	.	.	.	.	.	.	
3	Carter	E	420	1	89.24471	2.3	899.7624	400.5253	218.9367	7.97	99	25.55165
3	Carter	E	420	2	100.1918	2.3	863.2771	468.5372	248.4077	7.304	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
3	Clinton	B	0	1	41.79485	18.06685	172.9906	2612.242	327.1936	23.818	86	
3	Clinton	B	0	2	39.55758	18.06685	149.2923	2223.526	279.3737	23.966	.	
3	Clinton	B	120	1	125.6215	33.78244	768.7147	4221.527	280.3399	23.28	120	
3	Clinton	B	120	2	138.8457	31.98155	734.6273	4255.437	325.217	24.348	.	
3	Clinton	B	180	1	.	.	.	.	.	.	115	
3	Clinton	B	180	2	.	.	.	.	.	.	.	
3	Clinton	B	420	1	60.72921	2.3	160.129	4486.196	175.3176	15.436	120	3.412503
3	Clinton	B	420	2	54.5247	2.3	125.2763	4369.815	149.3522	16.772	.	
3	Clinton	O	0	1	34.52639	24.17856	309.7035	1588.192	308.9574	20.752	87	
3	Clinton	O	0	2	35.73191	24.17856	335.4229	1619.932	334.8164	20.814	.	
3	Clinton	O	120	1	70.99369	47.80623	573.9852	2371.959	363.4286	19.234	97	
3	Clinton	O	120	2	64.77789	47.27119	504.0139	2190.98	303.4807	17.864	.	
3	Clinton	O	180	1	.	.	.	.	.	.	108	
3	Clinton	O	180	2	.	.	.	.	.	.	.	
3	Clinton	O	420	1	120.0704	27.98369	243.0547	3709.516	316.8779	15.892	93	7.163891
3	Clinton	O	420	2	107.7262	26.79722	221.2892	3139.343	306.8627	15.892	.	
3	Clinton	E	0	1	89.43522	12.23127	169.0512	158.3933	173.0969	17.914	82	
3	Clinton	E	0	2	93.26655	14.65546	169.0512	207.1545	165.6316	17.124	.	
3	Clinton	E	120	1	103.3742	79.11326	840.5491	655.8011	509.6825	23.388	93	
3	Clinton	E	120	2	74.42774	74.30644	722.3216	483.1616	432.3412	23.94	.	
3	Clinton	E	180	1	12.89985	68.06184	258.6159	1086.245	341.3815	14.16	87	
3	Clinton	E	180	2	11.83026	58.24106	268.6955	1045.442	345.4839	13.428	.	
3	Clinton	E	420	1	11.31883	20.46317	236.1247	1533.57	352.2048	14.06	94	6.962122
3	Clinton	E	420	2	10.70655	18.99051	219.9934	1300.497	314.7985	14.982	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
3	Custer	B	0	1	18.50696	2.3	560.7819	2821.049	186.4712	5.936	102	
3	Custer	B	0	2	24.44729	7.650032	508.3495	2970.878	228.8662	5.782	.	
3	Custer	B	120	1	118.1305	26.82651	329.3973	4520.656	315.9127	13.852	95	
3	Custer	B	120	2	100.8697	27.83081	315.8994	4384.463	282.0013	12.056	.	
3	Custer	B	180	1	30.20128	11.32905	172.5662	4519.391	108.7097	7.65	165	
3	Custer	B	180	2	26.5923	5.818243	186.5621	4678.487	175.8336	7.084	.	
3	Custer	B	420	1	38.85462	2.3	57.41467	4963.065	245.123	7.26	116	1.351847
3	Custer	B	420	2	41.40886	2.3	51.87855	4604.321	236.8206	7.388	.	
3	Custer	O	0	1	27.21081	2.3	118.7649	1659.42	303.8893	7.822	71	
3	Custer	O	0	2	29.9439	2.3	126.7587	1512.949	302.0118	8.444	.	
3	Custer	O	120	1	5.960158	13.91909	398.9027	2113.48	345.665	7.672	124	
3	Custer	O	120	2	5.533208	16.04157	389.6073	1987.788	289.8445	7.376	.	
3	Custer	O	180	1	.	.	.	.	.	.	100	
3	Custer	O	180	2	.	.	.	.	.	.	.	
3	Custer	O	420	1	20.43084	2.3	115.6091	1884.616	157.5458	5.086	103	3.533157
3	Custer	O	420	2	28.36427	2.3	138.0252	2469.65	225.4526	4.756	.	
3	Custer	E	0	1	41.41131	15.70498	149.0347	2421.608	302.3174	7.57	75	
3	Custer	E	0	2	42.59553	16.48911	149.0347	2394.016	275.9686	7.366	.	
3	Custer	E	120	1	52.91929	55.18232	315.8994	2783.409	441.4324	12.862	75	
3	Custer	E	120	2	58.02396	51.87688	311.8408	2882.62	477.3964	13.77	.	
3	Custer	E	180	1	.	.	.	.	.	.	88	
3	Custer	E	180	2	.	.	.	.	.	.	.	
3	Custer	E	420	1	102.4992	38.66374	180.0623	2831.039	388.2781	6.274	84	6.700689
3	Custer	E	420	2	121.2981	41.74197	212.2271	4038.271	476.2783	5.72	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
3	Houston	B	0	1	25.62952	2.3	163.7925	1569.713	278.5844	20.384	104	
3	Houston	B	0	2	30.96433	2.3	174.3028	1596.615	248.8592	19.424	.	
3	Houston	B	120	1	102.4675	3.462894	170.6961	3058.686	170.3637	20.202	99	
3	Houston	B	120	2	112.3749	2.3	174.4354	3156.679	194.5133	19.924	.	
3	Houston	B	180	1	.	.	.	.	.	.	100	
3	Houston	B	180	2	.	.	.	.	.	.	.	
3	Houston	B	420	1	57.26316	2.3	81.12783	3049.484	194.484	18.934	88	2.391865
3	Houston	B	420	2	56.33557	2.3	65.57121	2520.352	122.792	18.384	.	
3	Houston	O	0	1	29.9439	2.3	106.729	1036.719	320.3392	10.898	79	
3	Houston	O	0	2	34.32476	8.090992	108.0692	986.3364	266.4968	10.594	.	
3	Houston	O	120	1	14.74599	16.04157	247.6344	1412.919	272.2526	11.204	87	
3	Houston	O	120	2	15.36457	16.04157	244.8734	1375.797	276.5426	10.956	.	
3	Houston	O	180	1	.	.	.	.	.	.	125	
3	Houston	O	180	2	.	.	.	.	.	.	.	
3	Houston	O	420	1	59.36041	2.3	120.4693	3189.239	159.0492	9.486	103	3.19758
3	Houston	O	420	2	63.79798	2.3	109.075	3418.962	171.9003	9.506	.	
3	Houston	E	0	1	31.76958	5.012327	357.4735	189.9166	219.3771	11.978	87	
3	Houston	E	0	2	37.63392	2.3	377.8255	207.1545	272.3008	11.774	.	
3	Houston	E	120	1	78.39289	25.77491	1034.096	707.7989	432.279	11.644	87	
3	Houston	E	120	2	80.24413	27.83081	998.118	664.8844	421.696	12.222	.	
3	Houston	E	180	1	.	.	.	.	.	.	89	
3	Houston	E	180	2	.	.	.	.	.	.	.	
3	Houston	E	420	1	38.54775	3.976997	120.053	900.1815	183.8239	15.528	99	3.479844
3	Houston	E	420	2	34.639	3.976997	120.053	917.0783	173.576	15.076	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
3	King	B	0	1	100.4884	2.3	113.3173	414.1	194.1294	13.504	97	
3	King	B	0	2	88.29322	2.3	100.0584	398.7685	208.3448	13.024	.	
3	King	B	120	1	175.9919	2.3	411.3383	751.0046	247.3879	17.676	118	
3	King	B	120	2	156.2034	2.3	314.9559	670.5458	162.2349	16.468	.	
3	King	B	180	1	144.6427	2.3	134.9586	795.7393	109.7827	14.426	78	
3	King	B	180	2	151.0223	2.3	140.6294	929.6405	126.3922	12.698	.	
3	King	B	420	1	233.2178	2.3	229.2465	870.9586	186.4712	13.466	128	5.717332
3	King	B	420	2	219.7627	2.3	280.8018	1264.971	210.3605	13.384	.	
3	King	O	0	1	97.85467	2.3	205.1784	442.6388	295.944	9.59	71	
3	King	O	0	2	76.08521	2.3	172.9958	292.3192	212.5865	9.762	.	
3	King	O	120	1	75.6114	2.3	1032.857	456.1821	299.873	12.156	98	
3	King	O	120	2	67.5043	2.3	1011.774	463.0383	298.5037	13.058	.	
3	King	O	180	1	.	.	.	.	.	.	87	
3	King	O	180	2	.	.	.	.	.	.	.	
3	King	O	420	1	123.6516	2.3	30.54093	371.5718	67.86879	6.526	91	1.180554
3	King	O	420	2	192.7301	2.3	44.33376	448.6897	124.903	6.814	.	
3	King	E	0	1	104.1667	1.25909	241.14	147.0456	305.386	11.27	39	
3	King	E	0	2	97.39181	2.3	224.2804	138.8878	272.518	9.768	.	
3	King	E	120	1	91.21746	2.3	5007.225	375.5844	330.262	15.934	75	
3	King	E	120	2	93.03472	2.3	4834.723	515.3253	315.1969	16.264	.	
3	King	E	180	1	.	.	.	.	.	.	71	
3	King	E	180	2	.	.	.	.	.	.	.	
3	King	E	420	1	14.75358	9.789289	155.2185	593.095	304.8925	12.406	81	5.635545
3	King	E	420	2	16.65149	2.3	162.9292	504.0671	269.7964	11.596	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
3	Nixon	B	0	1	120.778	2.3	192.6312	894.591	153.6961	15.832	142	
3	Nixon	B	0	2	136.3066	2.3	182.1675	770.5807	139.7403	16.018	.	
3	Nixon	B	120	1	159.3449	27.83081	260.0275	1347.898	255.2864	13.966	104	
3	Nixon	B	120	2	131.3181	25.77491	203.1206	1279.478	215.9875	14.912	.	
3	Nixon	B	180	1	.	.	.	.	.	.	108	
3	Nixon	B	180	2	.	.	.	.	.	.	.	
3	Nixon	B	420	1	196.053	2.3	56.83376	2333.257	182.3054	8.928	98	1.640047
3	Nixon	B	420	2	187.419	2.3	55.18484	2294.289	158.3085	8.538	.	
3	Nixon	O	0	1	81.37082	29.48862	774.1993	703.8692	251.0047	12.876	94	
3	Nixon	O	0	2	75.50837	26.66612	759.1115	636.9009	214.0606	12.434	.	
3	Nixon	O	120	1	90.78728	52.36235	217.1124	995.8649	397.7117	15.91	89	
3	Nixon	O	120	2	80.98759	55.41064	214.3203	902.9728	354.5026	15.166	.	
3	Nixon	O	180	1	.	.	.	.	.	.	91	
3	Nixon	O	180	2	.	.	.	.	.	.	.	
3	Nixon	O	420	1	166.1144	30.06895	82.67229	2151.162	343.2864	11.05	112	2.138507
3	Nixon	O	420	2	177.0112	29.43499	84.25852	2294.289	319.8913	10.802	.	
3	Nixon	E	0	1	116.5784	3.976997	248.2365	45.55795	227.1877	7.292	90	
3	Nixon	E	0	2	119.0359	8.004002	259.655	45.55795	230.7487	7.402	.	
3	Nixon	E	120	1	152.1614	49.27042	1120.531	156.4633	590.7172	19.012	91	
3	Nixon	E	120	2	107.9404	48.67656	880.9724	107.4072	434.407	19.138	.	
3	Nixon	E	180	1	.	.	.	.	.	.	100	
3	Nixon	E	180	2	.	.	.	.	.	.	.	
3	Nixon	E	420	1	0.6	45.604	408.5575	567.8941	374.724	8.124	91	12.7784
3	Nixon	E	420	2	0.6	45.604	401.8913	636.8122	393.1052	7.85	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
4	Lincoln	B	0	1	15.38649	5.012327	94.63256	178.4411	158.1798	17.91	60	
4	Lincoln	B	0	2	27.69278	5.012327	90.58551	155.5332	107.481	17.226	.	
4	Lincoln	B	120	1	105.5629	98.82376	568.8459	506.042	440.0794	24.8	87	
4	Lincoln	B	120	2	102.1807	90.19662	518.2791	460.1542	452.1059	22.956	.	
4	Lincoln	B	180	1	.	.	.	.	.	.	84	
4	Lincoln	B	180	2	.	.	.	.	.	.	.	
4	Lincoln	B	420	1	256.6515	24.68757	557.193	1008.098	437.7407	32.856	95	18.11238
4	Lincoln	B	420	2	251.2202	24.3238	642.0496	1135.615	436.5125	33.37	.	
4	Lincoln	O	0	1	67.96674	25.66325	651.3629	501.6401	327.4163	16.48	96	
4	Lincoln	O	0	2	67.84569	29.48862	658.3133	505.4244	343.5544	15.18	.	
4	Lincoln	O	120	1	106.8896	13.91909	315.8994	1254.518	318.0172	19.548	95	
4	Lincoln	O	120	2	107.4215	16.04157	315.8994	1226.384	306.9915	19.994	.	
4	Lincoln	O	180	1	.	.	.	.	.	.	91	
4	Lincoln	O	180	2	.	.	.	.	.	.	.	
4	Lincoln	O	420	1	119.0086	2.3	50.20847	668.9078	230.3755	11.38	96	1.349784
4	Lincoln	O	420	2	116.1683	2.3	40.10307	600.2769	199.6109	12.2	.	
4	Lincoln	E	0	1	22.19468	19.39955	660.1525	2133.6	369.323	18.062	95	
4	Lincoln	E	0	2	22.37768	19.39955	687.6825	2109.322	353.7194	16.504	.	
4	Lincoln	E	120	1	59.75353	20.47413	863.4756	3900.15	465.3781	30.298	97	
4	Lincoln	E	120	2	52.39838	20.47413	860.7811	3443.046	448.0639	25.998	.	
4	Lincoln	E	180	1	70.6628	2.3	867.8554	4864.354	316.6516	15.116	92	
4	Lincoln	E	180	2	74.00298	2.3	747.4911	4476.338	298.6384	14.866	.	
4	Lincoln	E	420	1	13.44107	2.3	102.4748	4522.048	301.8302	14.596	102	2.952685
4	Lincoln	E	420	2	12.81133	2.3	107.4314	4282.409	293.4959	14.352	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
4	Madison	B	0	1	65.66022	2.3	127.054	219.4937	237.0317	33.368	98	
4	Madison	B	0	2	66.92595	2.3	135.8827	212.8045	204.2375	31.456	.	
4	Madison	B	120	1	115.4486	47.30787	927.9073	584.5251	362.5434	35.762	111	
4	Madison	B	120	2	106.7734	44.25555	857.4475	505.4244	365.4906	36.794	.	
4	Madison	B	180	1	.	.	.	.	.	.	113	
4	Madison	B	180	2	.	.	.	.	.	.	.	
4	Madison	B	420	1	110.1891	15.43859	255.3786	1209.158	326.103	42.842	85	8.234669
4	Madison	B	420	2	107.5429	14.40073	232.4564	1192.46	334.8764	42.842	.	
4	Madison	O	0	1	92.20495	18.99051	128.8276	351.6211	174.0964	16.774	84	
4	Madison	O	0	2	103.9171	17.95343	128.8276	400.5253	240.9251	15.806	.	
4	Madison	O	120	1	120.8084	15.63556	700.7987	724.4531	190.6355	23.1	100	
4	Madison	O	120	2	142.7613	14.98181	590.294	702.808	262.0171	21.93	.	
4	Madison	O	180	1	.	.	.	.	.	.	95	
4	Madison	O	180	2	.	.	.	.	.	.	.	
4	Madison	O	420	1	211.4624	2.3	173.6256	667.7724	297.9568	29.992	97	5.000948
4	Madison	O	420	2	226.5684	2.402382	164.4641	658.5059	290.2897	26.492	.	
4	Madison	E	0	1	5.621168	32.4138	1939.144	2966.551	520.025	20.154	87	
4	Madison	E	0	2	5.1049	31.75737	1807.848	2642.651	459.8529	19.834	.	
4	Madison	E	120	1	7.772511	18.89151	836.4977	3050.992	259.3466	16.494	102	
4	Madison	E	120	2	9.100831	18.89151	818.9219	2836.101	223.8519	16.856	.	
4	Madison	E	180	1	85.71217	2.3	392.0992	3310.429	195.0075	10.606	101	
4	Madison	E	180	2	100.2749	0.419444	403.7983	3743.629	239.2621	9.848	.	
4	Madison	E	420	1	11.57144	2.3	165.2667	1378.93	193.9201	9.45	107	4.151586
4	Madison	E	420	2	10.54525	2.3	144.3367	1643.49	191.6131	9.45	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
4	Madison	B	0	1	65.66022	2.3	127.054	219.4937	237.0317	33.368	98	
4	Madison	B	0	2	66.92595	2.3	135.8827	212.8045	204.2375	31.456	.	
4	Madison	B	120	1	115.4486	47.30787	927.9073	584.5251	362.5434	35.762	111	
4	Madison	B	120	2	106.7734	44.25555	857.4475	505.4244	365.4906	36.794	.	
4	Madison	B	180	1	.	.	.	.	.	.	113	
4	Madison	B	180	2	.	.	.	.	.	.	.	
4	Madison	B	420	1	110.1891	15.43859	255.3786	1209.158	326.103	42.842	85	8.234669
4	Madison	B	420	2	107.5429	14.40073	232.4564	1192.46	334.8764	42.842	.	
4	Madison	O	0	1	92.20495	18.99051	128.8276	351.6211	174.0964	16.774	84	
4	Madison	O	0	2	103.9171	17.95343	128.8276	400.5253	240.9251	15.806	.	
4	Madison	O	120	1	120.8084	15.63556	700.7987	724.4531	190.6355	23.1	100	
4	Madison	O	120	2	142.7613	14.98181	590.294	702.808	262.0171	21.93	.	
4	Madison	O	180	1	.	.	.	.	.	.	95	
4	Madison	O	180	2	.	.	.	.	.	.	.	
4	Madison	O	420	1	211.4624	2.3	173.6256	667.7724	297.9568	29.992	97	5.000948
4	Madison	O	420	2	226.5684	2.402382	164.4641	658.5059	290.2897	26.492	.	
4	Madison	E	0	1	5.621168	32.4138	1939.144	2966.551	520.025	20.154	87	
4	Madison	E	0	2	5.1049	31.75737	1807.848	2642.651	459.8529	19.834	.	
4	Madison	E	120	1	7.772511	18.89151	836.4977	3050.992	259.3466	16.494	102	
4	Monroe	E	180	1	.	.	.	.	.	.	96	
4	Monroe	E	180	2	.	.	.	.	.	.	.	
4	Monroe	E	420	1	110.7795	2.3	86.83133	1606.82	275.0881	9.404	102	2.908277
4	Monroe	E	420	2	144.6544	15.71165	119.9179	1411.121	188.4516	9.198	.	
4	Obama	B	0	1	55.86812	2.3	275.5701	126.9901	232.6407	28.896	82	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
4	Obama	B	0	2	69.5475	2.3	265.2674	124.1421	186.4714	27.86	.	
4	Obama	B	120	1	74.66576	52.69199	2596.786	278.445	353.4083	37.424	101	
4	Obama	B	120	2	73.80179	55.90437	2773.897	298.7558	381.2412	40.732	.	
4	Obama	B	180	1	.	.	.	.	.	.	76	
4	Obama	B	180	2	.	.	.	.	.	.	.	
4	Obama	B	420	1	134.5429	9.52726	1220.347	603.7161	441.0457	47.61	78	46.38643
4	Obama	B	420	2	145.2071	14.40073	1301.353	709.9405	455.6033	45.764	.	
4	Obama	O	0	1	99.44449	30.22116	276.4342	495.7932	398.4244	11.904	77	
4	Obama	O	0	2	97.04242	31.769	298.1862	488.2216	384.6664	11.88	.	
4	Obama	O	120	1	30.37113	30.37668	1094.375	858.722	418.4797	15.954	91	
4	Obama	O	120	2	35.78435	28.1094	1036.871	740.9081	408.9472	17.086	.	
4	Obama	O	180	1	.	.	.	.	.	.	88	
4	Obama	O	180	2	.	.	.	.	.	.	.	
4	Obama	O	420	1	198.4899	9.52726	318.9037	444.5505	272.5204	11.676	108	8.193943
4	Obama	O	420	2	205.1611	9.52726	297.8681	454.9972	258.0508	11.836	.	
4	Obama	E	0	1	15.67737	2.3	805.764	1218.417	279.3637	14.42	77	
4	Obama	E	0	2	17.02231	2.3	840.4689	1261.394	310.3003	13.686	.	
4	Obama	E	120	1	25.41159	2.3	477.2926	1439.971	227.2201	23.992	89	
4	Obama	E	120	2	33.46336	2.3	404.6977	1234.229	197.3706	23.374	.	
4	Obama	E	180	1	.	.	.	.	.	.	81	
4	Obama	E	180	2	.	.	.	.	.	.	.	
4	Obama	E	420	1	0.6	2.3	130.0942	1973.765	233.1697	24.398	88	4.032562
4	Obama	E	420	2	25.6885	2.3	117.2329	1993.9	252.2148	23.758	.	
4	Taft	B	0	1	96.34309	2.3	50.9695	241.7105	195.4003	32.374	86	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
4	Taft	B	0	2	108.6079	2.3	45.41338	212.9066	191.4629	31.218	.	
4	Taft	B	120	1	48.35219	21.22928	1970.066	599.5171	365.9923	44.994	118	
4	Taft	B	120	2	36.86946	18.65742	1742.726	546.9433	293.1537	45.564	.	
4	Taft	B	180	1	.	.	.	.	.	.	111	
4	Taft	B	180	2	.	.	.	.	.	.	.	
4	Taft	B	420	1	93.33094	2.3	802.3302	992.6879	312.4278	39.734	100	22.26755
4	Taft	B	420	2	97.34869	2.3	749.6291	992.6879	309.4762	39.91	.	
4	Taft	O	0	1	28.27656	2.3	586.9117	427.3751	124.6301	26.368	103	
4	Taft	O	0	2	26.61623	2.3	579.4064	412.8032	102.3563	25.258	.	
4	Taft	O	120	1	58.33818	2.3	288.8038	861.036	97.50694	30.176	91	
4	Taft	O	120	2	58.2035	2.3	272.3565	1114.527	113.2326	32.11	.	
4	Taft	O	180	1	.	.	.	.	.	.	79	
4	Taft	O	180	2	.	.	.	.	.	.	.	
4	Taft	O	420	1	.	.	.	.	.	.	.	
4	Taft	O	420	2	.	.	.	.	.	.	.	
4	Taft	E	0	1	4.551002	2.3	72.94941	1125.741	174.3572	21.9	71	
4	Taft	E	0	2	4.931808	2.3	72.94941	1125.741	154.8244	22.406	.	
4	Taft	E	120	1	13.4281	2.3	183.3919	2116.465	220.5917	27.94	100	
4	Taft	E	120	2	11.97025	2.3	193.2777	2032.751	184.9503	29.042	.	
4	Taft	E	180	1	.	.	.	.	.	.	108	
4	Taft	E	180	2	.	.	.	.	.	.	.	
4	Taft	E	420	1	137.1721	2.3	40.94471	1146.119	160.5846	21.856	101	1.341604
4	Taft	E	420	2	138.3834	2.3	53.49476	1152.312	164.6526	21.276	.	
4	Tyler	B	0	1	113.6584	2.3	273.0131	191.4715	169.8609	18.586	95	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
4	Tyler	B	0	2	120.2892	2.3	273.0131	195.4776	155.7386	19.892	.	
4	Tyler	B	120	1	110.5338	18.89151	325.3021	350.8386	319.3296	17.49	93	
4	Tyler	B	120	2	104.3445	17.14348	309.0288	350.8386	278.6347	17.622	.	
4	Tyler	B	180	1	111.6331	21.34056	192.1461	515.3253	278.4794	19.984	83	
4	Tyler	B	180	2	111.4982	21.59636	202.3636	484.8109	320.6147	17.622	.	
4	Tyler	B	420	1	141.6074	15.93909	77.89561	648.3516	305.2098	18.848	71	3.180543
4	Tyler	B	420	2	142.284	18.29045	79.49091	689.4372	347.584	18.398	.	
4	Tyler	O	0	1	43.14464	15.70498	328.3198	840.3804	381.6796	13.298	97	
4	Tyler	O	0	2	38.32648	14.0153	292.5595	844.0506	374.1715	11.604	.	
4	Tyler	O	120	1	70.4639	15.16576	190.7921	944.6109	513.1356	12.746	89	
4	Tyler	O	120	2	64.74164	12.83838	165.7301	916.2335	491.7478	12.482	.	
4	Tyler	O	180	1	.	.	.	.	.	.	108	
4	Tyler	O	180	2	.	.	.	.	.	.	.	
4	Tyler	O	420	1	107.5774	2.3	254.4582	593.6319	259.5739	10.194	96	7.694128
4	Tyler	O	420	2	126.4008	2.3	260.3418	645.9041	280.5338	10.68	.	
4	Tyler	E	0	1	2.71	26.03207	311.316	2022.217	407.9891	10.126	87	
4	Tyler	E	0	2	0.6	23.17182	252.0779	2007.131	346.8229	9.844	.	
4	Tyler	E	120	1	30.95307	2.3	158.6184	2047.461	173.3609	16.644	101	
4	Tyler	E	120	2	37.85753	2.3	103.389	1449.833	106.723	16.356	.	
4	Tyler	E	180	1	.	.	.	.	.	.	112	
4	Tyler	E	180	2	.	.	.	.	.	.	.	
4	Tyler	E	420	1	6.111537	2.3	61.20388	1336.395	156.0807	7.468	112	1.568134
