Few nutritional diseases can respond so profoundly to appropriate therapy. The challenge is determining the best approach for a particular patient. The importance of diet history in the selection of foods along with common challenges and their commercially prepared & homemade solutions will be discussed.

A. Diet History
   a. Collecting
      i. Recognizing all potential antigen sources
   b. Handling Incomplete or Potentially Inaccurate History
      i. Hydrolysates vs. Uncommon Antigens

B. Blood & Saliva Testing
C. Cross-reactivity
   a. Effect on Novelty
D. Concurrent therapy
   a. Immunosuppressives
   b. Flavored Drugs/Treatments
E. Reduced n-6 to long-chain n-3 fatty acid ratio
   a. Dosing Marine Oils/Fat Based on n-6 Intake
F. Stool Quality “Effectors”
   a. Sudden Diet Changes
   b. Moisture
   c. Fat
   d. Fiber
      i. Type
         1. Soluble vs. insoluble
      ii. Amount
G. Elimination Trial Length
   a. GI Signs vs. Skin Signs
H. Development of New Reactions
   a. Timing
   b. “Feeding to Failure”
I. Recognizing Reactions
   a. Intolerances vs. Reactions
   b. Other disease mimicry
      i. Fat intolerance
      ii. Fiber-responsive
   c. Concurrent GI and Skin Signs
   d. Inappetance and Its Role
      i. Aversions
J. Commercial Solutions
   a. Hydrolysates
      i. Molecular weight averages
      ii. Species
      iii. Intact protein from carbohydrates
   b. Uncommon Antigen
      i. Limited ingredient
         1. Addressing hypoallergenic perceptions
      ii. Less limited ingredient
         1. OTC options
   c. Homemade
      i. When to use
         1. Concurrent conditions
         2. Commercially prepared novelty exhausted
      ii. Uncommon protein sources
         1. Effect on cost
      iii. Uncommon carbohydrate sources
         1. Effect on ease of preparation
      iv. When to fortify

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Be the Biggest Winner with Weight Loss
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Small animals in North America are supplied with an abundance of highly nutritious and palatable food. Concurrently, small animals live increasingly more sedentary lives, and clients provide treats and food as a basis for enhancing the human-animal bond. The result is frequently the consumption of excessive calories and the accumulation of adipose tissue. The development of obesity can have numerous adverse effects on a patient’s health, thus, weight reduction in obese patients or weight stability in patients with an ideal body condition should be a focus of every veterinarian. The veterinarian’s focus can be aimed by the consistent use of a body condition scoring system. Patients who are overweight or obese should be entered into a weight loss program. Successful weight loss programs should focus on three main areas that often are neglected. Area number one is increased awareness both by the veterinarian and by the client. Area number two is accurate accounting of the patient’s food intake. Area three is assessment of the plan’s ability to meet the patient’s and the client’s needs. The following lecture will detail the application of these three A’s in clinical practice.

Since animals do not wear clothes and there is no social stigma with having an obese small animal pet, clients are frequently unaware of the presence and/or magnitude of their pet’s obesity. Thus, the first step of any weight loss plan must be identifying the patient that is in need of weight reduction or is at risk of weight gain.

Veterinarians regularly perform procedures that will increase the risk of a patient becoming obese. Ovariohysterectomy and castration have been shown to lead to increased food intake (Kanchuk et al. 2003). Discharge instructions following orthopedic procedures frequently prescribe exercise restriction initially. Certain common drug therapies such as prednisone are known to cause polyphagia. Thus, iatrogenic energy imbalances should be identified and preventative adjustments in feeding strategies should be recommended. In addition, certain breeds appear to be more commonly obese, thus, in those breeds more aggressive intervention may be indicated. Finally, certain clients may be more prone to having a series of obese pets. Thus, “at-risk” client identification may be a valuable strategy to identify “at-risk” patients.

Some veterinarians feel uncomfortable addressing a patient’s overweightedness or obesity if the client is themselves overweight or obese. It should be remembered that, as veterinarians, we constantly discuss diseases in a patient that may also be afflicting the client. It kept on medical terms and discussed as a medical condition as opposed to a character weakness, clients usually respond quite well to the topic of obesity. If overweight clients raise any concern, it should be that they may have preconceived beliefs about what are effective methods for weight reduction based on personal experience, and these need may be addressed. Since fads are frequently introduced into the human weight loss marketplace, and clients take their cues from these highly marketed and publicized fads, awareness of these strategies can be useful in refuting their claims or in assisting with any contrasting proposed plans.

