

Swine Feeding Principles

Gene Pirelli

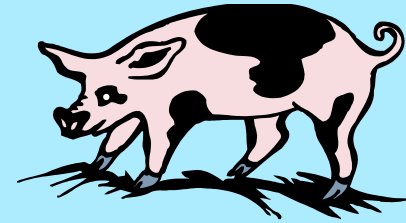
**OSU Department of Animal
and Rangeland Sciences**

Topics to be Covered

- **Protein and Amino Acids**
- **Energy Values**
- **Guidelines for Growing and Breeding Swine**
- **Interpreting Feed Tag Information**

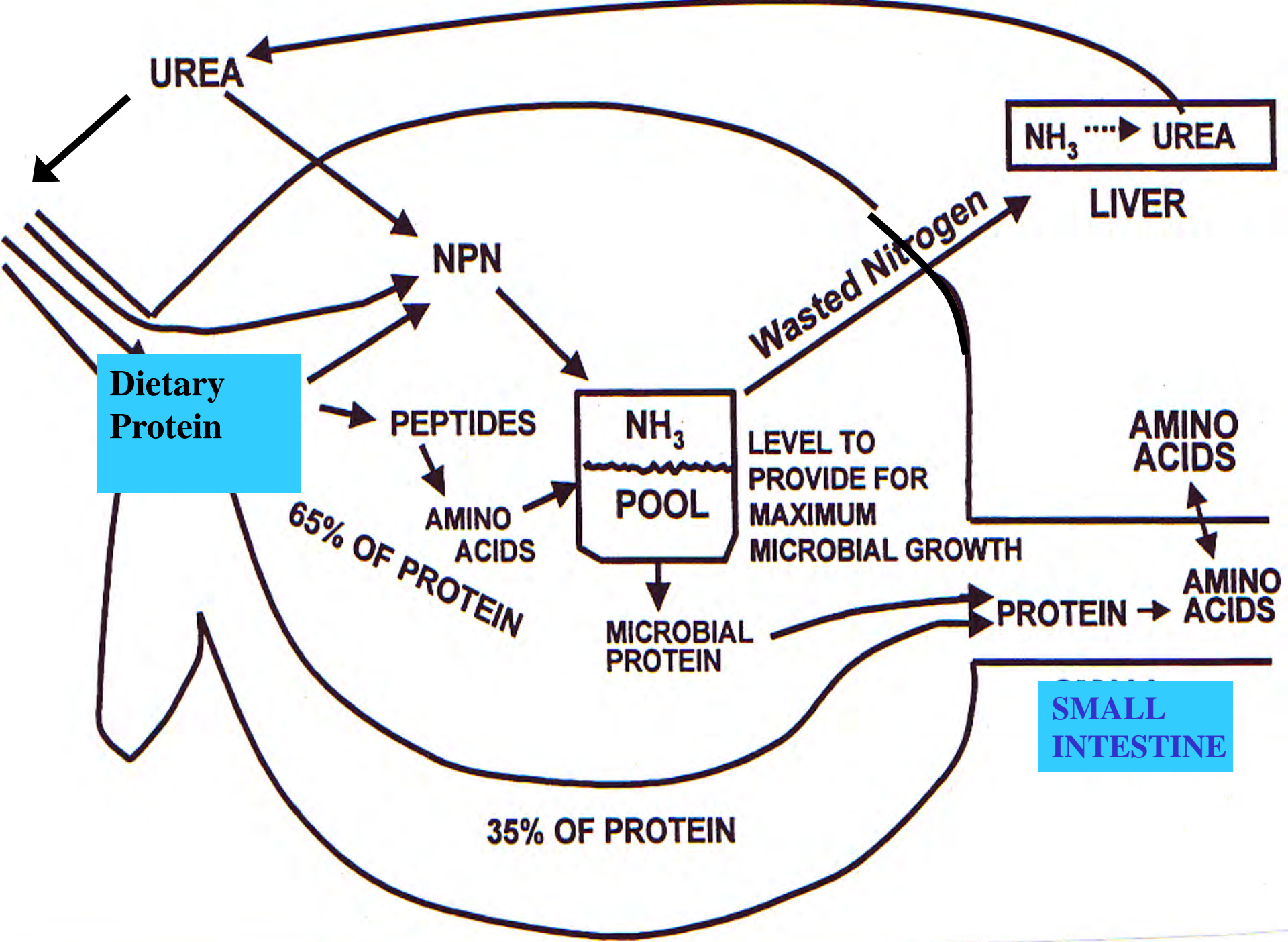
Swine Digestive System

Simple stomach
(Monogastric)

