I. Basic Nutrition

a. Type of Pet Food & Function | Typical Moisture Content (%) | Typical Protein Content (%) | Typical Fat Content (%) | Preservation Technology
---|---|---|---|---
Dry (Main meal) | 6-12 | 16-55 | 7-20 | Drying to Moisture level of 6-10%
Moist (Main meal) | 70-80 | 7-13 | 5-8 | Heat Sterilization
Semi Moist (Main meal) | 15-32 | 17-30 | 7-12 | Humectants, Mold inhibitors, pH
Snacks or Treats (Used as reward or to supplement main meal) | 10-70 | 18-25 | 10-15 | Drying, Humectants, mold inhibitors, pH

b. Calculating Energy Requirements
   i. Resting Energy Requirement – Estimated energy required for bodily function, not including activity. This number is only an estimate.
      1. Calories RER = 30 (weight in kg) + 70 or (better) RER = 70(kg)\(^{0.75}\)
      2. This number probably varies with breed of dog.
   ii. Maintenance Energy Requirement – Calories per day to sustain resting energy, as well as activity. Maintenance calories are RER multiplied by activity factor.
      1. MER = (RER) x factor
      2. Factors range between 0.75 and about 2.4, depending on age, lifestyle, and reproductive status.

c. Essential Nutrients
   i. These are substances the pet cannot manufacture in the body. They **MUST** be supplied in the diet.
   ii. List of Essential Nutrients for Dogs and Cats by Group:
      1. Protein
         a. Amino Acids
            i. Arginine
            ii. Histidine
            iii. Isoleucine
            iv. Leucine
            v. Lysine
            vi. Methionine (spared by cysteine)
            vii. Phenylalanine (spared by tyrosine)
            viii. Threonine
            ix. Tryptophan
            x. Valine
            xi. Taurine (cat, not dog)
      2. Fat
a. Linoleic acid  
b. Arachidonic acid (cat, not dog)  
c. +/- Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)  

3. Minerals  
a. Macrominerals (required at ≥100mg/Mcal, or approx. ≥400ppm)  
   i. Calcium (Ca)  
   ii. Phosphorus (P)  
   iii. Magnesium (Mg)  
   iv. Sodium (Na)  
   v. Potassium (K)  
   vi. Chloride (Cl)  
b. Trace minerals or microminerals (required at <100mg/Mcal, or approx. <400ppm)  
   i. Iron (Fe)  
   ii. Copper (Cu)  
   iii. Zinc (Zn)  
   iv. Manganese (Mn)  
   v. Selenium (Se)  
   vi. Iodine (I)  

4. Vitamins  
a. Fat-soluble vitamins  
   i. Vitamin A, retinol  
   ii. Vitamin D3, cholecalciferol  
   iii. Vitamin E, α-tocopherol  
   iv. +/- Vitamin K3, menadione (also vitamin K1, phylloquinone) (cat, not dog)  
b. Water-soluble vitamins  
   i. Thiamin, vitamin B1  
   ii. Riboflavin, vitamin B2  
   iii. Pyridoxine, vitamin B6  
   iv. Niacin, vitamin B3  
   v. Pantothenic acid, vitamin B5  
   vi. Cobalamin, vitamin B12  
   vii. Folic acid, vitamin B9  
   viii. Biotin, vitamin H or B7  
   ix. Choline  

iii. Unique needs of cats:  
   1. Cannot convert carotenoids to vitamin A.  
   2. Inadequate synthesis of vitamin D.  
   3. Cannot use tryptophan for niacin production.  
   5. Unable to make citrulline, a single arginine-free meal can be fatal.  
   6. Do not tolerate high levels of glutamate. This is high in plants and low in meat.  
   7. Do not conserve nitrogen well (needed to make protein).  
   8. Unable to make arachidonic acid from linoleic acid.
9. Metabolic carnivores, adapted to low carbohydrate diet. Low enzyme levels to break down carbohydrates.

d. Dogs are omnivores. They are metabolically/enzymatically set up to break down carbohydrates efficiently. Cats are strict carnivores and do not have mechanisms to efficiently handle carbohydrates.
   i. Dogs evolved as pack hunters taking down predominantly large herbivores as prey. These preys have huge amounts of plant materials in various stages of digestion in the gut which are consumed by the canine predator.
   ii. Cats evolved as mostly solitary hunters eating small prey (insects, rodents, birds), which have simple stomach digestive systems, which do not store plant materials. Cats, as stated above, are true metabolic carnivores and cannot metabolize carbohydrates well. They also have requirements for substances in the diet which dogs and people do not.

