

ANSC 324



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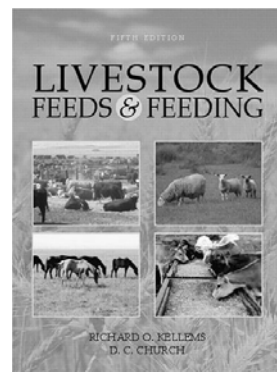
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<http://www.ansc.purdue.edu/swineclass/>



No Labs this week!

Lab next week will be held in ASTL

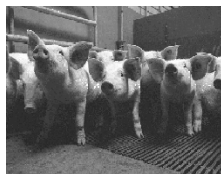


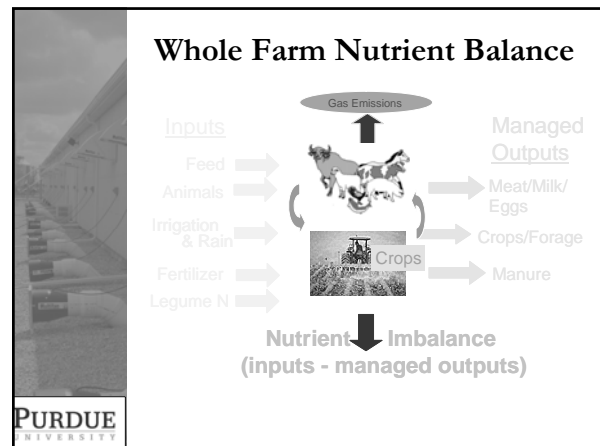
The Netherlands



ID-DLO-Institute for
Animal Science and Health

• 6 month stay in
the Netherlands





Sources of Gas and Odor Compounds

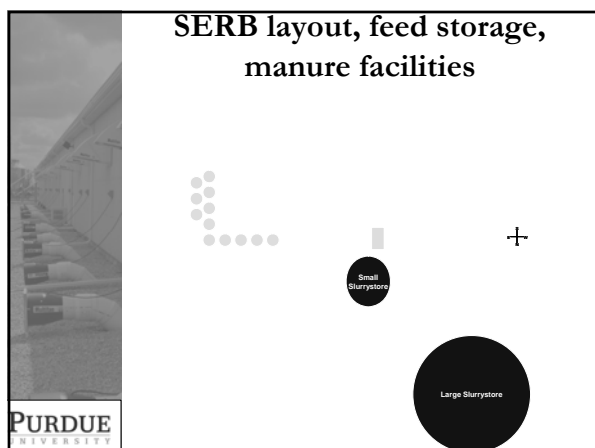
- Sulfurous Compounds
- Indoles and phenols
- Volatile fatty acids
- Ammonia and volatile amines
- Met, cys, sulfates, other sulfides
- Tyr, phe, trp
- Numerous fibers and numerous amino acids
- Numerous amino acids and urea