4	Tyler	E	420	2	7.494474	2.3	61.20388	1239.916	165.7841	7.032	.	
5	Fillmore	B	0	1	108.3704	2.172146	242.5265	299.1059	233.1022	15.458	94	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
5	Fillmore	B	0	2	92.64029	2.3	180.4367	226.1734	180.1555	14.904	.	
5	Fillmore	B	120	1	103.8179	49.85712	1785.281	641.0182	514.1839	21.758	88	
5	Fillmore	B	120	2	82.48925	49.85712	1422.36	573.9904	448.55	22.28	.	
5	Fillmore	B	180	1	.	.	.	.	.	.	82	
5	Fillmore	B	180	2	.	.	.	.	.	.	.	
5	Fillmore	B	420	1	105.192	24.68757	334.2509	1011.462	335.3148	10.52	87	10.7026
5	Fillmore	B	420	2	110.5467	25.40392	314.7068	1162.381	384.6172	10.334	.	
5	Fillmore	O	0	1	58.52952	2.3	445.6871	446.4478	263.3706	8.36	120	
5	Fillmore	O	0	2	66.61566	12.16203	479.8619	480.6429	268.1851	7.506	.	
5	Fillmore	O	120	1	42.71954	2.3	214.3203	445.8794	200.3895	14.136	124	
5	Fillmore	O	120	2	43.48694	2.3	225.4706	493.7749	202.3735	13.854	.	
5	Fillmore	O	180	1	.	.	.	.	.	.	106	
5	Fillmore	O	180	2	.	.	.	.	.	.	.	
5	Fillmore	O	420	1	74.50538	3.976997	129.2099	293.5026	148.9425	8.01	106	4.305683
5	Fillmore	O	420	2	88.88172	3.976997	188.8843	434.0934	171.0937	8.026	.	
5	Fillmore	E	0	1	0.6	2.3	425.0333	642.179	200.2795	7.678	111	
5	Fillmore	E	0	2	0.6	2.3	386.1472	645.9041	217.5244	7.188	.	
5	Fillmore	E	120	1	53.15202	23.28626	1198.13	902.0079	418.4753	12.056	80	
5	Fillmore	E	120	2	58.51974	24.55979	1074.304	801.691	293.4612	12.548	.	
5	Fillmore	E	180	1	.	.	.	.	.	.	84	
5	Fillmore	E	180	2	.	.	.	.	.	.	.	
5	Fillmore	E	420	1	0.6	2.3	244.4946	828.9862	294.1711	10.712	77	8.679321
5	Fillmore	E	420	2	0.6	2.3	221.2892	843.994	289.2362	10.268	.	
5	Ford	B	0	1	86.59434	2.3	107.4984	476.8508	236.7322	13.252	62	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
5	Ford	B	0	2	86.09724	2.3	115.7315	461.6644	264.2166	12.926	.	
5	Ford	B	120	1	84.14022	41.00884	775.5697	482.6928	357.6209	17.234	96	
5	Ford	B	120	2	94.68177	43.62304	752.2452	490.2769	410.6788	16.24	.	
5	Ford	B	180	1	.	.	.	.	.	.	93	
5	Ford	B	180	2	.	.	.	.	.	.	.	
5	Ford	B	420	1	67.17763	16.86372	239.3291	937.7061	456.5091	14.136	93	7.532403
5	Ford	B	420	2	74.58498	15.71165	248.9008	1056.146	483.8573	14.338	.	
5	Ford	O	0	1	73.17622	10.34764	422.2012	544.2688	175.8206	10.68	96	
5	Ford	O	0	2	89.40226	9.281109	420.9359	517.9218	193.6345	10.95	.	
5	Ford	O	120	1	125.0742	7.293066	253.1487	854.5823	289.8445	15.62	107	
5	Ford	O	120	2	105.027	7.293066	268.262	783.1424	246.5419	14.42	.	
5	Ford	O	180	1	.	.	.	.	.	.	136	
5	Ford	O	180	2	.	.	.	.	.	.	.	
5	Ford	O	420	1	213.2806	2.3	153.2672	947.0807	201.3168	7.83	113	3.848377
5	Ford	O	420	2	225.7988	2.3	149.8174	1124.433	234.1399	8.222	.	
5	Ford	E	0	1	106.3864	2.3	102.704	2004.116	134.5319	9.518	92	
5	Ford	E	0	2	127.7426	2.3	108.0692	1866.09	118.1109	8.79	.	
5	Ford	E	120	1	99.14727	2.3	295.6516	3841.272	249.442	9.276	80	
5	Ford	E	120	2	67.87089	2.3	252.1218	3639.409	184.995	9.956	.	
5	Ford	E	180	1	.	.	.	.	.	.	86	
5	Ford	E	180	2	.	.	.	.	.	.	.	
5	Ford	E	420	1	11.05492	2.3	203.6296	5500.284	182.8478	11.442	93	6.14555
5	Ford	E	420	2	15.3669	2.3	194.7082	5024.755	185.5567	10.39	.	
5	Franklin	B	0	2	75.18463	2.3	106.7087	313.7703	128.8797	18.188	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
5	Franklin	B	120	1	52.60446	64.60445	361.9991	765.525	268.3823	8.658	95	
5	Franklin	B	120	2	63.2023	60.40712	314.9559	848.4329	340.1485	8.868	.	
5	Franklin	B	180	1	22.87309	31.8769	436.1247	1164.873	220.2386	7	108	
5	Franklin	B	180	2	22.19337	32.64094	453.1466	1202.685	239.3508	7.016	.	
5	Franklin	B	420	1	23.39947	43.85367	335.6449	1821.359	368.3528	6.756	110	8.522698
5	Franklin	B	420	2	29.52682	46.62219	317.7528	1717.834	387.654	6.386	.	
5	Franklin	O	0	1	88.74752	21.39768	334.1838	1689.044	305.0559	6.966	84	
5	Franklin	O	0	2	76.10059	19.98235	311.316	1527.458	232.6864	6.48	.	
5	Franklin	O	120	1	96.13717	13.91909	394.9211	890.0927	295.959	9.412	113	
5	Franklin	O	120	2	78.78049	2.3	358.9361	766.8231	219.3195	9.528	.	
5	Franklin	O	180	1	.	.	.	.	.	.	130	
5	Franklin	O	180	2	.	.	.	.	.	.	.	
5	Franklin	O	420	1	83.19492	10.89153	278.1134	1860.376	244.11	4.866	127	6.55489
5	Franklin	O	420	2	87.01562	14.40073	302.0856	2177.215	288.1201	4.906	.	
5	Franklin	E	0	1	80.04704	2.172146	281.9504	1263.528	231.8536	3.222	78	
5	Franklin	E	0	2	69.94645	2.3	248.9008	947.0807	208.4647	3.588	.	
5	Franklin	E	120	1	15.344	15.16576	887.694	1401.319	199.6886	7.306	95	
5	Franklin	E	120	2	9.690369	9.879945	831.0932	1099.08	178.9808	6.88	.	
5	Franklin	E	180	1	.	.	.	.	.	.	86	
5	Franklin	E	180	2	.	.	.	.	.	.	.	
5	Franklin	E	420	1	58.44232	20.85342	181.5354	1745.504	200.532	3.454	103	5.05762
5	Franklin	E	420	2	51.31685	23.95612	NaN	NaN	165.5942	3.378	.	
5	Grant	B	0	1	95.71521	2.3	894.1972	529.7814	308.0145	14.904	99	
5	Grant	B	0	2	102.607	2.3	952.7196	457.8631	312.8383	12.976	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
5	Grant	B	120	1	28.67153	66.60112	2536.017	902.6479	527.3135	19.96	97	
5	Grant	B	120	2	42.37484	66.82364	2536.017	1048.187	555.3732	19.074	.	
5	Grant	B	180	1	32.34764	60.24142	588.5209	939.0106	428.474	13.244	99	
5	Grant	B	180	2	36.70614	56.3223	549.463	901.5514	461.8206	12.676	.	
5	Grant	B	420	1	67.85723	19.17194	914.047	1893.14	413.8752	12.73	96	27.61082
5	Grant	B	420	2	59.48662	19.17194	933.3419	1712.625	361.5265	11.912	.	
5	Grant	O	0	1	17.50929	9.281109	129.4183	1313.116	334.3873	12.918	89	
5	Grant	O	0	2	17.64187	11.32414	155.8906	1438.322	273.3408	12.224	.	
5	Grant	O	120	1	27.44341	24.66877	703.2236	1496.132	281.3588	16.086	107	
5	Grant	O	120	2	38.98186	20.91424	709.5744	1846.343	399.6178	15.068	.	
5	Grant	O	180	1	.	.	.	.	.	.	145	
5	Grant	O	180	2	.	.	.	.	.	.	.	
5	Grant	O	420	1	64.82829	6.981628	379.8133	1928.869	259.3184	12.844	174	6.167334
5	Grant	O	420	2	63.93605	2.3	368.1058	1953.319	268.1647	12.912	.	
5	Grant	E	0	1	11.99258	7.650032	729.4185	3184.646	323.9853	15.37	109	
5	Grant	E	0	2	17.8807	7.650032	810.9141	4235.52	400.3185	14.208	.	
5	Grant	E	120	1	13.14262	24.62341	1604.538	4193.932	457.4098	18.418	88	
5	Grant	E	120	2	10.11086	24.62341	1473.7	4036.711	455.8568	18.854	.	
5	Grant	E	180	1	.	.	.	.	.	.	99	
5	Grant	E	180	2	.	.	.	.	.	.	.	
5	Grant	E	420	1	13.02852	2.172146	288.1724	3937.926	199.0538	8.662	95	8.634194
5	Grant	E	420	2	12.10004	2.3	283.508	3244.564	166.1636	8.856	.	
5	Quincy	B	0	1	43.83448	2.3	128.7407	914.7909	306.7985	6.268	80	
5	Quincy	B	0	2	41.32856	2.3	135.1769	987.5684	271.2042	6.48	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
5	Quincy	B	120	1	74.21147	31.47634	1042.77	838.3963	329.1675	26.972	85	
5	Quincy	B	120	2	71.02209	32.72207	985.6942	766.8231	310.9414	26.534	.	
5	Quincy	B	180	1	.	.	.	.	.	.	91	
5	Quincy	B	180	2	.	.	.	.	.	.	.	
5	Quincy	B	420	1	112.8309	13.14534	409.8889	1473.042	317.6929	30.802	87	12.98985
5	Quincy	B	420	2	107.5293	9.789289	377.7573	1455.726	330.0343	27.824	.	
5	Quincy	O	0	1	40.86049	21.1462	1296.161	826.9934	348.4073	10.884	87	
5	Quincy	O	0	2	41.20118	19.39955	1246.452	845.3289	356.4098	10.592	.	
5	Quincy	O	120	1	60.28551	2.3	585.5823	1034.067	209.8278	20.48	134	
5	Quincy	O	120	2	64.86546	2.3	550.7377	986.2936	210.8777	21.622	.	
5	Quincy	O	180	1	.	.	.	.	.	.	122	
5	Quincy	O	180	2	.	.	.	.	.	.	.	
5	Quincy	O	420	1	240.3983	2.3	222.7505	1192	201.433	11.088	135	5.118227
5	Quincy	O	420	2	230.8846	2.3	258.8215	1078.015	175.9512	11.302	.	
5	Quincy	E	0	1	19.22838	1.25909	496.6186	4876.13	238.7559	9.198	85	
5	Quincy	E	0	2	17.6419	9.865679	532.1286	4789.902	247.1498	9.086	.	
5	Quincy	E	120	1	15.05827	22.25279	348.2186	5128.558	234.1019	15.324	81	
5	Quincy	E	120	2	15.96071	21.59635	292.8419	4563.176	235.4797	15.59	.	
5	Quincy	E	180	1	.	.	.	.	.	.	87	
5	Quincy	E	180	2	.	.	.	.	.	.	.	
5	Quincy	E	420	1	34.17632	2.3	1021.803	6848.055	184.7958	9.048	84	35.62681
5	Quincy	E	420	2	24.71415	2.3	1063.956	7479.345	215.7914	8.962	.	
5	Sherman	B	0	1	176.3702	2.3	212.7381	488.2216	197.1507	13.278	87	
5	Sherman	B	0	2	194.4178	2.3	203.6621	473.057	222.9904	14.876	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
5	Sherman	B	120	1	148.3852	14.0153	1732.312	755.6925	347.7905	27.484	116	
5	Sherman	B	120	2	153.6791	15.70498	1544.417	748.3025	342.2096	26.49	.	
5	Sherman	B	180	1	.	.	.	.	.	.	87	
5	Sherman	B	180	2	.	.	.	.	.	.	.	
5	Sherman	B	420	1	7.007146	2.3	292.7221	1255.997	295.7016	21.398	89	9.930704
5	Sherman	B	420	2	6.178725	2.3	323.2739	1432.629	329.0701	21.334	.	
5	Sherman	O	0	1	59.42263	2.3	498.8747	1005.712	313.9017	14.554	91	
5	Sherman	O	0	2	63.66793	2.3	488.0208	1027.458	308.7556	13.92	.	
5	Sherman	O	120	1	59.98584	7.293066	342.8498	999.0535	206.7446	12.916	123	
5	Sherman	O	120	2	57.1404	2.3	305.0668	828.6708	182.6438	12.46	.	
5	Sherman	O	180	1	37.82127	2.3	233.7963	1310.057	156.2612	11.992	94	
5	Sherman	O	180	2	46.07598	2.3	218.1066	1367.036	198.7421	11.098	.	
5	Sherman	O	420	1	153.3939	2.3	65.57121	774.4806	305.9487	21.478	140	1.344025
5	Sherman	O	420	2	143.933	2.3	65.57121	875.0959	296.3177	20.032	.	
5	Sherman	E	0	1	21.78265	2.399708	456.313	3041.409	287.1941	16.212	82	
5	Sherman	E	0	2	30.86299	2.3	448.741	2835.737	280.9482	15.634	.	
5	Sherman	E	120	1	24.77926	5.091327	564.6486	4829.97	356.9326	21.31	79	
5	Sherman	E	120	2	18.18377	2.3	382.3896	3893.955	287.521	21.344	.	
5	Sherman	E	180	1	.	.	.	.	.	.	98	
5	Sherman	E	180	2	.	.	.	.	.	.	.	
5	Sherman	E	420	1	40.74983	2.3	461.0329	5094.998	281.6723	14.664	91	14.69689
5	Sherman	E	420	2	32.8658	2.3	471.0932	5305.823	316.3766	13.606	.	
6	Bush	B	0	1	96.88426	1.25909	180.7625	72.3759	235.8204	18.584	66	
6	Bush	B	0	2	75.47896	1.25909	166.5605	50.92808	188.9115	18.302	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
6	Bush	B	120	1	63.89994	29.71964	639.4828	193.349	391.1597	26.176	95	
6	Bush	B	120	2	58.05434	25.77491	559.787	178.4026	351.3291	25.962	.	
6	Bush	B	180	1	37.91891	2.3	275.1008	85.88713	196.1909	20.728	74	
6	Bush	B	180	2	50.55862	6.456269	354.1993	178.7363	273.5463	18.82	.	
6	Bush	B	420	1	20.43084	2.3	452.1803	354.382	361.8516	17.208	99	13.14489
6	Bush	B	420	2	21.45344	2.3	454.8045	308.7742	365.0857	15.802	.	
6	Bush	O	0	1	63.6892	13.09465	1307.988	118.3635	207.2102	17.688	117	
6	Bush	O	0	2	64.30574	9.865679	1247.198	105.9484	208.6536	17.388	.	
6	Bush	O	120	1	70.76675	33.78244	631.4736	350.8386	305.6439	23.682	87	
6	Bush	O	120	2	71.85339	34.64543	577.2319	302.7982	211.4067	25.03	.	
6	Bush	O	180	1	21.15204	8.649181	215.3325	169.9345	131.553	16.086	89	
6	Bush	O	180	2	25.65001	10.49206	242.0824	217.0558	155.2602	16.164	.	
6	Bush	O	420	1	116.5743	2.3	496.516	357.8341	213.446	16.104	89	15.46331
6	Bush	O	420	2	92.61949	2.3	462.6645	315.8867	177.9528	16.996	.	
6	Bush	E	0	1	28.80243	2.3	758.7847	224.4198	111.0922	10.51	72	
6	Bush	E	0	2	30.40506	2.3	701.6357	212.9066	72.79806	10.39	.	
6	Bush	E	120	1	43.41376	32.89521	347.366	830.4906	415.7718	19.748	63	
6	Bush	E	120	2	44.62423	35.06845	353.2263	808.9017	430.3525	18.886	.	
6	Bush	E	180	1	.	.	.	.	.	.	73	
6	Bush	E	180	2	.	.	.	.	.	.	.	
6	Bush	E	420	1	54.34038	2.3	311.1393	1088.924	213.4162	11.066	73	11.86259
6	Bush	E	420	2	59.74273	2.3	292.4063	1106.962	233.8514	10.458	.	
6	Ernie	B	0	1	25.18519	2.3	249.7819	311.0957	226.6943	13.994	42	
6	Ernie	B	0	2	26.23459	2.3	239.4361	299.509	172.2537	13.876	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
6	Ernie	B	120	1	24.27634	12.68124	752.6569	631.6965	322.1975	21.262	93	
6	Ernie	B	120	2	23.70856	13.91909	684.1465	615.0415	332.8686	23.452	.	
6	Ernie	B	180	1	.	.	.	.	.	.	100	
6	Ernie	B	180	2	.	.	.	.	.	.	.	
6	Ernie	B	420	1	43.57692	14.40073	527.7948	696.2745	263.1314	7.576	108	14.41429
6	Ernie	B	420	2	55.86488	10.89153	557.193	754.2789	266.7942	7.88	.	
6	Ernie	O	0	1	21.42155	17.23999	183.903	494.0664	205.5526	13.806	103	
6	Ernie	O	0	2	22.5645	17.96167	211.9401	440.8497	196.9183	13.596	.	
6	Ernie	O	120	1	40.69176	49.27042	396.8895	644.7176	421.2528	16.732	76	
6	Ernie	O	120	2	30.96513	50.14787	428.6127	615.0527	324.5333	17.234	.	
6	Ernie	O	180	1	36.04247	32.26053	356.0078	715.1737	291.7346	13.428	77	
6	Ernie	O	180	2	34.08286	31.48995	388.4966	693.5391	318.9412	13.498	.	
6	Ernie	O	420	1	66.51372	54.64447	595.4312	2358.284	459.9355	21.588	76	21.19487
6	Ernie	O	420	2	54.63641	53.54238	527.2388	2012.04	439.2298	20.45	.	
6	Ernie	E	0	1	62.62665	19.39955	1224.043	556.1258	242.737	7.582	101	
6	Ernie	E	0	2	54.19208	10.24999	990.7229	373.7201	180.2963	7.564	.	
6	Ernie	E	120	1	33.39418	26.32453	1126.051	484.8109	325.9093	11.366	94	
6	Ernie	E	120	2	35.30548	27.41281	1104.199	460.4507	320.7666	12.064	.	
6	Ernie	E	180	1	.	.	.	.	.	.	90	
6	Ernie	E	180	2	.	.	.	.	.	.	.	
6	Ernie	E	420	1	23.01952	64.69136	1117.923	1142.408	488.2853	7.878	73	45.03625
6	Ernie	E	420	2	24.14721	65.17933	1173.435	1250.187	481.5467	7.408	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
6	Johnson	B	0	1	69.04455	2.3	254.4582	507.1377	166.2396	14.842	93	
6	Johnson	B	0	2	77.82521	2.3	248.5567	522.2401	238.4968	14.088	.	
6	Johnson	B	120	1	52.82459	29.71964	388.2779	605.0283	216.5882	20.516	110	
6	Johnson	B	120	2	36.88089	28.79361	385.6181	621.7086	290.1244	20.904	.	
6	Johnson	B	180	1	.	.	.	.	.	.	113	
6	Johnson	B	180	2	.	.	.	.	.	.	.	
6	Johnson	B	420	1	100.688	26.10618	400.5357	1065.225	287.9588	9.968	115	9.582733
6	Johnson	B	420	2	91.05204	23.20839	367.5242	1021.552	289.6497	9.752	.	
6	Johnson	O	0	1	35.18904	2.399708	223.8817	253.251	170.4534	17.634	107	
6	Johnson	O	0	2	32.16869	2.399708	197.8538	273.4706	103.6518	20.08	.	
6	Johnson	O	120	1	39.34996	63.27604	957.0839	588.3046	307.462	13.512	120	
6	Johnson	O	120	2	38.05251	63.27604	995.6339	635.0225	241.4129	13.65	.	
6	Johnson	O	180	1	.	.	.	.	.	.	125	
6	Johnson	O	180	2	.	.	.	.	.	.	.	
6	Johnson	O	420	1	19.47561	36.84391	1206.412	1412.408	338.9048	12.916	115	29.69226
6	Johnson	O	420	2	22.92386	40.11773	1173.435	1527.833	351.8647	13.244	.	
6	Johnson	E	0	1	35.08568	7.650032	1134.139	350.5827	184.9179	7.004	103	
6	Johnson	E	0	2	32.72003	2.3	1063.871	377.5678	205.7524	6.858	.	
6	Johnson	E	120	1	23.55184	68.26889	1585.589	497.1787	361.0313	11.494	93	
6	Johnson	E	120	2	28.09008	77.00591	1761.647	608.3677	382.9184	12.222	.	
6	Johnson	E	180	1	.	.	.	.	.	.	97	
6	Johnson	E	180	2	.	.	.	.	.	.	.	
6	Johnson	E	420	1	46.7291	46.54912	430.5909	1172.411	390.3977	8.174	67	19.19797
6	Johnson	E	420	2	43.20337	46.54912	465.8835	1162.381	428.9707	8.026	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
6	Kennedy	B	0	1	45.3434	2.3	112.4483	284.5006	196.658	12.704	58	
6	Kennedy	B	0	2	61.08631	2.3	131.9642	338.9798	219.3292	12.902	.	
6	Kennedy	B	120	1	29.52928	38.26852	467.4418	355.5667	305.9142	16.164	89	
6	Kennedy	B	120	2	28.13585	36.16646	413.4747	341.4896	267.8411	15.68	.	
6	Kennedy	B	180	1	.	.	.	.	.	.	83	
6	Kennedy	B	180	2	.	.	.	.	.	.	.	
6	Kennedy	B	420	1	81.38456	6.232825	490.1856	524.3919	323.0443	16.868	86	17.16233
6	Kennedy	B	420	2	86.95804	7.15821	538.4999	489.747	352.4129	15.256	.	
6	Kennedy	O	0	1	70.24679	27.99535	138.3792	91.44039	140.8067	26.186	108	
6	Kennedy	O	0	2	78.53034	32.26536	151.0901	128.7316	195.7686	24.162	.	
6	Kennedy	O	120	1	22.82965	100.655	2032.7	366.6761	450.1684	28.314	81	
6	Kennedy	O	120	2	20.65781	91.1898	1745.603	326.9224	306.5538	28.146	.	
6	Kennedy	O	180	1	.	.	.	.	.	.	86	
6	Kennedy	O	180	2	.	.	.	.	.	.	.	
6	Kennedy	O	420	1	67.30329	33.69502	210.2218	322.1296	221.297	21.86	73	8.455807
6	Kennedy	O	420	2	67.0833	33.0595	219.9934	345.0776	205.5776	23.284	.	
6	Kennedy	E	0	1	64.01348	12.16203	346.7731	346.7177	213.14	10.26	74	
6	Kennedy	E	0	2	61.19185	2.3	341.1039	319.5881	205.8474	9.15	.	
6	Kennedy	E	120	1	52.67306	31.98155	1510.33	566.4886	337.5752	12.128	95	
6	Kennedy	E	120	2	43.98362	28.00444	1349.646	467.8379	249.7834	12.374	.	
6	Kennedy	E	180	1	.	.	.	.	.	.	83	
6	Kennedy	E	180	2	.	.	.	.	.	.	.	
6	Kennedy	E	420	1	10.11086	18.65742	89.99725	1285.793	376.7084	10.514	84	2.958834
6	Kennedy	E	420	2	10.22627	17.23999	83.22662	1271.472	372.8281	10.696	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
6	Pierce	B	0	1	.	.	.	.	.	.	41	
6	Pierce	B	0	2	.	.	.	.	.	.	.	
6	Pierce	B	120	1	5.304794	41.50942	228.2508	463.0383	357.1725	40.892	96	
6	Pierce	B	120	2	5.960158	43.32592	240.7269	503.9798	360.9112	41.214	.	
6	Pierce	B	180	1	.	.	.	.	.	.	.	
6	Pierce	B	180	2	.	.	.	.	.	.	.	
6	Pierce	B	420	1	27.43406	26.66612	164.9752	781.5242	434.3209	54.384	89	5.11388
6	Pierce	B	420	2	25.8032	22.41295	152.236	744.6058	442.6106	53.158	.	
6	Pierce	O	0	1	57.30722	2.399708	379.096	189.9166	280.3191	38.994	109	
6	Pierce	O	0	2	77.05328	2.3	387.9853	152.674	284.8616	46.776	.	
6	Pierce	O	120	1	26.28019	19.75637	747.4911	610.3337	366.7573	47.448	95	
6	Pierce	O	120	2	22.36434	19.20757	766.8495	573.4856	311.5833	46.594	.	
6	Pierce	O	180	1	.	.	.	.	.	.	77	
6	Pierce	O	180	2	.	.	.	.	.	.	.	
6	Pierce	O	420	1	8.845873	2.402382	222.7505	1139.487	371.0776	36.978	89	7.393032
6	Pierce	O	420	2	8.845873	2.3	235.8352	1080.948	375.2948	34.858	.	
6	Pierce	E	0	1	.	.	.	.	.	.	.	
6	Pierce	E	0	2	.	.	.	.	.	.	.	
6	Pierce	E	120	1	.	.	.	.	.	.	.	
6	Pierce	E	120	2	.	.	.	.	.	.	.	
6	Pierce	E	420	1	.	.	.	.	.	.	.	
6	Pierce	E	420	2	.	.	.	.	.	.	.	
6	York	B	0	1	166.5449	42.24297	46.61606	78.81915	156.2006	16.592	58	
6	York	B	0	2	181.7597	42.95682	55.79779	57.49688	141.199	16.68	.	

