Virginia Cooperative Extension Service

VIRGINIA VETERINARY NOTES

VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE

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WHAT'S INSIDE!

THOUGHT FOR THE MONTH

A person's greatest emotional need is to feel appreciated.

Kent C. Roberts, DVM
Extension Veterinarian

OBESITY IN COMPANION ANIMALS
Part II of III

Weight Loss and Energy

A successful weight reduction program in the obese dog or cat begins with an understanding the energy intake and the energy expenditure in the animal, i.e., calories in and calories out. It is inappropriate to suggest to a client to simply reduce the animal's food intake. One must determine the energy requirements of the animal, and select a diet that will meet not only the energy needs, but also the protein and vitamin/mineral needs. Additionally, increasing the energy expenditure in an animal through regular exercise will make the weight loss program more successful.

In order to consider weight reduction in obese companion animals, a clear understanding of energy terms is needed. There are three common terms used in describing energy requirements. The first is the Resting Energy Requirement (RER). This term refers to the energy needs of the animal at rest (not expending appreciable energy). A term that is often used in human nutrition is Basal Energy Requirement which is a measure of energy needs of a person that is lying perfectly still, usually just upon waking from a night's sleep, in a thermoneutral environment. These measurements are difficult to obtain in animals, and RER is considered practical and fairly precise. A second term in veterinary medicine describing energy needs is Maintenance Energy Requirement (MER). An animal's MER is the energy needed for the animal to maintain its body weight (no gain or loss) and have normal activity levels. The last term commonly used is Total Energy Requirement (TER). The TER takes into account any deviations from MER and is correlated to RER. For example TER>MER in the growing kitten, the lactating bitch, and the performing/working dog. Conversely, the TER<MER in the hospitalized patient that is caged all day, the geriatric dog, and the inactive pet that remains in the house all day. Very rarely will TER = or > MER in a sick patient. Although there is a requirement for healing, it is still usually less than the energy needs of a healthy active pet.

These energy values can be calculated readily. All calculations require the current body weight to be in kilograms (BW kg). The energy is expressed as kilocalories of Metabolizable Energy in 24 hours (kcal ME/day).

$RER = 70 \times (BW)^{0.75}$ = kcal ME/day

$MER_{(dogs)} = 2 \times RER$ = kcal ME/day

$MER_{(cats)} = 1.4 \times RER$ = kcal ME/day

TER = TER factor x RER = kcal ME/day

Example TER factors for the dog and cat as related to their physical condition:

Condition	Dog	Cat
Cage Rest with some movement	1.25	1.25
Post Surgery & Trauma	1.30-1.35	1.30
Sever Sepsis & Cancer	1.50-1.60	1.35
Head Trauma & Major Burns	1.75-2.0	1.40
Geriatric/Inactive	1.60-1.70	1.35

To reduce an obese dog or cat, you must think in terms of animal's **optimum** body weight. Optimum weights in dogs can be determined from the breed, size, gender, and lineage of the animal. Generally, cats fall into 2 optimum body weight categories (regardless of breed): 8-10 pounds for most females and 10-13 pounds for most males. The TER factors for reduction diets are the same as above, except everything is based on optimum body weights.

In order to reduce an animal, the total calories fed must be less than the optimum TER ($TER_{(opt)}$). The TER needed for reduction is different in dogs and cats. Dogs can be reduced at 60% of the $TER_{(opt)}$ while cats should be reduced at 70% of the $TER_{(opt)}$. Reduction diets at 40% of $TER_{(opt)}$ and starvation diets have been used in dogs with mixed results. Starvation diets are inappropriate because they can cause a relative protein, vitamin, and mineral deficiency. Post-surgical healing can be delayed and most dogs tend to regain the lost weight once they return to their normal diet. Cats should <u>never</u> be put on a starvation diet. The risk of idiopathic hepatic lipidosis is high in obese cats that lose weight quickly or that are anorexic; therefore, cats should never lose more than 2 pounds/month and they should never be allowed to go for longer than 2-3 days without eating.

