

# **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**



**Total Feeds**

# 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



**Total Feeds**

# Critical terms:

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



Total Feeds

# Life cycle nutrition:

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



Total Feeds

# Life cycle nutrition:

1. In utero for fetus
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**Total Feeds**

# Life cycle nutrition:

## 3.Lactation/breeding



Total Feeds

# Life cycle nutrition:

## 5. Weaning



Total Feeds

# Life cycle nutrition:

## 6. Backgrounding

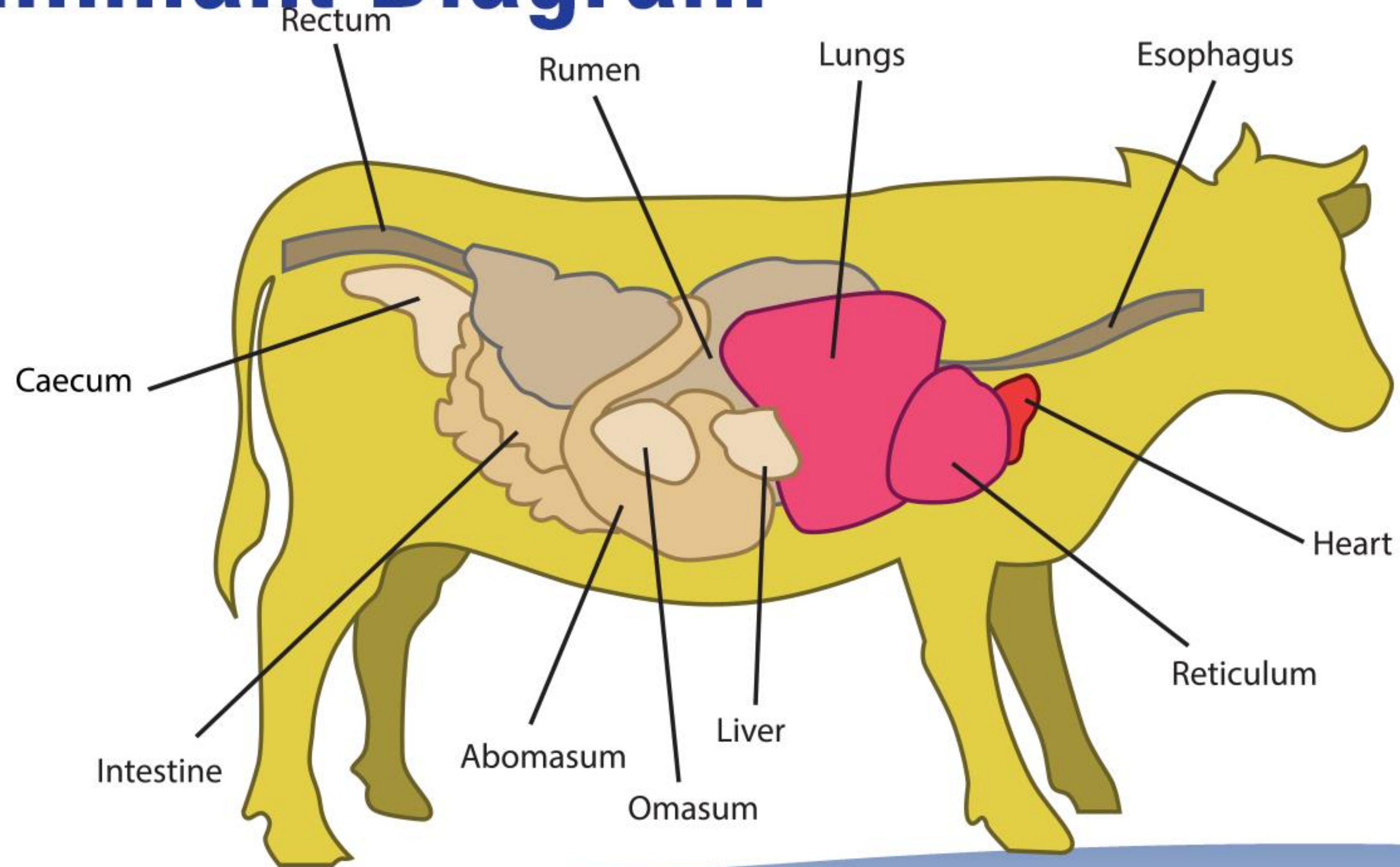


Total Feeds



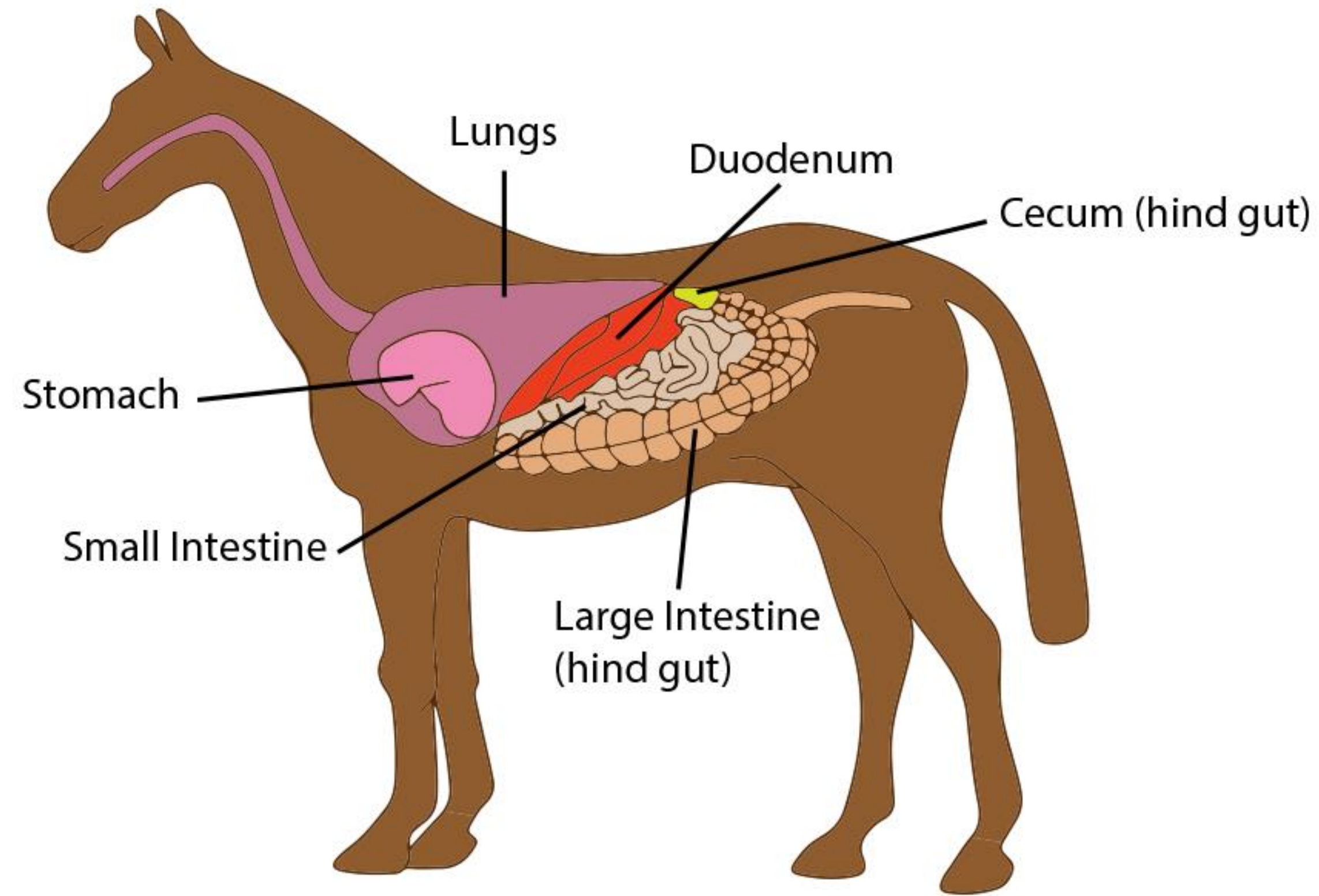
# DIGESTIVE SITE DIFFERENCES

## Ruminant Diagram



# *DIGESTIVE SITE DIFFERENCES*

## **Equine Diagram**



**Total Feeds**

# How to unlock nutrients:

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



Total Feeds