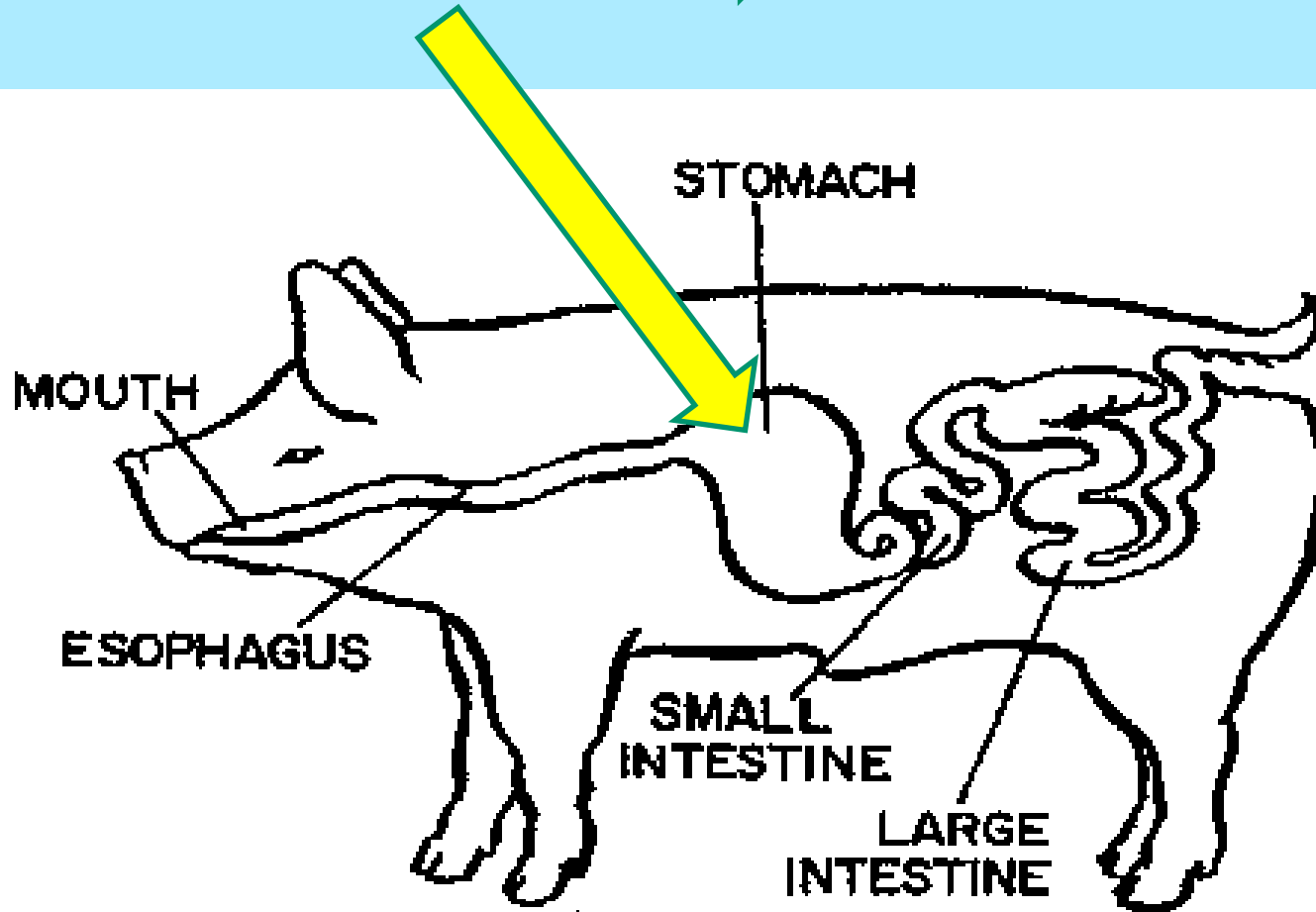


Different from cattle and
Sheep (Ruminants)





Dietary Protein → **Amino Acids**



Protein

- Protein in the feed is necessary for building muscle and producing milk.