e. Protein
   i. Source of nitrogen and amino acids in the diet. Can be utilized for energy.
   ii. Amino acids are the nitrogen containing molecules which are linked together to make proteins.
   iii. Protein quality – refers to how closely the amino acid content of a protein matches the needs of the body. This refers to how a protein meets the need for essential amino acids (see Essential Nutrients), but also considers digestibility.
   iv. Complete proteins are those which supply readily available essential amino acids. The most complete biological protein is egg protein.
   v. Proteins, which are individually incomplete, can be combined to supply complete proteins. Example: beans & rice.
   vi. The percentage of protein on a food bag does not consider either digestibility or protein completeness.
   vii. Nitrogen balance – Proteins are the primary source of Nitrogen in the diet. Any amount in excess of body requirements must be excreted. In dogs, cats, & people, this occurs by conversion to urea in the liver and excretion in the urine by the kidneys.
   viii. In cases of liver disease, Nitrogen accumulations as ammonia & contributes to seizures and other clinical signs. With kidney disease, urea accumulates in the blood (increased blood urea, nitrogen is measured as a biomarker of kidney disease). Therapeutic diets for liver and kidney disease are formulated to attain zero nitrogen balance by providing high quality protein in optimal amounts.
   ix. A higher protein percentage does not mean a diet is “better.”

f. Fats
   i. Essential fats:
      1. Linoleic Acid – An omega-6 fatty acid which must be provided in the diet. Can be abbreviated as LA.
         a. Good sources are plants (vegetable oils) or animals raised on feed high in LA.
            i. Example: Corn fed chickens
         b. Dogs and man can synthesize arachidonic acid from linoleic. Cats cannot and thus arachidonic acid (ARA or AA in abbreviation) is an essential fatty acid to them.
      2. Linolenic Acid – Abbreviated ALA. Sources include flax seed oil.
         a. Potential sources of omega-3 long chain poly-unsaturated fatty acids DHA & EPA in theory. However, this requires conversion which is not efficient.
         b. Best sources of DHA & EPA are cold water fish oils where they are supplied directly.
c. Do not be fooled by the label “Omega-3 Fatty Acid.” Always look for DHA & EPA directly.
d. Both omega-3 & omega-6 fatty acids are important in the diet. The appropriate ratios in different settings of disease are not yet clear.
g. Carbohydrates (CHO)
   i. Major source of energy & fiber.
      1. Fiber – 2 types of fiber:
         a. **Soluble Fiber** – Can be a source of prebiotics which feed the beneficial GI bacteria. It also acts as a scaffold for beneficial bacteria to grow on. Soluble fiber also holds water & improves stool character. It is not measured in the crude fiber percentage on pet food labels.
         b. **Insoluble Fiber** – Measured as crude fiber on labels. As it is not digestible, insoluble fiber decreases the caloric density of food & acts as a bulking agent for feces. It can also slow the absorption of simple sugars, which is beneficial for diabetic pets.
         c. **Simple Carbohydrates** – These are small molecules which require little to no modification for absorption into the blood stream. Many are simple sugars.
         d. **Complex Carbohydrates** – Larger molecules which have slower absorption due to the need for modification & processing.
   h. Vitamins
      i. Dogs & cats do **not** require vitamin C in the diet. They can produce it from glucose. It may be added to some foods as a preservative. Excessive amounts of vitamin C in diet are a concern in some pets by increasing risk for bladder & kidney stones.
      ii. **Water Soluble Vitamins** – In dogs and cats, these are the B vitamins. They should be supplied on a daily basis as they are readily dissolved in body water & eliminated through the kidneys.
         1. B1 – Thiamine
         2. B2 – Riboflavin
         3. B3 – Niacin
         4. B5 – Pantothentic Acid
         5. B6 – Pyridoxine
         6. B7 – Biotin
         7. B9 – Folic Acid
         8. B12 – Cobalamin
      iii. Good sources of B vitamins, except for B12, include germinal portions of grains, organ meat, & yeast. B12 is only available in animal sources.
      iv. **Fat Soluble Vitamins** – Minimal storage (days) in fatty tissues of the body.
         1. Must be supplied in diet as pets cannot make them.
         2. **Vitamin K** – Healthy gut bacteria may produce enough of this to meet dietary needs. Food sources include green leafy vegetables.
         3. **Vitamin A** – Cats must be fed vitamin A, or retinol, as they cannot convert carotenoids. Dogs can produce active vitamin A from carotenoids. Sources of carotenoids are orange or red colored fruits & vegetables. Excessive active vitamin A can be toxic & may be seen with excessive liver consumption. Feeding carotenes to species that can convert is the safest means of supplementation.
         4. **Vitamin D** – Although humans can produce vitamin D in skin with sunlight exposure, dogs & cats **cannot** do this, vitamin D must be supplied in the diet. There are multiple
forms of vitamin D (D2, D3, etc.) in the body. They are converted & activated in the body after absorption. Foods high in vitamin D include fatty fishes.