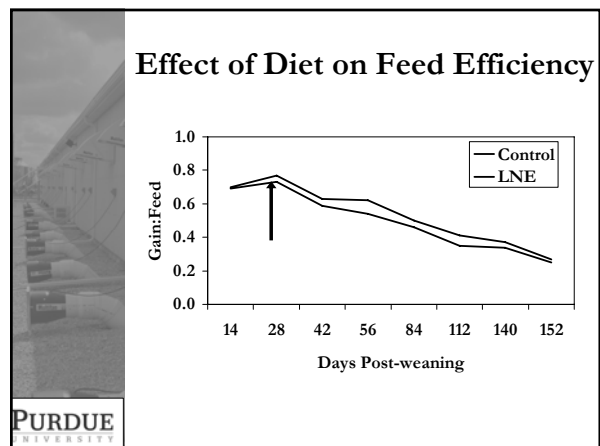
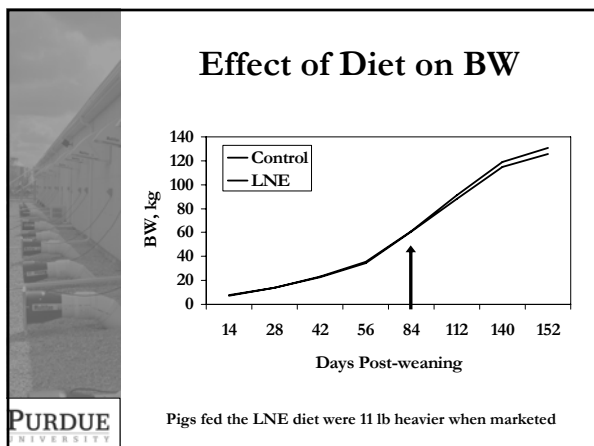
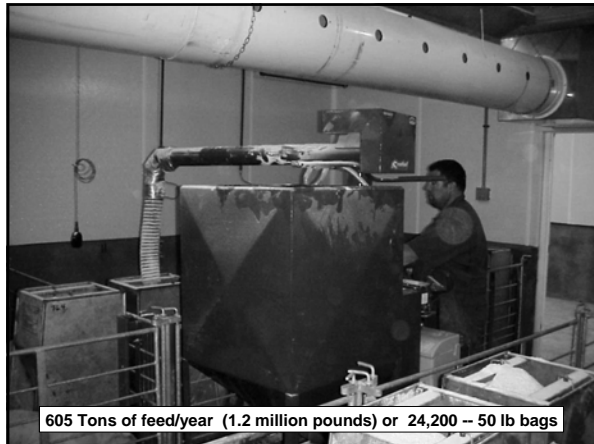
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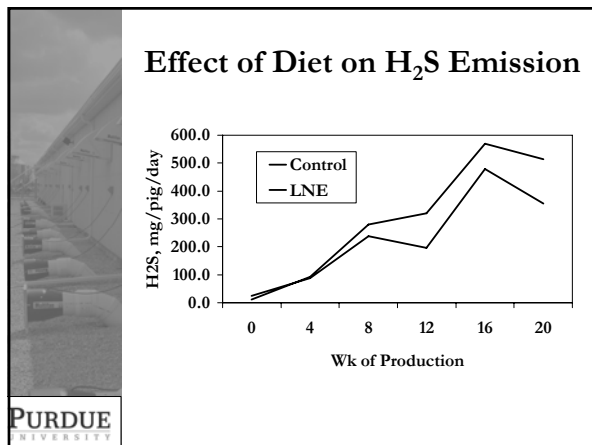
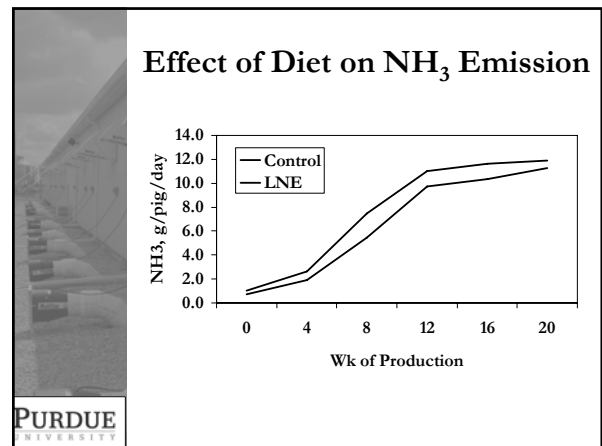
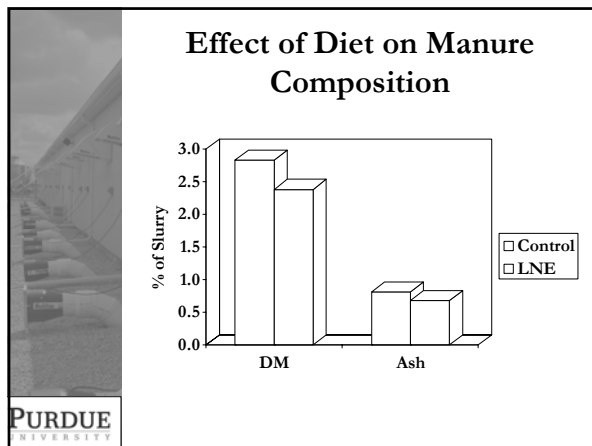
Common Odorous Compounds Associated with Livestock Manure