- *Crude protein or total protein is the total amount of protein in a feed, listed as percent.*

Protein

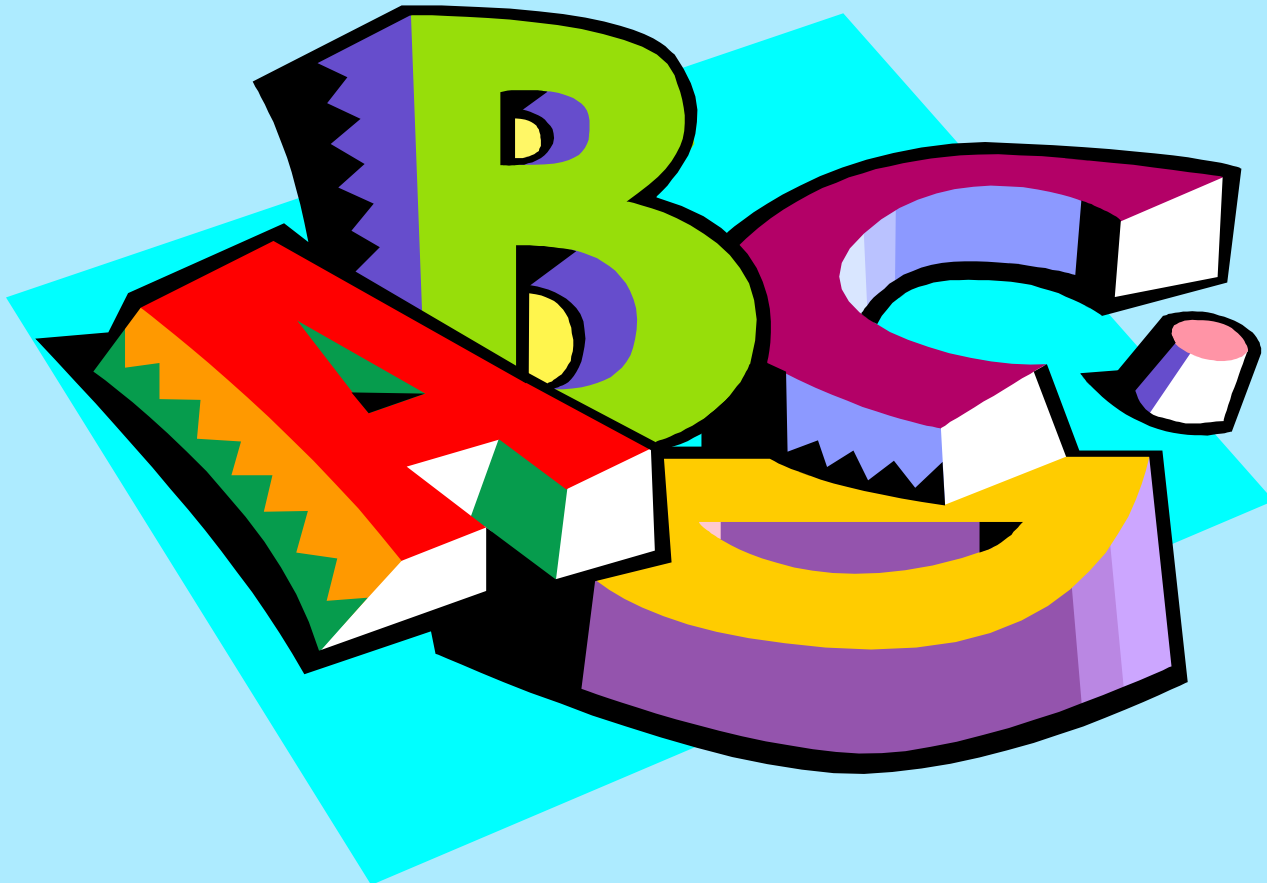
- Measured in a lab by **nitrogen x 6.25**
- *Not a measure of quality or digestibility*

