

To the Graduate Council:

I am submitting herewith a thesis written by David Paul Walker entitled "Length-Growth Patterns With the Prediction and Adjustment Equation for Length of Pigs From Birth to 70 Days of Age." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Animal Science.

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and recommend its acceptance:

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Vice Chancellor
Graduate Studies and Research

Thesis

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LENGTH-GROWTH PATTERNS WITH THE PREDICTION AND ADJUSTMENT

EQUATION FOR LENGTH OF PIGS FROM BIRTH

TO 70 DAYS OF AGE

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

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August 1977

1332622

ACKNOWLEDGEMENTS

The author would like to express his deepest appreciation to the following people who helped weigh and measure the pigs. His wife Ruth Charlene Walker, Dr. F. B. Masincupp, Paul Lane, Mike Hunter, Doug Ellis, George Beckman, Jim Hopper, Steve Damron, David Shannon, Joe Pearson, Millie Bass, Kenny Marbury, Angie Heirigs, Steve Osei, Eddie Claiborne, Johnnie Vaughn, and Remi Osijo.

The author would also like to express his appreciation to his Major Professor, Dr. F. B. Masincupp, for his guidance and to Dr. G. M. Merriman and Dr. R. L. Murphree for their cooperativeness and for serving on his graduate committee. Appreciation is also conveyed to Dr. W. L. Sanders for his assistance in the statistical analysis and to Mrs. Viola Gibbons and David Shannon for their computer programming assistance.

ABSTRACT

The purpose of this experiment was to determine the length-growth patterns in pigs from birth to weaning, to determine if length can be predicted during this period, and to determine if an effective adjustment factor for length can be calculated.

The lengths of each pig were measured from the poll of the head along the spinal column to the tail head. The weights and measurements were taken within 24 hours after birth and again at 1, 2, 3, 4, 5, 6, 7, 9, 17, and 24 weeks of age. The data were analyzed by the Statistical Analysis System using the model:

$$\hat{Y} = Y_m + b_1 (\text{Age}_p - \text{Age}_m) + b_2 (\text{Age}_p^2 - \text{Age}_m^2) + b_3 (\text{Age}_p^3 - \text{Age}_m^3).$$

where:

$\hat{Y}$ = predicted length

Y_m = measured length used to predict or adjust other lengths

b_1 = .303

b_2 = -.003

b_3 = .00003

Age_p = age in days of length to be predicted

Age_m = age in days of measured length

It was found that the length-growth curve from birth to weaning was linear, that length could be predicted during this time period and the lengths of pigs of different ages could be adjusted to a common age. The equation for predicting and/or adjusting length would probably be of little value to the commercial pork producer as a selection criterion because length is not significantly correlated with carcass yield,

performance of the pig, et cetera. However, longer carcasses are associated with faster rates of gain and more desirable backfat. Therefore, the adjustment factor would be valuable to the researchers because they could adjust the length of the pigs to a common length to get the most accurate research data.

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CHAPTER I

INTRODUCTION

There is considerable literature regarding carcass length in swine and its relationship to various measures of carcass composition and performance of the pig (Lidvall et al., 1972; Graham et al., 1963; Hiner and Thronton, 1962; Bowland and Braude, 1965; Roy et al., 1968; and Doornenbal et al., 1962). There are also established methods for adjusting carcass data at market to a common weight so that pigs slaughtered at various weights may be effectively compared (National Association of Swine Records, 1970). However, the literature lacks any information on length-growth patterns in swine from birth to weaning. Consequently, there are no adjustment factors available regarding live measurements in weanling pigs. In the case of young pigs allotted to an experiment regarding length, no adjustment factors for length are available to readily adjust all pigs to a common point.

This experiment was undertaken to determine the length-growth patterns in pigs from birth to weaning, to determine if length can be predicted during this period, and to determine if an effective adjustment factor for length at weaning or before could be calculated.

CHAPTER II

LITERATURE REVIEW

Carcass Length

In 1971, Bereskin, Shelby, and Hazel found that barrows averaged 2.08 cm shorter in carcass length than gilts and that breed of sire significantly affected only carcass length, while breed of dam significantly influenced all carcass traits studied. It is well documented that carcass length, loin eye area, lean cut weight, and percent lean cuts are moderately heritable within the range of .4 to .6 (Enfield and Whatley, Jr., 1961; Arganosa et al., 1969).

Martin and Fredeen (1966) found that carcass length increased approximately 1.3 cm per unit increase in vertebral number. In their study, 615 pigs were x-rayed immediately prior to slaughter to assess the predictive value of x-ray measurements of the vertebrae and backfat at slaughter weight. It was concluded that x-ray is not superior to the simple probe method for predicting cutout yield from measurements made on the live animal. Consideration of birth weight, slaughter weight, age at slaughter, and linear measurements at birth were not of value in improving the precision of this prediction. According to Lidvall et al. (1972), the measurement of length from the poll to the tail accounted for 61% of the variance in actual carcass length. A combination of poll to tail length, unshrunk live weight, breed effects, and sex effects accounted for 72% of the variance in carcass length. Therefore, it was concluded by the authors that these weights and measurements could be

of value in selecting live hogs for carcass length.

Correlation of Carcass Characteristics with Carcass Length

Bowland and Braude (1965) established that the results from comparisons between pigs within litters and between pigs of different litters suggest that both the average thickness of backfat and its distribution are related to the length of the carcass. Thus, the longer carcasses have a more desirable backfat thickness. It was found that the longer carcasses are associated with faster rates of carcass weight gain and larger eye muscles. However, these observations involved only small effects and generally accounted for trivial amounts of the small variation observed between pigs within any one of the litters and between litters in any one of the experiments.

According to Hiner and Thornton (1962), an increase in carcass length (measured from the first rib to the aitch bone) was associated with a decrease in fat cuts, backfat thickness, and bacon weight and an increase in ham and loin weights.

In 1968, Roy et al. established basically the same things when they found that both the carcass backfat and live backfat probe were negatively correlated with area of loin eye and length of carcass. However, these later authors did find a positive genetic correlation between post weaning daily gain and loin eye area. A high positive genetic correlation was also found between birth weight and loin eye area.

As a general rule, the length of carcass has very little significant correlation with percent yield, size of loin, size of ham, et cetera.

Therefore, carcass length and weight have a low predictive value in percent yield of trimmed lean cuts (Fredeen et al., 1964). Also, it has been found that carcass length is of little value as an index of composition (Doornenbal et al., 1962; Graham et al., 1963; Pearson et al., 1970; Holland and Hazel, 1958; and Pearson et al., 1965).

