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## Nutrition Associated Disease

Saren Van Amstel

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# NUTRITION ASSOCIATED DISEASE

Sarel Van Amstel

# Introduction

- ▣ Many approaches to camelid nutrition
  - No to free choice grain
  - No alfalfa
  - Assessment of grass hay digestibility
  - Choices and variability of feed supplements

- ▣ Extremes in body condition, health and productivity:
  - Many normal 3-3.5 BCS
  - Some over conditioning – obese 5/5
  - Too many - poor body condition (emaciation) – 1/5 BCS

# Under conditioning

## ▣ Disease complex:

- Protein/Energy Malnutrition PEM (Failure to thrive/starvation)
  - Mobilization & Serous atrophy of fat stores
  - Fat stores including bone marrow turned into a gelatinous substance
  - Fluid effusion into body cavities
- Nutritional osteodystrophy (Rickets)
  - ▣ Osteopenia. Thinning of bones
- Trace mineral deficiencies



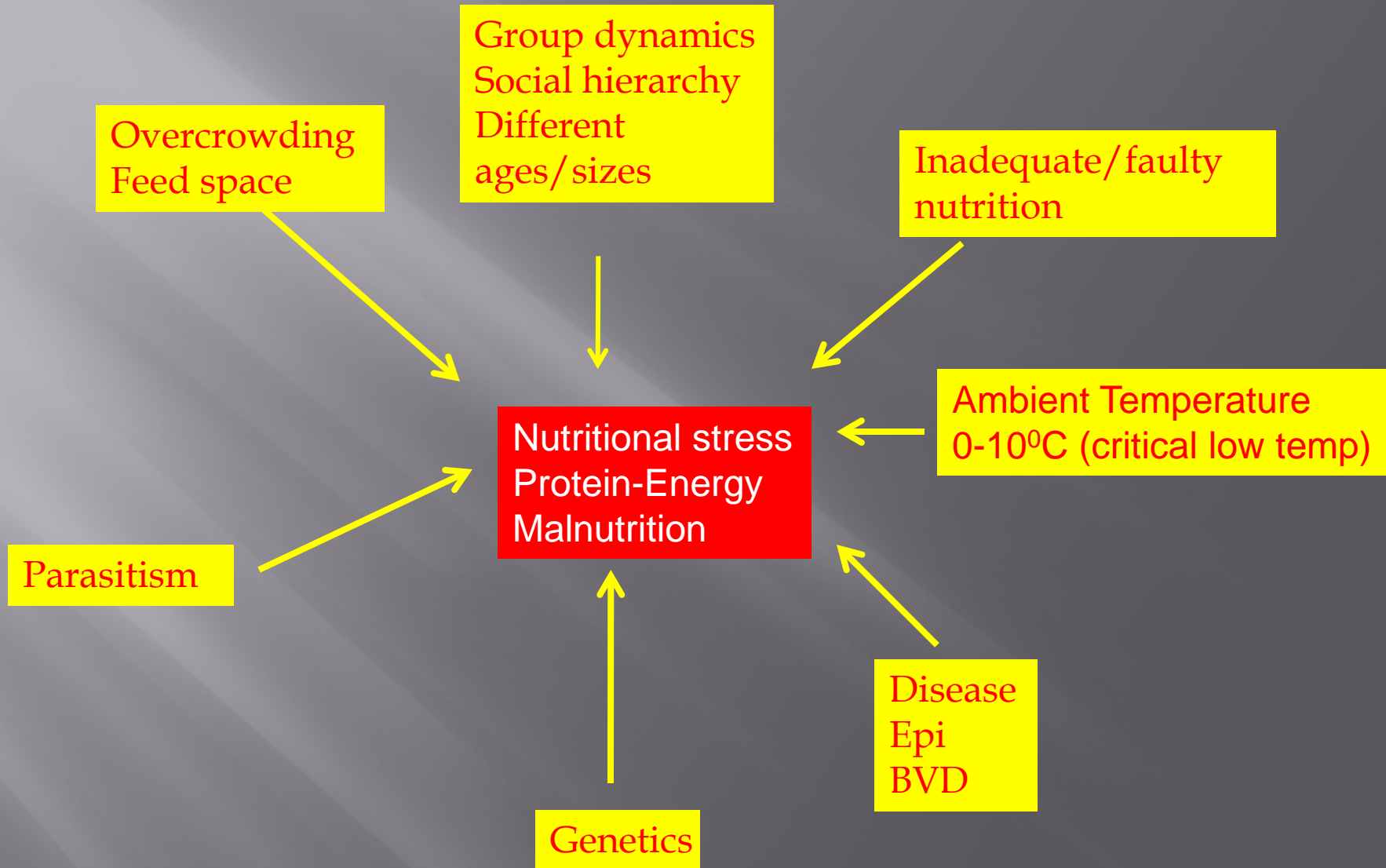
## ▣ PEM:

- Poor body condition. BCS 1/5
- Growing animals cessation of gain
- Weak often down acutely
- Normal or depressed appetite
- Pregnant, lactating females hepatic lipidosis
- Often mild non-regenerative anemia and hypoproteinemia
- Joints feel prominent & swollen costochondral junctions

# PEM

- ▣ Animals predisposed
  - Pregnant/lactating
  - **Growth**
  - Geriatric







# PEM

- ▣ Most common reason is poor quality forages
- ▣ Forage - principal dietary component
- ▣ 100 pound camelid should have access to 2 pounds of good quality dry grass hay per day
- ▣ Poorer quality hay; mix with alfalfa
- ▣ Alfalfa, mature
- ▣ Grain according to needs
- ▣ Other supplements

