Back to Basics: Interpreting Product Guides & Labels

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Small Animal Clinical Sciences

Objectives
- Review some nutrition basics
- Utilize basic nutritional tools
- Case examples
- Nutritional assessments - incorporating into exam
  - Red flags
  - Case example
- Hot topics

Resources
- Textbooks:
  - Applied Veterinary Clinical Nutrition
- WSAVA website
  - http://www.wsva.org/nutrition-toolkit
- ACVN website
  - http://www.acvn.org/
- Pet Nutrition Alliance website
  - http://petnutritionalliance.org/
- Timely Topics in Nutrition - JAVMA
- Product guides

Product Guides
- Contact company reps
  - Electronic copy (PDF)
  - Paper/hardcopy
  - https://vet-royalcanin-ca.force.com/

Nutrition
- Interaction of food with an organism
  - Nutrients and other substances in food
  - Effects on growth, reproduction, maintenance
  - Interaction contributes to health or disease
  - Complex
Clinical Nutrition

- Management of patients’ nutritional needs

Nutritional Needs

- Animals should be fed to meet their Energy needs
- Food also needs to provide essential nutrients
  - Water
  - Energy
    - Macronutrients: protein, fat, carbohydrates
      - Essential amino acids
      - Essential fatty acids
    - Micronutrients
      - Essential vitamins
      - Essential minerals

Where to start?

Calculation of Energy Density


Metabolizable Energy (ME)

- Label → kcal/kg
- Calculated as kcal/100 g (of food)

Energy Density

- Metabolizable Energy (ME)
- kcal/kg
- From macronutrients
  - Protein, Fat, Carbohydrate
    - Atwater factors
      - Protein = 4 kcal/g; Fat = 9 kcal/g; CHO = 4 kcal/g
    - Modified Atwater factors
      - Protein = 3.5 kcal/g; Fat = 8.5 kcal/g; CHO = 3.5 kcal/g
Proximate Analysis

Guaranteed Analysis

Guaranteed Analysis (GA)
- Crude protein, MIN
- Crude fat, MIN
  - max. if calorie-restricted
- Crude fibre, MAX
- Moisture, MAX
- Others
  - only if highlighted on label

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- Others
  - only if highlighted on label

“Carbohydrate”
Calculated by difference
- Fiber
- Protein
- Fat
- Moisture
- Ash (estimate ~3% if not on GA)

Total Dietary Fiber
- IDF
- SDF
- HMW SDF
- LMW SDF

Expressed as “% As Fed”
% As Fed = grams per 100 g food

Regulatory

“Carbohydrate”
Calculated by difference
Fiber → Protein → Fat → Moisture → Ash (estimate ~3% if not on GA) + “Carbohydrate” = 100 %

**Carbohydrate**

Calculated by difference

- Fiber
- Protein
- Fat
- Moisture
- Ash (estimate ~3% if not on GA)

+ "Carbohydrate"

100%

---

**Metabolizable Energy (ME)**

- Typically expressed on label as kcal/kg
- Calculated as kcal/100 g (of food)

\[
ME \text{ (kcal/100 g)} = \\
\text{Prot (g/100 g)} + \text{Fat (g/100 g)} + \text{CHO (g/100 g)}
\]

*May need to use Atwater factors highly-digestible diets*

---

<table>
<thead>
<tr>
<th></th>
<th>Crude Protein (minimum)</th>
<th>Crude Protein (maximum)</th>
<th>Crude Fat (minimum)</th>
<th>Crude Fat (maximum)</th>
<th>Crude Fiber (minimum)</th>
<th>Crude Fiber (maximum)</th>
<th>Moisture (maximum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ash</td>
<td>3%</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Total: 60.8%
CHO (by difference): 39.2%
100%

---

**Metabolizable Energy (ME)**

\[
ME \text{ (kcal/100 g)} = \\
\text{Prot (g/100 g)} \times 3.5 \text{ kcal/g} + \text{Fat (g/100 g)} \times 8.5 \text{ kcal/g} + \text{CHO (g/100 g)} \times 3.5 \text{ kcal/g}
\]