A patient is overweight, using a human definition, when they are up to 20% over their ideal body weight, and a patient is obese when they are 20-25% over their ideal body weight due to adiposity. There are numerous methods of quantifying a patient’s body condition. The least accurate and potentially most subjective method is using a patient’s body weight. Tables listing the “normal” weight range for dogs based on breed and sex do not account for the potential individual variation that can exist within breeds nor are similar tables fine enough to be useful in cats. Thus, the usefulness of body weight alone is quite minimal. More sensitive methods such as bioelectrical impedance, stable isotope dilution, bromide dilution, DEXA and MR imaging are available, but their widespread use is inherently limited by cost and/or availability. A more readily available technique is the use of a body condition scoring system (Laflamme et al. 1994). Body condition scoring utilizes both visual and tactile cues to assign a numeric value to a patient’s degree of adiposity. The body condition score (BCS) has been validated to correlate with more complex measures of body condition such as DEXA. It should be noted that a BCS is not designed to determine a patient’s degree of sarcopenia, but most patients are concurrently sarcopenic and “fat wasted” when underweight. Exceptions to this occur in disease states such as hyperadrenocorticism where there is a disconnect between the patient’s degree of lean and fat mass. (Further discussion regarding underweight patients is beyond the scope of this/these presentation/notes.) Since body condition scoring can be readily explained to clients, it is an effective tool to increase a client’s awareness of a patient’s degree of adiposity. Many of the therapeutic pet food companies have created posters and handouts which illustrate the appearance of patients at the different body condition scores. Some companies even have charts on their packaging. Most of these systems are based on either a 5- or 9-point system. 5-point systems usually consider a 3 out of 5 as ideal. Each subsequent point on the 5 point scale represents an increase or decrease depending on direction of 20-30% in body fat above or below ideal (i.e., 1 = very thin and 5 = obese). 9-point systems usually consider a 4 or 5 out of 9 as ideal. Each subsequent point on the 9-point scale represents an increase or decrease depending on direction of 10-15% in body fat above or below ideal (i.e., 1 = emaciated and 9 = grossly obese). Clients should be given a handout (readily available from many pet food companies) and informed of where their pet falls on the chart.

There is a constant search on the part of the medical community and the public to identify interventions that will improve the quality and quantity of life. To date, the only intervention proven scientifically to improve quality of life and concurrently extend
lifespan in a pet species is caloric restriction and maintenance of a lean body condition score (Kealy et al. 2002). This argument may be the best motivator to prevent at risk patients from becoming obese. In any given patient, there may be a more specific benefit to weight reduction. For example, an obese dog with tracheal collapse clearly will benefit from weight reduction, thus, the client’s focus should be placed on weight reduction as a treatment for the tracheal collapse. Similarly, an obese dog with a lameness refractory to further NSAID therapy and/or surgery may benefit greatly from weight reduction. Clients should be focused on improvement of the clinical sign that is worsened by overweightedness/obesity. Although it would be nice if patient’s achieved an ideal body weight as an endpoint for any weight loss plan, it may not be practical and may misplace the client’s focus. Since significant improvements can be made in certain diseases with weight reduction, the improvements themselves serve as the best and most effective means of maintaining interest and focus on continued weight loss.

The goal of any plan should be the improved health of the patient. For some patients this may not be the return to an ideal body weight, but instead the reduction in clinical signs associated with some disease process or a reduction in risk for the development of disease (please see table below). It must be remembered that a weight loss plan that achieves any weight reduction has inherently been successful. Weight loss can be quite difficult to achieve in some patients and/or be very slow, thus, even slight weight reductions should be celebrated.

