

## Dr. R. Harry Anderson

Ph.D. degree from S.D.S.U. 1970  
3 years extension specialist in wyoming  
15 years with a major feed company as feedlot consultant and district manager  
45 years consulting nutritionist for all species  
18 years since starting current formulas



---

---

---

---

---

---

---

---

## What is important in nutrition?

- 1.Keep the animal healthy
- 2.Make everything the most efficient possible
- 3.Maximize performance and production as first priority in formulation



---

---

---

---

---

---

---

---

## Critical terms:

- 1.Digestibility
- 2.Bioavailability
- 3.Chelate vs. Complex
- 4.*Ascoplyllum nodosum*



---

---

---

---

---

---

---

---

**Life cycle nutrition:**

- 1. In utero for fetus
- 2. Gestation
- 3. Lactation/breeding
- 4. Creep feeding
- 5. Weaning
- 6. Backgrounding



---

---

---

---

---

---

---

---

**Life cycle nutrition:**

- 1. In utero for fetus
- 2. Gestation



---

---

---

---

---

---

---

---

**Life cycle nutrition:**

- 3. Lactation/breeding



---

---

---

---

---

---

---

---

### Life cycle nutrition:

#### 5. Weaning



---

---

---

---

---

---

---

---

### Life cycle nutrition:

#### 6. Backgrounding



---

---

---

---

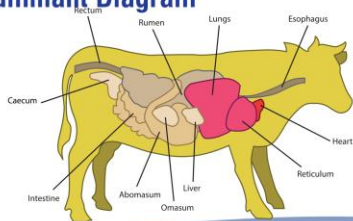
---

---

---

---

### DIGESTIVE SITE DIFFERENCES Ruminant Diagram



---

---

---

---

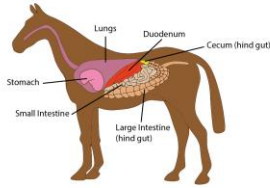
---

---

---

---

## DIGESTIVE SITE DIFFERENCES Equine Diagram



---

---

---

---

---

---

---

---

## How to unlock nutrients:

- 1.Promote bacterial growth rate
- 2.Provide nutrients to the bacteria
- 3.Control bacteria that are negative to fiber digestion



---

---

---

---

---

---

---

---

## Fiber digestion – how does it work:

- 1.Done by bacteria
- 2.Converts the sugars in fiber to volatile fatty acids that are absorbed and converted to sugar or fat



---

---

---

---

---

---

---

---

## Fiber digestion

Fiber + Bacteria = Volatile Fatty Acids = Energy Units



---

---

---

---

---

---

---

---

## Missing keys to maximizing health and performance

1. Protein and amino acid digestion
2. Minerals – the overlooked nutrients
3. Level and form of trace minerals
4. *Ascophyllum nodosum*



---

---

---

---

---

---

---

---

## Digestive health is important:

1. Affects the absorption of nutrients
2. Affects the function of the immune system



---

---

---

---

---

---

---

---

### Hormonal control:

- 1.Highly micro nutrient dependent



---

---

---

---

---

---

---

---

### Fertility and how affected:

- 1.Blood flow to endocrine system
- 2.Trace minerals
- 3.Protein availability and amino acid digestibility



---

---

---

---

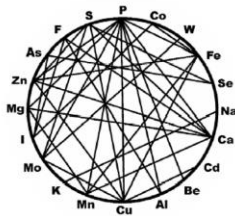
---

---

---

---

### GENERAL MINERAL INTERACTION WHEEL



---

---

---

---

---

---

---

---

MAJOR MINERALS AND INTERACTIONS

List of major minerals

- 1. Calcium
- 2. Magnesium
- 3. Potassium
- 4. Sodium
- 5. Chlorine
- 6. Phosphorus




---

---

---

---

---

---

---

---

MAJOR MINERALS AND INTERACTIONS

Ratios that work for all species

Potassium = 1.25  
 Calcium = 1  
 Phosphorus = 0.3  
 Magnesium = 0.3  
 Sodium to balance potassium




---

---

---

---

---

---

---

---

MAJOR MINERALS AND INTERACTIONS

Problems when ratios are not in safe bounds

- a. Potassium too high and calcium/magnesium too low can cause muscle spasms (grass tetany/tie up, etc.)
- b. Iron/molybdenum vs. copper and copper tie up
- c. Magnesium not high enough to balance potassium can cause anxiety and muscle spasms




---

---

---

---

---

---

---

---

*TRACE MINERALS - IMPORTANCE & QUALITY*  
**List of trace minerals**

1. Cobalt
2. Copper
3. Selenium
4. Iron
5. Manganese
6. Iodine
7. Zinc



---

---

---

---

---

---

---

---

**Brief chemistry lesson on forms**

1. Metallic
  - a metal ion attached to oxygen
  - cheap with a low bio-availability



---

---

---

---

---

---

---

---

**Brief chemistry lesson on forms**

2. Sulphates
  - a metal ion attached to a sulphate radical
  - more expensive
  - 60-70% bio-available



---

---

---

---

---

---

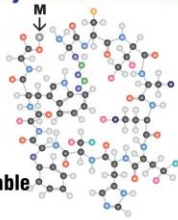
---

---



### Brief chemistry lesson on forms

- 3. Amino acid complex
- metal ion attached to a protein or amino acid
- ~80% bio-available



---

---

---

---

---

---

---

---

### Brief chemistry lesson on forms

- 4. Proteinates
- metal ion attached to a protein



---

---

---

---

---

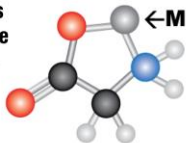
---

---

---

### Brief chemistry lesson on forms

- 6. True chelates
- most expensive
- very high bio-availability



---

---

---

---

---

---

---

---

*ASCOPHYLLUM NODOSUM*

**Definition**

- 1. North Atlantic, cold water species of seaweed or kelp
- 2. Contains high level of sulfated, short chain polysaccharide called fucoidan that is made of fucose sugar molecules




---

---

---

---

---

---

---

---

*ASCOPHYLLUM NODOSUM*

**Where research conducted**

- 1. Virginia Tech University - fescue toxicosis, heat tolerance
- 2. Texas Tech University - feedlot carcass improvement, immune system enhancement, E. coli control in hind gut
- 3. University of Missouri - body temperature control in extreme heat using heat chambers




---

---

---

---

---

---

---

---

*ASCOPHYLLUM NODOSUM*

**Where research conducted**

- 4. University of Alabama - body temperature control and reduced fly population in hot weather
- 5. North Dakota State University - fiber digestibility
- 6. University of Alberta, Lethbridge - E. coli reduction in feedlot animals




---

---

---

---

---

---

---

---

*ASCOPHYLLUM NODOSUM*

**Benefits**

- 1. **Heat tolerance** – lower body temperature in hot weather and animals will work harder and longer without getting overheated
- 2. **Digestive tract** – maintain better lower gut environment resulting in better nutrient absorption
- 3. **Immune system** – thought to result from healthy lower gut
- 4. **Blood flow**
- 5. **Nervous system moderation** – presence of fucose sugar



---

---

---

---

---

---

---



---

---

---

---

---

---

---