*May need to use Atwater factors highly-digestible diets*
Metabolizable Energy (ME)

<table>
<thead>
<tr>
<th>GUARANTEED ANALYSIS</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Crude Protein (minimum)</td>
<td>24%</td>
<td>3.5 kcal/100g</td>
</tr>
<tr>
<td>Crude Protein (maximum)</td>
<td>36%</td>
<td>3.5 kcal/100g</td>
</tr>
<tr>
<td>Crude Fat (minimum)</td>
<td>20%</td>
<td>8.5 kcal/100g</td>
</tr>
<tr>
<td>Crude Fat (maximum)</td>
<td>20%</td>
<td>8.5 kcal/100g</td>
</tr>
<tr>
<td>Crude Fiber (minimum)</td>
<td>4%</td>
<td>3.5 kcal/100g</td>
</tr>
<tr>
<td>Crude Fiber (maximum)</td>
<td>4%</td>
<td>3.5 kcal/100g</td>
</tr>
<tr>
<td>Moisture (minimum)</td>
<td>11%</td>
<td>3.5 kcal/100g</td>
</tr>
<tr>
<td>Moisture (maximum)</td>
<td>11%</td>
<td>3.5 kcal/100g</td>
</tr>
<tr>
<td>Ash</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>60.8%</td>
<td></td>
</tr>
<tr>
<td>CHO (by difference)</td>
<td>39.2%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Total = 380.7 kcal/100 g

Can project Percent (%) Calories from each:
84 kcal Protein / 380.7 kcal
45% 84 kcal Protein
92.06% of calories from protein

“Percent Metabolizable Energy From”
Protein - 22%  Fat - 45%  CHO - 33%
Allows comparison between diets fed to Energy needs.

www.BalanceIT.com

https://secure.balanceit.com/tools/_gaconverter/index.php
Nutritional Needs
- Animals should be fed to meet their Energy needs
- Food also needs to provide essential nutrients
  - Water
  - Energy
    - Macronutrients: protein, fat, carbohydrates
      - Essential amino acids
      - Essential fatty acids
    - Micronutrients
      - Essential vitamins
      - Essential minerals

**Complete & Balanced**
- What does “complete” mean?
  - All ESSENTIAL nutrients present
  - species & life-stage
- What does “balanced” mean?
  - Nutrients in correct amounts & proportions
  - Prevent deficiencies or excesses
  - Varies with species & life-stage

### Essential Nutrients
- 39
- 42

### Digestion Test Results
<table>
<thead>
<tr>
<th>Nutrition</th>
<th>Dry Formula</th>
<th>Canned Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total, %</td>
<td>85.9</td>
<td>81.1</td>
</tr>
<tr>
<td>Protein, %</td>
<td>88.0</td>
<td>89.6</td>
</tr>
<tr>
<td>Fat, %</td>
<td>95.4</td>
<td>93.8</td>
</tr>
<tr>
<td>Carbohydrate, %</td>
<td>91.5</td>
<td>79.5</td>
</tr>
</tbody>
</table>

**Percentage of Metabolizable Energy from:**
- Protein, %: 25.2, 42.3
- Fat, %: 38.3, 34.4
- Carbohydrate, %: 36.5, 23.3

****: Carbohydrate values are too low to be rational.
Variation in Maintenance Energy Requirement

Individuals Will Vary - ADJUST

Average

Below average

68% of data

6% of data

Above average

4% of data

1% of data

Feed to meet energy requirements

Diet is complete and balanced

Requirements for all essential nutrients automatically met
(exceptions for extreme calorie users)

Who determined nutrient reqs?

- National Research Council (NRC)
  - Most recent publication - 2006
  - Key academic experts in field
  - Provides MR, AI, RA, & SUL when available

- Association of American Feed Control Officials (AAFCO)
  - Published every year, may or may not update recommendations
  - Invited experts from industry & academia
  - Provides RA & SUL ONLY
  - Modifications for practical industry concerns
  - Safety margin for commercialization & diet digestibility

- FEDIAF
  - Fédération Européenne de L'Industrie des Aliments Pour Animaux Familiers
  - European equivalent to AAFCO

- Private research
  - Should still comply with established guidelines or legal requirements but may have preferred ranges within allowed parameters...