Table 45 (Continued) Gut hormone and endocrine factor plasma concentrations.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time (min)</i>	<i>Rep</i>	<i>Ghrelin (pg/mL)</i>	<i>GLP-1 (pg/mL)</i>	<i>Insulin (pg/mL)</i>	<i>Leptin (pg/mL)</i>	<i>PYY (pg/mL)</i>	<i>Adiponectin (mg/L)</i>	<i>Glucose (mg/dL)</i>	<i>Insulin: glucose</i>
6	York	B	120	1	119.8052	105.6986	519.624	219.247	408.9454	25.1	92	
6	York	B	120	2	106.9428	101.1958	396.2486	200.7804	379.912	24.58	.	
6	York	B	180	1	.	.	.	.	.	.	85	
6	York	B	180	2	.	.	.	.	.	.	.	
6	York	B	420	1	219.5795	21.29248	596.3186	283.5621	231.8718	17.956	108	16.04575
6	York	B	420	2	274.3953	32.74284	611.4721	308.7742	313.6618	18.706	.	
6	York	O	0	1	56.65244	2.3	483.9434	225.4169	181.2497	14.394	99	
6	York	O	0	2	64.97702	2.3	533.9663	296.2239	215.7067	13.202	.	
6	York	O	120	1	47.49284	29.50175	798.5003	548.9689	299.1114	19.04	86	
6	York	O	120	2	43.97407	30.90309	712.2593	527.5501	311.7375	20.098	.	
6	York	O	180	1	.	.	.	.	.	.	82	
6	York	O	180	2	.	.	.	.	.	.	.	
6	York	O	420	1	24.76868	18.99051	173.7113	736.5978	438.7047	13.296	73	6.695499
6	York	O	420	2	20.8574	17.95343	166.9429	787.0891	451.2164	12.44	.	
6	York	E	0	1	130.4486	73.73006	568.5814	1755.904	503.0356	15.782	61	
6	York	E	0	2	130.0812	74.40362	533.5887	1689.044	505.3283	14.542	.	
6	York	E	120	1	160.6391	51.87688	250.3928	4185.472	416.9328	15.24	81	
6	York	E	120	2	157.8882	51.38661	228.2508	4222.464	407.1802	14.02	.	
6	York	E	180	1	.	.	.	.	.	.	72	
6	York	E	180	2	.	.	.	.	.	.	.	
6	York	E	420	1	177.726	29.11437	79.49091	3056.031	301.467	12.356	85	2.384205
6	York	E	420	2	170.1022	26.79527	61.75323	2595.587	292.6132	12.436	.	