5. **Vitamin E** – Active form is Alpha-tocopherol. Natural forms are typically D-alpha-tocopherol, which is twice as active as synthetic vitamin E, which is DL-alpha-tocopherol.
   a. Natural antioxidant. Good sources are seeds, whole grain, vegetable oil, & leafy greens.
   b. If taking high doses of omega-3 fatty acids (DHA & EPA) need increased amounts of vitamin E in the diet.
   c. Mixed tocopherols, which are used as preservatives in pet foods supply.

i. **Minerals**
   i. See Essential Nutrients in preceding presentation.
   ii. Macrominerals are required in larger amounts than trace minerals.
   iii. Signs of deficiency may take a long time to become obvious if there are large stores in the body (example: calcium in bone). Deficiencies may have detrimental consequences prior to this time.
   iv. Minerals with little reserve (potassium, sodium, chloride, magnesium) show obvious signs early in deficiency.
   v. Form mineral is supplied in influences how much can be absorbed by the body (bioavailability).
   vi. Ratio of calcium: Phosphorus in food is important as well as amounts. Diets based on skeletal muscle meats are too high in phosphorus & too low in calcium.
   vii. Minerals are often required in small amounts to participate in chemical reactions. Specific functions include:

1. Iron (Fe) – Oxygen transport to tissues in red blood cells.
2. Phosphorous (PO₄) – Part of ATP (adenosine triphosphate) the energy currency of the body.
3. Sodium (Na) – Determines circulating blood volume, necessary for nerve & muscle (including the heart) function.
4. Chloride (Cl) – Binds to sodium & functions in maintaining fluid balance & neuromuscular function, part of hydrochloric acid in stomach, which is needed for food digestion & immune function.
5. Calcium (Ca) – Essential for cardiac contraction, used as a signal for many synthetic & secretory functions in cells which are critical to proper immune & other functions.
6. Potassium (K+) – Critical for neuromuscular function, kidney health, & cardiac contraction.

viii. **Sources**

1. Ca – Bone & calcium salts. Meals in pet food are excellent sources as they are ground & make both calcium & phosphorous available.
2. PO₄ – Protein rich foods, plants, & bone.
3. Potassium – Essentially available in all foods, deficiency occurs when pets have decreased appetite.
4. Sodium – Usually requires additional supplementation of NaCl to diet to insure sufficient levels.
5. Copper – Liver.
II. Pet Food Labels

a. AAFCO and Laws
   i. Regulations are developed by Association of American Feed Control Officials (AAFCO). AAFCO is an industry formed organization; not a governmental one. Individual states then make the decision to adopt them. Execution of regulations is by FDA or state.

b. ALL or 100% Rule
   i. Only thing in can is ingredient and water.
   ii. NOT balanced diets – can be harmful if fed as sole ration.
   iii. Only applies to ingredients of animal origin.

c. 95% Rule
   i. Example: Beef for dogs, tuna cat food.
   ii. 95% of product is named ingredient, not counting water, vitamins, minerals, & condiments.
   iii. 70% of products is main ingredient after adding water.
   iv. If two named ingredients, then 95% of product is sum of both ingredients.
   v. First word of name must be ingredient that is highest percentage.
   vi. Second named ingredient has to be 3% or more.
   vii. Applies only to animal origin ingredients.