WHO determined nutrient reqs?

Bonsai
- 7 yo MC Brussels Griffon
- Body weight - 4.14 kg
- BCS of 4/9
- History of pancreatitis
- Diagnosed with IBD

Diet History
- Currently eating:
  - Hill's Prescription Diet i/d Low Fat, canned
  - 1/2-3/4 can per day:
Diet History

- Currently eating:
  - Hill's Prescription Diet i/d Low Fat, canned
  - 1/2-3/4 can per day: provides 176-263 kcal/day
  - 24% protein, 20% fat, and 56% carbohydrate on a ME basis

When pancreatitis was diagnosed:
- Orijen Adult Dog, Six Fish Dog or Regional Red, dry
  - 1/2 cup/day = 228-239 kcal per day
  - 35% protein, 41% fat, and 24% carbohydrate on a ME basis
Bonsai

- 7 yo MC Brussels Griffon
- Body weight - 4.14 kg
- BCS of 4/9

- History of pancreatitis
- Diagnosed with Stage II, NP, NH CKD....
### INGREDIENTS

Grain-Free, Dehydrated, Chicken, Turkey, Beef, Lamb, Fish, and Salmon. Allergen-Friendly.

### ALLERGEN-FRIENDLY

Grain-free, Dehydrated, Chicken, Turkey, Beef, Lamb, Fish, and Salmon. Allergen-Friendly.

### NUTRIENT CONTENTS

<table>
<thead>
<tr>
<th></th>
<th>As Fed</th>
<th>Dry Matter</th>
<th>As Fed, Calories, Baseline</th>
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</thead>
<tbody>
<tr>
<td>Protein</td>
<td>5.3%</td>
<td>3.0%</td>
<td>28.6 g</td>
</tr>
<tr>
<td>Fat</td>
<td>2.9%</td>
<td>0.5%</td>
<td>2.8 g</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>77.9%</td>
<td>73.1%</td>
<td>77.9%</td>
</tr>
<tr>
<td>Crude fibre</td>
<td>0.5%</td>
<td>0.1%</td>
<td>0.5 g</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.15%</td>
<td>0.1%</td>
<td>200 mg</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.13%</td>
<td>0.4%</td>
<td>105 mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>0.06%</td>
<td>0.2%</td>
<td>57 mg</td>
</tr>
<tr>
<td>Potassium</td>
<td>0.2%</td>
<td>0.1%</td>
<td>191 mg</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.04%</td>
<td>0.0%</td>
<td>18 mg</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>0.5%</td>
<td>0.5%</td>
<td>27 KJ/100 kcal</td>
</tr>
<tr>
<td>Water</td>
<td>0.3%</td>
<td>0.3%</td>
<td>13%</td>
</tr>
<tr>
<td>% Calories from:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>32 g/1000 kcal</td>
<td>39 g/1000 kcal</td>
<td>49 g/1000 kcal</td>
</tr>
<tr>
<td>Fat</td>
<td>69 g/1000 kcal</td>
<td>49 g/1000 kcal</td>
<td>49 g/1000 kcal</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>1.91 g/1000 kcal</td>
<td>1.91 g/1000 kcal</td>
<td>1.91 g/1000 kcal</td>
</tr>
</tbody>
</table>

### METABOZUZABLE ENERGY

<table>
<thead>
<tr>
<th></th>
<th>kcal/kg</th>
<th>kcal/13 oz</th>
<th>kcal/13 oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>1.0 kcal</td>
<td>3.0 kcal</td>
<td>3.0 kcal</td>
</tr>
<tr>
<td>Fat</td>
<td>0.0 kcal</td>
<td>0.0 kcal</td>
<td>0.0 kcal</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>0.0 kcal</td>
<td>0.0 kcal</td>
<td>0.0 kcal</td>
</tr>
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</table>

### Questions?

- What are the nutritional benefits of the ingredients?
- How does the calorie content compare across the different forms?
- What are the typical levels of key nutrients like Protein, Fat, and Carbohydrates?