Aunan and Winters (1949) reported that carcass length was significantly correlated (5% level of probability) with area of lean of the loin, but was not significantly correlated with lean content of the carcass.

Cross et al. (1975) stated that neither length nor weight of carcass was associated with more than 10% of the variability in cutting yields. Carcass length in combination with fat depth at the 10th rib and longissimus muscle area at the 10th rib provided the most accurate criteria for predicting total lean from the four lean cuts.

Effects of Diet

Hale and Southwell (1967) concluded that pigs fed diets containing either 18-15% or 16-13% protein sequences were more efficient in utilizing feed and had a higher yield of lean cuts than pigs fed the 14-16% protein diets in this study. It was also found that the barrows gained weight faster than the gilts, but gilts produced longer carcasses with lean backfat, larger loin-eye area, and a higher yield of lean cuts.

In another study Tribble et al. (1956) found that the carcass characteristics studied were not significantly influenced by protein content of the diets. They also found that carcass measurements such as backfat thickness, length of carcass, heart girth, and flank girth

were not significantly affected by different protein levels. However, they did report that pigs fed an antibiotic had longer carcasses and longer hind legs as compared to those not fed an antibiotic.

Growth Rate Effectors

Bruner and Swiger (1968) established that fall-farrowed Duroc and Poland pigs gained slightly faster than those farrowed in the spring, while the reverse was true for the Yorkshire, Spotted, and Landrace breeds. The average difference in carcass length for the two seasons was approximately .8 cm. The spring-fall difference in length by breed varied from 2.5 cm. for Durocs to -1 cm. for Polands and Hampshires. Even though there were differences in fall and spring farrowed pigs, the overall seasonal difference for daily gain was negligible and differences for specific breeds were small.

In a Canadian study by Plank and Berg (1963), it was found that winter-fed pigs grew slower, were less efficient, had a higher dressing percentage, and shorter carcasses than summer-fed pigs. Also, in both seasons, females outgained barrows under a limited feeding program. Under a liberal feeding regime, barrows outgained females because they consumed more feed. Under equalized limited feeding, pigs with the ability to gain both rapidly and efficiently tended to produce superior carcasses. When pigs with the ability to gain rapidly and efficiently were put on a liberal feeding program, rapid gains reflected increased feed consumption, inferior feed conversion and fatter carcasses.

Growth Patterns

Growth may be considered as a combination of physiological processes such as increased cell size, increased cell number and/or chemical changes which are responsible for physical maturation. Therefore, growth may be considered from two aspects: an increase in body mass with time, and changes in form or composition resulting from different growth rates of component parts. The increase in body mass may be divided into prenatal, postnatal to weaning, and weaning to slaughter (Garner, 1976).

Little research has been reported on preweaning growth patterns. Whatley and Quaife (1937) reported that growth was curvilinear. However, if one were to separate their graphs before six weeks and after six weeks, the growth curve would be linear. They concluded that this change in growth rate may be due to initiation of supplemental feeding at about six weeks of age. Ahlschwede and Robison (1971) suggested that the relationship between direct genetic and maternal effects changed from positive to negative at about three weeks of age, the age at which supplemental feed was made available.

When Boaz and Elsley (1962) fed pigs to weights of 30, 40, or 50 pounds at 56 days of age, the growth curves from 50 pounds to 200 pounds (approximately 70 days) were essentially the same. The lighter pigs at 56 days were slightly fatter at slaughter but were not significantly fatter. A study by Nelson and Robison (1976) also showed that rate of growth on test was independent of weaning weight, i. e., there was no compensatory growth. However, it has been established by Boaz and

Elsley (1962) that pigs raised to 30 and 40 pounds at 56 days of age took less time (in days) to reach 200 pounds than pigs raised to 50 pounds at 56 days of age.

Sex Differences

In a study involving 108 crossbred barrows and gilts, Wagner et al. (1963) found that barrows gained significantly faster than gilts. This agrees with the findings of Lacy (1932), Bruner et al. (1958), Mulholland et al. (1960), and Ontvedt et al. (1962), but disagrees with Charette (1961).

Bruner et al. (1958) reported that gilts had longer carcasses than barrows. Cahill et al. (1960), Charette (1961), and Kropf (1962) also found gilt carcasses to be longer than littermate barrow carcasses. The vertebra length at the last rib in gilts was significantly longer than in barrows (Kropf, 1962). Charette (1961) reported that boar carcasses were longer than barrow carcasses.

CHAPTER III

EXPERIMENTAL PROCEDURE

To determine the length-growth patterns of pigs from birth to weaning, 100 Duroc X Yorkshire pigs were utilized. These pigs were simultaneously used in a nutritional experiment. At 3 days of age, one-half of the pigs in each litter received 7 cc of iron-dextran intramuscularly, and at 10 days of age each litter was allotted to one of five different creep rations which are described in Table I. All pigs were vaccinated for erysipelas and the boar pigs were castrated at approximately 3 weeks of age. The pigs were weaned at 10 weeks of age and moved to the finishing floor where they were allotted to 9 different finishing rations (Table II). These pigs were slaughtered at an average weight of 220 pounds (100 kg).

Body length and weight of each pig was recorded within 24 hours after birth and again at 1, 2, 3, 4, 5, 6, 7, 9, 17, and 24 weeks of age. The first 9 measurements were taken by placing the pig in a stationary crate with his legs on either side of the edge of a 1" x 6" board. This mechanism maintained each pig in approximately the same position with dorsal surface straight and the head level with the back. The measurement was then taken from the poll of the head, along the spinal column to the tail head with a laminated-plastic measuring tape. Because of the increased size of the pigs at the 17th and 24th weeks, the pigs were driven into a larger crate with a cranking mechanism to raise each pig off the ground so the same position in which they were previously measured could be maintained.

TABLE I
CONTROL CREEP RATION^a

Ingredients	Pounds
Corn	621
Soybean oil meal	250
Tankage	60
Dicalcium phosphate	10
Salt	5
Vitamin-mineral premix ^b	10
Antibiotic	1.5
Alfalfa meal	50

^a Experimental rations were: 1 = Control, 2 = Control plus 2.5% corn oil, 3 = Control plus 5% corn oil, 4 = Control plus 2.5% tallow, 5 = Control plus 5% tallow.