Percent Protein is a minor consideration in swine rations

Amino acids are required for growth of pigs.

Swine feed should be balanced on amino acids.

**Amino Acids are called the
“Building Blocks of Protein”**



There Are 22 Amino Acids.....

- **Ten are known as “Dietary Essential Amino Acids” for pigs.**

Amino Acids

- **Lysine**
- **Methionine**
- **Threonine**
- **Tryptophan**
- **Isoleucine**
- **Arginine**
- **Histidine**
- **Phenylalanine**
- **Valine**
- **Leucine**

Protein (muscle)

lysine-methionine-tryptophan



lysine-valine-isoleucine-leucine

Protein Quality is Important

If one or more amino acids are deficient in the diet, protein synthesis in the animal (muscle growth) proceeds at a slower rate or stops.

Protein (muscle)

lysine-methionine-tryptophan



Protein
Synthesis
Stops

AA in Protein Sources

- **Soybean Meal - *high***
- **Canola Meal – *high***
- **Peas – *low-moderate***
- **Fish Meal - *high***
- **Alfalfa Meal – *low-moderate***
- **Dried Milk Products - *moderate***

Energy

- The energy (carbohydrate) in a feed provides what is necessary for growth, lactation and reproduction
- *Energy is estimated, not usually tested*

Energy

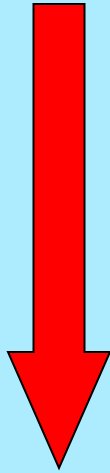
- **The energy content is often listed as TDN but is an old system (Total Digestible Nutrients)**
- **Digestible Energy or Metabolizable Energy as KCAL or Mcal.**

Carbohydrate in a Ration

- ***Grains and Fats*** provide the bulk of energy needed for growth and lactation.

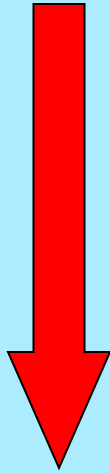
Grain Energy

- **Corn**



Grain Energy

- **Corn**
- **Wheat**
- **Barley**



Grain Energy

- **Corn**
- **Wheat**
- **Barley**
- **Oats**

Higher



Protein



Higher

Energy of Grains

| FEED | % TDN | KCAL/LB |
|---------------|--------------|----------------|
| Corn | 90 | 1550 |
| Wheat | 85 | 1450 |
| Barley | 82 | 1380 |
| Oats | 78 | 1240 |

Fats and Oils

- **These contain 2.25 times the energy of corn. Used in small amounts to raise calorie density or content.**
- **Soybean oil, “white grease,” are examples.**

Examples of Nutrient Requirements

National Research Council

- *Publishes Nutrient Requirements for Swine.*
- *The following charts are based on this information.*

Growing/Finishing Pig

| | Kcal/Day | % Lysine |
|------------------|-----------------|----------------------|
| Weaner | 1,680 | 1.35 (22% CP) |
| Feeder | 3,400 | 1.25 (20%CP) |
| Grower I | 6,305 | 1.00 (18% CP) |
| Grower II | 8,760 | 0.85 (15% CP) |
| Finisher | 10,450 | 0.75 (14% CP) |

Early Gestating Sows

| | DE KCAL | Lysine | Crude Protein | Ca/P |
|------------------------------|-------------------------|---------------|--------------------------|--------------|
| 385 pound sow | 6200 per day | 0.57% | 13.5 % | .9/.8 |
| | | | | |

Lactating Sows

| | DE KCAL | Lysine | Crude Protein | Pig gain/day |
|-----------------------|-----------------------------|---------------|--------------------------|-------------------------|
| 385 lb sow | 19,000 + per day | 0.95 % | 17.5 % | .4 - .5 |
| Based | on | 12 lbs | per day | |

So.....we know what the pig needs.....