Volatile Fatty Acids	Ammonia & Amines	Phenolic Compounds	Sulfur Compounds
Acetic	Ammonia	Phenol	Hydrogen sulfide
Propionic	Methylamine	P-cresol	Dimethyl Sulfide
Butyric	Ethylamine	Indole	Methyl Mercaptan
Isobutyric		Skatole	Ethyl Mercaptan
Isovaleric			Diethyl Sulfide

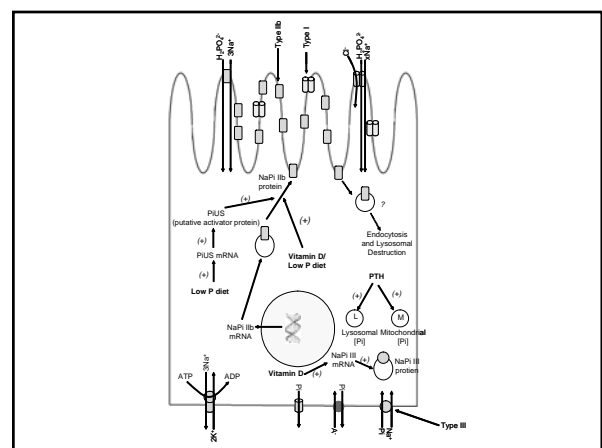
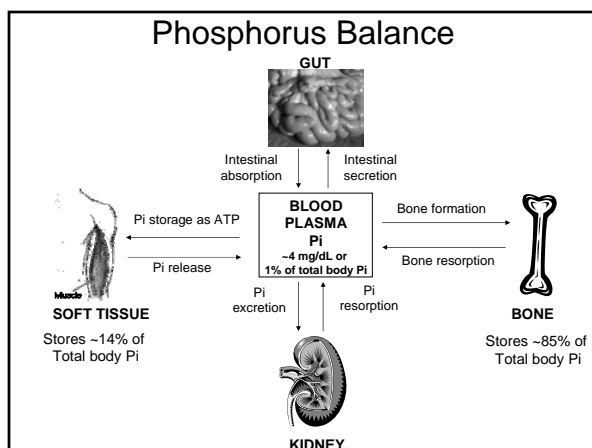
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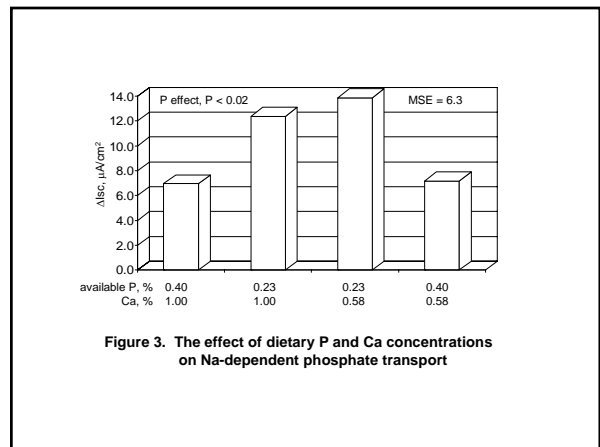
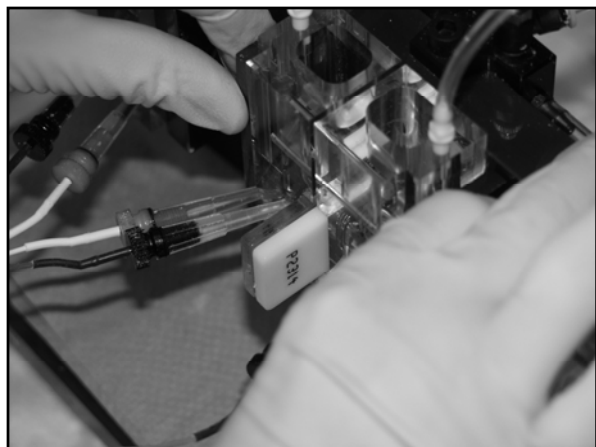
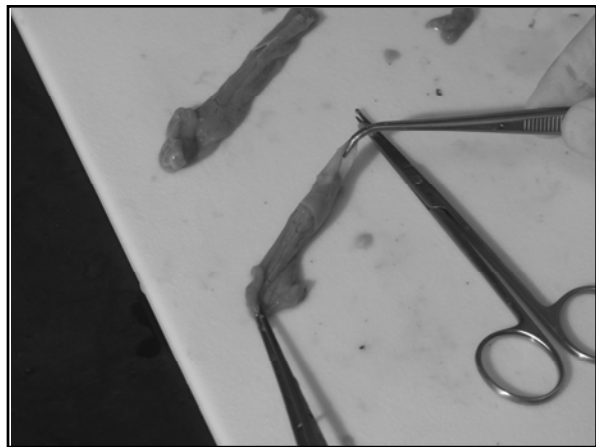
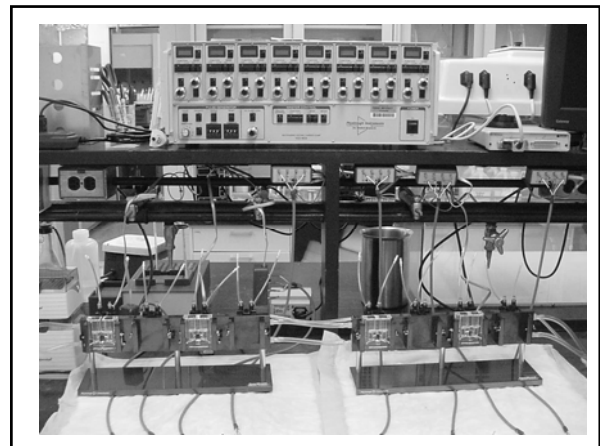
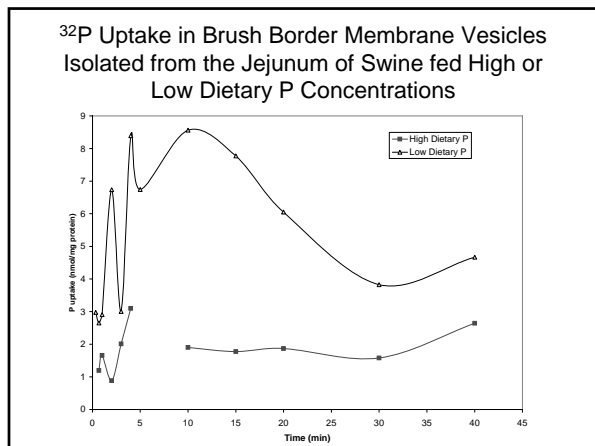