^b Provides in addition to the ration: Vitamin A-400,000 USP units, Vitamin D3-100,000 IC units, Vitamin E-500 Int. units, Riboflavin-400 Mgs., d-Pantothenic acid-1,000 Mgs., Niacin-2,000 Mgs., Vitamin B12-1,500 Mgs., Vitamin K (MSBC)-100 Mgs., Choline Chloride-20,000 Mgs., Zinc (Zn)-1.2%, Iron (Fe)-1.2%, Manganese (Mn)-0.8%, Copper (Cu)-0.12%, Cobalt (Co)-0.02%, Iodine (I)-0.008%, Selenium (Se)-0.001%.

TABLE II
FINISHING RATIONS

<u>University of Tennessee Control Ration</u>	
No. 2 yellow corn	748 lb
Soybean oil meal (44)	150 lb
Meat scraps (50)	50 lb
Dehydrated Alfalfa meal (17)	17 lb
Dicalcium phosphate	10 lb
Salt	5 lb
Vitamin-Mineral premix	6 lb
Antibiotic	1 lb

Corn-Soybean Meal 1

No. 2 yellow corn	750 lb
Soybean oil meal	218 lb
Dicalcium phosphate	70 lb
Limestone	10 lb
Salt	5 lb
Vitamin-Mineral premix	6 lb
Antibiotic	1 lb

Corn-Soybean Meal 2

738
220
20
10
5
6
1

Experimental Rations

<u>Ration</u>	<u>Description</u>
1.	Control- U. T. 16%
2.	Corn-Soybean meal control: .66% Ca .55% P
3.	Corn-Soybean meal control: .85% Ca .75% P .77% Lysine
4.	U. T. Control + 10% Dried cow waste: .99% Ca .82% P
5.	U. T. Control + 20% Dried cow waste: 1.12% Ca .82% P
6.	Corn-Soybean meal + 10% Dried cow waste: .85% Ca .75% P
7.	Corn-Soybean meal + 20% Dried cow waste: .85% Ca .75% P
8.	Corn-Soybean meal + 10% Dried cow waste: 1/2 Vitamin-Mineral premix
9.	Corn-Soybean meal + 10% Dried cow waste: Equals .77% Lysine

A description of the two measuring crates is given in Burgess, 1965.

The data were analyzed by the Statistical Analysis System and growth curves for each pig were estimated using the following model:

$$\hat{Y} = Y_m + b_1 (\text{Age}_p - \text{Age}_m) + b_2 (\text{Age}_p^2 - \text{Age}_m^2) + b_3 (\text{Age}_p^3 - \text{Age}_m^3).$$

where:

$\hat{Y}$ = predicted length

Y_m = measured length used to predict or adjust other lengths

b_1 = .303

b_2 = -.003

b_3 = .00003

Age_p = age in days of length to be predicted

Age_m = age in days of measured length

CHAPTER IV

RESULTS AND DISCUSSION

Data from this experiment indicate that the length-growth pattern of pigs from birth to 70 days of age is linear. Figure 1, which depicts this growth curve, is a composite graph for all pigs in the experiment. However, a study of Table III indicated that creep, sex, age³, and iron x creep, age² x creep, age x sex interactions had a significant effect on the length-growth patterns in these pigs. The growth curves for barrows and gilts on each creep ration are shown in Figures 2, 3, 4, 5, and 6. On the other hand, a look at the partial analysis (Table III) indicates that only age has a highly significant ($P < .0001$) effect on length with age² ($P < .037$) and age³ ($P < .038$) having a slightly less significant effect. These facts, plus the fact that if an attempt were made to adjust or predict lengths under field conditions, no information on prior nutrition or management would be known, consequently, only one adjustment factor would be used. This situation occurs today when one attempts to adjust carcass data (length, backfat, and loin-eye area) to a common weight of 220 pounds (100 kg). Due to these reasons, it was felt that a single curve, utilizing all pigs, would be the most effective in predicting or adjusting a pig's length to a common age between birth and weaning. The R^2 value for the composite graph is .90 which indicates that this analysis is highly significant.

Although the sex effect has been essentially disregarded in Figure 1, it has been established by other researchers that sex does have an