Once a client recognizes that their pet is overweight and may benefit from weight loss, there is a potential for the development of guilt and concern that the veterinarian will blame them for their pet’s weight. It must be remembered that for most clients the development of guilt can result in a desire to consciously or subconsciously deflect blame. The main effect of this defensive posture is a lack of accurate accounting of a patient’s complete daily/weekly diet. Unfortunately, patients vary greatly with regard to energy requirement for weight stability (presented in Lewis et al. 1987); thus, if one receives an inaccurate or incomplete diet history from the client, there is an increased risk that recommendations for amounts to feed will result in weight gain, weight stability or weight loss at too rapid a rate. This is due to the inherent variability in energy requirement for the individual patient. Although the following equations, to calculate weight loss in a patient, can be used, the best measurement is to use the patient’s current caloric intake to make recommendations.

In dogs, feed resting energy requirement (RER; seventy times the current body weight in kilograms raised to the 3/4 power (70 x \((BW_{kg}^{3/4})\)) OR 80% of current caloric intake whichever is less. Please note if the calculation results in a value below 50% of RER, a careful review of the patient’s health status (blood work, physical, etc.) and the accuracy of the diet history should be undertaken. Severe caloric restriction can result in both metabolic rate and activity changes that may prevent weight loss without concurrently making a patient extremely lethargic. Most patients undergoing weight reduction should be at least as active as they were prior to the initiation of the plan or more often they will be more active. In addition, special care must be made in cats to ensure that weight loss is not so rapid as to increase the risk of developing hepatic lipidosis. An obese cat should never be allowed to become anorexic under the pretext that it will be beneficial for weight loss. Anorexia in an obese cat should be closely monitored for, and the risk of developing hepatic lipidosis should be discussed with the client at the start of any weight loss plan.

The rate of loss (usually 1-2% of body weight per week) is based on traditional clinical recommendations that were designed to maintain lean body mass and preferentially burn fat mass. In addition, it appears that the slower the rate of weight loss, the less the body responds by slowing the metabolic rate and the less hungry the patient seems. Thus, a slower rate of weight loss potentially decreases the likelihood of weight rebound and increases the likelihood of client compliance. Often patients with the most compliant of clients will not lose greater than 0.5% of their body weight per week. If the patient is doing well and the client is not impatient, this level of loss should be accepted and further caloric restriction is not necessary. It must be remembered that there can be a great deal of variation in the energy requirement of a patient. Thus, even with the most accurate diet history and most compliant client, there will be times when the patient’s response to the weight loss plan will be poor. Thus, an assessment of a patient’s response must be made with corresponding adjustments based on the response.

Since patients may respond to the weight loss plan in unpredictable ways, reassessing the patient’s response is vital to any successful plan. It is not uncommon for patients to be identified as needing weight loss and placed on weight loss diets indefinitely without adjustment. Prescription diets are just that -- prescriptions. Veterinary therapeutic diets are sold through veterinarians due to the concern that they may be used inappropriately. This includes using a diet that is proving ineffective in treating the desired disease process. Veterinarians have become increasingly aware of the need to check the efficacy of a particular antibiotic for say a bacterial UTI, and thus perform repeat urinalyses with C&S. If ineffective in clearing the UTI a different antibiotic will be selected and prescribed. The same philosophy should be adopted for commercial therapeutic diets. Thus, in the case of a diet designed for weight

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loss, adjustments in the quantity of diet being fed needs to be adjusted based on response. There is often a temptation to starve the animal to achieve “guaranteed” weight loss, but this is not in the best medical interest of the patient nor is it likely to lead to long-term successful weight loss and/or compliance.

Reweighing patients serves two main functions. First, it allows adjustments to be made in the weight loss plan based on response. Second, it allows for more frequent success. Since the majority of patients will not show any visible signs of weight loss for several months, the client may become disenchanted and less resolved to continue. However, if the client can see quantifiable changes in the patient’s weight, it can help reinforce their commitment to the weight loss plan. It also can serve as a clear indicator to the client whether the restriction is appropriate or not. For example, if the client initially felt the restriction was too severe, but is then faced with the reality that the patient is losing weight at an appropriate rate or isn’t losing weight, their acceptance of the plan or adjustments to the plan should increase. Weigh-ins also provide the best method to adjust the level of restriction for a particular patient. Without weigh-ins, weight loss plans are often doomed to failure due to inaccurate initial recommendations.