Another component of a weight reduction program includes the prediction of how long it will take the animal to lose its weight. This can be calculated by:

1. Determine the amount of weight to be lost. $BW_{(obese)}$-$BW_{(opt)}$ = pounds of weight to lose.
2. Determining the amount of calories to be lost. # of pounds to lose x 3500 kcal/pound = kcal ME to lose.
3. Determining the daily kcal deficit. $TER_{(opt)}$-$TER_{(red)}$=kcal ME/day deficit.
4. Determining the time period. # of kcal to lose/daily deficit = approximate number of days to lose weight.

<u>Examples of Weight Reduction Programs</u>:

Case #1:

Canine: 14-year-old spayed female Beagle. Current BW = 35 pounds. Optimum BW = 22 pounds. BCS = 4.5/5.
Activity level = goes outside 2x/day for 10 minutes each time.
(BCS = Body Condition Score)

Calculations:

$RER_{(opt)} = 70 \times (10)^{0.75} = 394$ kcal ME/day.
$TER_{(opt)}$ = 1.6 x RER = 1.6 x 394 = 630 kcal ME/day. A TER factor of 1.6 was chosen because the dog is a geriatric patient that is relatively inactive.
To reduce, feed at 60% of $TER_{(opt)}$. Therefore, $TER_{(red)} = 0.6 \times 630 = 378$ kcal ME/day.

Time for Weight Loss:

- Weight to lose: 35 - 22 = 13 pounds
- Calories to lose: 13 x 3500 kcal/# = 45,500 kcal ME.
- Daily deficit: $TER_{(opt)}$ - $TER_{(red)}$ = 630 - 378 = 252 kcal/day.
- Time to lose weight: 45,500 kcal ME/(252 kcal/day) = 181 days. I always allow an additional 10% time period for metabolic adjustments and weight loss plateaus--it will take approximately 181 + 18 = 199 days to reduce.

Case #2:

Feline: five-year-old neutered male DSH. Current BW = 16 pounds. Optimum BW = 11 pounds. BCS 5/5.
Activity level: wakes up to walk to food bowl and litter pan and then goes back to sleep!

Calculations:

$RER_{(opt)} = 70 \times (5)^{0.75} = 234$ kcal ME/day.
$TER_{(opt)}$ = 1.4 x RER = 1.4 x 234 = 328 kcal ME/day. Therefore, $TER_{(red)} = 0.7 \times 328 = 230$ kcal ME/day.

Time for Weight Loss:

- Weight to lose: 16 - 11 = 5 pounds
- Calories to lose: 5 x 3500 kcal/# = 17,500 kcal ME.
- Daily deficit: $TER_{(opt)}$ - $TER_{(red)}$ = 328 - 230 = 98 kcal/day.
- Time to lose weight: 17,500 kcal ME/(98 kcal/day) = 179 days. Allowing an additional 10% time period for metabolic adjustments and weight loss plateaus, it will take approximately 179 + 18 = 197 days to reduce.

**Please Note: Even though these animals have different pounds of weight to lose, it will take them nearly the same time. This is common when comparing canine and feline weight loss programs because of the slower rate at which we reduce cats.

Quantity of Food to Feed/Day:

1. Determine the caloric density of the selected food.
2. Divide the daily $TER_{(red)}$ by the calories in the food = quantity of food.

Example:

Case #1:
1. Feed Purina dry Fit n' Trim®. One 8 ounce cup contains approximately 251 kcal ME.
2. $TER_{(red)}$ = 378 kcal ME/day. (378 kcal ME/day)/251 kcal/cup = 1.5 cups/day.

Case #2:
1. Feed Hill's Prescription Feline dry r/d®. One 8 ounce cup contains approximately 181 kcal ME.
2. $TER_{(red)}$ = 230 kcal ME/day. (230 kcal ME/day)/181 kcal ME = 1.25 cups/day.

--Pamela Ray, DVM, Clinical Nutritional Service, College of Veterinary Medicine, Blacksburg, VA.