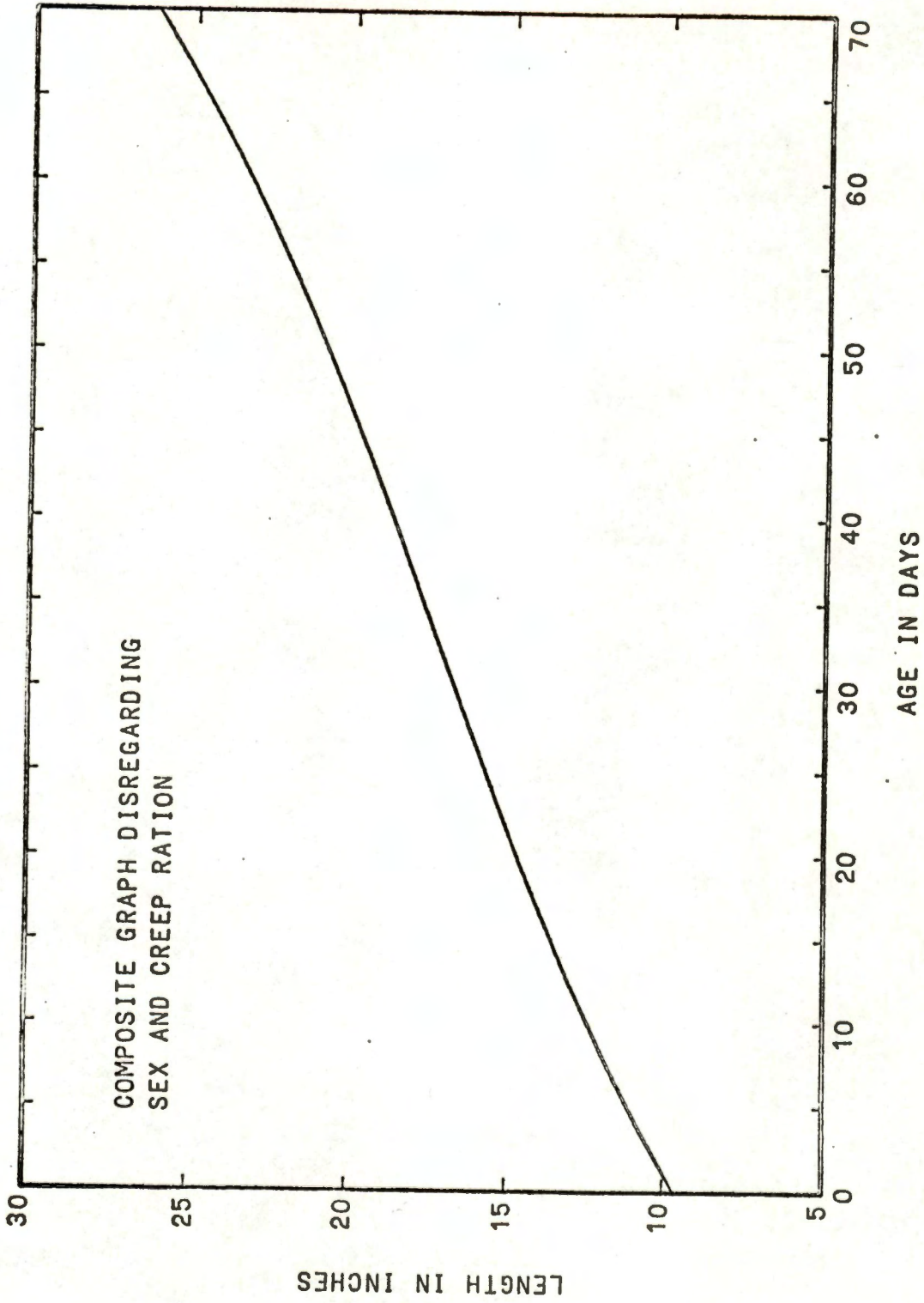


Figure 1. Composite Graph Disregarding Sex and Creep Ration.

TABLE III
RESULTS OF STATISTICAL ANALYSIS

Dependent Variable: Length		Sum of Squares	Mean Square	F Value	PR > F	R-Square	C.V.	
Source	DF							
Model	43	17651.24192100	410.49399816	208.43	0.0001	0.912352	8.1928	
Error	861	1695.72170729	1.96947933		Std Dev		Length Mean	
Corrected Total	904	19346.96362829			1.40338139		17.12935912	
Source	DF	Type I SS	F Value	PR > F	DF	Type III SS	F Value	PR > F
Iron	1	0.31821403	0.16	0.6878	1	0.12290002	0.06	0.8028
Creep	4	105.47943148	13.39	0.0001	4	3.03549518	0.39	0.8192
Iron*Creep	4	29.15945987	3.70	0.0054	3	1.60197085	0.27	0.8470
Sex	1	24.72703915	12.56	0.0004	1	0.74501698	0.38	0.5387
Age	1	17380.50520287	8824.92	0.0001	1	64.44609790	32.72	0.0001
Age*Age	1	0.86322544	0.46	0.5081	1	8.51933660	4.33	0.0378
Age*Age*Age	1	50.06986282	25.42	0.0001	1	8.44949038	4.29	0.0386
Age*Iron	1	0.00101995	0.00	0.9818	1	0.72830184	0.37	0.5433
Age*Creep	4	6.93025013	0.88	0.4755	4	7.50291274	0.95	0.4330
Age*Iron*Creep	4	7.79567831	0.99	0.4123	4	0.15796878	0.02	0.9992
Age*Age*Iron	1	0.48639294	0.25	0.6193	1	1.07894796	0.55	0.4594
Age*Age*Creep	4	19.98328787	2.54	0.0388	4	3.34392666	0.42	0.7910
Age*Age*Iron*Creep	4	5.32963480	0.68	0.6083	4	0.85396692	0.11	0.9796
Age*Age*Age*Iron	1	1.57705653	0.80	0.3711	1	1.23018749	0.62	0.4296
Age*Age*Age*Creep	4	3.00103704	0.38	0.8223	4	2.23324482	0.28	0.8888
Age*Age*Age*Iron*Creep	4	1.61102850	0.20	0.9359	4	1.54960663	0.20	0.9401
Sex*Age	1	12.70829956	6.45	0.0113	1	1.60190605	0.81	0.3674
Sex*Age*Age	1	0.11943786	0.06	0.8055	1	0.65285361	0.33	0.5649
Sex*Age*Age*Age	1	0.57636085	0.29	0.5887	1	0.57636085	0.29	0.5887