Some practitioners have set up weight loss support groups for clients with patients undergoing weight loss. This allows for grouped weigh-ins, encouragement and peer advice. Patients further along in the program can be used as examples, which in turn strengthen the resolve of all involved. A display of before and after photographs of patients that have completed plans can help as both an incentive and a recruiting tool. This certainly could be a practice builder and enable a more consolidated approach to obesity management of the practice’s patients.

Numerous dietary strategies have been employed in the design of therapeutic diets. With the exception of a few low carbohydrate weight loss diets, all diets have a decreased energy density (i.e., kcal per unit volume) than most “light” or maintenance diets. The basis of this strategy is the concept that gastric/bowel distention leads to satiety. The use of fiber to achieve satiety is hotly debated (unpublished data by Hill’s; Butterwick et al. 1997). Other strategies have been employed to achieve decreased energy density other than fiber. For example, one company achieves decreased energy density by increasing the degree of kibble expansion following extrusion, thus, creating a kibble that is more puffed up with air. Probably the most important formulation difference between weight loss diets and regular foods is an increase in the essential nutrients per kilocalorie. Ideally, the only nutrient being limited during weight loss would be energy. A patient’s requirement for protein, fat, minerals and vitamins is not known to decrease during weight loss. Thus, limiting intake of essential nutrients would be inappropriate. One must remember that a pet eats to their caloric need typically. For example, dogs and cats do not have a drive for calcium when in a state of calcium deficiency. Nutritionists are aware of this fact, thus, commercial diets provide a set amount of a particular nutrient per kilocalorie of diet to ensure that an appropriate amount of the nutrient is consumed. If a patient’s caloric intake is intentionally restricted for an extended period, as it is during weight loss plans, there is a potential for the patient to develop a nutrient deficiency unless a diet designed with enhanced levels of nutrients per kilocalorie is fed. To illustrate this point let’s take the example of protein. Let’s say that an adult obese dog needs to consume 16% of dry matter as protein (assuming a particular level of protein digestibility and amino acid composition) to avoid an amino acid deficiency at a caloric intake that maintains the dog’s current weight. Let’s also say the clients are currently feeding a diet with 20% of dry matter as protein and decide on their own to use this same diet for weight loss. They then gradually decrease the amount of diet fed to achieve weight loss until they are feeding 60% of the amount they were originally feeding. Unfortunately, the dog is now being fed the same amount of protein as if the diet contained 12% protein on dry matter and is at definite risk for developing an amino acid deficiency. This concern extends to all nutrients, thus, the selection of a weight loss diet is not solely for decreased energy density and potential satiety, but also for deficiency prevention.

Increasing the frequency of meals may assist with decreasing the problem of begging. This may be due to a satiety effect or more likely will provide the client with an allowed and accounted for meal during times of begging. Increasing the frequency of meals may also lead to better compliance because although the volume for any given meal is less, the client feels the pet is fed more due to the increased meal frequency. There may also be an increase in energy expenditure with increased meal frequency due to the “thermal effect of food”.

Providing clients with treats is important for compliance to weight loss plans. If treats are not included in the plan, they most likely will still be provided but not accounted for, making appropriate adjustments in caloric intake more difficult. Incomplete and unbalanced treats should be limited to 10% of caloric intake to prevent deficiencies from developing. Excellent low calorie human foods that can be used as treats are baby carrots (assuming that calcium oxalate urolithiasis is not a concern as carrots are higher in oxalate), air-popped popcorn and unflavored rice cakes. Even high fat treats can be used, but careful instructions on the limited amount that can be fed must be given to the client (this also allows one to educate the client on energy density differences between foodstuffs).

