Objective:
To understand the misinformation that may exist about companion animal nutrition

Myth:
Raw food diet is appropriate for dogs and cats

Facts:
• Raw food diet questions:
  – Complete & balanced nutrition?
  – Safety from food-borne pathogens?
  – Problems associated with bones?

Facts:
• The SAFE way to feed dog or cat
  – Commercial pet food
  – Respected manufacturer
  – Complete & balanced according to AAFCO procedures

Myth:
It’s safe to feed my kitten raw chicken and beef
**Facts:**

• Feeding raw meat
  – Complete & balanced??
  – Contain bacteria?
• Zoonotic transfer to humans
  – Parasitic cysts?
• Cook any meat offered as a treat

**Myth:**

Feeding raw meat and bones results in better skin and hair coat, and has more energy

**Facts:**

• Protein and fat are important nutrients for skin and hair coat and energy
• Complete & balanced diets according to AAFCO procedures contribute to lustrous coat and healthy skin

**Myth:**

Cooking destroys enzymes and nutrients

**Facts:**

• Cooking is beneficial:
  – Improves the bioavailability of nutrients
  – Alters structure of amino acids
  – Breaks down non-nutritional factors
    • To increase digestibility
    – Kills bacteria and parasites

**Facts:**

• Dogs and cats make enzymes needed to digest food and use nutrients
• Manufacturers of high quality pet foods build safety margins into formulations
  – Account for losses during normal processing and storage
Myth:
Chicken meal is superior to poultry by-product meal and real chicken

Facts:
• Most chicken meal, poultry by-product meal (PBM) and real chicken contain quality protein (digestible and palatable)
• Chicken meal is primarily chicken necks and backs – has more ash per unit of protein than PBM
• PBM is slightly more concentrated protein source, if properly processed

Myth:
Chicken meal is a superior protein source compared to real chicken

Facts:
• Chicken meal is primarily chicken necks and backs – has more ash per unit of protein compared to real chicken
• Real chicken is derived from striated muscle of chickens

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>% Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry by-product meal</td>
<td>65-70</td>
</tr>
<tr>
<td>Meat &amp; bone meal</td>
<td>50-55</td>
</tr>
<tr>
<td>Chicken</td>
<td>63-67</td>
</tr>
<tr>
<td>Chicken</td>
<td>60+</td>
</tr>
<tr>
<td>Lamb meal</td>
<td>48-55</td>
</tr>
<tr>
<td>Fish meal</td>
<td>60-65</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>46-50</td>
</tr>
<tr>
<td>Corn gluten meal</td>
<td>60-64</td>
</tr>
<tr>
<td>Rice gluten meal</td>
<td>40-50</td>
</tr>
<tr>
<td>Dried egg product</td>
<td>43-48</td>
</tr>
</tbody>
</table>

Myth:
Animal protein is better quality than plant & grain protein
Facts:

- No single source of protein is perfect
- No single source contains all essential amino acids

Fact:
Animal & Plant Sources Are Good Sources of Protein

Protein Quality

- High quality = smaller portions required
  (high quality = high content and digestibility)
- Amino acid composition
- Complementary proteins
  - provide limiting amino acids
    - soybean meal is low in methionine
    - chicken is high in methionine

Quality Protein Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Protein (%)</th>
<th>Source of:</th>
<th>BV</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried Egg</td>
<td>45-49</td>
<td>High quality</td>
<td>94</td>
<td>Almost complete protein</td>
</tr>
<tr>
<td>Soybean Meal</td>
<td>48</td>
<td>High in tryptophan, lysine</td>
<td>73</td>
<td>Complements meat sources</td>
</tr>
<tr>
<td>Chicken meal/poultry by-product meal</td>
<td>58</td>
<td>High lysine, methionine</td>
<td></td>
<td>Minerals vary</td>
</tr>
<tr>
<td>Beef, lamb, pork, chicken</td>
<td>29</td>
<td>Good source, low in tryptophan</td>
<td>74</td>
<td>Fat variable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Protein (%)</th>
<th>Source of:</th>
<th>BV</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish meal</td>
<td>59</td>
<td>High tryptophan, lysine, methionine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn gluten meal</td>
<td>60</td>
<td>High tryptophan, lysine</td>
<td></td>
<td>Complements meat sources</td>
</tr>
<tr>
<td>Corn (whole)</td>
<td>8</td>
<td>Low tryptophan, lysine, methionine</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>7</td>
<td>Adequate source</td>
<td>64</td>
<td>Low minerals</td>
</tr>
</tbody>
</table>
**Myth:**
Soy products have very little nutritive value for dogs and cats

