

Feeding Companion Animals

- ### Introduction
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- Dogs
 - domesticated about 12,000 years ago
 - omnivore
 - Cats
 - domesticated about 3,000 years ago
 - carnivore
 - Pet food industry - \$8.8 billion
 - 160 million dogs and cats

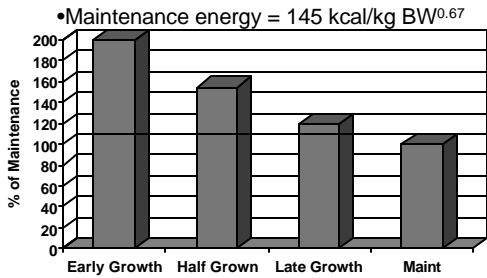
- ### Nutrient Requirements
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- Originally established by the NRC
 - growing animals – minimum requirements
 - Association of American Feed Control Officials (AAFCO)
 - ensure pet foods uniformly labeled
 - developed standard nutrient profiles
 - nutrient concentrations for growth and maintenance

- ### Nutrient Requirements
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- AAFCO
 - suggested range of nutrients
 - Chihuahua 1 kg vs Great Dane 75 kg
 - bone length and density, hair type and length, muscle tone

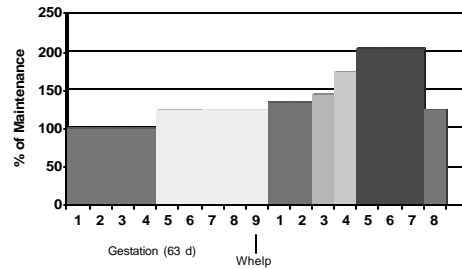
- ### Water
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- Nutrient required in greatest amount
 - Animal can survive 10x longer without food vs H₂O
 - Body H₂O is inversely related to body fat
 - dehydration concern in growing animals
 - H₂O content of commercial diets 10 – 84%

- ### Energy
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- Requirements influenced by
 - environmental factors
 - physical activity
 - age and reproductive state
 - Maintenance
 - Dogs 145 kcal/kg BW^{0.67}
 - Cats 80 kcal/kg BW
 - Animals offered a balanced diet tend to eat to satisfy energy requirement

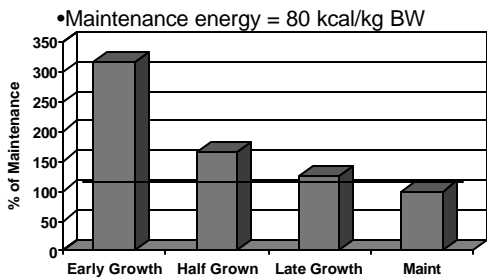
Dog Energy Requirements



ME Reproductive Requirements



Cat Energy Requirements



Carbohydrates

- Grain sources provide energy
 - corn, rice, wheat, oats, and barley
 - processing important - finely ground and heat treated
- Hexokinase & Glucokinase
 - glucokinase absent in cats

Carbohydrates

- Fiber
 - keeps GI tract healthy
 - wheat midds, beet pulp, soy hulls
 - too much fiber detrimental to energy and protein utilization
 - development and sale of high-fiber, low-calorie pet foods

Fat

- Proportion of metabolizable fat to other metabolizable nutrients important
 - when diet contains low % CP or poor-quality protein, desired % fat may be as low as 5-10%
- Linoleic essential
 - arachidonic essential in cats
- Tallow, lard, poultry, vegetable, fish

Protein

- Soybean meal, corn gluten meal, poultry and meat by-products
- Cats have significantly higher protein requirement than dogs
- Cats require taurine
 - by-product of S amino acid metabolism
 - important component of bile salts
- Ratio of CP to ME important

Recommended Nutrient Concentration of Dog Foods

	Growth & Reproduction	Maintenance
ME kcal/g DM	3.5	3.5
CP, %	22.0	18.0
Fat	8.0	5.0
Ca	1.0	0.6
P	0.8	0.5

Commercial Foods

- Dry (88-94% DM), semi-moist (60-77% DM), and moist (22-40% DM)
- Dry pet foods
 - extrusion - high temp, short time, optimizes expansion and dextrinization of starch
 - pelleted or kibbled
- Semi-moist - snacks
- Moist - most expensive, cats major mkt

Commercial Foods

- Puppy and kitten foods - more protein
- Working dog
 - Iditarod - 10,000-11,000 kcal/d
 - Dog racing - anaerobic metabolism
- Diet foods
 - 24-34% of adult dogs obese
 - important not to restrict other nutrients
- Generic or Brand Name pet foods

Pet Food Labels

- Information required on the label
 - product name
 - net weight
 - ingredient list
 - guaranteed analysis
 - name and address of manufacturer
 - designation "Dog Food" or "Cat Food"
 - statement of nutritional adequacy or purpose

Pet Food Labels

- Labels do not provide information on availability of nutrients
- Pet foods in interstate commerce must contain a statement and validation of nutritional adequacy
 - complete and balanced nutrition - must indicate method used to substantiate
 - feeding trials or formulation to meet AAFCO Nutrient Profiles

Pet Food Labels

- **Guaranteed Analysis**
 - min protein and fat & max fiber and water
 - as-fed basis
- **Ingredient list**
 - decreasing order of predominance based on weight
- **Nutritional adequacy**
 - Undergone feeding trials - "feeding tests", "AAFCO feeding test protocols", "AAFCO feeding studies"
 - Calculation method - "complete and balanced"
- **Caloric density** – maybe, maybe not

Atwater's Physiological Fuel Values (PFV)

Humans	GE	Dig (%)	ME (kcal/g)
CHO	4.15	x 98	= 4
Protein	(5.65-1.25)	x 92	= 4
Fat	9.4	x 95	= 9

Dog	GE	Dig (%)	ME (kcal/g)
CHO	4.15	x 85	= 3.5
Protein	(5.65-1.25)	x 80	= 3.5
Fat	9.4	x 93	= 8.7

Calculating ME Content

Nutrient	% of DM
Fat	9
Protein	24
Fiber	3
Ash	15

- Fat = $9 \text{ g}/100 \times 8.7 = 0.78 \text{ kcal/g}$
- CHO = $100 - 58 = 42\%$
- CHO = $42 \text{ g}/100 \times 3.5 = 1.47 \text{ kcal/g}$
- Protein = $24 \text{ g}/100 \times 3.5 = 0.84 \text{ kcal/g}$
- 3.10 kcal ME/g vs 3.45 kcal ME/g

Calculating Intake

- 145 kcal/kg BW^{0.67}
- 60 lb dog (27 kg)
- 2,182 kcal ME ($145 \text{ kcal} \times 27^{0.67}$)
- 1,319 kcal ME / 3.10 kcal ME/g = 425 g or 0.94 lb/d
- **Nutrient Balance**
 - 0.84 kcal ME protein / 3.1 kcal ME = 27%

Have a Great Spring Break