# 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



Total Feeds

# Fiber digestion

**Fiber + Bacteria = Volatile Fatty Acids = Energy Units**



**Total Feeds**

# 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*



Total Feeds

# **Digestive health is important:**

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



**Total Feeds**

# Hormonal control:

1. Highly micro nutrient dependent



Total Feeds



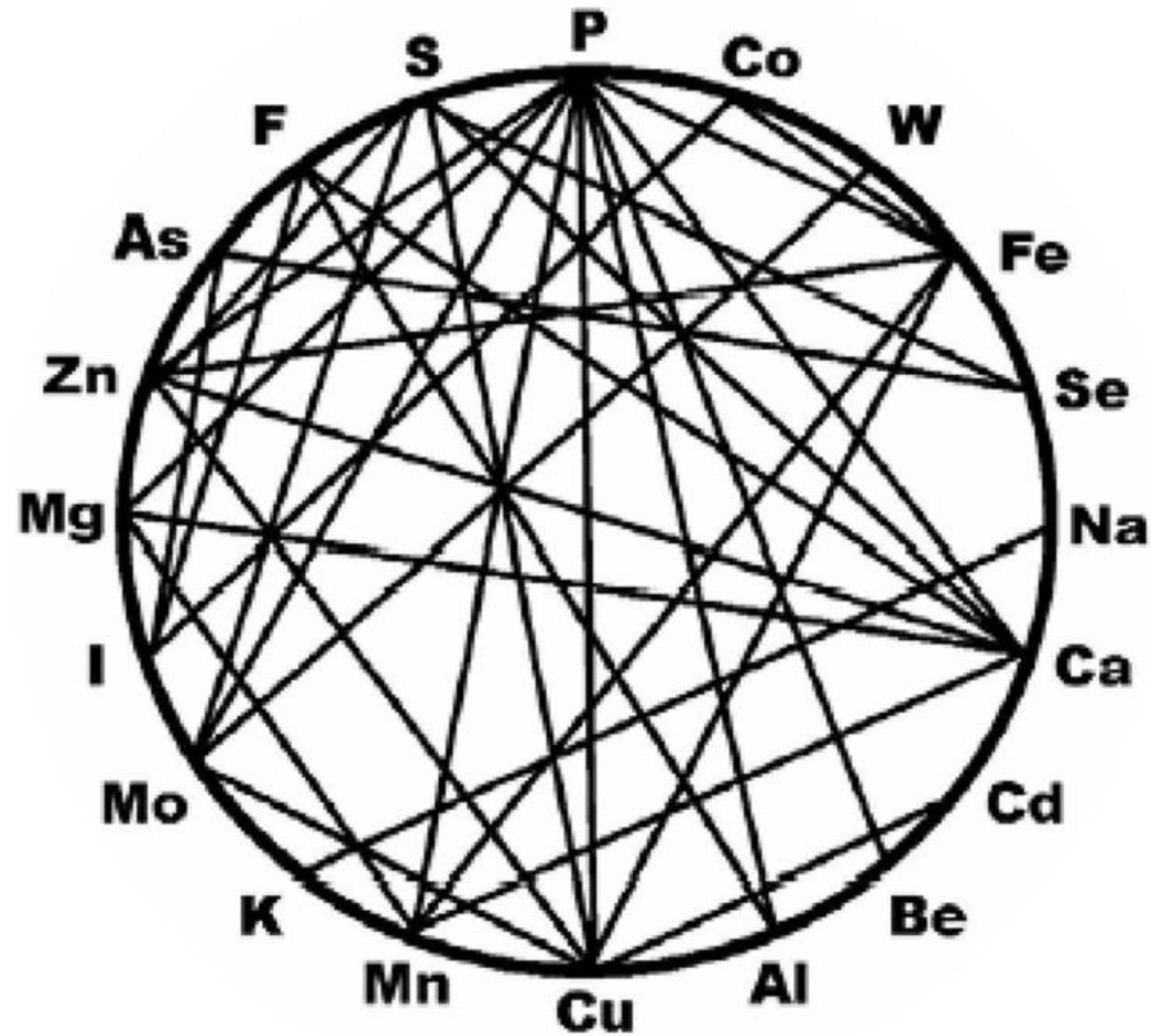
# Fertility and how affected:

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



Total Feeds

# GENERAL MINERAL INTERACTION WHEEL



Total Feeds

# *MAJOR MINERALS AND INTERACTIONS*

## **List of major minerals**

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



Total Feeds

# *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**



**Total Feeds**

# *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**



Total Feeds

## **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



Total Feeds

# Brief chemistry lesson on forms

## 2. Sulphates

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

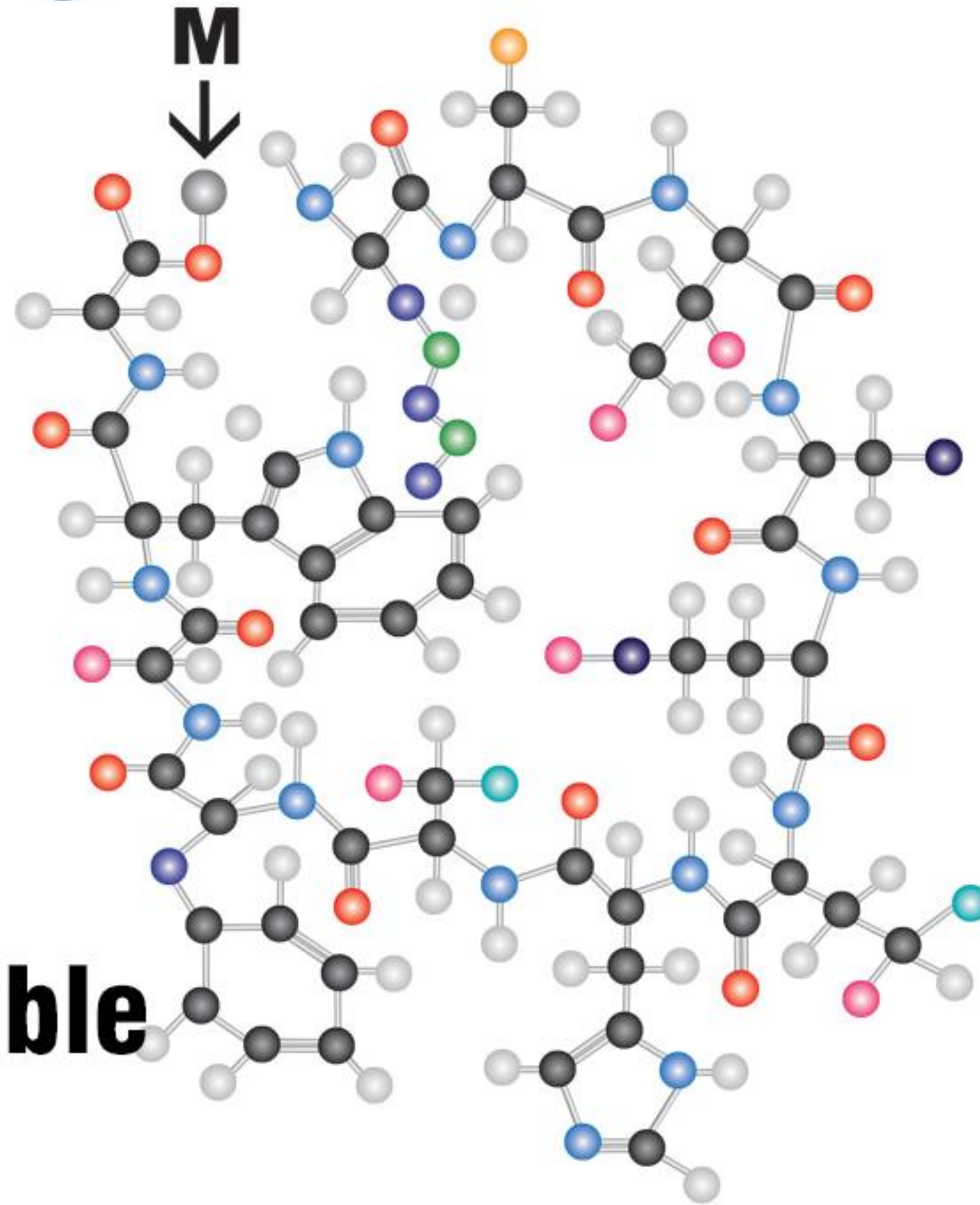


Total Feeds



# Brief chemistry lesson on forms

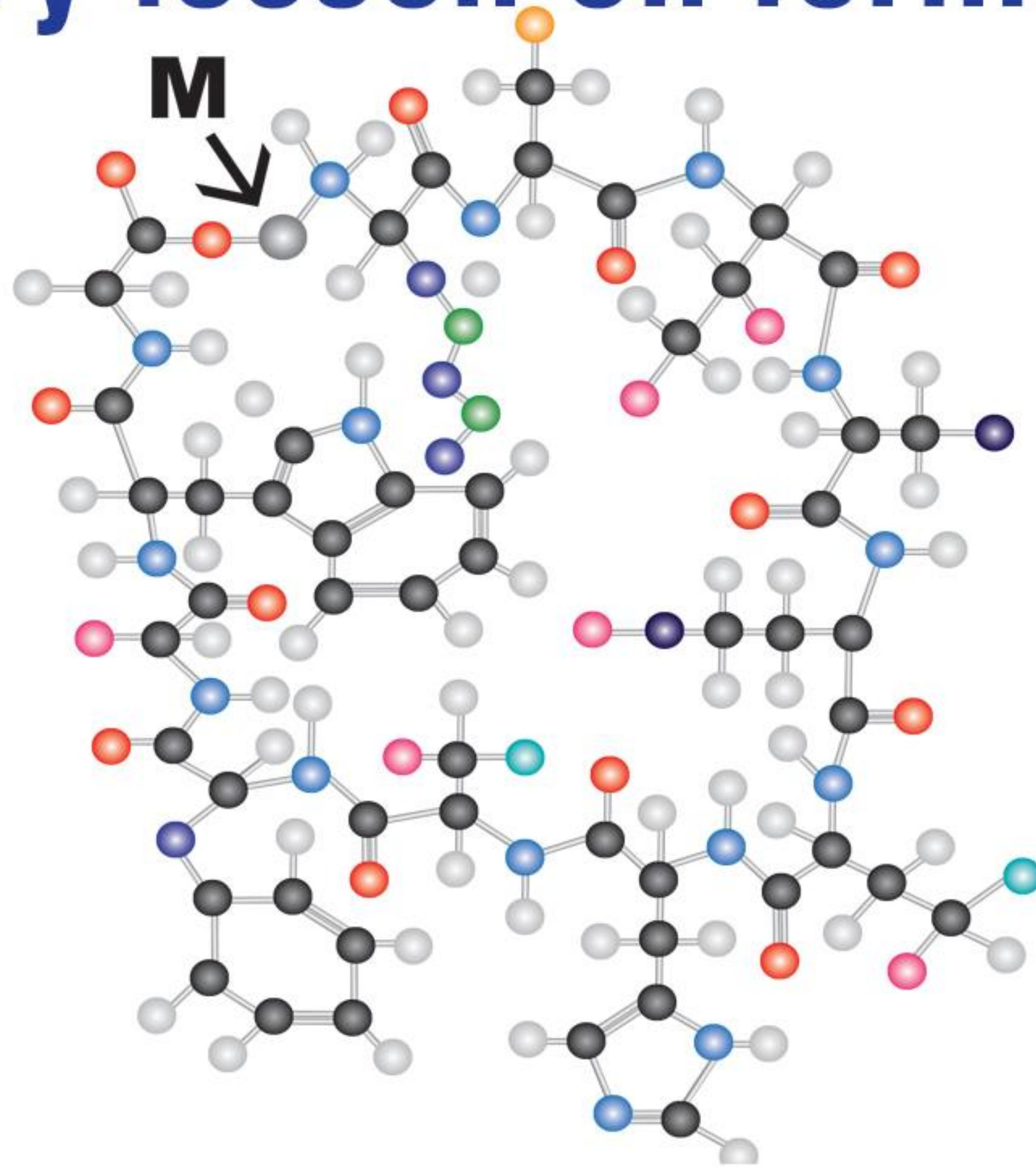
**3. Amino acid complex**  
**- metal ion attached to a protein or amino acid**  
**~80% bio-available**