Ghrelin: <0.7 entered as 0.6

GLP-1: <2.4 entered as 2.3

Table 46 Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Weight (kg)</i>	<i>BCS</i>	<i>Food eaten (kcal)</i>	<i>Food eaten (kcal/kg)</i>	<i>Food eaten (kcal/kg^{0.75})</i>
1	Adams	B	16.6	8	310.8465	18.72569277	37.79766014
1	Adams	O	16.2	9	1067.085	65.86944444	132.1486571
1	Adams	E	13.2	6	2151.1815	162.9682955	310.6322954
1	Arthur	B	15.4	9	584.577	37.95954545	75.19711582
1	Arthur	O	14.8	8	105.0589	7.098574324	13.92311989
1	Arthur	E	10.4	5	1692.902	162.7790385	292.3188447
1	Garfield	B	12.2	5	3.093	0.25352459	0.473816355
1	Garfield	O	12.4	5	0	0	0
1	Garfield	E	12.6	6	371.6755	29.49805556	55.57583871
1	Polk	B	17.6	9	150.0105	8.523323864	17.45770529
1	Polk	O	17	9	568.5965	33.44685294	67.9152793
1	Polk	E	14.4	7	681.491	47.32576389	92.19094266
1	Taylor	B	17	9	702.6265	41.33097059	83.92432065
1	Taylor	O	16.2	9	1202.6615	74.2383642	148.9385589
1	Taylor	E	13.4	7	1215.549	90.71261194	173.5576942
1	Truman	B	16.2	9	443.33	27.36604938	54.90234063
1	Truman	O	16	9	306.207	19.1379375	38.275875
1	Truman	E	13	8	275.7925	21.21480769	40.28329042
2	Harding	B	15.6	6	465.4965	29.83951923	59.30249576
2	Harding	O	15.8	7	946.9735	59.93503165	119.4937005
2	Harding	E	15.6	7	1003.163	64.30532051	127.7991769
2	Harrison	B	18.2	9	6.7015	0.368214286	0.760533732
2	Harrison	O	17.4	9	1.5465	0.08887931	0.181525645
2	Harrison	E	16.6	9	1335.145	80.43042169	162.3481588
2	Hoover	B	18.6	9	7.7325	0.415725806	0.863346675
2	Hoover	O	17.6	9	452.0935	25.68713068	52.61308433
2	Hoover	E	15.8	8	890.784	56.37873418	112.4034374
2	Jackson	B	19	9	3.6085	0.189921053	0.396516724
2	Jackson	O	18.2	7	1372.261	75.39895604	155.7339072
2	Jackson	E	16.2	6	1327.928	81.9708642	164.4516622
2	Lynden	B	13.6	5	201.5605	14.820625	28.46107146
2	Lynden	O	13.4	5	279.401	20.8508209	39.89324438
2	Lynden	E	13.8	6	386.1095	27.97894928	53.92636818
2	Wilson	B	16	8	321.672	20.1045	40.209
2	Wilson	O	15.8	8	394.873	24.99196203	49.82698672
2	Wilson	E	16	9	956.768	59.798	119.596
3	Carter	B	13.4	6	39.6935	2.962201493	5.667490437

Table 46 (Continued) Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Weight (kg)</i>	<i>BCS</i>	<i>Food eaten (kcal)</i>	<i>Food eaten (kcal/kg)</i>	<i>Food eaten (kcal/kg^{0.75})</i>
3	Carter	O	10.9	5	703.142	64.50844037	117.2122942
3	Carter	E	10.7	4	1131.007	105.7015888	191.173398
3	Clinton	B	18.7	8	79.9025	4.272860963	8.885444589
3	Clinton	O	17.2	9	874.288	50.83069767	103.516167
3	Clinton	E	13.2	6	1367.106	103.5686364	197.4111784
3	Custer	B	17.1	7	26.806	1.567602339	3.187754962
3	Custer	O	15.7	9	320.641	20.42299363	40.65316054
3	Custer	E	11.3	4	1085.643	96.07460177	176.1481977
3	Houston	B	17.3	7	200.014	11.56150289	23.57902364
3	Houston	O	15.3	8	474.26	30.99738562	61.30528614
3	Houston	E	13.4	6	397.966	29.69895522	56.82211192
3	King	B	14.8	7	385.594	26.05364865	51.10153914
3	King	O	13.2	6	112.379	8.513560606	16.22761572
3	King	E	13	5	761.909	58.60838462	111.2872958
3	Nixon	B	17	8	654.1695	38.48055882	78.13643647
3	Nixon	O	15.3	8	1278.44	83.55816993	165.2577279
3	Nixon	E	11.8	5	1517.632	128.6128814	238.3718515
4	Lincoln	B	12.4	5	1335.145	107.6729839	202.0515423
4	Lincoln	O	14.8	5	145.8865	9.857195946	19.33387109
4	Lincoln	E	18.4	7	568.5965	30.9019837	64.00159758
4	Madison	B	13.4	5	1778.475	132.7220149	253.9330131
4	Madison	O	12.6	5	584.0615	46.3540873	87.33346084
4	Madison	E	16.2	8	96.914	5.982345679	12.00190702
4	Monroe	B	11.4	4	1542.376	135.2961404	248.6060082
4	Monroe	O	13.2	5	422.1945	31.98443182	60.96521686
4	Monroe	E	16.8	8	486.1165	28.93550595	58.58121853
4	Obama	B	10.6	3	1665.065	157.0816038	283.4339002
4	Obama	O	12	4	214.448	17.87066667	33.26105847
4	Obama	E	14.4	7	296.4125	20.58420139	40.09817854
4	Taft	B	11	5	1147.503	104.3184545	189.9806266
4	Taft	O	12.4	5	305.176	24.61096774	46.18320967
4	Taft	E	13.6	7	195.3745	14.36577206	27.58758589
4	Tyler	B	11.6	5	1661.972	143.2734483	264.4114214
4	Tyler	O	13	5	104.6465	8.049730769	15.2850616
4	Tyler	E	15	8	6.7015	0.446766667	0.879232185
5	Fillmore	B	12.2	5	1087.705	89.15614754	166.625418
5	Fillmore	O	12.4	5	23.1975	1.870766129	3.510548032