*Interaction

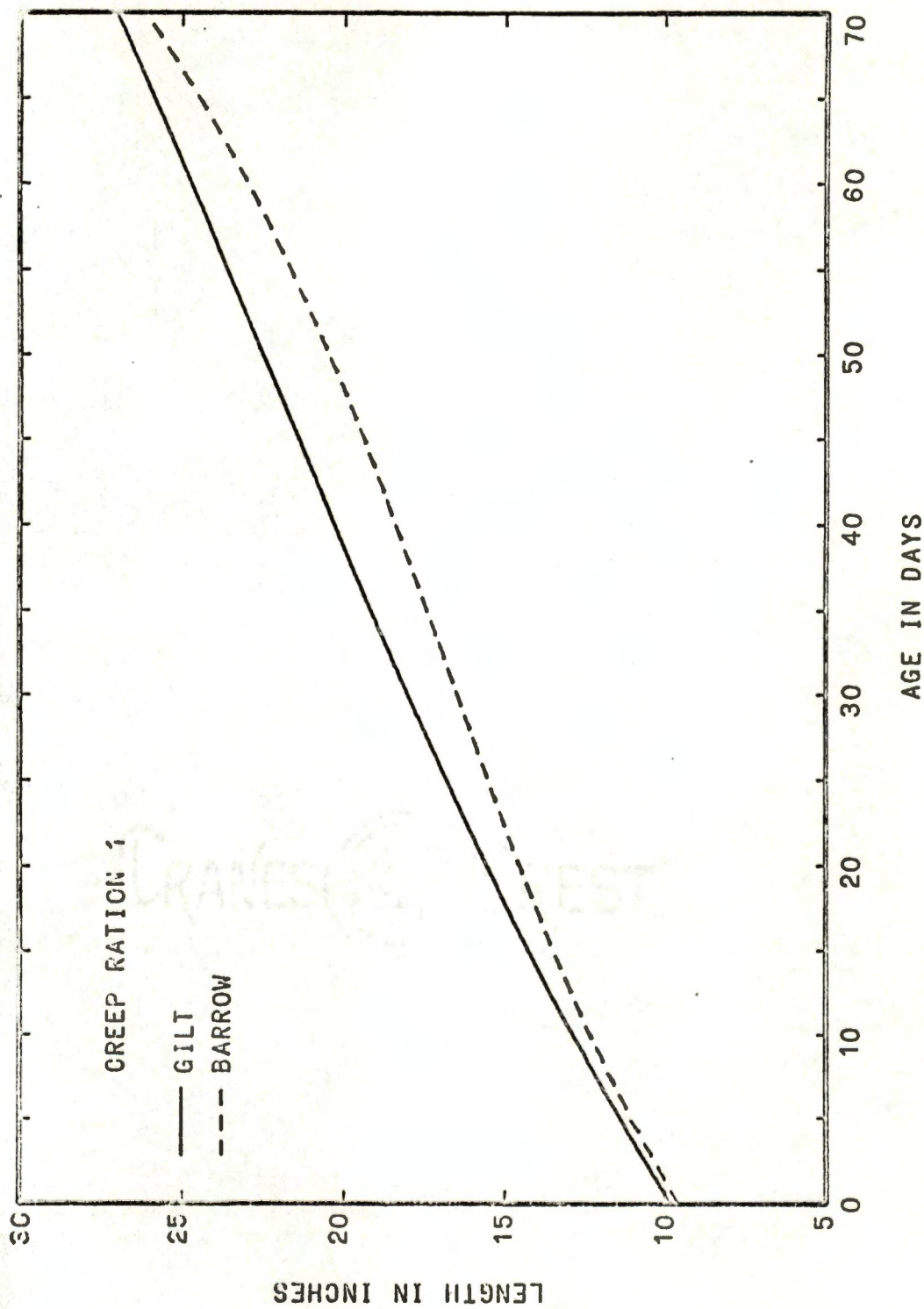


Figure 2. Creep Ration 1.

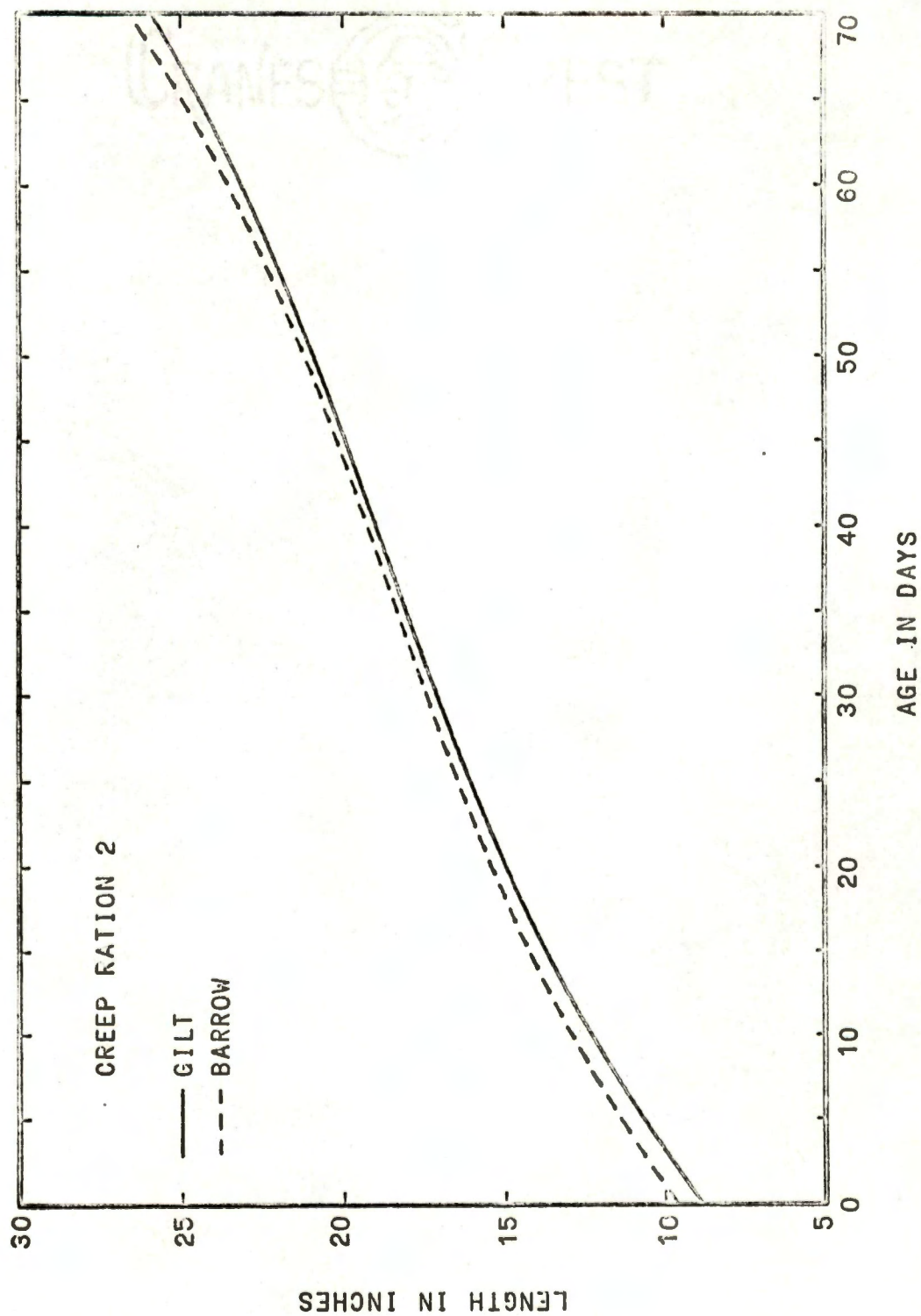


Figure 3. Creep Ration 2.