Exclusively relying on caloric restriction may not be the best means of achieving weight loss. Caloric restriction coupled with exercise has the benefit of increasing the patient’s metabolic rate and assisting with lean body mass maintenance. In addition, exercise provides an alternative method of reinforcing the human-animal bond that does not rely on treats or meal feeding. Exercise can be instituted by simply increasing/creating play time(s) or taking the pet on walks.
It is important that once a patient successfully completes a weight loss plan that they also successfully maintain their new weight. Thus, care should be taken when the patient is weaned onto a new diet and a new caloric intake. Numerous weight management diets are available over-the-counter (OTC). These diets fall into two categories, “light”, “lite” or “low calorie” AND “less calorie”, “reduced calorie”, “lean”, “low fat”, “less fat” or “reduced fat”. Only the first group of terms gives information on energy density. By definition, these “light” diets must contain no more than specific amounts of calories such as 3100 kcal ME/kg for dry dog diets and no more than 900 kcal ME/kg for canned dog diets. The other group of terms do not provide any insight on the energy density of the diet. Thus, a diet that is labeled “reduced calorie” could be very energy dense (e.g., 500 kcal/cup) if being compared to an even more energy dense diet (e.g., 600 kcal/cup) and, thus, potentially be very inappropriate for weight loss or an obese prone dog. The selection of a weight maintenance diet is further complicated by the common lack of energy density information on diet packaging. Therefore, creating a list of “light” diets that you are familiar with and that is readily available to the client may prove quite useful. Armed with such a list, the client can select a diet that meets their personal preferences (e.g., diet ingredients, brand/company, price). As the veterinarian, you can then give a starting recommendation on the amount of the new diet to feed. Initially, feeding should start with a slow transition to the new diet over 5-7 days at the same number of calories that the patient was on at the end of the weight loss plan. The patient should then be weighed. Then the caloric intake should be increased by ~10%, and the patient should be reweighed in two weeks. If the patient is losing weight then an additional increase of ~10% can be implemented and the patient reweighed in two weeks. If the patient is weight stable, then continue at current caloric intake and reweigh in one month. If gaining weight, reduce by ~10% and review that the client is complying with the dietary recommendations still. Overall, this process of weaning the patient onto the new amount of diet is performed based on weigh-ins to achieve weight stability.

References available upon request
So Many Foods, So Little Time, Money, and Space—Help!
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With the ever expanding selection of commercially prepared foods to meet practice, client and patient needs, how does one determine what to offer as a solution and carry? This lecture will provide strategies to optimize and prioritize recommendations and inventory.

Outline
A. Average Revenue From Food Sales and The Potential
   a. Economic Rationale for Nutrition In Clinical Practice
      i. 4% of total veterinary practice revenue
      ii. Large compliance gap indicates significant additional potential
      iii. Above is important given “opportunity cost” of spending resources/time on nutrition

B. Strategies to Increase Product Sales
   a. Recommending an Effective Therapeutic Nutritional Plan
      i. Matching plan to client and patient needs
         Please see lecture entitled “Increasing Compliance With Nutritional Recommendations” for more on this topic.
   b. Establishing Expectations
      i. Client education outlining nutritional goals
         1. Contrast therapeutic solutions/recommendations with perceived alternatives/OTC products
   c. Monitoring Patient Response
      i. Measure to see if goals are met and adjust as needed
         1. Proactively schedule recheck calls and appointments
   d. Providing a Variety of Viable Options
      i. Maximize with inventory management

C. Inventory Management
   a. Selecting What to Carry
      i. Practice type based
         1. Client demographics
      ii. Veterinary exclusivity
         1. Understanding FDA guidelines on therapeutic food sales
      iii. Product performance/support for use
      iv. Company technical resources/delivery practices
      v. Margins and carrying cost of inventory
   b. Determining How Much to Stock
      i. Sizing
      ii. Number
      iii. Adjusting orders based on historical data
   c. Handling Returns
      i. Manufacturer policies
      ii. Tracking reasons
         1. Improving offerings
   d. Storage
      i. “First in, first out” stacking or shelving
      ii. Visibility/proximity to waiting area/discharge
      iii. Security
   e. Point of Sale Procedures
      i. Cross checking product matches recommendation
      ii. Expiration date check
      iii. Overall product condition check
      iv. Service
         1. Carrying out
         2. Schedule reorder reminders
   f. Handling Perishables and Product Recalls
      i. Temperature, moisture, and pest controls
      ii. Recall notification procedures
         1. Liability insurance coverage

D. Recommending Nutraceuticals and Dietary Supplements
   a. Method for Assessing Safety and Efficacy
      i. Confirming that form or carriers are appropriate
1. Probiotic
   a. Viability
   b. Species specificity
2. Nutritive carriers
   i. Matching recommended dose to reported efficacious dose
   ii. Understanding if safe upper limits exist

E. Creating or Increasing Revenue From Nutritional Recommendations
   a. Nutritional Recommendations for Healthy Patients
      i. Importance
         1. For maintenance
         2. During growth
            a. Large breeds
            b. Form (variety in kittens)
            c. Energetics and individual energy needs
   b. Nutritional Recommendations for Unhealthy Patients
      i. Importance
         1. End of life decisions

Recommended additional reading
With the insight gained from having generated 10,000s of homemade recipes, this lecture will discuss the common reasons for, the challenges with, and the successful approach to homemade feeding.