**Facts:**
• Soy is an excellent source of:
  – Amino acids (9/10 essential amino acids for dogs)
  – Fat
  – Fiber
  – Potassium
  – Choline
• Soy can be as digestible as meat or poultry meals

**Myth:**
Soybean meal depletes body of zinc stores

**Facts:**
• Not true, soybean meal does not “eat” or deplete body of zinc stores
• Phytate is found in most plants
• With excess dietary calcium, phytate:
  – Binds dietary zinc
  – Limits dietary zinc availability
  – No effect on zinc already in body

**Myth:**
Corn is a filler and is poorly digested

**Facts:**
• “Fillers” have no nutritional or functional value
• Corn is finely ground to help ensure digestibility
• Each ingredient in product helps to achieve specific nutritional, functional, or palatability goals
• Products are tested to ensure digestibility in dog or cat
• Corn is not a “filler”
5 Grades of Corn...
- USDA official standards for grain
- Dictated by pounds (bushel wt), damaged kernels (heat or broken), foreign materials (other grains, weed seeds, debris)
- #1 highest quality, #5 lowest quality
- #1 grade is generally for human consumption
- Pet food uses #2 grade corn in formulas
  - USDA #2 or better grade yellow dent corn

Facts:
- Corn is an excellent source of nutrients
- Corn is a highly available source of:
  - Complex carbohydrates
  - Fats
    - Linoleic acid (healthy skin & coat)
  - Essential amino acids
  - Fiber
- Ground corn can be >98% digestible

Myth:
Soybean meal causes bloat in dogs

Gastric Dilatation-Volvulus
- Bloat, twisted stomach, stomach torsion
- Process:
  - gastric dilatation with air, fluid, excess food
  - stomach twists
  - occludes both ends, blood flow
  - splenic engorgement, blocks abdominal vessels
  - cardiovascular collapse
- Signs: retching, enlargement of abdomen, pain
- Treatment - decompress, surgery

Risk Factors for Bloat
- Gas associated with bloat is swallowed air
- Dogs who develop bloat:
  - “greedy eaters”
  - “gulp” water

Risk Factors for Bloat
- Older dogs > younger dogs
- Pure breeds > mixed breeds
- Familial link
- Deep-chested dogs
- Nervous, fearful dogs
- Eats one meal per day
- Not caused by dietary factors
Precautionary strategies for bloat

- Feed several smaller meals per day
- High water content (i.e., gravy)
- Easily digestible diet
- Restrict exercise before and after meals
- Know signs of bloat and what to do
- Know the phone number of nearest vet clinic

Soybean Facts:

- No association between soybean meal consumption & bloat
- Dogs on meat-based diets just as likely as dogs on soy-based diets to develop condition leading to bloat
  [Cornell College of Vet. Medicine Newsletter, 1991]

Flatulence:

Excessive gas in the stomach and intestines

Facts:

- Fiber tends to cause flatulence (gas) in some dogs
- Soy has fiber
- Fiber in soy may be one cause of flatulence in some dogs

Myth:

Soy causes loose stools

Facts:

- Small firm stools are not a direct measure of digestibility of pet food
- Many factors influence stool size:
  - Type & level of fiber
  - Physical nature of diet, etc.
- Properly cooked & processed pet foods containing soy products:
  - Highly digestible
  - Produce firm stools
More on loose stools

- Puppies/kittens frequently have loose stools
  - No cause and effect with high-quality puppy or kitten food containing soy has been established
- Other contributing factors:
  - Sudden diet changes
  - Spoiled food (garbage, etc)
  - Rich or spicy foods
  - Lactose intolerance
  - Other food allergies not related to soy
  - GI parasites