Table 46 (Continued) Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Weight (kg)</i>	<i>BCS</i>	<i>Food eaten (kcal)</i>	<i>Food eaten (kcal/kg)</i>	<i>Food eaten (kcal/kg^{0.75})</i>
5	Fillmore	E	12.6	5	296.4125	23.52480159	44.32192408
5	Ford	B	11.2	5	1264.5215	112.9037054	206.5440558
5	Ford	O	13	5	265.998	20.46138462	38.85266889
5	Ford	E	16	9	358.2725	22.39203125	44.7840625
5	Franklin	B	12.2	4	1644.9605	134.8328279	251.9913312
5	Franklin	O	14.2	5	954.1905	67.19651408	130.4424148
5	Franklin	E	15.4	7	361.3655	23.46529221	46.48428411
5	Grant	B	11.8	6	1249.572	105.8959322	196.2681277
5	Grant	O	13.6	6	457.2485	33.62121324	64.56514165
5	Grant	E	15.2	9	317.0325	20.85740132	41.18329535
5	Quincy	B	12	4	1701.6655	141.8054583	263.9296971
5	Quincy	O	14.2	5	414.462	29.18746479	56.65894193
5	Quincy	E	18	9	479.9305	26.66280556	54.91917085
5	Sherman	B	12.6	6	1194.929	94.83563492	178.6751652
5	Sherman	O	14	6	315.486	22.53471429	43.58971856
5	Sherman	E	17.4	9	294.866	16.94632184	34.61088961
6	Bush	B	11	4	1387.726	126.1569091	229.7519527
6	Bush	O	11.6	4	1358.858	117.142931	216.1875021
6	Bush	E	13.2	5	967.078	73.26348485	139.6468215
6	Ernie	B	11.7	5	1554.748	132.8844444	245.7653262
6	Ernie	O	12.3	5	1605.7825	130.5514228	244.4881909
6	Ernie	E	12.3	5	1746.514	141.9930081	265.9152459
6	Johnson	B	10.3	5	1441.338	139.9357282	250.690524
6	Johnson	O	11.4	5	1461.958	128.2419298	235.6439303
6	Johnson	E	10.7	5	1516.601	141.7384112	256.350108
6	Kennedy	B	10.6	4	1604.7515	151.3916509	273.1670995
6	Kennedy	O	11.4	5	1251.1185	109.7472368	201.6600207
6	Kennedy	E	11.7	5	1133.069	96.84350427	179.1088153
6	Pierce	B	10.1	4	1564.027	154.8541584	276.0598297
6	Pierce	O	11	5	1530.004	139.0912727	253.3075021
6	Pierce	E	11.5	6	1259.882	109.5549565	201.7467238
6	York	B	9.8	4	753.1455	76.85158163	135.9750818
6	York	O	10.3	5	1182.0415	114.7613107	205.5913346
6	York	E	11.1	5	274.246	24.70684685	45.09704316

Table 47 Muscle PCR.

Group	Dog	Point	ΔCT	ΔCT	ΔCT	ΔCT	ΔCT	$\Delta\Delta CT$	$\Delta\Delta CT$	$\Delta\Delta CT$	$\Delta\Delta CT$	$\Delta\Delta CT$
			Mean SIRT1	Mean UCP3	Mean PGC-1 α	Mean NRF-1	Mean SIRT3	SIRT1	UCP3	PGC-1 α	NRF-1	SIRT3
1	Adams	B	7.79	-0.04	4.16	8.83	10.00	.	.	.	.	.
1	Adams	O	6.74	0.09	4.33	7.31	8.77	2.08	0.91	0.89	2.87	2.35
1	Adams	E	7.34	0.20	4.24	6.24	8.78	1.37	0.85	0.94	6.02	2.33
1	Arthur	B	7.86	0.00	5.67	8.78	10.83	.	.	.	.	.
1	Arthur	O	7.45	1.51	5.09	7.39	9.24	1.32	0.35	1.49	2.62	3.00
1	Arthur	E	6.85	1.04	4.13	6.78	8.35	2.00	0.49	2.90	3.98	5.55
1	Garfield	B	7.76	1.77	4.91	9.50	10.73	.	.	.	.	.
1	Garfield	O	6.78	-0.19	4.88	6.20	8.17	1.97	3.89	1.02	9.84	5.91
1	Garfield	E	6.22	0.27	4.19	6.06	7.53	2.92	2.84	1.64	10.85	9.22
1	Polk	B	8.64	-0.13	5.82	9.10	11.43	.	.	.	.	.
1	Polk	O	6.04	-1.53	3.23	6.49	8.34	6.05	2.63	6.01	6.09	8.51
1	Polk	E	8.15	0.87	4.87	8.41	8.84	1.40	0.50	1.94	1.61	6.01
1	Taylor	B	7.44	0.03	3.83	5.98	7.96	.	.	.	.	.
1	Taylor	O	6.78	-0.58	5.46	8.36	12.06	1.58	1.53	0.32	0.19	0.06
1	Taylor	E	7.86	0.16	4.64	7.89	8.55	0.75	0.92	0.57	0.27	0.67
1	Truman	B	9.51	3.51	7.61	6.96	7.31	.	.	.	.	.
1	Truman	O	6.79	0.15	4.99	6.82	7.26	6.60	10.23	6.15	1.10	1.03
1	Truman	E	7.24	0.47	3.58	6.15	9.74	4.85	8.22	16.38	1.75	0.19
2	Harding	B	7.59	0.02	4.28	8.06	9.73	.	.	.	.	.
2	Harding	O	9.63	4.05	8.93	11.94	14.85	0.24	0.06	0.04	0.07	0.03
2	Harding	E	7.99	0.83	4.76	6.48	9.15	0.75	0.57	0.72	2.99	1.50
2	Harrison	B	6.99	0.62	4.84	6.71	7.64	.	.	.	.	.
2	Harrison	O	.	.	.	.	.	.	.	.	.	.

Table 47 (Continued) Muscle PCR.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	ΔCT <i>Mean</i> <i>SIRT1</i>	ΔCT <i>Mean</i> <i>UCP3</i>	ΔCT <i>Mean</i> <i>PGC-1α</i>	ΔCT <i>Mean</i> <i>NRF-1</i>	ΔCT <i>Mean</i> <i>SIRT3</i>	$\Delta\Delta CT$ <i>SIRT1</i>	$\Delta\Delta CT$ <i>UCP3</i>	$\Delta\Delta CT$ <i>PGC-1α</i>	$\Delta\Delta CT$ <i>NRF-1</i>	$\Delta\Delta CT$ <i>SIRT3</i>
2	Harrison	E	6.98	0.37	4.98	7.80	10.94	1.01	1.19	0.91	0.47	0.10
2	Hoover	B	9.18	3.03	8.54	10.32	14.63	.	.	.	.	.
2	Hoover	O	.	.	.	.	.	.	.	.	.	.
2	Hoover	E	5.97	-1.02	3.19	5.78	7.05	9.23	16.53	40.57	23.20	191.09
2	Jackson	B	7.83	1.68	6.76	6.73	9.62	.	.	.	.	.
2	Jackson	O	6.70	-0.96	4.26	6.87	7.37	2.19	6.25	5.64	0.91	4.77
2	Jackson	E	5.84	-0.46	4.06	5.59	7.82	3.98	4.39	6.48	2.20	3.49
2	Lynden	B	12.15	2.61	8.35	6.80	13.65	.	.	.	.	.
2	Lynden	O	9.93	4.89	10.58	10.95	14.88	4.66	0.21	0.21	0.06	0.43
2	Lynden	E	7.25	0.75	5.79	7.51	8.47	29.82	3.61	5.90	0.61	36.23
2	Wilson	B	7.58	2.86	5.69	4.64	10.06	.	.	.	.	.
2	Wilson	O	7.38	0.23	3.57	7.83	8.95	1.15	6.19	4.35	0.11	2.15
2	Wilson	E	7.09	-0.13	4.64	9.26	8.67	1.41	7.96	2.08	0.04	2.61
3	Carter	B	12.38	2.14	5.38	6.36	7.73	.	.	.	.	.
3	Carter	O	9.49	1.55	6.06	9.78	11.57	7.37	1.50	0.62	0.09	0.07
3	Carter	E	7.50	0.91	4.65	12.71	10.00	29.34	2.34	1.67	0.01	0.21
3	Clinton	B	7.45	0.77	5.46	9.77	11.00	.	.	.	.	.
3	Clinton	O	7.92	-0.03	4.13	9.51	11.42	0.72	1.74	2.52	1.19	0.74
3	Clinton	E	6.62	-0.11	2.93	9.64	7.68	1.78	1.85	5.77	1.09	10.01
3	Custer	B	7.19	-0.37	4.37	9.06	10.49	.	.	.	.	.
3	Custer	O	7.79	0.88	5.70	7.41	8.74	0.66	0.42	0.40	3.14	3.37
3	Custer	E	6.91	-0.06	2.82	6.69	8.24	1.21	0.81	2.92	5.15	4.74
3	Houston	B	8.14	0.53	4.91	6.83	8.84	.	.	.	.	.

Table 47 (Continued) Muscle PCR.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT1</i>	<i>ΔCT</i> <i>Mean</i> <i>UCP3</i>	<i>ΔCT Mean</i> <i>PGC-1α</i>	<i>ΔCT</i> <i>Mean</i> <i>NRF-1</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT3</i>	<i>ΔΔCT</i> <i>SIRT1</i>	<i>ΔΔCT</i> <i>UCP3</i>	<i>ΔΔCT</i> <i>PGC-1α</i>	<i>ΔΔCT</i> <i>NRF-1</i>	<i>ΔΔCT</i> <i>SIRT3</i>
3	Houston	O	9.93	2.60	5.51	11.05	11.93	0.29	0.24	0.66	0.05	0.12
3	Houston	E	6.95	0.00	4.33	7.37	9.43	2.29	1.45	1.49	0.69	0.66
3	King	B	8.42	1.09	5.66	9.45	10.94	.	.	.	.	.
3	King	O	9.20	3.43	8.18	11.26	14.11	0.58	0.20	0.17	0.28	0.11
3	King	E	10.16	3.82	7.87	12.14	12.32	0.30	0.15	0.22	0.15	0.38
3	Nixon	B	7.97	0.97	5.54	7.94	10.03	.	.	.	.	.
3	Nixon	O	7.23	-0.01	4.09	7.20	11.18	1.68	1.98	2.74	1.67	0.45
3	Nixon	E	7.33	0.03	4.21	9.80	8.00	1.57	1.93	2.53	0.28	4.09
4	Lincoln	B	5.93	-0.96	3.12	5.53	7.03	.	.	.	.	.
4	Lincoln	O	8.18	1.89	6.79	10.73	11.18	0.21	0.14	0.08	0.03	0.06
4	Lincoln	E	7.55	0.50	4.96	8.60	8.15	0.33	0.36	0.28	0.12	0.46
4	Madison	B	6.04	-0.98	2.97	6.21	8.04	.	.	.	.	.
4	Madison	O	8.33	0.93	4.77	9.14	11.53	0.20	0.27	0.29	0.13	0.09
4	Madison	E	7.55	-0.25	3.95	4.34	7.47	0.35	0.60	0.51	3.67	1.49
4	Monroe	B	6.29	0.14	4.85	8.29	11.78	.	.	.	.	.
4	Monroe	O	9.43	15.47	11.37	10.52	13.76	0.11	0.00	0.01	0.21	0.25
4	Monroe	E	7.20	-1.22	4.12	7.99	8.97	0.53	2.57	1.67	1.23	7.01
4	Obama	B	6.92	-0.37	3.91	10.81	8.88	.	.	.	.	.
4	Obama	O	8.28	2.29	6.58	9.08	12.50	0.39	0.16	0.16	3.32	0.08
4	Obama	E	7.04	0.17	2.61	6.34	8.89	0.92	0.69	2.47	22.17	0.99
4	Taft	B	6.53	-0.66	3.03	5.90	7.70	.	.	.	.	.
4	Taft	O	6.98	-0.19	6.76	7.23	11.07	0.73	0.72	0.08	0.40	0.10
4	Taft	E	7.34	-0.65	4.29	7.34	9.09	0.57	0.99	0.41	0.37	0.38

Table 47 (Continued) Muscle PCR.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT1</i>	<i>ΔCT</i> <i>Mean</i> <i>UCP3</i>	<i>ΔCT</i> <i>Mean</i> <i>PGC-1α</i>	<i>ΔCT</i> <i>Mean</i> <i>NRF-1</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT3</i>	<i>ΔΔCT</i> <i>SIRT1</i>	<i>ΔΔCT</i> <i>UCP3</i>	<i>ΔΔCT</i> <i>PGC-1α</i>	<i>ΔΔCT</i> <i>NRF-1</i>	<i>ΔΔCT</i> <i>SIRT3</i>
4	Tyler	B	7.00	0.08	5.14	8.03	8.91	.	.	.	.	.
4	Tyler	O	6.16	0.05	4.12	6.43	8.97	1.78	1.03	2.03	3.02	0.96
4	Tyler	E	6.88	-0.61	3.89	5.90	6.76	1.09	1.62	2.38	4.36	4.43
5	Fillmore	B	6.25	0.31	3.25	5.02	5.98	.	.	.	.	.
5	Fillmore	O	6.77	0.15	5.17	6.34	8.62	0.70	1.12	0.26	0.40	0.16
5	Fillmore	E	8.80	1.61	3.36	6.45	9.56	0.17	0.40	0.92	0.37	0.08
5	Ford	B	6.13	0.35	3.46	6.72	7.59	.	.	.	.	.
5	Ford	O	10.04	3.31	6.57	10.37	11.37	0.07	0.13	0.12	0.08	0.07
5	Ford	E	7.34	0.41	5.07	10.54	9.43	0.43	0.96	0.33	0.07	0.28
5	Franklin	B	6.78	-1.12	4.05	7.57	8.27	.	.	.	.	.
5	Franklin	O	5.93	-2.00	4.82	6.94	.	1.80	1.85	0.59	1.55	.
5	Franklin	E	6.73	0.58	3.49	6.63	7.35	1.03	0.31	1.47	1.92	1.90
5	Grant	B	6.60	-0.09	3.62	6.84	8.18	.	.	.	.	.
5	Grant	O	9.35	2.62	7.27	10.87	11.01	0.15	0.15	0.08	0.06	0.14
5	Grant	E	7.02	0.25	4.19	9.80	8.16	0.75	0.79	0.67	0.13	1.02
5	Quincy	B	6.80	0.09	3.54	7.50	8.26	.	.	.	.	.
5	Quincy	O	7.68	1.20	4.55	9.21	11.85	0.54	0.46	0.50	0.30	0.08
5	Quincy	E	7.33	1.40	4.80	6.99	8.38	0.69	0.40	0.42	1.43	0.92
5	Sherman	B	8.63	-0.13	4.85	6.18	8.99	.	.	.	.	.
5	Sherman	O	7.94	13.00	11.86	8.24	13.12	1.62	0.00	0.01	0.24	0.06
5	Sherman	E	7.33	0.80	3.22	6.94	8.03	2.47	0.52	3.10	0.59	1.94
6	Bush	B	7.61	0.27	1.96	4.19	8.18	.	.	.	.	.
6	Bush	O	6.13	-0.84	2.79	7.13	9.04	2.79	2.16	0.57	0.13	0.55

