Feeding Companion Animals

Introduction

- 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

- 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

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

Water

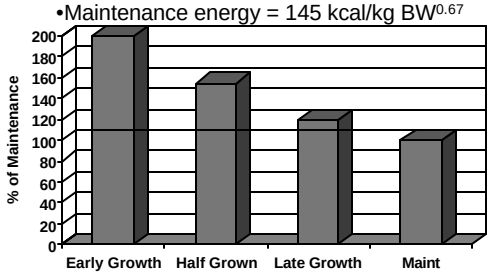
- Nutrient required in greatest amount
- Animal can survive 10x longer without food vs H_2O
- Body H_2O is inversely related to body fat
  - dehydration concern in growing animals
- H_2O content of commercial diets 10 – 84%

Energy

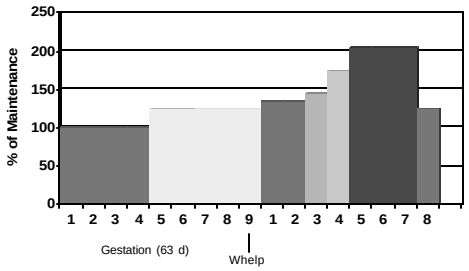
- Requirements influenced by
  - environmental factors
  - physical activity
  - age and reproductive state
- Maintenance
  - Dogs 145 kcal/kg $BW^{0.67}$
  - Cats 80 kcal/kg BW
- Animals offered a balanced diet tend to eat to satisfy energy requirement

Dog Energy Requirements

•Maintenance energy = 145 kcal/kg $BW^{0.67}$

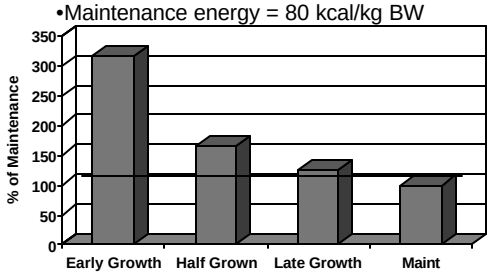


ME Reproductive Requirements



Cat Energy Requirements

•Maintenance energy = 80 kcal/kg BW



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					
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 g/100 x 8.7 = 0.78 kcal/g
- CHO = 100 - 58 = 42%
- CHO = 42 g/100 x 3.5 = 1.47 kcal/g
- Protein = 24 g/100 x 3.5 = 0.84 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 kcal x $27^{0.67}$)
- 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