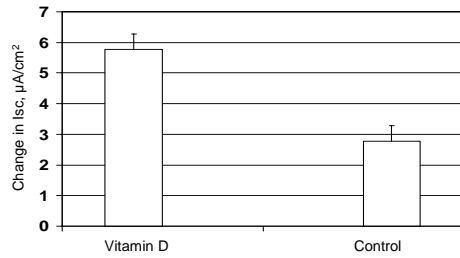


Regulation of P Uptake by the Brush Border Membrane





The effect of $1,25(\text{OH})_2\text{D}_3$ on Caco-2 cell Na^+ -dependent phosphate uptake



n=8, 10 nmol $1,25(\text{OH})_2\text{D}_3$ for 48h

Na/Pi-2B Protein abundance in the brush border membrane of pigs fed an adequate or a low P diet

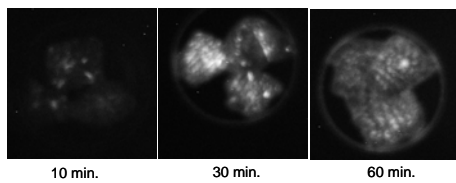
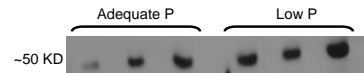


Figure 1. Intestinal attachment of bioluminescent *E. coli* O157:H7 increased over time. There are three intestinal loop sample present for each time period.