d. 25% Rule
   i. Dinner, Recipe, Feast, Platter, Stew, Entrée, Formula, etc.
   ii. Both canned & dry forms
   iii. Named ingredient must be 25%, not counting water for processing. Must be 10% counting water.
   iv. If 2 ingredients named, they must be 25% together.
   v. Second ingredient must be 3% or more.
   vi. Applies to all ingredients, not just animal origin.
   vii. Named ingredient is not always the primary ingredient. Must check ingredient list.

e. 3% or “With” Rule
   i. Example: Dog food with beef, is 3% beef.
   ii. Can be in name or in a side burst on front label.

f. Flavor Rule
   i. Amount of ingredient must be detectable.
   ii. No specified percent.
   iii. Often contain digests which concentrate flavor. These are produced from the ingredient, not artificial.
   iv. Most artificial flavors in pet foods are bacon or smoke.
   v. The claim “no artificial flavors” pretty much applies to all other pet foods.
   vi. “Chicken Flavored Cat Food” may not have any chicken, only digest.

g. Guaranteed Analysis
   i. Percentages are given on an “as fed” basis. This does not account for differences in moisture or calorie density.
   ii. Food can also be considered in a “dry-matter” basis, which accounts for moisture & allows for comparison of dry & canned foods. This is not on labels.
   iii. Best way to compare food is on an energy basis (e.g. 65 grams of protein per 100 calories). Again, not supplied on labels.
   iv. Guaranteed Analysis is not an average analysis of food. It just states minimum or maximum percentages. Major pet food manufacturers (e.g. Purina) check every single batch of food for
adherence to guaranteed analysis. They also save samples of every batch of food in case there are problems later.

v. May be able to get energy basis & average analysis from larger pet food manufacturers. Often not available on boutique diets.

vi. Percentages are listed in “Crude” form. This does not take into account digestibility or amino acid profile (quality of protein).

1. **Crude Fat**
   a. Ether extraction technique.
   b. No evaluation of essential fatty acids.
   c. Higher fat = higher calories.

2. **Crude Protein**
   a. Measured by nitrogen content.
   b. No information on availability or quality of protein.

3. **Crude Fiber**
   a. Only measure insoluble fiber, non-digestible.
   b. Higher fiber = low calories.

4. **Moisture**
   a. Water content.
   b. Maximum is 78%, unless label states “in gravy” or “in sauce.”
   c. Canned foods high in water, dry food lower. Can’t compare on as fed basis.

5. Often other nutrients are listed, but they are not required to be.

h. **Ingredient List**
   i. Compares ingredients on a weight basis which can be influenced by moisture content of ingredients.
   ii. Meat, poultry, fish all contains lots of water. This can make them appear prominent in ingredient list.

i. **Nutritional Adequacy Statement**
   i. Must meet minimum AAFCO standards. These are defined as amount needed to prevent signs of deficiency.
   ii. States if determined by feeding trial or formulation.
   iii. States life stage for which food is adequate (growth, reproduction, maintenance).
   iv. Does not mean optimal amount.
   v. States complete & balanced, if food is.
   vi. If no AAFCO statement, food may not be complete & balanced and could be unsafe for feeding as sole diet.
   vii. Some AAFCO standards are not updated or ideal in all breeds (example: copper).
   viii. Requires specific wording to be legally stated.
III. Marketing Claims
   a. Natural – Legal definition is no chemically synthetized or artificial ingredients.
      i. Most pet foods are not “all natural,” as vitamins & minerals must be added to make diets complete and balanced.
         1. Taurine, an essential nutrient in cats to prevent blindness & heart disease, is always synthetic. Highest natural source would be oysters. Virtually all comes from China.
         2. Methionine, lysine, & other added amino acids are typically synthetic & required to make diet naturally sound.
      ii. Ingredients coming to the pet food manufacturer may have artificial preservatives utilized by supplier.
   b. Organic – Legal definition is no synthetic pesticides, herbicides, antibiotics, hormones, or GMOs.
      i. No balanced, complete pet food is truly 100% organic due to addition of vitamins, minerals, & trace elements.
   d. Human Grade – Technically illegal as any ingredient put in pet food is not approved for human consumption.
   e. Raw – See section
      i. Frozen, refrigerated, or dehydrated uncooked ingredients.
   f. Inclusion or Exclusion of Specific Ingredients – Solely marketing
      i. Example: Corn. Most allergens are animal proteins, not carbohydrates. Ground corn is highly digestible.
      ii. Example: Grain Free.
         1. No indication of quality.
         2. No evidence of superiority of other CHO sources.
         3. Can be even higher in CHO than grain containing diets.
   g. Marketing Statements to Consider
      i. Human Grade – inappropriate, not true.
      ii. Carnivore Diet – Dogs are omnivores, not carnivores. Cats are true carnivores.
      iii. No Byproducts – Not an indication of quality. Some byproducts, such as organ meat (lungs, pancreas, tripe, etc.), do not contain beak, feathers, hooves, or hide. Beet pulp, tomato pomace, organ meats, animal fats, & some fiber sources are all byproducts.
   h. AAFCO Approved or Veterinarian Approved
      i. Not truthful
      ii. AAFCO does not approve foods
      iii. There is no veterinary board or body that approves foods. An individual doctor may render a product opinion, but this is just that, a personal opinion. Unless the individual was a board certified nutritionist, they have no additional training or knowledge.
IV. Raw Diets