Total Feeds

# Brief chemistry lesson on forms

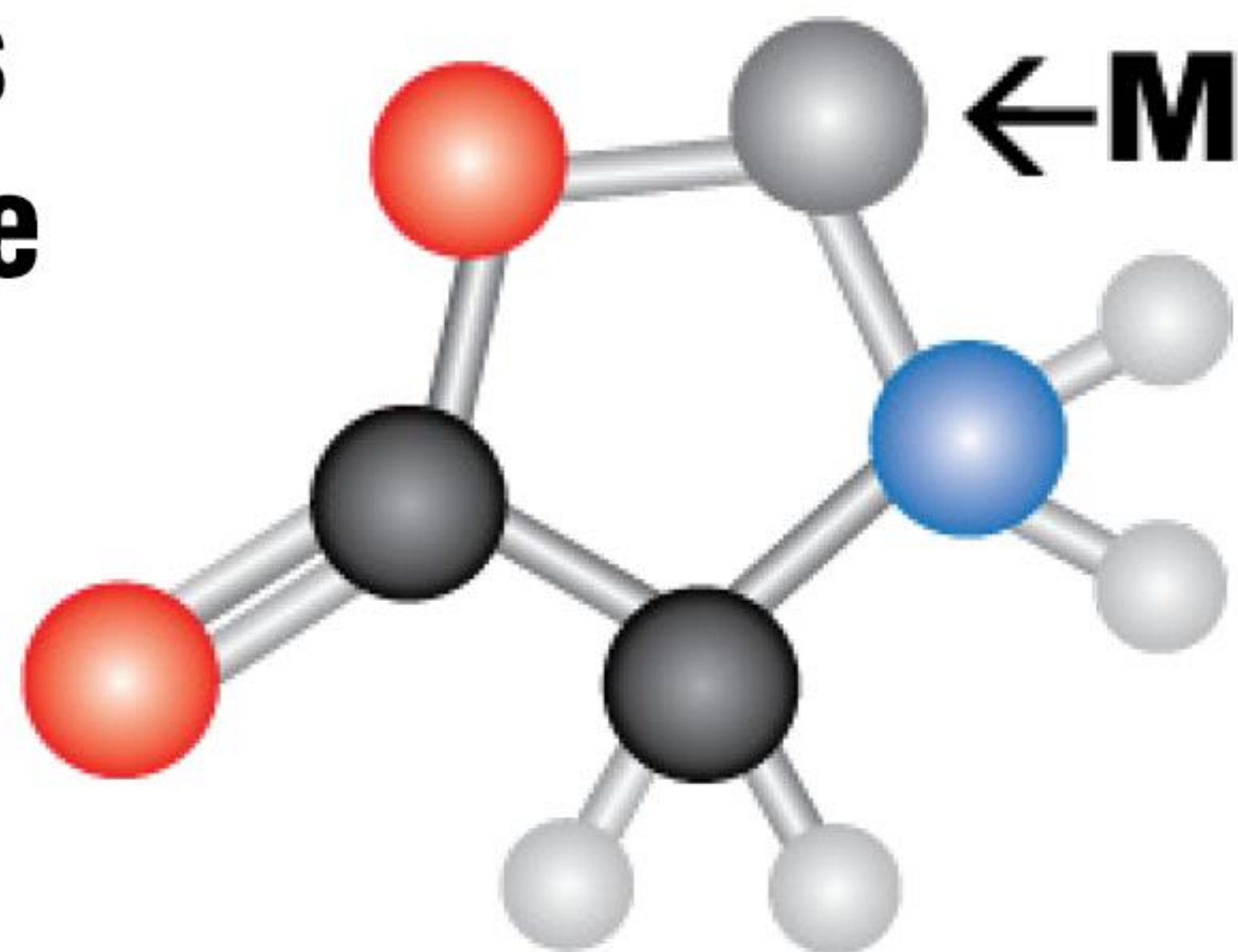
## 4. Proteinate -metal ion attached to a protein



Total Feeds

# Brief chemistry lesson on forms

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



Total Feeds

# *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**



Total Feeds

# *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**



Total Feeds

# *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**





*Birk*