Outline

A. Reasons for Feeding Homemade Food
   a. Medical Need
      i. Most common conditions
         1. Adverse reactions
         2. Diseases with reduced appetite/learned aversions
         3. Concurrent condition
         4. Unintentional
   b. Human Animal Bond
      i. Client enjoys cooking for pet
   c. Anthropomorphism
      i. Children should have healthy fresh meals
         1. Doesn’t predict dietary approach
      ii. Pets should be fed like humans
         1. Often predicts dietary approach
   d. Fear
      i. Toxins
      ii. Diseased/unhealthful livestock
      iii. Unknown/Indeterminate
      iv. Establishment
   e. Client Philosophy(ies)
      i. No preservatives
      ii. Whole/fresh foods
      iii. Agricultural practices
      iv. Vegan/vegetarian
      v. Religious
   f. Regionalism
      i. Coastal
B. Challenges with Homemade Food
   a. Pathogens/Zoonoses
      i. Asymptomatic shedding
      ii. Associated liability
   b. Nutrient incompleteness/imbalance
      i. Whole prey vs. whole food
      ii. Perception that variety over time solves constant deficiencies
   c. Appropriateness:
      i. Long-term feeding
         1. Good intention, short-term recipes
      ii. Species
         1. Vegetarianism for a carnivore
      iii. Pet Risk Factors/Conditions/Diseases
         1. Lack of awareness of caloric distribution
         2. Requirements in growth and sickness
   d. Potential Use of Toxic or Inappropriate Ingredients
      i. Garlic and onion
      ii. Oxalate rich foods
      iii. Mineral and protein rich carbohydrates
   e. Cost
      i. Perception of cost vs. reality
   f. Convenience
   g. “Diet Drift”
      i. Tendency to change recipe over time
   h. Energy Balance
      i. Increased digestibility and palatability effect on caloric intake and body condition
C. Assessing Recipes
   a. Completeness
      i. Sources of essential nutrients checklist
      ii. Specificity needed to assess
   b. Balance
      i. Formulation software
      ii. Individualized consultations with DACVN
   c. Preparation Methods
      i. Pathogens
      ii. Vitamin degradation
      iii. Batching
When Dietary Fat is Just Too Much Fat
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Achieving needed dietary fat restriction although a simple concept can be challenging to implement. Determining the level of fat restriction a patient needs and the amount of dietary fat in a potential food along with identifying palatable options can be difficult. The importance of a diet history evaluation, caloric distribution and its calculation, and commercially prepared & homemade solutions will be discussed.

Outline

A. Pathogenesis
   a. CCK stimulation of pancreatic digestive enzymes release
   b. Effect of macronutrients on CCK
      i. Fatty acids - significant
      ii. Amino acids - moderate
      iii. Carbohydrate - minimal

B. Level of needed fat restriction dictated by patient
   a. Higher levels of fat may be tolerated, if potentially inducing level of dietary fat very high
   b. Important to determine as moderate or severe fat restriction can be very limiting and negatively affect palatability

C. Caloric Distribution
   a. Best method to compare foods’ macronutrient levels
   b. Units are percentage of calories
      i. Not same percent as that found on packaging in guaranteed analysis section
      ii. Crude fat % value on labels are often much lower than the % of calories from fat
         1. Commonly leads to confusion and client believing they have found a “fat restricted” diet over-the-counter (OTC) that “works” when in fact it is too high in fat
   c. Method to calculate from guarantees
      i. Calculate the % carbohydrate by adding up crude protein, crude fat, moisture, crude fiber, and ash percentages with 3% assumed for ash when unavailable and subtracting the total or sum from 100% to get % carbohydrate by difference
      ii. Multiple % crude protein value by 3.5, % crude fat by 8.5, and % carbohydrate (calculated by difference) by 3.5 and adding the products of all three. Then divide the individual products by the total and multiply by 100 to get the percentage of calories from each macronutrient