a. Unbalanced & incomplete in the vast majority of cases.
b. Most diets are contaminated with E. coli/Salmonella if grocery store meat is used. Also Toxoplasmosis.
c. Some diets available commercially are decontaminated using UV radiation or high pressure pasteurization & thus are safer.
d. Potential source of contamination & infection to people, especially the young, elderly, or immunocompromised.
e. Adequacy & balance claims for non-raw commercial diets are made for the cooked product. If ingredients are heat sensitive manufacturers add sufficient amounts to be sure an adequate amount survives processing (i.e. nutrients are not cooked out).
f. Dogs in the wild eat organs, gut contents, small bones, etc., not just skeletal muscle.
g. Bones can cause gut perforation from splintering.
h. FDA does not recommend feeding raw diets, nor do most board certified veterinary nutritionists.
i. Definitely consult a nutritionist, go to balanceit.com, or petdiets.com.
j. Dogs are genetically distinct from wolves.
k. Benefits of Raw Diets

   i. Toxins formed during cooking are avoided.
   ii. Control over ingredients.
   iii. More beneficial microorganisms survive & may have a probiotic effect.
   iv. Higher antioxidant levels.
l. One board certified nutritionist recommends __________ __________ (origin brand) which is both high pressure pasteurized and balanced. Company large enough to practice quality control and utilize a true (PhD or ACVN) nutritionist.
V. Homemade Diets
   a. Potential benefits
      i. Palatability.
      ii. Control over ingredients.
      iii. No preservatives.
      iv. No storage mites.
      v. Contain phytonutrients.
      vi. Often little ingredient diversity, so can determine if pet is sensitive to those ingredients.
      vii. No hidden formula or ingredient changes (pet foods have 6 months to change label after changing ingredients).
      viii. You can source your ingredients ethically.
   b. Potential problems
      i. Most home cooked diets are incomplete & unbalanced. The most common problems are in calcium, B vitamins, & fatty acids. I do not trust any recipes off the internet. Balanced & complete diets are possible if you go to a board certified veterinary nutritionist (Diplomat of the ACVN), utilize the website & product called Balance It, or utilize the petdiets.com website. Lay people, & especially pet store employees with no degree in nutrition, are not qualified to speak about dietary completeness or balance. Most DVMs, myself (a board certified primary care DVM) included, do not have sufficient knowledge to assure these parameters. Proprietary software of considerable expense is utilized, formulating & balancing diets.
      ii. Diets can be analyzed at some universities (U.C. Davis & Michigan State that I know of).
      iii. Recipe drift – Example using chicken breast vs. a recipe stated chicken thigh. This definitely changes fatty acid content as well as calories & possibly calcium. Balanced recipes must be strictly adhered to without changing ingredients or amounts over time.
VI. Evaluating Pet Food Companies & Foods
   a. AAFCO statement present?
   b. Veterinary nutritionist (DACVN) or PhD employed by company?
   c. How long had the company been in business? Good track record?
   d. Are claims made on packaging absurd or misleading? Do people selling the food make over-reaching statements?
   e. Does company do ethical research on pet nutrition?
   f. Does the company use ingredients that fit with your choices, e.g. grass-fed or free range?
   g. Does the company test each delivery of an ingredient for toxins, molds, etc.?
   h. Does the company test each batch of food to assure its nutritional adequacy and match to guaranteed analysis?
   i. Is a sample of each batch of food saved for later analysis if a problem is noted after it reaches the market?
   j. Are actual feeding trials of foods done or is AAFCO statement based solely on formulation?
   k. If you call the company can they readily answer these questions? If not, can they direct you to someone who can in a timely fashion (24 hours)?
VII. Obesity: The number 1 nutritional DISEASE in the USA