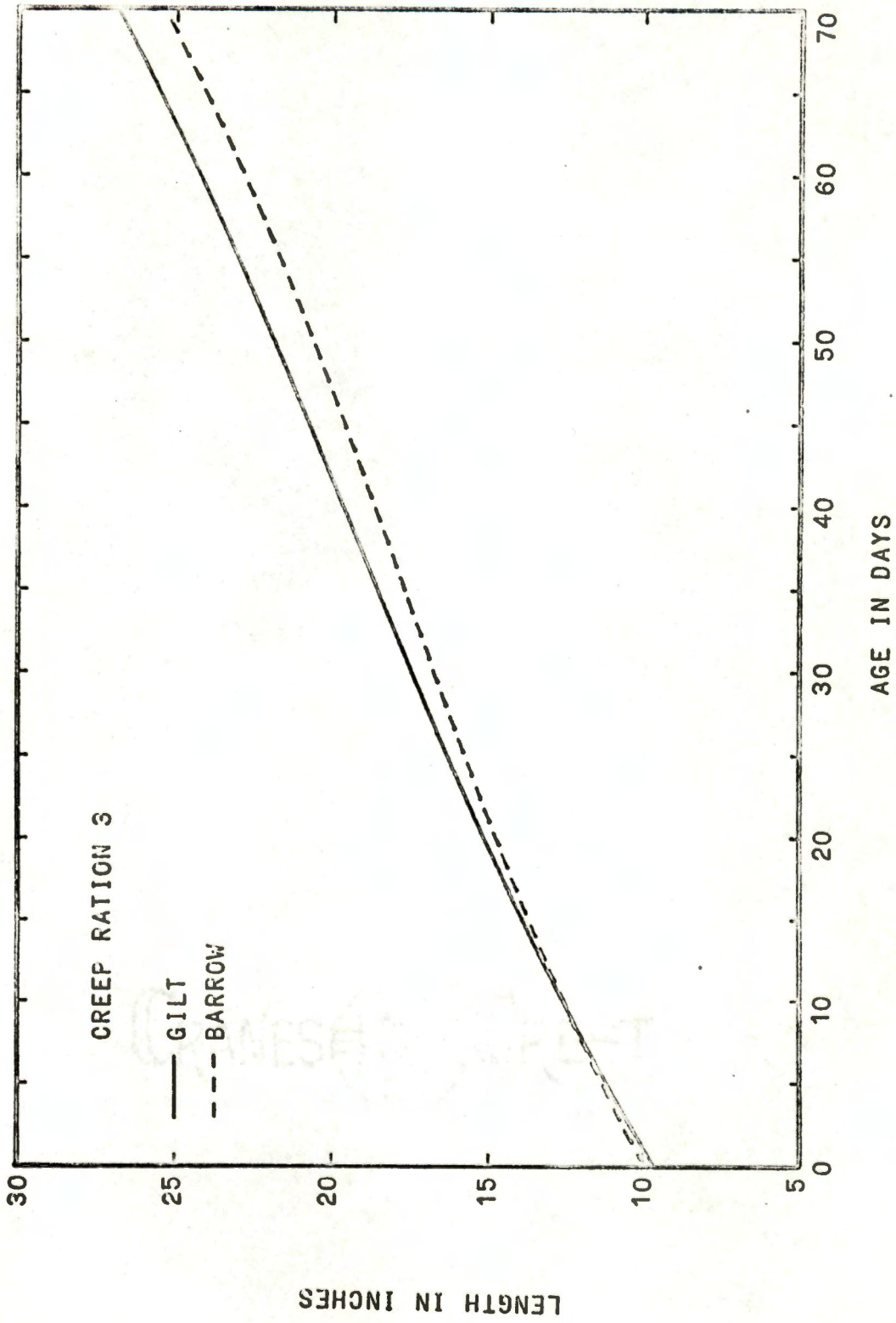


Figure 4. Creep Ration 3.

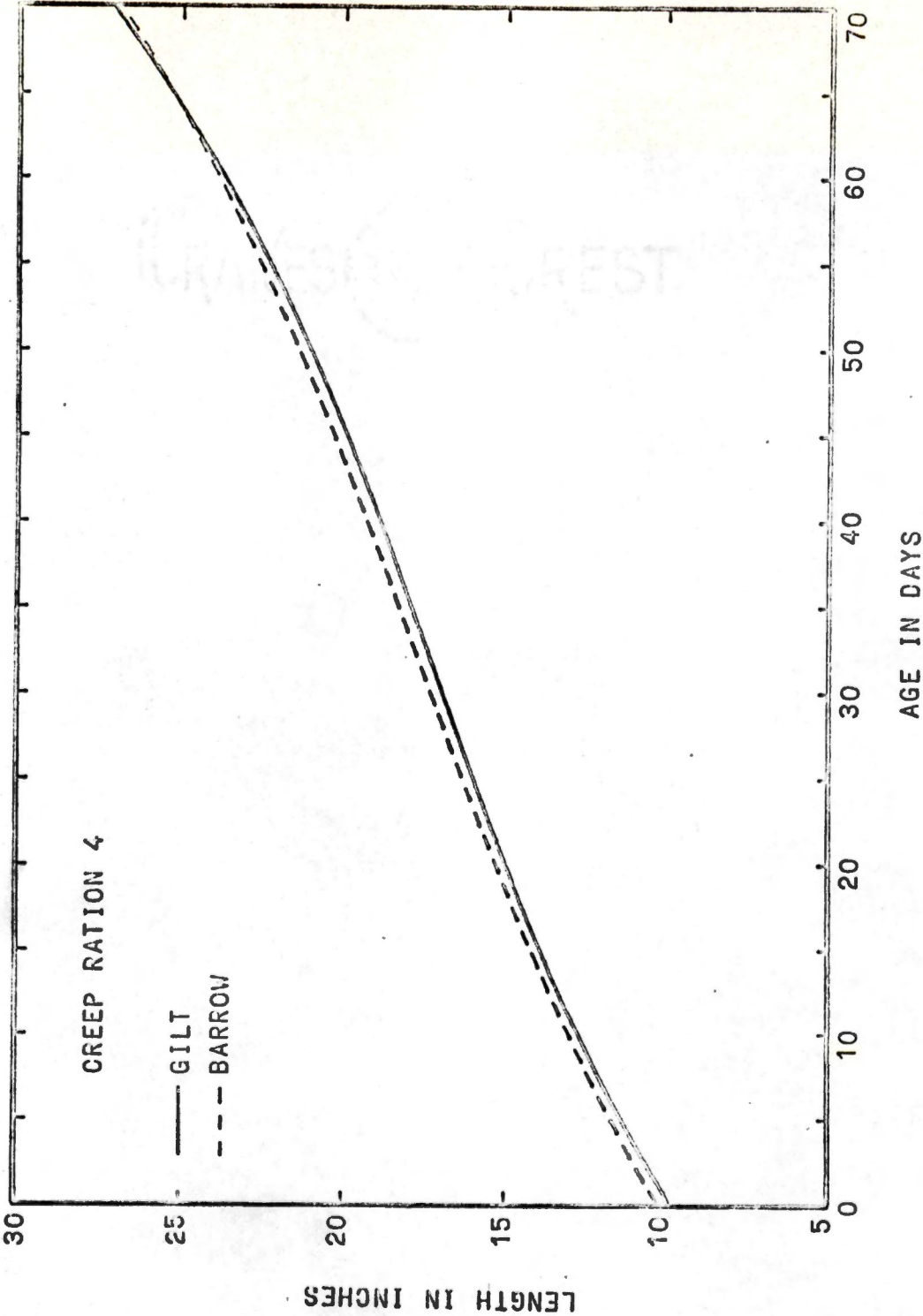


Figure 5. Creep Ration 4.

