Why Study Nutrition?

AG 240
Less than 2% of the Population is involved in Agriculture

Source: American Farm Bureau Farm Facts
Genetic changes require different feeding regimes

Source: Contemporary Issues in Agriculture
Understand Feed Consumption
Feed Costs $$$$$$

- Comprise approximately 60% of annual cow costs in cow-calf operations
- 50-75% in other species
Should we feed cereal grains to people instead of animals?
Feed Grain Usage in U.S.

- Cattle consumed 19.1%
- Hogs consumed 23.1%
- Poultry consumed 26.9%

Source: NCBA Cattle and Beef Handbook-1997
Justification?

- Livestock are efficient converters of grain to protein
- Livestock production and use of feed grains is not part of the world’s hunger problem
Digestive Process
Types of diets

- Herbivore
- Carnivore
- Omnivore
Types of Digestive Systems

- Monogastric
- Ruminant
Digestion Definition

- Mechanical, chemical and enzymatic action necessary for food to be “usable” by body

- “Usable” - Converting complex nutrients into forms that can be absorbed by animal
Digestive Steps

- Prehension
- Mastication
- Deglutition
- Regurgitation (ruminants only)
Digestive Steps con’t

- Digestion
- Absorption
- Excretion
- Peristalsis
Monogastric Digestive System

Simple stomach with one compartment

FIGURE 1-5. Digestive system of the pig.

Source: Animal Feeding and Nutrition (Jurgens)
Swine Structure

- Mouth
- Esophagus
- Glandular Stomach
- Small Intestine
- Large Intestine
Mouth and Esophagus

- Tongue
- Teeth
- Saliva (3 paired glands)
  - Water
  - Mucin
  - Bicarbonate salts
  - Amylase
- Esophagus connects mouth to stomach
- Sphincter Valve (cardiac)
Glandular Stomach Regions

- Esophageal
- Cardiac
- Fundic
- Pyloric

FIGURE 1-6. Swine stomach.
Chemical Digestion

- HCL
- Mucin
  - Coats the lining of the stomach
- Pepsinogen
  - Converts to Pepsin when food is present
- Rennin
- Lipase
Swine Stomach

Source: University of Guelph, Canada
Final notes on Swine Stomach

- pH of 2
  - Very acidic
  - Denatures proteins

- Chyme
  - Partially digested food leaving stomach

- Pylorus Sphincter
  - Separates stomach and small intestine
Swine Small Intestine

- Primary site of enzymatic digestion
- Walls lined with villi
- pH is 6 to 7
- Muscular contractions move food

Source: University of Guelph, Canada
Sections of Small Intestine

- Duodenum
  - Active site of Enzymatic digestion
- Bile
  - Neutralizes pH of chyme
  - Produced by liver and stored in gall bladder
  - Emulsifies fats
- Pancreatic enzymes
Sections of Small Intestine
con’t

- Jejunum

- Ileum

Primary site for nutrient absorption
Walls lined with villi
Large Intestine Functions

- Absorption of water
- Form solid waste
- Some microbial fermentation
Large Intestine Sections

- Cecum
  - Microbial digestion; very little in pig
- Colon
  - Largest part
  - Water absorption
- Rectum
  - Elimination of indigestible food
Swine Cecum

Source: University of Guelph, Canada
Functions of GI Tract

- Digestion
- Absorption
- Excretion of elements
- Synthesis of nutrients by micro-organisms
  - Coprophagy
    - Consuming own feces
    - Primarily in rabbits and rats
Swine Digestive System

Source: Livestock Feeds & Feeding (Kellens/Church)
Chicken Differences

- Mouth
- Crop
- Proventriculus
- Gizzard
Chicken Differences con’t

- **Small Intestine**
  - Very long

- **Large Intestine**
  - 2 ceca
  - Short LI
  - One excretory gland

Source: Livestock Feeds & Feeding (Kellens/Church)
Horse Differences

- Mouth
- Esophagus
- Stomach
- Small Intestine
- Large Intestine

More complex digestive tract—12 X body length. Total capacity 45 gal. 40 or 42 teeth.

FIGURE 1-7. Digestive system of the horse.