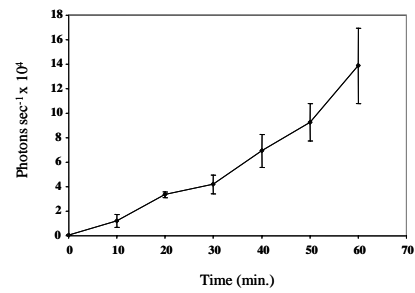
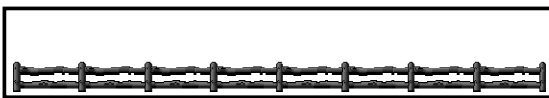
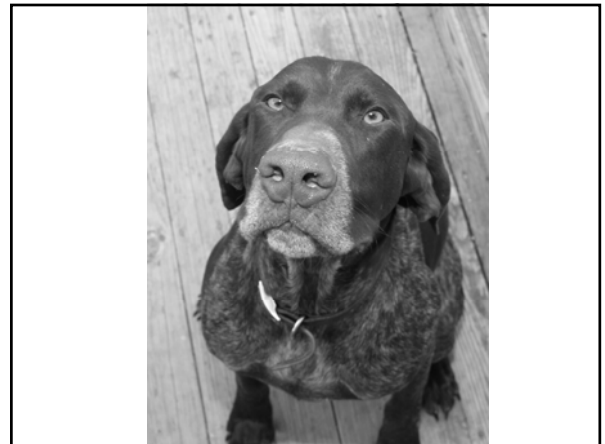
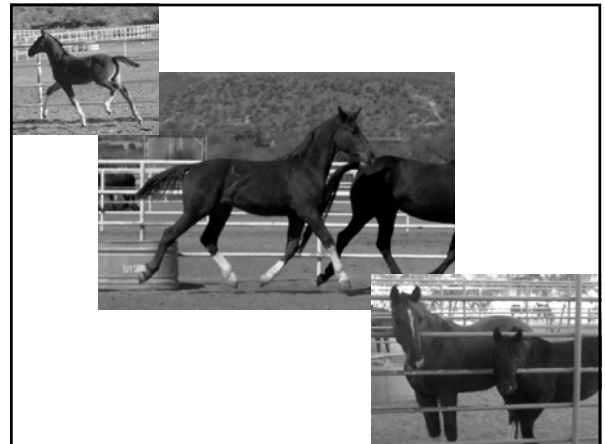
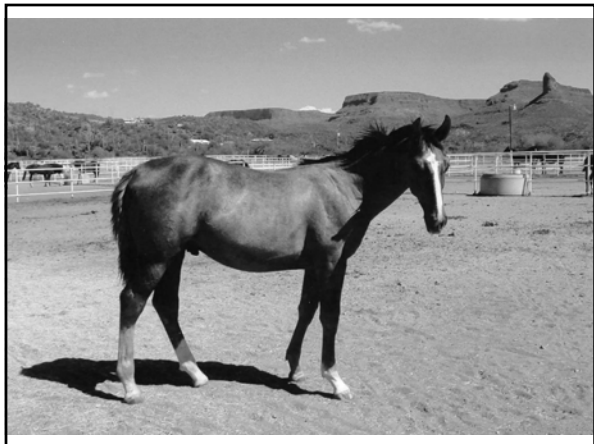
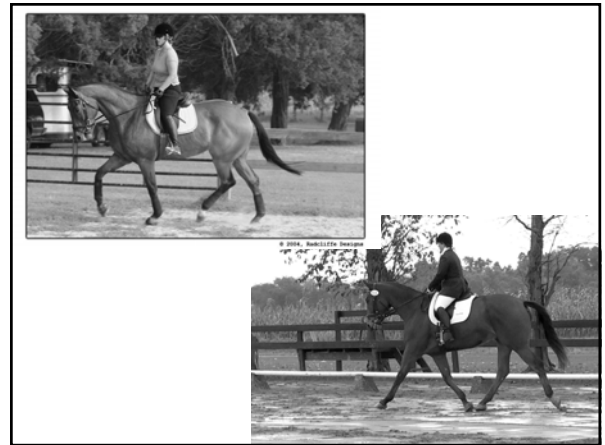
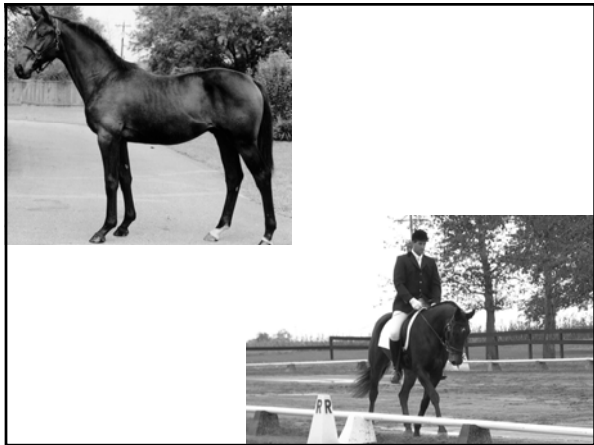