The “break” in the nutrition link is that we know nutrient needs but many times lack feed nutrient content.....

Sample Feed Tag

Pig Grower

Medicated

for pigs between 30 and

75 pounds

Net Weight 50 pounds

Pig Grower

Medicated

for pigs between 30 and 75 pounds

Active Drug Ingredients

Chlortetracycline

100g/Ton

Sulfathiazole 0.011%

(100g/Ton)

Penicillin 50g/Ton

Guaranteed Analysis

Crude Protein min 18.00%

Lysine min 1.10%

Crude Fat min 6.50%

Crude Fiber max 4.00%

Calcium min 0.60%

Calcium max 1.10%

Phosphorus min 0.40%

Salt min 0.40%

Salt max 0.90%

Selenium min 0.30 PPM

Zinc min 0.30 PPM

Growing/Finishing Pig

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INGREDIENTS: Grain Products, Plant Protein Products, Processed Grain By-Products, Fat, Calcium Phosphate, Lignin, Sulfonate, Ground Limestone, Salt, L-Lysine Monohydrochloride, Methinone Supplement, Zinc Oxide, Zinc Sulfate, Ferrous Sulfate, Manganous Oxide, Copper Sulfate, Calcium Iodate, Sodium Selenite,

Pig Grower 16

GUARANTEED ANALYSIS

| | | |
|---------------|-----|---------|
| Crude Protein | Min | 16.0 % |
| Lysine | Min | 0.5 % |
| Crude Fat | Min | 3.0 % |
| Crude Fiber | Max | 9.5 % |
| Calcium | Min | 1.0 % |
| Calcium | Max | 1.5 % |
| Phosphorus | Min | 0.65 % |
| Salt | Min | 0.4 % |
| Salt | Max | 0.9 % |
| Selenium | Min | 0.3 ppm |
| Zinc | Min | 180 ppm |

Growing/Finishing Pig

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Pig Grower 16

INGREDIENTS

Processed Grain By-Products, Grain Products, Plant Protein Products, Molasses Products, Calcium Carbonate, Hydrolyzed Vegetable Oil and Animal Fat, Salt, Monocalcium and Dicalcium Phosphate, Choline Chloride, Vitamin A Acetate, Vitamin D3 Supplement,

Pig Grower 16

Vitamin E Supplement, Manganous Oxide, Zinc Sulfate, Ferrous Sulfate, Copper Sulfate, Sodium Selenite, Ethylenediamine Dihydriodide, Cobalt Sulfate, Niacin Supplement, Calcium Pantothenate, Biotin, Riboflavin Supplement, Vitamin B12 Supplement, Menadione Dimethylpyrimidinol Bisulfite (Vitamin K), Pyridoxine, Hydrochloride, Thiamine Mononitrate, Folic Acid , Zinc Oxide, Calcium Iodate, DL-Methionine Hydroxy Analogue.

**Information Brought to You
By Oregon State University
Extension and Department of
Animal and Rangeland
Sciences**

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Present Day Swine Rations

- **Are based on desired performance.**
- **Can be related to body condition score, backfat, level of lean gain or total weaned litter weight.**



National Swine Nutrition Guide

U. S. Pork Center of Excellence

National Swine Nutrition Guide

- **Digestibility of nutrients is the key
such as DAA and Dig. P**
- **<http://www.usporkcenter.org/home/projects/national-swine-nutrition-guide.aspx>**

Alternative Feed Publication:

<http://www.pork.org/filelibrary/resources/04836.pdf>