Table 47 (Continued) Muscle PCR.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT1</i>	<i>ΔCT</i> <i>Mean</i> <i>UCP3</i>	<i>ΔCT</i> <i>Mean</i> <i>PGC-1α</i>	<i>ΔCT</i> <i>Mean</i> <i>NRF-1</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT3</i>	<i>ΔΔCT</i> <i>SIRT1</i>	<i>ΔΔCT</i> <i>UCP3</i>	<i>ΔΔCT</i> <i>PGC-1α</i>	<i>ΔΔCT</i> <i>NRF-1</i>	<i>ΔΔCT</i> <i>SIRT3</i>
6	Bush	E	6.61	-0.41	3.44	5.50	8.28	1.99	1.60	0.36	0.40	0.94
6	Ernie	B	5.85	-0.50	4.60	5.26	7.72	.	.	.	.	.
6	Ernie	O	8.33	0.85	6.43	9.29	9.82	0.18	0.39	0.28	0.06	0.23
6	Ernie	E	7.48	1.17	4.11	7.03	7.93	0.32	0.31	1.41	0.29	0.86
6	Johnson	B	6.33	-0.56	4.26	6.45	7.17	.	.	.	.	.
6	Johnson	O	7.77	-1.07	3.61	7.99	10.32	0.37	1.43	1.57	0.34	0.11
6	Johnson	E	6.53	0.30	4.29	10.04	8.05	0.87	0.55	0.98	0.08	0.54
6	Kennedy	B	6.97	1.75	4.98	9.58	9.56	.	.	.	.	.
6	Kennedy	O	7.99	0.65	5.09	8.66	11.10	0.49	2.15	0.92	1.89	0.34
6	Kennedy	E	7.09	-0.77	2.82	5.84	8.00	0.92	5.76	4.46	13.32	2.96
6	Pierce	B	6.22	0.86	2.23	5.82	6.54	.	.	.	.	.
6	Pierce	O	9.66	2.69	5.76	10.62	13.83	0.09	0.28	0.09	0.04	0.01
6	Pierce	E	6.88	0.80	4.51	8.28	9.52	0.63	1.04	0.21	0.18	0.13
6	York	B	5.92	-0.10	1.38	7.21	8.49	.	.	.	.	.
6	York	O	7.38	2.17	4.58	8.23	11.15	0.36	0.21	0.11	0.49	0.16
6	York	E	6.27	-1.10	2.62	6.38	9.71	0.79	1.99	0.42	1.78	0.43

No baseline sample for Nixon; used average baseline value for groups ObN, ObP, WLD; did not include Garfield, Lynden, or Carter who were not included in final analysis

No baseline sample for Grant; used average baseline value for groups ExN, ExP, IBW

No baseline SIRT3 sample for Bush; used average baseline SIRT3 value for groups ExN, ExP, IBW

Table 48 Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT1</i>	<i>ΔCT</i> <i>Mean</i> <i>UCP2</i>	<i>ΔCT</i> <i>Mean</i> <i>PGC-1α</i>	<i>ΔCT</i> <i>Mean</i> <i>NRF-1</i>	<i>ΔCT</i> <i>Mean</i> <i>FASN</i>	<i>ΔΔCT</i> <i>SIRT1</i>	<i>ΔΔCT</i> <i>UCP3</i>	<i>ΔΔCT</i> <i>PGC-1α</i>	<i>ΔΔCT</i> <i>NRF-1</i>	<i>ΔΔCT</i> <i>FASN</i>
1	Adams	B	5.83	2.64	7.79	8.74	-2.14	.	.	.	.	.
1	Adams	O	5.47	1.39	7.24	6.35	0.44	1.29	2.37	1.46	5.25	0.17
1	Adams	E	5.10	-1.12	5.05	4.35	-2.53	1.66	13.55	6.70	20.99	1.31
1	Arthur	B	6.88	2.78	6.39	7.80	-0.15	.	.	.	.	.
1	Arthur	O	6.40	3.07	8.40	6.20	2.45	1.39	0.81	0.25	3.03	0.17
1	Arthur	E	1.92	-5.04	2.92	1.58	-3.59	30.93	224.47	11.08	74.65	10.86
1	Garfield	B	4.68	5.17	7.21	8.33	-1.81	.	.	.	.	.
1	Garfield	O	4.14	-4.22	5.18	2.86	-1.70	1.45	669.72	4.09	44.51	0.93
1	Garfield	E	4.27	-0.13	3.78	3.29	-3.55	1.33	39.33	10.78	32.88	3.34
1	Polk	B	6.36	4.28	6.65	7.33	-0.85	.	.	.	.	.
1	Polk	O	6.08	2.53	6.01	6.36	-0.95	1.22	3.37	1.56	1.96	1.07
1	Polk	E	6.38	3.19	7.21	6.66	-0.22	0.99	2.13	0.68	1.59	0.64
1	Taylor	B	6.44	3.36	7.67	6.74	-0.18	.	.	.	.	.
1	Taylor	O	6.54	1.37	8.01	6.15	0.17	0.93	3.95	0.79	1.50	0.79
1	Taylor	E	6.65	1.85	7.82	6.51	0.76	0.86	2.84	0.90	1.17	0.52
1	Truman	B	5.99	2.14	6.92	6.98	-0.92	.	.	.	.	.
1	Truman	O	5.57	0.95	7.16	5.91	1.00	1.34	2.29	0.85	2.09	0.27
1	Truman	E	5.87	1.60	8.36	5.89	1.78	1.09	1.46	0.37	2.12	0.15
2	Harding	B	1.06	2.09	7.01	6.53	-0.05	.	.	.	.	.
2	Harding	O	7.83	-4.03	9.20	4.84	1.06	0.01	69.38	0.22	3.22	0.46
2	Harding	E	5.26	-1.97	5.48	3.57	-2.25	0.05	16.64	2.89	7.75	4.62
2	Harrison	B	5.18	2.11	6.62	6.17	-1.10	.	.	.	.	.
2	Harrison	O	6.33	2.49	7.74	6.01	-0.11	0.45	0.77	0.46	1.12	0.50

Table 48 (Continued) Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT Mean SIRT1</i>	<i>ΔCT Mean UCP2</i>	<i>ΔCT Mean PGC-1α</i>	<i>ΔCT Mean NRF-1</i>	<i>ΔCT Mean FASN</i>	<i>ΔΔCT SIRT1</i>	<i>ΔΔCT UCP3</i>	<i>ΔΔCT PGC-1α</i>	<i>ΔΔCT NRF-1</i>	<i>ΔΔCT FASN</i>
2	Harrison	E	5.73	3.73	6.48	5.98	0.06	0.68	0.33	1.10	1.15	0.45
2	Hoover	B	6.11	2.90	7.15	7.21	0.17	.	.	.	.	.
2	Hoover	O	5.38	3.25	7.96	8.20	1.38	1.66	0.78	0.57	0.50	0.43
2	Hoover	E	.	.	.	.	.	.	.	.	.	.
2	Jackson	B	5.17	2.01	6.04	5.65	-1.01	.	.	.	.	.
2	Jackson	O	3.49	-3.17	3.92	2.50	-4.94	3.20	36.19	4.37	8.86	15.22
2	Jackson	E	5.08	2.08	6.89	5.35	0.66	1.06	0.95	0.56	1.23	0.31
2	Lynden	B	6.21	2.15	6.31	6.15	-2.14	.	.	.	.	.
2	Lynden	O	5.23	-1.38	9.84	5.70	1.46	1.97	11.50	0.09	1.36	0.08
2	Lynden	E	5.36	2.02	7.16	6.15	-1.07	1.80	1.09	0.55	1.00	0.48
2	Wilson	B	5.48	3.12	5.94	6.93	-0.08	.	.	.	.	.
2	Wilson	O	3.93	-4.06	4.82	2.78	-0.40	2.93	144.73	2.17	17.74	1.25
2	Wilson	E	5.98	2.23	7.09	6.05	0.95	0.71	1.84	0.45	1.85	0.49
3	Carter	B	5.48	2.87	6.08	6.28	-1.02	.	.	.	.	.
3	Carter	O	5.46	2.21	6.48	6.19	2.94	1.02	1.58	0.75	1.07	0.06
3	Carter	E	4.99	1.13	6.32	5.87	-0.93	1.41	3.33	0.84	1.33	0.94
3	Clinton	B	5.40	3.15	6.33	6.08	-1.78	.	.	.	.	.
3	Clinton	O	6.01	1.91	6.27	6.89	1.06	0.66	2.36	1.05	0.57	0.14
3	Clinton	E	4.99	0.85	6.91	8.00	-0.35	1.33	4.91	0.67	0.26	0.37
3	Custer	B	2.06	2.58	7.49	7.46	0.49	.	.	.	.	.
3	Custer	O	6.54	1.24	6.73	7.72	0.45	0.04	2.53	1.68	0.84	1.02
3	Custer	E	4.29	2.84	6.67	8.21	0.75	0.21	0.84	1.76	0.59	0.84

Table 48 (Continued) Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT Mean SIRT1</i>	<i>ΔCT Mean UCP2</i>	<i>ΔCT Mean PGC-1α</i>	<i>ΔCT Mean NRF-1</i>	<i>ΔCT Mean FASN</i>	<i>ΔΔCT SIRT1</i>	<i>ΔΔCT UCP3</i>	<i>ΔΔCT PGC-1α</i>	<i>ΔΔCT NRF-1</i>	<i>ΔΔCT FASN</i>
3	Houston	B	5.27	1.67	7.00	6.11	-0.08	.	.	.	.	.
3	Houston	O	5.22	0.65	7.08	6.19	1.20	1.04	2.03	0.95	0.95	0.41
3	Houston	E	5.13	3.04	6.10	8.13	-1.61	1.10	0.39	1.86	0.25	2.89
3	King	B	5.65	2.44	6.51	6.70	-1.39	.	.	.	.	.
3	King	O	4.45	-1.71	7.95	5.37	1.40	2.30	17.69	0.37	2.51	0.14
3	King	E	.	.	.	.	.	.	.	.	.	.
3	Nixon	B	6.13	2.92	6.27	6.00	-1.93	.	.	.	.	.
3	Nixon	O	6.37	0.94	8.85	6.14	2.05	0.85	3.94	0.17	0.90	0.06
3	Nixon	E	4.91	1.87	5.88	5.88	1.04	2.34	2.07	1.30	1.09	0.13
4	Lincoln	B	.	.	.	.	.	.	.	.	.	.
4	Lincoln	O	.	.	.	.	.	.	.	.	.	.
4	Lincoln	E	5.97	2.77	6.46	5.83	-1.75	.	.	.	.	.
4	Madison	B	.	.	.	.	.	.	.	.	.	.
4	Madison	O	.	.	.	.	.	.	.	.	.	.
4	Madison	E	6.03	2.99	7.01	6.45	-1.96	.	.	.	.	.
4	Monroe	B	.	.	.	.	.	.	.	.	.	.
4	Monroe	O	.	.	.	.	.	.	.	.	.	.
4	Monroe	E	6.30	4.12	7.01	5.94	-1.85	.	.	.	.	.
4	Obama	B	.	.	.	.	.	.	.	.	.	.
4	Obama	O	.	.	.	.	.	.	.	.	.	.
4	Obama	E	5.09	2.04	6.12	6.04	-2.55	.	.	.	.	.
4	Taft	B	.	.	.	.	.	.	.	.	.	.
4	Taft	O	.	.	.	.	.	.	.	.	.	.

Table 48 (Continued) Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT1</i>	<i>ΔCT</i> <i>Mean</i> <i>UCP2</i>	<i>ΔCT</i> <i>Mean</i> <i>PGC-1α</i>	<i>ΔCT</i> <i>Mean</i> <i>NRF-1</i>	<i>ΔCT</i> <i>Mean</i> <i>FASN</i>	<i>ΔΔCT</i> <i>SIRT1</i>	<i>ΔΔCT</i> <i>UCP3</i>	<i>ΔΔCT</i> <i>PGC-1α</i>	<i>ΔΔCT</i> <i>NRF-1</i>	<i>ΔΔCT</i> <i>FASN</i>
4	Taft	E	-2.87	-6.36	0.08	-2.26	-8.89	.	.	.	.	.
4	Tyler	B	4.18	-0.88	5.88	4.08	-5.00	.	.	.	.	.
4	Tyler	O	7.06	2.63	11.43	6.95	0.84	0.14	0.09	0.02	0.14	0.02
4	Tyler	E	5.31	3.08	7.21	5.54	0.07	0.46	0.06	0.40	0.36	0.03
5	Fillmore	B	4.13	1.00	6.99	5.31	0.14	.	.	.	.	.
5	Fillmore	O	5.92	-0.27	11.22	5.94	3.27	0.29	2.42	0.05	0.65	0.11
5	Fillmore	E	5.56	3.03	6.12	6.01	-1.45	0.37	0.24	1.83	0.62	3.01
5	Ford	B	.	.	.	.	.	.	.	.	.	.
5	Ford	O	.	.	.	.	.	.	.	.	.	.
5	Ford	E	5.93	2.81	7.07	6.21	-1.47	.	.	.	.	.
5	Franklin	B	.	.	.	.	.	.	.	.	.	.
5	Franklin	O	.	.	.	.	.	.	.	.	.	.
5	Franklin	E	6.84	3.89	7.19	6.93	-1.23	.	.	.	.	.
5	Grant	B	4.74	0.84	7.01	5.91	-1.04	.	.	.	.	.
5	Grant	O	10.71	6.89	10.75	10.10	5.89	0.02	0.02	0.07	0.05	0.01
5	Grant	E	6.56	2.46	8.03	6.51	0.56	0.28	0.33	0.49	0.66	0.33
5	Quincy	B	.	.	.	.	.	.	.	.	.	.
5	Quincy	O	4.16	-3.49	5.16	2.81	-5.45	.	.	.	.	.
5	Quincy	E	6.82	3.92	8.54	6.28	1.69	.	.	.	.	.
5	Sherman	B	6.07	1.79	7.27	6.40	-0.83	.	.	.	.	.
5	Sherman	O	5.31	4.27	7.48	5.85	-2.45	1.70	0.18	0.86	1.46	3.07
5	Sherman	E	7.53	3.81	7.75	6.90	-2.10	0.36	0.25	0.72	0.70	2.41
6	Bush	B	.	.	.	.	.	.	.	.	.	.