D. Commercial Foods
   a. OTC
   b. Therapeutic foods
      i. Low fat
      ii. Other but happen to be lower fat
   c. Homemade
      i. Indications
         1. Palatability issues with commercial
         2. Fat restriction beyond even therapeutic options needed
         3. Concurrent conditions
            a. Calcium oxalate urolithiasis
            b. Adverse reactions to food
            c. Renal disease
      ii. Solutions
         1. Free at vet.balance.it
            a. Note that ground meat are typically too fatty to be used
            b. Using low linoleic acid fatty acid containing oils difficult
               i. Avoid olive oil, coconut oil
               ii. Use corn oil or walnut oil
            c. Human supplement options available for free
               i. Conflict: speaker is an owner of Balance IT that sells all-in-one supplements at this site
         2. For a fee via Diplomates listed at acvn.org
            a. Advantage can get help with level of dietary fat restriction needed based on diet history evaluation
            b. Requires medical record and completed diet history form typically
            c. May or may not interact directly with client
Urolithiasis: Is Nutritional Management Written in Stone?
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The nutritional management of urolithiasis is ever evolving. Changes over the last couple of decades include not focusing on urine pH in calcium oxalate urolithiasis, treating with antibiotics and/or surgery for struvite urolithiasis prevention in canine patients, a decreased focus with urate urolithiasis in some female canine patients and pushing dietary protein when concurrent hepatic encephalopathy exists with urate urolithiasis, and avoiding the development of taurine deficiency in cystine urolithiasis.

Outline
A. Diagnosis
   a. Crucial to ensure right therapy is applied
      i. If stone analysis not undertaken closer monitoring of treatment needed
         1. Concern of struvite shell over other stone type (compound urolith)
   b. Challenge of culturing infection in dogs with struvite
      i. Presume infection
B. Calcium oxalate (CaOx) urolithiasis
   a. Water
      i. Higher moisture (85%)
         1. Soup or stew like
            a. How to calculate
         2. Slow introduction needed to improve acceptance and to avoid loose stool and accidents
            i. Goal: Urine specific gravity of 1.020 or less for dogs and 1.025 or less for cats
            ii. Goal: No crystalluria
   b. Controlled calcium levels to enable CaOx crystals to pass in feces
   c. Avoidance of higher oxalate foods
      i. Example: carrots but many other vegetables, grains, and starch rich foods
   d. Potassium citrate
      i. As a citrate source versus minimal to no impact on urinary pH
   e. Commercial foods
   f. Homemade foods
      i. Indications
C. Struvite urolithiasis
   a. Decreasing urinary pH while avoiding high protein intake that increase ammonia and phosphorus intake
      i. Sulfur amino acid supplementation - methionine
   b. Increasing water intake
      i. Concern of higher sodium intake with cats especially
   c. Controlling magnesium intake not just ash
   d. Canine management
      i. UTI cause, no apparent cases of sterile struvite urolithiasis
         1. Prevention focused on antibiotics and/or correction of anatomical issues leading to increased risk of UTI
         ii. Dissolution can still be accomplished with diet
            1. Close monitoring needed to ensure progress is made especially if urolith was compound with different core like calcium oxalate
   e. Commercial foods
   f. Homemade foods
      i. Indications
D. Urate urolithiasis
   a. Breed genetic defect versus hepatic shunt
      i. If shunt and surgical correction possible, pursue as method of prevention
   b. Avoidance of high purine intake
      i. Lower protein
         1. Titrate lower intake to any liver failure and hepatic encephalopathy (HE)
            a. Risk of protein malnourishment
               i. Risk of sulfur amino acid deficiency in dogs on legume based diet
   c. Lower purine rich foods
   d. Increase water intake
   e. Commercial foods

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f. Homemade foods
   i. Indications
E. Cystine urolithiasis
   a. Avoidance of high cystine intake
      i. Lower protein
         1. Avoid taurine deficiency
         2. Alkalinizing effect
   b. Increase water intake
   c. Medical therapy (e.g., 2-MPG)
   d. Commercial foods
   e. Homemade foods
      i. Indications
F. Other rare stone types
   a. Not to be covered