Figure 2. Plot of bioluminescence measured using a Hamamatsu PMT module versus time. Values represent the average of three intestinal tissue sections incubated with *E. coli* O157:H7-*lux* following irrigation to remove unattached cells.



Radcliffe Family Zoo





Opportunities

- Internships
- Jobs
- Pork Interest Group



Expectations...

- Retention of material covered in ANSC221
- Reasonable math and writing skills
- We will formulate a lot of diets in lab
- Ability to assimilate information

Feeding Nonruminants:

Ingredients must be blended together in an intelligent and strategic way to ensure that the *diet* meets *all* the *nutrient needs* of the animal for growth or lactation....as economically as possible.

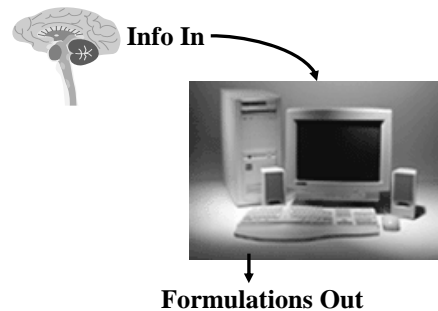
Diet Formulation

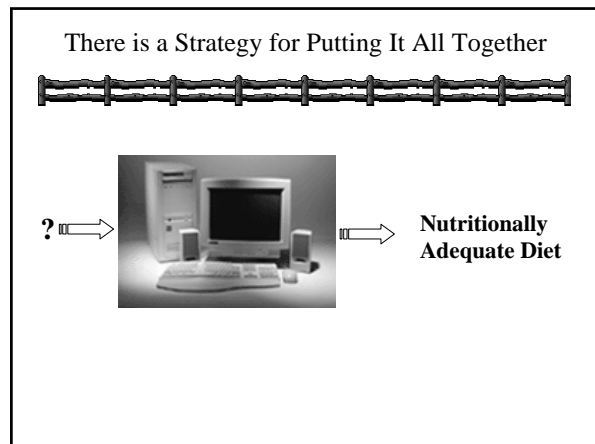
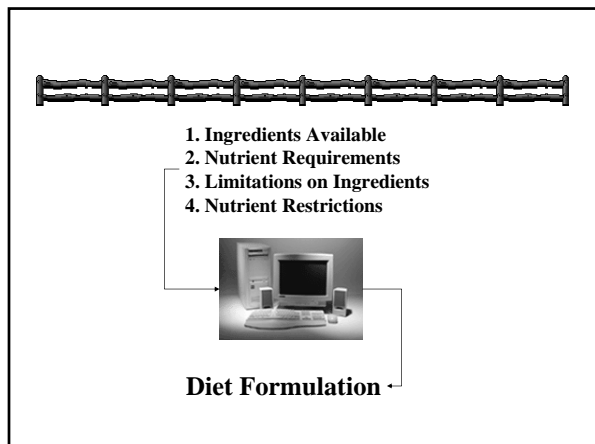
- Hand based calculations
- Computer based calculations
- A good understanding of hand-based diet formulation is essential to properly utilize computer-based formulation programs

Using the Computer

It is not automatic!