Table 48 (Continued) Intrusion meal consumption.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>ΔCT</i> <i>Mean</i> <i>SIRT1</i>	<i>ΔCT</i> <i>Mean</i> <i>UCP2</i>	<i>ΔCT Mean</i> <i>PGC-1α</i>	<i>ΔCT</i> <i>Mean</i> <i>NRF-1</i>	<i>ΔCT</i> <i>Mean</i> <i>FASN</i>	<i>ΔΔCT</i> <i>SIRT1</i>	<i>ΔΔCT</i> <i>UCP3</i>	<i>ΔΔCT</i> <i>PGC-1α</i>	<i>ΔΔCT</i> <i>NRF-1</i>	<i>ΔΔCT</i> <i>FASN</i>
6	Bush	O	.	.	.	.	.	.	.	.	.	.
6	Bush	E	6.01	2.80	6.67	5.97	-1.11	.	.	.	.	.
6	Ernie	B	3.38	-2.91	2.65	6.15	-6.35	.	.	.	.	.
6	Ernie	O	.	.	.	.	.	.	.	.	.	.
6	Ernie	E	5.32	2.23	6.58	6.22	1.25	0.26	0.03	0.07	0.95	0.01
6	Johnson	B	5.75	0.93	7.09	5.32	-4.23	.	.	.	.	.
6	Johnson	O	3.93	-0.95	5.75	3.54	-5.84	3.52	3.69	2.52	3.42	3.05
6	Johnson	E	-1.73	-4.74	1.25	-0.52	-5.72	178.33	50.71	56.99	57.25	2.81
6	Kennedy	B	6.97	1.47	6.58	6.00	-2.47	.	.	.	.	.
6	Kennedy	O	.	.	.	.	.	.	.	.	.	.
6	Kennedy	E	6.04	2.84	6.62	6.07	-1.03	1.91	0.39	0.97	0.95	0.37
6	Pierce	B	.	.	.	.	.	.	.	.	.	.
6	Pierce	O	.	.	.	.	.	.	.	.	.	.
6	Pierce	E	5.41	1.96	7.91	5.45	-1.74	.	.	.	.	.
6	York	B	.	.	.	.	.	.	.	.	.	.
6	York	O	.	.	.	.	.	.	.	.	.	.
6	York	E	5.09	3.74	6.47	6.02	-1.00	.	.	.	.	.

Table 49 Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Adams	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	B	2	0	1	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	B	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Adams	B	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Adams	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	B	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Adams	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Adams	B	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	B	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Adams	B	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Adams	B	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Adams	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Adams	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Adams	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Adams	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Adams	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Adams	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Adams	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Adams	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Adams	B	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Adams	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Adams	B	44	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Adams	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Adams	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	O	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	O	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	O	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	O	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Adams	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Adams	O	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	O	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	O	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	O	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	O	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	O	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Adams	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	O	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	E	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	E	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Adams	E	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Adams	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Adams	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Adams	E	18	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	E	20	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Adams	E	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Adams	E	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Adams	E	26	0	0	0	0	1	0	0	0	0	0	0	0	1	0	M	0
1	Adams	E	28	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Adams	E	30	0	0	0	0	1	0	0	0	0	0	0	0	1	0	F	0
1	Adams	E	32	0	0	0	1	0	0	0	0	0	0	0	0	1	0	M	0
1	Adams	E	34	0	0	0	1	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	E	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Adams	E	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Adams	E	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Adams	E	44	0	0	0	0	1	0	0	0	0	0	0	0	1	0	M	0
1	Adams	E	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Arthur	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Arthur	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	B	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Arthur	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	B	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Arthur	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	B	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	B	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
1	Arthur	B	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	B	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Arthur	B	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Arthur	B	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Arthur	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
1	Arthur	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
1	Arthur	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
1	Arthur	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Arthur	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
1	Arthur	B	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Arthur	B	38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Arthur	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Arthur	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Arthur	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Arthur	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Arthur	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Arthur	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Arthur	O	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Arthur	O	14	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Arthur	O	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	O	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	O	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
1	Arthur	O	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	28	1	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
1	Arthur	O	30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	O	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Arthur	O	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	O	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Arthur	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Arthur	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Arthur	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Arthur	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Arthur	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Arthur	E	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Arthur	E	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	14	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	16	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	E	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Arthur	E	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Arthur	E	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Arthur	E	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Arthur	E	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Arthur	E	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Arthur	E	34	0	0	0	0	1	0	0	0	0	0	1	0	0	0	M	1
1	Arthur	E	36	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	E	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	E	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Arthur	E	44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Arthur	E	46	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Garfield	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Garfield	B	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	B	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Garfield	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Garfield	B	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	B	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Garfield	O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Garfield	O	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Garfield	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Garfield	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	O	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Garfield	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	O	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	O	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Garfield	O	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Garfield	E	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	E	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	E	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Garfield	E	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Garfield	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Garfield	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Garfield	E	42	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	E	44	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Garfield	E	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Polk	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Polk	B	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	1
1	Polk	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	B	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	B	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
1	Polk	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
1	Polk	B	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
1	Polk	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
1	Polk	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
1	Polk	B	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	B	28	0	0	0	0	0	0	0	1	0	0	0	1	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Polk	B	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
1	Polk	B	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	B	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Polk	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	1
1	Polk	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
1	Polk	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	O	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Polk	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	O	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
1	Polk	O	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
1	Polk	O	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	O	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	O	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Polk	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
1	Polk	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
1	Polk	O	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	O	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	O	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	O	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	O	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	O	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	O	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	O	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Polk	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Polk	E	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Polk	E	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Polk	E	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
1	Polk	E	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Polk	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Polk	E	12	0	0	0	0	0	0	0	1	0	0	0	0	0	1	F	1
1	Polk	E	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	E	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Polk	E	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Polk	E	20	1	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Polk	E	22	1	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Polk	E	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	E	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Polk	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	E	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
1	Polk	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
1	Polk	E	44	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Polk	E	46	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
1	Taylor	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
1	Taylor	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	B	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Taylor	B	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Taylor	B	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Taylor	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	32	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Taylor	B	34	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Taylor	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	O	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Taylor	O	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	O	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
1	Taylor	O	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Taylor	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Taylor	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	E	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Taylor	E	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
1	Taylor	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	E	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Taylor	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Taylor	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Taylor	E	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Taylor	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Taylor	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	B	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	B	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	B	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Truman	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	B	44	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Truman	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	O	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	O	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Truman	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	O	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Truman	O	30	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Truman	O	32	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
1	Truman	O	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
1	Truman	O	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	E	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
1	Truman	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	E	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
1	Truman	E	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	E	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
1	Truman	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
1	Truman	E	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0		0
2	Harding	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Harding	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Harding	B	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Harding	B	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Harding	B	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Harding	B	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Harding	B	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Harding	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Harding	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Harding	O	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Harding	O	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Harding	O	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Harding	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Harding	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Harding	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Harding	O	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	O	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Harding	O	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Harding	O	26	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Harding	O	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Harding	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	O	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Harding	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	O	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Harding	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Harding	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Harding	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	E	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	E	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Harding	E	12	0	0	0	0	0	0	0	0	1	0	1	0	0	0	M	0
2	Harding	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Harding	E	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Harding	E	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harding	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	E	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	E	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harding	E	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harding	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Harding	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harding	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Harrison	B	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	B	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	B	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	B	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Harrison	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	6	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Harrison	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Harrison	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Harrison	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Harrison	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Harrison	E	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Harrison	E	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Harrison	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Harrison	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Harrison	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Harrison	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Harrison	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Hoover	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Hoover	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Hoover	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Hoover	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Hoover	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Hoover	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Hoover	B	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	B	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
2	Hoover	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Hoover	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Hoover	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Hoover	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Hoover	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Hoover	B	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	B	46	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Hoover	O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Hoover	O	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Hoover	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	O	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Hoover	O	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Hoover	O	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	O	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Hoover	O	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Hoover	O	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Hoover	O	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Hoover	O	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Hoover	O	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Hoover	O	24	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
2	Hoover	O	26	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	O	28	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	O	30	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	O	32	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
2	Hoover	O	34	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	O	36	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	O	38	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	O	40	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	O	42	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
2	Hoover	O	44	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
2	Hoover	O	46	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
2	Hoover	E	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	E	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	E	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Hoover	E	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Hoover	E	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	14	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	16	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	18	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	20	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	22	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Hoover	E	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
2	Hoover	E	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
2	Hoover	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Hoover	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Hoover	E	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
2	Hoover	E	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
2	Hoover	E	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Hoover	E	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Hoover	E	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Jackson	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
2	Jackson	B	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Jackson	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Jackson	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	B	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Jackson	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Jackson	B	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Jackson	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	B	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Jackson	B	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Jackson	B	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Jackson	B	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Jackson	B	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Jackson	B	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Jackson	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	B	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Jackson	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	O	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	O	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Jackson	O	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Jackson	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Jackson	O	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Jackson	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	O	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
2	Jackson	O	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	O	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	O	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	O	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	O	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Jackson	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	O	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Jackson	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	O	46	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
2	Jackson	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
2	Jackson	E	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	14	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	16	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	18	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Jackson	E	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Jackson	E	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Jackson	E	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	E	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Jackson	E	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Jackson	E	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Jackson	E	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Jackson	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Jackson	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Lynden	B	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Lynden	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Lynden	B	10	0	1	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Lynden	B	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Lynden	B	14	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Lynden	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Lynden	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Lynden	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Lynden	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Lynden	O	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Lynden	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Lynden	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	E	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Lynden	E	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Lynden	E	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Lynden	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Lynden	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Lynden	E	36	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
2	Lynden	E	38	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Lynden	E	40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
2	Lynden	E	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Lynden	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Lynden	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
2	Wilson	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	B	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	B	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Wilson	B	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
2	Wilson	B	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	B	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
2	Wilson	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	B	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Wilson	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Wilson	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Wilson	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Wilson	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
2	Wilson	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	O	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Wilson	O	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
2	Wilson	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Wilson	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Wilson	O	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Wilson	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
2	Wilson	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
2	Wilson	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Wilson	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
2	Wilson	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
2	Wilson	E	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
2	Wilson	E	30	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	32	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	34	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
2	Wilson	E	38	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
2	Wilson	E	40	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
2	Wilson	E	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
2	Wilson	E	44	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
2	Wilson	E	46	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Carter	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Carter	B	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	B	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Carter	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	B	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Carter	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	B	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Carter	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	O	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	O	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Carter	O	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Carter	O	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Carter	O	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	E	6	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Carter	E	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
3	Carter	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Carter	E	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Carter	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	E	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Carter	E	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	Carter	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	Carter	E	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Carter	E	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Carter	E	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Carter	E	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Carter	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Carter	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Clinton	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	B	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Clinton	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	B	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Clinton	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Clinton	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	O	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Clinton	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Clinton	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Clinton	O	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Clinton	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	O	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Clinton	O	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Clinton	O	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Clinton	O	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
3	Clinton	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Clinton	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Clinton	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Clinton	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Clinton	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Clinton	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	E	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Clinton	E	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Clinton	E	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Clinton	E	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	E	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Clinton	E	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Clinton	E	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Clinton	E	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
3	Clinton	E	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Clinton	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	E	30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Clinton	E	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Clinton	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Clinton	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Clinton	E	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Clinton	E	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
3	Clinton	E	46	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Custer	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Custer	B	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	B	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Custer	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	B	44	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
3	Custer	O	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
3	Custer	O	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	O	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	O	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	O	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	O	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	O	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Custer	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	E	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
3	Custer	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	E	8	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
3	Custer	E	10	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
3	Custer	E	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
3	Custer	E	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	E	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	E	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Custer	E	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Custer	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Custer	E	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	E	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
3	Custer	E	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	1
3	Custer	E	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Custer	E	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Custer	E	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
3	Custer	E	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
3	Houston	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Houston	B	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Houston	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Houston	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
3	Houston	B	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Houston	B	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Houston	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Houston	O	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Houston	O	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Houston	O	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Houston	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Houston	O	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Houston	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Houston	O	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Houston	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Houston	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
3	Houston	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Houston	E	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Houston	E	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
3	Houston	E	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Houston	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Houston	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Houston	E	34	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Houston	E	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Houston	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Houston	E	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Houston	E	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Houston	E	44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Houston	E	46	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	King	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
3	King	B	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	King	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	King	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	B	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	King	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	B	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
3	King	B	16	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	B	18	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	B	20	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	B	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
3	King	B	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	B	26	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	King	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	B	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	King	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	King	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	B	44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	King	B	46	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	King	O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	King	O	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
3	King	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	O	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	King	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	O	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	O	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	O	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	King	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	King	O	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
3	King	O	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	King	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	King	O	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	King	O	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	King	O	40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	King	O	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	O	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	O	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	King	E	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	King	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	King	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	King	E	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	E	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	King	E	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	E	18	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	E	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	E	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	King	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	King	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	King	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	King	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
3	King	E	46	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	B	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	B	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Nixon	B	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Nixon	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	B	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Nixon	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Nixon	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Nixon	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	B	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	O	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
3	Nixon	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	Nixon	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	O	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	16	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Nixon	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Nixon	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Nixon	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	B	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	O	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
3	Nixon	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	Nixon	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	O	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	16	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Nixon	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Nixon	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
3	Nixon	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	B	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	O	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
3	Nixon	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
3	Nixon	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	O	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	16	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Nixon	O	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	26	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	36	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	42	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	O	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	O	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	E	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Nixon	E	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Nixon	E	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	E	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	E	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
3	Nixon	E	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
3	Nixon	E	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
3	Nixon	E	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Nixon	E	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
3	Nixon	E	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
3	Nixon	E	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	E	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
3	Nixon	E	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
3	Nixon	E	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Nixon	E	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Nixon	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	E	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
3	Nixon	E	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
3	Nixon	E	44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
3	Nixon	E	46	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
4	Lincoln	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	B	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	B	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Lincoln	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Lincoln	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	B	16	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	B	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Lincoln	B	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
4	Lincoln	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Lincoln	B	26	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Lincoln	B	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Lincoln	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Lincoln	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Lincoln	O	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Lincoln	O	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Lincoln	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	O	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Lincoln	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	E	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Lincoln	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Lincoln	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Lincoln	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Lincoln	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Lincoln	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Lincoln	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	14	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	16	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	20	0	0	0	1	0	0	0	0	0	0	0	0	1	0	M	0
4	Madison	B	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
4	Madison	B	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	B	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
4	Madison	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Madison	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	O	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Madison	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	O	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
4	Madison	O	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	O	22	0	0	0	0	0	0	0	0	1	0	1	0	0	0	B	0
4	Madison	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Madison	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Madison	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Madison	E	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	E	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Madison	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Madison	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Madison	E	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Madison	E	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Madison	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Madison	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Monroe	B	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
4	Monroe	B	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	B	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Monroe	B	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	B	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Monroe	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Monroe	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	B	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Monroe	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Monroe	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	B	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Monroe	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Monroe	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Monroe	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Monroe	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	O	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	O	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	O	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	O	8	0	0	0	0	0	0	0	0	1	0	0	1	0	0	F	0
4	Monroe	O	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Monroe	O	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Monroe	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Monroe	O	28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	O	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
4	Monroe	O	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Monroe	O	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Monroe	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	O	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	E	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Monroe	E	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Monroe	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	E	8	0	0	0	1	0	0	0	0	0	0	0	0	1	0	F	0
4	Monroe	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Monroe	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Monroe	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Obama	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Obama	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Obama	B	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Obama	B	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Obama	B	8	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Obama	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Obama	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Obama	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Obama	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Obama	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Obama	B	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
4	Obama	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
4	Obama	B	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
4	Obama	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Obama	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
4	Obama	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Obama	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Obama	O	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
4	Obama	O	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Obama	O	8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
4	Obama	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Obama	O	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Obama	O	38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Obama	O	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Obama	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
4	Obama	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Obama	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Obama	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Obama	E	6	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Obama	E	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Obama	E	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Obama	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Obama	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Obama	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Taft	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Taft	B	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
4	Taft	B	6	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
4	Taft	B	8	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
4	Taft	B	10	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
4	Taft	B	12	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
4	Taft	B	14	0	0	0	0	0	0	1	0	0	0	1	0	0	0	B	0
4	Taft	B	16	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
4	Taft	B	18	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0
4	Taft	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	22	0	0	0	0	0	0	1	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Taft	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Taft	O	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Taft	O	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	1
4	Taft	O	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Taft	O	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Taft	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Taft	O	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Taft	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Taft	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
4	Taft	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Taft	E	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Taft	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Taft	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Taft	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