Myth:
Soy products cause skin allergies

Clinical Significance

In dogs:
- 1 in 400 have a food allergy
- 15% suffer from an allergic disease
  - atopy, contact allergy, flea bite, food
- Food hypersensitivity may contribute to:
  - “itching” in 62% of non-seasonal allergic skin diseases
  - chronic GI diseases

Dog Dermatology Studies

- 10 studies - 253 dogs
  - Skin surface lesions associated with food allergy
  - Beef, dairy products & wheat account for 65% of all reported cases of food allergies
  - Chicken, eggs, lamb & soy account for 25% of all reported cases of food allergies


Clinical Significance

In cats:
- 6% chronic skin abnormalities from food sensitivity (university practice)
- Food sensitivity 2nd most common cause of allergic dermatitis
  - Up to 11% of cats with skin surface lesion dermatitis

Cat Dermatology Study

- 8 studies or case reports
  - 45 cats with skin surface lesions associated with food allergy
  - 80+% of food allergies to beef, dairy products or fish

Facts About Food Allergens

- Almost exclusively proteins
- Allergens are a certain size
  - 18,000-36,000 daltons
  - capable of eliciting immune response

Average Molecular Weight

<table>
<thead>
<tr>
<th>Average Molecular Weight of NURISH 1500: 12,168</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Molecular Weight of Protein in PVD HA-Formula: 18,000 - 36,000 Daltons</td>
</tr>
<tr>
<td>Average Molecular Weight of Unmodified ISP: 28,961</td>
</tr>
</tbody>
</table>

Molecular Weight (Daltons) determined by HPLC

Myth:

Corn is highly allergenic

Facts:

- No protein more or less likely to stimulate allergic response
- Any protein is potentially allergenic

Dog Dermatology Studies

- 10 studies
  - 253 dogs had skin surface lesions associated with food allergy
  - Only 6 had allergies to corn \( \rightarrow 2.4\% \)


Cats & Food Allergies

- 55 cats with primary GI problems
  - 16 (29%) food sensitive
  - Corn gluten responsible in 3 of 16 cats

Myth: Excessive protein causes hot spots

Facts:
- Hot spots result from skin irritation
- As dog scratches, condition intensifies
- Most hot spots caused by flea or contact allergies
- No evidence to support association with dietary protein

Myth: Excess protein causes kidney disease

Fact: High dietary protein does not cause kidney disease in otherwise healthy dogs and cats

1992 Veterinary Survey: Protein
- Survey of veterinary practitioners
- 42% thought high protein caused kidney damage
- 82% recommended lower protein diets for geriatric dogs
  (Finco 1992)
Research: Protein and Canine Kidney Disease

<table>
<thead>
<tr>
<th>Researcher (Affiliation)</th>
<th>% Dietary Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovee (UPenn)</td>
<td>8, 18, 26, 54%</td>
</tr>
<tr>
<td>Bovee (UPenn)</td>
<td>19, 27, 56%</td>
</tr>
<tr>
<td>Robertson (UPenn)</td>
<td>19, 27, 56%</td>
</tr>
<tr>
<td>Finco (UGA)</td>
<td>18, 34%</td>
</tr>
<tr>
<td>Finco (UGA)</td>
<td>17, 34%</td>
</tr>
<tr>
<td>Finco (UGA)</td>
<td>16, 24, 50%</td>
</tr>
<tr>
<td>Polzin (UMinn)</td>
<td>8, 17, 44%</td>
</tr>
<tr>
<td>Churchill (UMinn)</td>
<td>22, 39%</td>
</tr>
</tbody>
</table>

Fact:
- Diets between 10% and 40% protein had no adverse effect on kidney function
- Diets differed in phosphorus and other nutrients

Myth:
Older dogs should be protein restricted

Fact:
Older dogs should not be protein restricted unless medically necessary

Research in Older Dogs
- Lean mass decreases
- Body fat increases
- Protein turnover decreases
- Older dogs need more protein than younger dogs

Protein Turnover
**Myth:**
Dietary protein should be restricted in liver disease

**Normal Liver Function**

### Nutrient metabolism
- Carbohydrate
- Fat
- Protein
  - Synthesis of blood proteins
    - Albumin
    - Clotting factors
  - Deamination of protein / urea formation