Using the Computer





Things to Remember

1. Animals require carbohydrates, lipids, amino acids, vitamins, and minerals in their diet; Feed ingredients supply them.

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2. No ingredient contains all of these nutrients in a quantity sufficient to meet all nutrient needs. Thus, ingredients must be chosen and mixed together in specific proportions to yield a complete diet.

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3. Most software formulates diets based on a least cost algorithm. When all requirements are met, the computer will use the cheapest ingredients made available as filler, unless controlled by the ingredient limitations and nutrient restrictions set by the nutritionist (i.e., you).

Mis-Using the Computer for Diet Formulation

Principles of:

Computerized Diet Formulation

I. Nutrient and Additive Considerations

A. Energy

1. Animals consume feed largely to meet the energy demand created by the biochemical processes that consume energy for maintenance, growth, work, and production. That is to say, *metabolic demand drives intake*.
2. Diets must be formulated with consideration of the energy level in the diet. When intake meets energy demand, it must also meet all other nutrient needs to achieve the feeding objective (maintenance, growth, or production).

Principles of:

Computerized Diet Formulation

B. Protein and Amino Acids

1. Animals have requirements for essential and non-essential amino acids. Therefore, requirements are set for **total crude protein** and specific limiting **amino acids**.
2. Crystalline amino acids are sometimes used to provide a more tailored amino acid profile so that total dietary protein can be reduced.

Principles of:

Computerized Diet Formulation

C. Lipids and Fatty Acids

1. Normally, essential fatty acid requirements (i.e., linoleic acid) are met when typical grains are used due to their inherent oil content (30% ground corn in the diet meets the 1% linoleic acid requirement for broilers).
2. Dietary fat is often added to provide energy and control dust.
3. There is no practical requirement for crude fat.

Principles of:

Computerized Diet Formulation

D. Calcium and Phosphorus

1. Typically require a concentrated source such as ground limestone (calcium carbonate) and a phosphate salt such as dicalcium phosphate.
2. Dietary concentrations are limited to control ratios.

Principles of:

Computerized Diet Formulation

E. Vitamins and Trace Minerals

1. Vitamin premixes typically provide an excess to insure that adequate dietary intake is achieved
 - a. Fat Soluble $\longrightarrow 4X$
 - b. Water Soluble $\longrightarrow 2 - 4X$
2. Mineral premixes
3. Selenium

Principles of:

Computerized Diet Formulation

F. Non-nutritive Additives

1. Growth Promotants
2. Pellet binders
3. Coloring agents
4. Flavor enhancers
5. Vaccines
6. Therapeutics

Principles of:

Computerized Diet Formulation

II. Ingredient Considerations

A. Feasibility of desired nutrient constraints:

The ingredients selected must accommodate the nutrient demands of the formulation.

1. Calcium requirement will require a calcium source
2. Achieving higher energy densities may require added fat source
3. Poor or marginal quality protein sources may require crystalline amino acids

Principles of:

Computerized Diet Formulation

B. Physiological limitations

1. Whey: lactose content
2. Fiber

C. Practical limitations

1. Flowability, Mixability, Pelletability, Handling constraints, etc.

D. Premixes and Additives

1. "Fixed" at a set concentration based on their particular formulation scheme
2. Legal constraints

Principles of:

Computerized Diet Formulation

III. Setting Up a Diet Formulation

- A. Select *ingredients* from ingredient database
- B. Apply minimum, maximum, fix, or range
- C. Decide which *nutrients* to formulate for
- D. Determine appropriate *minimums* and *maximums* (i.e. nutrient requirements and ranges)
- E. Formulate,and evaluate!