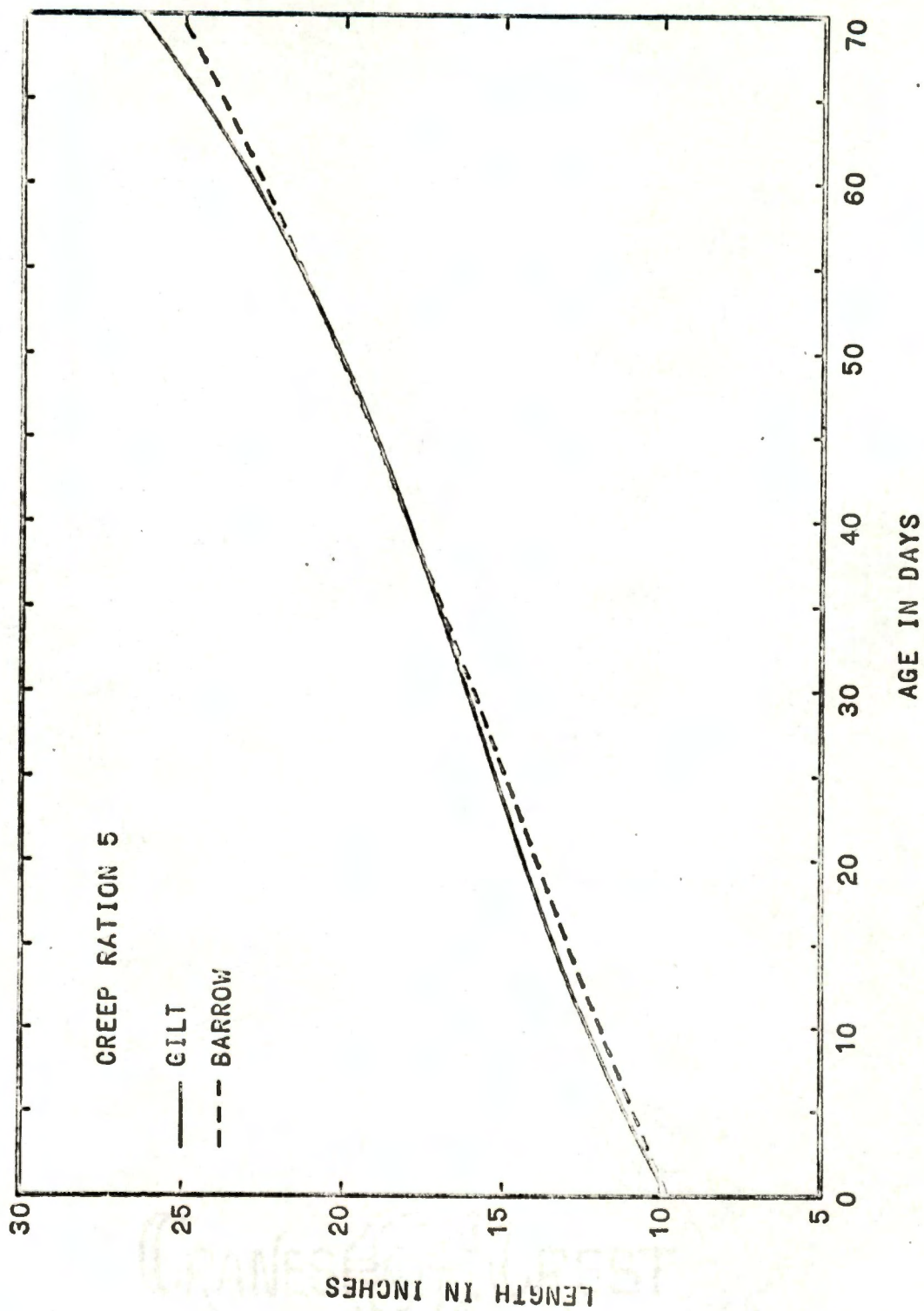


Figure 6. Creep Ration 5.

effect on carcass length in market hogs. Bruner et al. (1958), Cahill et al. (1960), Charette (1961), Kropf (1962), and Bereskin et al. (1971) found that barrows were shorter in carcass length than gilts. In this experiment, although barrows were on the average 0.19 inches (.48 cm) shorter than gilts, the observation in itself was not significant (Table III, type III SS). Figures 2, 4, and 6 indicate that gilts are longer from birth to 70 days of age, whereas Figures 3 and 5 depict barrows as being longer. If the creep rations were causing an effect, it did not alter the shape of the curve either between sexes or between rations. Therefore, the same equation can be used to predict the length of either sex. Since Age, Age², and Age³ were significant in both a sequential and a partial analysis, and sex and creep ration were only significant in a sequential analysis, the equation for predicting and adjusting length becomes:

$$\hat{Y} = Y_m + b_1 (\text{Age}_p - \text{Age}_m) + b_2 (\text{Age}_p^2 - \text{Age}_m^2) + b_3 (\text{Age}_p^3 - \text{Age}_m^3).$$

where:

$\hat{Y}$ = predicted length

Y_m = measured length used to predict or adjust other lengths

b_1 = .303

b_2 = -.003

b_3 = .00003

Age_p = age in days of length to be predicted

Age_m = age in days of measured length

If one wanted to predict the length of a pig at 67 days of age from the length at 46 days of age, and the length of the pig at 46 days of age

was 20.63 inches (52.4 cm), the equation would be as follows:

$$\begin{aligned}\hat{Y}_p &= Y_m + b_1 (\text{Age}_p - \text{Age}_m) + b_2 (\text{Age}_p^2 - \text{Age}_m^2) + b_3 (\text{Age}_p^3 - \text{Age}_m^3) \\ \hat{Y}_p &= 20.63 + .303 (67-46) + -.003 (67^2-46^2) + .0003 (67^3-46^3) \\ \hat{Y}_p &= 20.63 + .303 (67-46) + -.003 (4489-2116) + .00003 (30076-97336) \\ \hat{Y}_p &= 20.63 + .303 (21) + -.003 (2373) + .00003 (203427) \\ \hat{Y}_p &= 20.63 + 6.363 + (-7.119) + (6.103) \\ \hat{Y}_p &= \underline{25.98 \text{ inches}} (65.99 \text{ cm})\end{aligned}$$