# Obesity

- ▣ More common in llamas
- ▣ Feeding too high quality forage relative to requirements
- ▣ Overfeeding supplements – grain & readily fermentable fiber
- ▣ Predisposes to:
  - Heat stress
  - Metabolic disease
  - Infertility
  - Lameness - arthritis
  - Lactic acidosis (grain overload) – cracked corn, oats, barley or wheat in combination with low crude fiber (<12%)

# PEM / Obesity control

- ▣ Body condition score/body weights every 4-6 weeks (3-3.5 of 5)
- ▣ Provide effective protective shelter during cold/wet conditions
- ▣ Forage analysis
- ▣ Feed lower quality forages before grazing pasture or increase stocking density/ grazing intensity/use mature pastures
- ▣ Attend to other predisposing causes:
  - Herd management
  - Parasitism
  - Dental /health checks

# Polioencephalomalacia Vit B1 deficiency

- ❑ Thiamine deficiency common in camelids resulting in polio.
- ❑ Water soluble vitamins (B complex group including B1 - thiamine) produced by microbes in C1
- ❑ Predisposing factors include:
  - Excessive dietary sulphur or overdose with amprolium
  - Rumen acidosis – thiaminase producing bacteria
  - Thiaminase containing plants
- ❑ Clinical signs:
- ❑ Depression, seizures, blindness, hypersensitivity and sudden death
- ❑ Treat with Vit B1 (10-20 mg/kg)

# Urolithiasis

- ▣ Over feeding grain –high in phosphate
- ▣ Lush grass pastures heavily fertilized with potassium
- ▣ Clinical signs:
  - Straining and inability to urinate
  - Dribbling urine
- ▣ Increase water consumption by adding salt to diet
- ▣ Urine acidification – ammonium chloride

# Trace minerals

- ▣ 15 required. 5 associated with disease
  - Copper; iodine; iron; selenium and zinc.
  - Large proportion of forages deficient in zinc, selenium and copper but high in potassium which will depress magnesium uptake
  - Excess Ca in diet such as legume hays (alfalfa) will depress Zn intake



# Trace minerals

- ▣ Well water
  - Can be high in sulfur and iron
    - ▣ Reduce Cu absorption
    - ▣ High sulfur can predispose to polio-encephalomalacia
    - ▣ Areas with rock phosphate can be high in fluoride
      - Chronic fluorosis.
        - Tooth decay
        - Chronic lameness due to fluoride deposition in bone



# Trace minerals

- ▣ Disease states associated with mineral deficiencies:
  - Immune dysfunction – Cu, Zn, Se
  - Developmental abnormalities – Cu, Mn, I
  - Abortion Cu, I, Se
  - Retained placenta Cu, Se, I
  - Metabolic disturbances Co, I, Fe, Zn

# Trace mineral supplementation

- ▣ Inorganic sources; sulfate and carbonate more bioavailable than oxide
- ▣ Organic forms are protected from gastric alteration thus highly bioavailable
  - Zinc methionine
- ▣ Nutrient delivery calculations
  - Amount fed  $\times$  trace mineral content

# Trace mineral supplementation

- ▣ Nutrient delivery calculations
  - None of mineral supplements and only 7/17 pellet supplements provide sufficient copper
  - 50% of mineral and pellet supplements provide sufficient selenium
  - 67% of mineral and pellet supplements have sufficient iron
  - Vit A & E generally adequately supplemented
  - Zn adequate in all mineral and 10 of 12 pellet supplements
  - 25% of all supplements meet vitamin D requirements

# Trace minerals

- ▣ Zinc
  - Normal immunity; skin integrity; fiber quality
  - Can cause hair loss and hyperkeratosis on all body surfaces
  - Secondary infection common
  - Play a role in “munge”
  - Diagnosed on skin biopsy – eosinophil infiltration diagnostic

# Trace minerals

- ▣ Zinc supplementation
- ▣ Avalia - Zn 100. zinc-methionine.
  - Greater bioavailability
  - 0.5 gram/day

# Trace minerals

- ▣ Copper (function)
  - Necessary for hemoglobin formation along with iron (Hypochromic microcytic)
  - Necessary for normal bone formation
  - Necessary for normal keratinization in the feet (pads & nails)



# Trace minerals

- ▣ Copper (deficiency)
  - Interaction of molybdenum, sulfur with dietary copper results in lower availability
  - Anemia, altered hair coloration, impaired immune response and poor growth
- ▣ Copper (excess)
  - Causes hepatic necrosis without hemolysis
  - Copper conc. higher than 20mg/kg and 16:1 Cu:Mo ratio



# Trace minerals

## ▣ Selenium

- Important biochemical component of enzyme system that protects body cell membranes against peroxidative damage (antioxidant)
- Clinical signs of deficiency: lameness; < activity; Dyspnea; colic; >suscept to heat stress; infertility
- Selenium supplementation @1mg/day/animal
- Soil should be tested for selenium
- Use BoSe strategically

# References

- ▣ Van Saun, R. Camelid Nutrition. Trace mineral supplementation: what are our targets? 2010 Intl. Camelid Health Conf. for Veterinarians. Ohio State Univ. CVM
- ▣ Dr. Nancy A. Irlbeck. Basic of alpaca nutrition.

[http://www.alpacaresearchfoundation.org/papers\\_reports/Basics%20of%20Alpaca%20Nutrition.html](http://www.alpacaresearchfoundation.org/papers_reports/Basics%20of%20Alpaca%20Nutrition.html)

Questions?