able 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Taft	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Taft	E	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Taft	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Taft	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Tyler	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Tyler	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
4	Tyler	B	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	B	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
4	Tyler	B	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	B	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	B	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
4	Tyler	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	B	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
4	Tyler	B	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
4	Tyler	B	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Tyler	O	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Tyler	O	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
4	Tyler	O	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
4	Tyler	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Tyler	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	O	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
4	Tyler	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
4	Tyler	O	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Tyler	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	O	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
4	Tyler	O	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	O	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	O	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Tyler	O	26	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
4	Tyler	O	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	O	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	O	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
4	Tyler	O	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Tyler	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Tyler	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Tyler	O	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	O	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	O	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
4	Tyler	E	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	E	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
4	Tyler	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
4	Tyler	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
4	Tyler	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Tyler	E	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
4	Tyler	E	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
4	Tyler	E	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	E	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
4	Tyler	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Fillmore	B	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Fillmore	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Fillmore	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Fillmore	B	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Fillmore	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	B	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	B	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	B	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	B	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	B	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	B	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	B	28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Fillmore	B	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	B	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	B	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Fillmore	B	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	B	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Fillmore	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	O	6	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	O	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	O	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Fillmore	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Fillmore	O	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Fillmore	O	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Fillmore	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Fillmore	O	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	O	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	O	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	O	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	O	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Fillmore	O	46	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	E	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	E	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Fillmore	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Fillmore	E	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	E	10	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Fillmore	E	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	E	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Fillmore	E	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Fillmore	E	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	E	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	E	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	E	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Fillmore	E	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Fillmore	E	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	E	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	E	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	E	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Fillmore	E	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Fillmore	E	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	E	44	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Fillmore	E	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Ford	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Ford	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	10	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Ford	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Ford	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Ford	B	18	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Ford	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Ford	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	B	30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Ford	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Ford	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	B	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	B	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Ford	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	O	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
5	Ford	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Ford	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Ford	O	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	34	0	0	0	0	0	0	0	0	1	0	1	0	0	0	F	0
5	Ford	O	36	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	O	38	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	O	40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Ford	O	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Ford	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Ford	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Ford	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Ford	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Ford	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Ford	E	10	0	0	0	0	0	0	0	0	1	0	1	0	0	0	B	0
5	Ford	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Ford	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Ford	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Ford	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Ford	E	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Ford	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Ford	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Ford	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Franklin	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	B	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	B	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	B	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	B	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	B	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	B	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	B	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	B	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Franklin	B	22	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Franklin	B	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Franklin	B	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Franklin	B	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Franklin	B	30	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Franklin	B	32	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	B	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Franklin	B	36	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	B	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	B	40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	B	42	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	B	44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	B	46	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	O	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	O	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	O	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	O	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	O	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Franklin	O	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	O	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	O	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	O	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	O	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	O	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	O	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	O	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	O	26	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	O	28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Franklin	O	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Franklin	O	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	O	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	O	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	O	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	O	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Franklin	O	42	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	O	44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	O	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	E	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Franklin	E	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	E	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Franklin	E	16	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	E	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Franklin	E	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Franklin	E	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Franklin	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Franklin	E	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Franklin	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Franklin	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Franklin	E	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Franklin	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Franklin	E	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Franklin	E	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Grant	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	B	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Grant	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	B	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Grant	B	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Grant	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	B	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Grant	B	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	B	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	B	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
5	Grant	B	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	B	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	B	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	B	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Grant	B	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Grant	B	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Grant	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Grant	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Grant	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Grant	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	O	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	O	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Grant	O	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Grant	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
5	Grant	O	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
5	Grant	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
5	Grant	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Grant	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Grant	E	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Grant	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Grant	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Grant	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Grant	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Quincy	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
5	Quincy	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	B	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Quincy	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Quincy	B	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Quincy	B	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Quincy	B	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Quincy	B	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
5	Quincy	B	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	1
5	Quincy	B	24	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	B	26	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Quincy	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Quincy	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Quincy	B	32	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Quincy	B	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Quincy	B	36	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Quincy	B	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
5	Quincy	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Quincy	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Quincy	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	O	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Quincy	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Quincy	O	10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
5	Quincy	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
5	Quincy	O	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Quincy	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Quincy	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
5	Quincy	E	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
5	Quincy	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	E	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
5	Quincy	E	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	E	10	0	0	0	1	0	0	0	0	0	0	0	0	0	1	M	0
5	Quincy	E	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Quincy	E	14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
5	Quincy	E	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
5	Quincy	E	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Quincy	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Quincy	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Quincy	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Quincy	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	16	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	18	0	0	0	0	0	0	0	0	1	0	0	0	1	0	B	0
5	Sherman	B	20	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Sherman	B	24	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	B	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	B	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Sherman	B	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	B	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Sherman	B	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Sherman	B	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Sherman	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Sherman	B	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	O	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	O	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	O	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Sherman	O	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Sherman	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Sherman	O	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
5	Sherman	O	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
5	Sherman	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
5	Sherman	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	E	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	E	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
5	Sherman	E	10	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
5	Sherman	E	12	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
5	Sherman	E	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
5	Sherman	E	16	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0
5	Sherman	E	18	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0
5	Sherman	E	20	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0
5	Sherman	E	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
5	Sherman	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
5	Sherman	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
5	Sherman	E	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	B	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Bush	B	6	0	0	0	1	0	0	0	0	0	0	0	0	1	0	M	0
6	Bush	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Bush	B	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	Bush	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	B	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Bush	B	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	Bush	B	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	B	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Bush	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	B	28	0	0	0	0	0	0	1	0	0	0	0	0	1	0	B	0
6	Bush	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Bush	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	1
6	Bush	B	34	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Bush	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	B	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	B	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	B	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	B	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Bush	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Bush	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	O	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
6	Bush	O	8	0	0	0	1	0	0	0	0	0	0	0	0	1	0	M	0
6	Bush	O	10	0	1	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Bush	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Bush	O	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	O	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Bush	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	E	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	E	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	Bush	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	Bush	E	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Bush	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Bush	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Bush	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Bush	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Bush	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Bush	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Bush	E	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Bush	E	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Bush	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	E	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	E	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Bush	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Ernie	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	B	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Ernie	B	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Ernie	B	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Ernie	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	B	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Ernie	B	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	B	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	B	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	B	46	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	O	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Ernie	O	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	O	16	0	0	0	0	0	0	0	0	1	0	1	0	0	0	B	0
6	Ernie	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	O	22	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Ernie	O	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	1
6	Ernie	O	26	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
6	Ernie	O	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
6	Ernie	O	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	O	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	O	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Ernie	O	36	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	O	38	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	O	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	O	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	O	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	O	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	E	6	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	E	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Ernie	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Ernie	E	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Ernie	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Ernie	E	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	E	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	E	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Ernie	E	32	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	34	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	36	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Ernie	E	38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Ernie	E	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Ernie	E	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	B	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	B	6	0	0	0	0	0	0	1	0	0	0	0	1	0	0	B	0
6	Johnson	B	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Johnson	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Johnson	B	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	B	16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
6	Johnson	B	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Johnson	B	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	B	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	B	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	B	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	B	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	B	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	B	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	B	38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	B	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	B	42	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
6	Johnson	B	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	Johnson	B	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	Johnson	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	O	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Johnson	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	O	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	O	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
6	Johnson	O	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
6	Johnson	O	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Johnson	O	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Johnson	O	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	O	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	O	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
6	Johnson	O	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0
6	Johnson	O	46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Johnson	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	E	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Johnson	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Johnson	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	20	1	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
6	Johnson	E	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	E	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
6	Johnson	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	E	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	E	30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
6	Johnson	E	32	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
6	Johnson	E	34	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	E	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Johnson	E	38	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Johnson	E	40	1	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Johnson	E	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Johnson	E	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Kennedy	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	B	4	1	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	Kennedy	B	6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	B	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	B	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	B	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	1
6	Kennedy	B	14	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	B	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Kennedy	B	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Kennedy	B	20	0	0	0	0	0	1	0	0	0	0	0	0	1	0	B	0
6	Kennedy	B	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Kennedy	B	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	B	28	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	B	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	B	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Kennedy	B	36	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
6	Kennedy	B	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Kennedy	B	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Kennedy	B	42	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	B	44	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
6	Kennedy	B	46	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
6	Kennedy	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
6	Kennedy	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	O	18	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
6	Kennedy	O	20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
6	Kennedy	O	22	0	0	0	0	0	0	0	0	0	0	0	1	0	0	M	0
6	Kennedy	O	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
6	Kennedy	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	M	0
6	Kennedy	O	28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Kennedy	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	O	32	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	Kennedy	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	O	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Kennedy	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	E	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	E	10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	14	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Kennedy	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Kennedy	E	32	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	E	34	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	E	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Kennedy	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	E	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
6	Kennedy	E	42	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Kennedy	E	44	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Kennedy	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Pierce	B	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	1
6	Pierce	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
6	Pierce	B	10	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Pierce	B	12	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Pierce	B	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	1
6	Pierce	B	16	0	0	0	0	0	0	0	0	1	0	1	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Pierce	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Pierce	B	20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	B	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	1
6	Pierce	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Pierce	B	26	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Pierce	B	28	0	0	0	0	0	0	0	0	1	0	1	0	0	0	B	0
6	Pierce	B	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	Pierce	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Pierce	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Pierce	B	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Pierce	B	38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
6	Pierce	B	40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Pierce	B	42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	0
6	Pierce	B	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Pierce	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	Pierce	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	O	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
6	Pierce	O	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
6	Pierce	O	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Pierce	O	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	O	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	B	1
6	Pierce	O	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
6	Pierce	O	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	1
6	Pierce	O	20	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	O	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	O	24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
6	Pierce	O	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	O	28	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Pierce	O	30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Pierce	O	32	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
6	Pierce	O	34	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0
6	Pierce	O	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	O	38	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0
6	Pierce	O	40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	O	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	O	44	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0
6	Pierce	O	46	0	0	0	0	0	0	0	1	0	0	0	0	1	0	B	0
6	Pierce	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	E	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	Pierce	E	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
6	Pierce	E	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
6	Pierce	E	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	0
6	Pierce	E	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	B	0
6	Pierce	E	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
6	Pierce	E	16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	0
6	Pierce	E	18	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
6	Pierce	E	20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	B	0
6	Pierce	E	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	Pierce	E	24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	Pierce	E	26	0	0	0	0	0	0	0	0	0	0	0	0	1	0	M	1
6	Pierce	E	28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	1
6	Pierce	E	30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	1
6	Pierce	E	32	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	1
6	Pierce	E	34	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	1
6	Pierce	E	36	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	1
6	Pierce	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	Pierce	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Pierce	E	42	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	0
6	Pierce	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	Pierce	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	York	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1
6	York	B	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	B	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	B	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	B	8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
6	York	B	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	B	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
6	York	B	14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	B	16	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	York	B	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	York	B	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	B	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	York	B	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	B	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	B	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	B	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	B	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	B	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	B	36	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	B	38	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	York	B	40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	1

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	York	B	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	B	44	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	York	B	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	O	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	O	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	O	4	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	O	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	O	8	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	1
6	York	O	10	0	0	0	1	0	0	0	0	0	0	0	0	1	0	M	0
6	York	O	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	York	O	14	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	York	O	16	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	York	O	18	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	York	O	20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	York	O	22	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	York	O	24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	York	O	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	York	O	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	40	0	0	0	0	0	0	0	0	0	0	1	0	0	0	B	0
6	York	O	42	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	O	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B	0
6	York	E	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	E	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	E	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	E	6	1	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	E	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	York	E	10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	F	0
6	York	E	16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	22	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	24	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	26	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

Table 49 (Continued) Behavior frequency counts.

<i>Group</i>	<i>Dog</i>	<i>Point</i>	<i>Time</i>	<i>Eating Meal / Head in Bowl</i>	<i>Drinking</i>	<i>Eating Feces</i>	<i>Urinating / Defecating</i>	<i>Stretching</i>	<i>Yawning / Panting</i>	<i>Body Shaking</i>	<i>Playing w/ Toys</i>	<i>Grooming</i>	<i>Resting (head down)</i>	<i>Lying (head up)</i>	<i>Sitting</i>	<i>Standing</i>	<i>Walking / Running / Jumping</i>	<i>Cage Position</i>	<i>Vocalizing</i>
6	York	E	30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	32	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	36	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	38	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	0
6	York	E	40	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	F	0
6	York	E	44	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0
6	York	E	46	0	0	0	0	0	0	0	0	0	1	0	0	0	0	F	0

VITA

Maryanne Murphy is originally from New Jersey and received her dual BS in animal sciences and biological sciences from Rutgers University in 2004. She then moved to the Midwest and earned her DVM from Iowa State University in 2008. Maryanne returned to the East Coast and completed a rotating general medicine and surgery internship at Fifth Avenue Veterinary Specialists in New York City.

After relocating to Tennessee in 2009, Maryanne completed a clinical nutrition residency at the University of Tennessee and was conferred as a Diplomate of the American College of Veterinary Nutrition in 2013.