a. Although calories fed & calories expended are extremely important, they are not the whole story in obesity.
   i. MER & RER – see Basic Nutrition Section

b. Incidence of obesity in the US is: Dogs 50-60%, Cats 50-63%. In the 1960’s and 1970’s pet obesity was estimated at 6-12%

c. BCS – Body Condition Score allows estimation of excess fat & percentage above ideal weight. Many owners underestimate BCS of their pet.

d. Fat, once thought to be inactive energy storage tissue, is now known to secrete hormones & cytokines (substances that carry messages between tissues, example: TNFalpha, interleukin6). These substances are markedly proinflammatory. This inflammatory state is responsible for many of the deleterious effects of obesity, such as arthritis or diabetes. The joint changes in arthritis are NOT simply due to carrying excess pounds.

e. Diseases associated with the inflammatory state of obesity include:
   i. Arthritis
   ii. Diabetes mellitus, Insulin resistance
   iii. Decreased immune function. Increased susceptibility to infection
   iv. Pancreatitis
   v. Intervertebral disc disease
   vi. Cancer
   vii. Cruciate ligament rupture
   viii. Bladder stones & lower urinary tract inflammation
   ix. Dermatitis
   x. Dental disease
   xi. Adverse changes in intestinal bacteria
   xii. Increase triglycerides & cholesterol
   xiii. Respiratory disease
   xiv. Cardiovascular disease
   xv. Hypertension

f. Several studies have shown normal to lean dogs lived 18 to 24 months longer than their modestly obese (BCS 7) cohorts.

g. Mature healthy non-obese pets will maintain a normal body weight even when free fed. I do not recommend free feeding pets, especially cats.
   i. In obese pets, this does not occur. This reflects the altered state produced metabolically by the secretions of fatty tissues.

h. The accumulation of fat in the obese state promotes development greater numbers of fat cells, as well as increased size of existing cells. The higher number of fat cells predisposes to regaining weight as the number of cells does not diminish with weight loss.

i. Metabolic Syndrome
   i. Leptin – A substance secreted by cells to signal the brain to stop eating, increases energy expenditure, & improves insulin sensitivity. As numbers of fat cells increase, so does leptin secretion chronically. Leptin also decreases the energy derived from a given meal. In obese animals, the high amounts of leptin cause decreased responsiveness of the leptin signaled pathways in the brain, liver, & pancreas; this is called Leptin Resistance. Satiety in normal dogs is signaled by the number of calories consumed. Satiety in cats is signaled by the volume of food in the stomach.
   ii. Insulin – Obese pets, especially cats, have excessively high insulin levels. Like leptin, we see the development of insulin resistance. Especially in cats, this along with inflammatory changes in pancreas predisposes to diabetes. High levels of insulin promote storage of carbs, protein, and fat in all species.
   iii. Amylin (IAPP) is secreted from the pancreas along with insulin & rises with obesity. Amylin forms amyloid, which is deposited in the pancreas destroying cells & also predisposing to diabetes. Amyloid can also damage kidneys.
iv. Non-insulin dependent utilization of glucose is also impaired in obese pets. This contributes to elevated blood sugar. This further elevates risk of diabetes.

v. Serotonin (SHT) – involved in regulating food consumption as well as mood, energy use, & GI motility. Serotonin levels are higher in lean pets. This may be related to abnormal gut flora in obese individuals. Utilization of probiotics is useful in obese pets.

vi. Adiponectin – Higher levels in lean animals compared to obese pets. Acts in synergy with leptin & affects carbohydrate metabolism, sensitivity to insulin, & energy metabolism.


viii. Tumor Necrosis Factor Alpha – Higher in obese pets. Highly inflammatory cytokine. Also, contributes to insulin resistance.

j. Risk Factors for Obesity

i. Genetics, breed.

ii. Children or non-compliant adults in household.

iii. Slower individual metabolism

iv. Owner not accounting accurately for treat calories.

v. Not measuring food, using larger scoop.

vi. Large food bowls (owners tend to offer more food because they perceive empty bowl.

vii. Neutering – decrease calories by 25 to 30% immediately after sterilization surgery.

viii. Owners using treats/food to answer all the pet’s needs (play, attention, affection, etc.).