One can also use this formula to adjust the lengths of a group of pigs to a common age. For instance, if a pig is 65 days of age and 21.50 inches (54.6 cm) in length and one wanted to adjust his length to the common age of the other pigs whose ages are 37 days, the equation would be as follows:

$$\begin{aligned}\hat{Y}_p &= Y_m + b_1 (\text{Age}_p - \text{Age}_m) + b_2 (\text{Age}_p^2 - \text{Age}_m^2) + b_3 (\text{Age}_p^3 - \text{Age}_m^3) \\ \hat{Y}_p &= 21.50 + .303 (37-65) + -.003 (37^2-65^2) + .00003 (37^3-65^3) \\ \hat{Y}_p &= 21.50 + .303 (37-65) + -.003 (1369-4225) + .00003 (50653-274625) \\ \hat{Y}_p &= 21.50 + .303 (-28) - .003 (-2856) + .00003 (-223972) \\ \hat{Y}_p &= 21.50 + (-8.484) - (8.568) + -(6.719) \\ \hat{Y}_p &= \underline{14.86 \text{ inches}} (37.74 \text{ cm})\end{aligned}$$

For the prediction equation the predicted length is 25.98 inches (65.99 cm), whereas, the actual measured length of the pig at 67 days is 26.25 inches (66.67 cm). This same pattern is found in the adjustment where the adjusted length for the 37th day of age is 14.86 inches (37.74 cm) and the actual measured length at 37 days of age is 15.38 inches (39.06 cm). As can be seen there is a difference of less than one inch between the predicted or adjusted length and the actual measured

length. Most of this difference can probably be attributed to the inaccuracy of measuring the length. A slight change in position of the pig, such as inflation of the lungs due to squealing, could change the measurement as much as 1/2 inch (1.27 cm). These reasons are suggested by Hetzer et al. (1950) who deduced that a hog's body position changes so frequently that body measurements for length may not be reliable. Fewson and Leroy (1959) concluded that the usefulness of body length measured on living animals appears to be very questionable since the average of five repeated measurements at a time were still unsatisfactory.

While measuring the pigs, it was noted that pigs within the same litter were approximately the same length. It has been well documented that carcass length, loin eye area, lean cut weight, and percent lean cuts are moderately heritable within the range of .4 to .6 (Enfield and Whatley, Jr., 1961 and Arganosa et al., 1969). It has been noted by Bereskin et al. (1971) that breed of sire significantly affected only carcass length, but breed of dam significantly influenced all carcass traits studied. Some of the carcass traits studied by these authors were carcass length, loin eye area, size of ham, and backfat.

It should be noted that in the literature review carcass length refers to the hanging carcass length and not the live measurement of length. However, it was felt that this carcass length is still relevant to the live carcass length because Lidvall et al. (1972) concluded that the measurement from the poll to the tail head accounted for 61% of the variance in the hanging carcass length. This agrees with Spears (1967) who obtained a correlation of .87 between carcass length and length

measured from the poll to the root of the tail of the live hog. This, at least, implies a reliability for live body-length measurements.



CHAPTER V

SUMMARY

The results of this experiment have shown the length-growth patterns in young swine to be linear. For the purposes of this experiment and because of the effects of the different finishing rations, the analysis of the data was terminated at weaning. However, length and weight measurements were taken up to slaughter and the results showed that the curve remained linear from birth to slaughter, approximately 220 pounds (100 kg).

From the results of this experiment, a successful adjustment and prediction equation has been established for this data. Because of the low correlation of carcass length to cutting yields, index of composition, size of loin, size of ham, et cetera, the prediction equation is probably of little value to the pork producer who is trying to predict the performance of his hogs. If there was a high correlation between carcass length and size of ham, percent yield, and rate of gain, a pork producer could measure the length of a pig at some age and predict the length at a future age and therefore be able to predict the carcass yield and rate of gain, et cetera in the future. This would become an excellent selection tool for boars and gilts for the purebred producer. For a pork producer who relies heavily upon length as a selection tool, the prediction equation would be very useful because he could predict which pig would be the longest at weaning. The most valuable aspect of this research would be the adjustment factor. Since longer carcasses are associated with faster rates of gain and a more desirable backfat, it becomes necessary to adjust pigs that deviate from the average length

of the group to a common length so that the rate of gain can be more effectively compared. Therefore, the adjustment factor would probably be useful only to the researcher and not the commercial pork producer.





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CRANES CREST

APPENDIX

TABLE IV
LENGTH AND WEIGHT MEANS BY WEEK

Age	N	Mean Length $\pm$ S. D.	Weight $\pm$ S. D.
1 day	101	10.05 $\pm$ 0.66	3.57 $\pm$ 0.61
1 week	101	12.55 $\pm$ 1.11	6.49 $\pm$ 1.54
2 weeks	101	14.12 $\pm$ 1.31	9.10 $\pm$ 2.16
3 weeks	100	15.86 $\pm$ 1.26	12.21 $\pm$ 2.84
4 weeks	99	16.97 $\pm$ 1.40	14.46 $\pm$ 3.47
5 weeks	101	18.38 $\pm$ 1.58	18.09 $\pm$ 4.22
6 weeks	101	19.52 $\pm$ 1.58	22.94 $\pm$ 5.28
7 weeks	101	21.72 $\pm$ 1.73	30.42 $\pm$ 6.27
9 weeks	100	25.05 $\pm$ 2.14	45.68 $\pm$ 8.29
17 weeks	97	36.39 $\pm$ 2.04	128.38 $\pm$ 16.07
24 weeks	101	42.49 $\pm$ 1.69	198.30 $\pm$ 21.04

VITA

David Paul Walker was born in Knoxville, Tennessee on April 26, 1953. He attended Amherst and Cedar Bluff Elementary Schools and graduated from Karns High School in June 1971. He then entered Carson Newman College in Jefferson City, Tennessee and later transferred to Tennessee Technological University where he received his Bachelor of Science degree with a major in Animal Science in August 1975. In September of the same year, he entered the University of Tennessee, Knoxville where he received his Master of Science degree with a major in Animal Science on August 23, 1977.

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