### Normal Liver Function
- Vitamin metabolism
  - Water soluble (B vitamins)
  - Fat soluble (A, E, D, K)
- Bile production
- Detoxification
  - Drugs, toxins, bacteria from GI tract & bloodstream

**Liver Disease- Common Diagnoses**
- **Cat**
  - Hepatic lipidosis (fatty liver)
  - Cholangiohepatitis (inflamed liver and bile tract)
- **Dog**
  - Portosystemic shunt (abnormality of blood vessels in liver)
  - Cancer
  - Cirrhosis (end-stage scarring)
Liver Disease

• Treatment and diet recommended based on underlying disease
  – Basis of “liver diet” criticism

However, there are some basic nutrition principles...

Nutritional Goals with Liver Disease

• Provide enough nutrients to:
  – Maintain pet
  – Promote liver cell regeneration

• Do not overwhelm remaining metabolic capacity
  – May lead to accumulation of toxic metabolites

Liver Disease - Diet

• Palatable
• Small frequent meals
• Highly digestible

• What is an adequate protein intake for liver patients?

Liver Disease - Protein

• Abnormalities in protein metabolism
  – Theoretically, highly branched-chain amino acids would be beneficial, but proof is lacking

• Protein requirement is comparable to (or higher than) a healthy dog or cat

• Bottom line: Protein should not be restricted unless signs of protein intolerance (encephalopathic signs)

Encephalopathic Liver Disease - Protein

• Titrate protein level - goal:
  – Minimize neurologic signs
  – Maintain adequate blood protein levels
  – Albumin

Liver Disease Summary

• Multiple causes / multiple treatments
• Diet is supportive therapy
  – Ensure adequate caloric intake
    • 1/3 of caloric intake supports liver organ regeneration and function
  – Protein restriction only if protein intolerance (neurologic signs)
    • Liver patient has normal to elevated protein requirements
  – Highly digestible carbohydrate & fat
**Myth:**
Protein causes developmental bone problems in large breed puppies

**Facts:**
- Research at Utrecht University in the Netherlands
  - No detrimental effects on skeletal development from protein up to 32% of diet
  - Puppies fed only 15% protein had evidence of inadequate protein intake

**Facts:**
- Large breed puppies require fewer calories / body weight than smaller breeds
- Avoiding excessive calories helps:
  - Manage growth and excessive weight gain
  - Beneficial to skeletal development in large breed puppies

**Review of calcium importance in Large Breed dogs…**

**Functions of Calcium**
- Bone & dental structure
- Enzymatic & metabolic reactions
- Muscle contraction
- Release & uptake of neurotransmitters
- Activation of blood clotting factors

**Dietary Calcium**
- Breeds differ in ability to digest and absorb nutrients
- Some more predisposed to calcium-sensitive conditions
- Some metabolize calcium more/less efficiently
- Calcium recommendations for puppies based on breed size?
Calcium Deficiency

- Puppies:
  - Poor growth rates
  - Reduced mineralization of bone
  - Subsequent defects: rickets, stress fractures
- Adult dogs:
  - Depletion of bone calcium
  - Weakened bone structure
  - Muscle weakness

Excess Calcium

- In growing animals
  - Inhibits growth
  - Induces bone defects (osteochoondrosis)
  - Lameness
  - Interferes with absorption of other nutrients (zinc)

Calcium & Large Breed Dogs

- Avoid calcium less than 0.55%
  - Deficient for growth
- Calcium 0.8% - 0.9% (dry matter basis)
  - Adequate for Great Dane & giant breed puppies
  - Marginal for other large breed puppies

Laflamme (2000 Purina Nutrition Forum) Effect of Breed Size on Calcium Requirements for Puppies

Calcium 1.0% - 1.55%
- Safe & adequate for all breeds

Calcium 1.5% - 2.0% (dry matter basis)
- Appears safe for large breeds
- No data available for giant breed puppies

Laflamme (2000 Purina Nutrition Forum) Effect of Breed Size on Calcium Requirements for Puppies