1. My own dog regards a massage as a treat, we are conditioned to use food as love.

ix. Pets become conditioned/trained to expect food treats & meals and may demonstrate behaviors to cue owners (begging).

x. Sedentary lifestyle of owners often leads to sedentary pets.

xi. Choice of energy dense, highly palatable foods fed without accurately measuring portions.

xii. Age & body composition of owner.

xiii. Owner underestimation of pet’s BCS, denial of pet’s obesity.

k. Weight Loss: General

i. Safe rates of weight loss that allows loss of fat rather than muscle is 3-4% per month.

ii. The best predictor of amount to feed to lose weight is based on calories currently consumed (including treats!). Decrease by 20-25%.

iii. If a good dietary history is not available, feed at 55% of MER for neutered pets. Calculated using obese weight or 70% MER using ideal weight.

1. **Note about DOD**

iv. Pet must be weighed monthly & calories fed adjusted to facilitate ideal rate of weight loss.

v. Recommendations of Various Energy Intake Levels as Part of a Low-Calorie Diet

<table>
<thead>
<tr>
<th>Excess weight</th>
<th>20-30%</th>
<th>30-40%</th>
<th>&gt;40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat mass</td>
<td>25-35%</td>
<td>35-45%</td>
<td>&gt;45%</td>
</tr>
<tr>
<td>BCS</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

vi. Increased calorie expenditure, via activity, facilitates both weight loss and preservation of muscle.

vii. Higher protein diets may facilitate preservation of muscle, but evidence is conflicting.

viii. Lower energy density, weight loss diets insure that receives needed levels of vitamins & minerals and allow feeding larger quantities of food. This aids the signaling of satiety via stretch receptors in the stomach and intestines.

ix. Pet weight loss % may vary with each week. They can experience plateaus and persistence is a must.

x. Energy density, calories per cup or per can, should be on the bag. If they are not, they may be found on a company website.

xi. Food should be dosed the same way we dose medication – accurately, consistently, and on schedule.
I. Weight Loss: Dogs
   i. Daily calorie counts must include all treats and some chew items (e.g. bone marrow in actual bones is very fatty and high in calories).
   ii. Exercise (energy expenditure) is an important part of all weight loss plans.
   iii. Have all very overweight pets evaluated by a veterinarian to determine ability to exercise.
   iv. For very obese, elderly, or pets ill with other serious disease, consider exercise sessions with an animal physical therapist.
   v. For obese dogs with arthritis, swimming can be healthful, non-impactive exercise.
   vi. Exercise walks should be brisk enough to raise the pet’s heart rate (aerobic activity). They should not include times to sniff or eliminate. Ultimate goal is two 20-30-minute walks daily.
   vii. Start exercise gradually and add time as your dog loses weight and conditions muscles.

m. Weight Loss: Cats
   i. Must be monitored strictly to avoid potentially fatal fatty liver syndrome.
   ii. Many cats improve self-regulation of feeding amounts when switched to a high protein, high fat, low carbohydrate canned diet.
   iii. Cats do better with multiple meals daily. Feeders are available which only open when triggered by a collar or at a set time to facilitate this.
   iv. In healthy cats in single cat households, multiple small meals may be placed throughout the house on raised furniture to facilitate exercise and environmental enrichment (mimics hunting behavior).
   v. Cats do best with multiple short play sessions. Laser pointers, feathers on a stick, or thrown balls or stuffed mice can be used for interactive play. Energy expenditure is an important component of weight loss.
VIII. Websites

a. www.wasava.org (Nutritional Tool-kit)
b. www.talkspetfood.aafco.org
c. www.fda.gov/animalveterinary/products/animalfoodfeeds/petfood
d. www.petobesityprevention.org