CONTROL OF FELINE INFECTIOUS PERITONITIS (FELINE CORONA VIRUS) IN KITTENS

It appears that kittens in multi-cat homes become infected most commonly from cats other than their mothers. This suggests that transmission of coronavirus to kittens generally takes place horizontally after birth, by adults other than the queen. Seronegative queens in a mixed random adult-mother environment had kittens which became seropositive. As only two were seropositive, it would appear that relatively few queens were excreting virus.

This evidence is from a University of Glasgow veterinary school study which found that 37% of kittens that mixed not only with their mothers but other cats became FIP positive, whereas only 6% that were kept with their mothers only became positive. None of the kittens in litters isolated from all other cats including their mothers at age 4 to 6 weeks became seropositive.

Since owners may wish to continue breeding from healthy queens in households where they are seropositive cats, breeders should ensure that any kittens they sell will not infect other cats or later die of FIP themselves. To this end, only seronegative kittens should be sold. It is assumed that seronegative cats are unlikely to be excreting the feline corona virus of FIP.

The results of the Glasgow study indicate that in these households the queen and its kittens should be kept isolated from all other cats until sold. As coronavirus can be indirectly transmitted, strict hygiene precautions should be observed. Finally the kittens should be tested at 10 to 12 weeks of age and should only be sold if seronegative. **--Abstracted from Addie, D.D. and Jarrett, O. Vet Record 126 (1990), p. 164, as reported in Animal Health Beat, Vol. 8, No. 1, Jan 1992, University of Nevada, Reno.**

DEAR WASTE GENERATOR

(The New England Journal of Medicine published this letter in its July 5 "Letters to the Editor" column.)

A recent letter I received from the New Jersey Department of Environmental Protection, Division of Solid Waste Management, Bureau of Special Waste Planning, addressed to "Dear Regulated Medical Waste Generator," has prompted me to consider my feelings about the various ways I am greeted. I am happy with "Dear Larry," "Dear Lawrence," "Dear Dr. Weisberg," or "Dear Mr. Weisberg." I don't mind "Dear Doctor" or "Dear Sir," so long as the letter is not from a member of my family. I have come to accept "Dear Friend" from fundraisers I don't know, and "Dear Provider" from health insures. I can even understand a computer I've never met addressing me as "Dear Miss Weisberg" (Although I prefer "Ms."). But I don't think I shall every come to terms with "Dear Regulated Medical Waste Generator." What really disappoints me is the absence of a corresponding intimate closing, like "We miss you. Please write soon. Love, NJDEP, DSWM, BSWP." **--Veterinary Medical News from Washington, AUG 90, as reported in Herd Health Memo, No. 6, 1990-91, University of Kentucky, Lexington, KY.**

CRYPTOCOCCOSIS IN TWO CATS SEROPOSITIVE FOR FIV

Cryptococcosis, a systemic fungal infection of humans and animals, is recognized worldwide. C. neoformans var neoformans, the main cause of the disease in animals, is found mostly in the droppings of fowls and in particular pigeons. Fowl and pigeons do not contract the disease, perhaps because of their high body temperatures, but excrete the microorganisms in feces. Other animals become infected by inhaling dust that contains the viable yeast forms. In domestic animals, cryptococcosis is most prevalent in cats.

C. neoformans is a typical opportunistic organism. Most affected animals clinically present with lesions in the upper respiratory tract and in the regional lymph nodes, but lesions of the skin, central nervous system and eyes are also frequently described. In humans, pre-existing immunosuppressive conditions and prolonged corticosteroid treatment, are important predisposing factors for cryptococcosis. In dogs, immunosuppressive diseases such as ehrlichiosis have been associated with fatal disseminated cryptococcosis. Some authors have suggested that in the cat, infection with feline leukemia virus (FeLV) or feline immunodeficiency virus (FIV) might be predisposing factors although this has not been proven. The authors report cryptococcosis in two cats infected with FIV (feline immunodeficiency virus).

FIV is a lentivirus which resembles both structurally and behaviorally the human immunodeficiency virus (HIV). FIV infects CD4+ and CD8+ subsets of T lymphocytes and can cause immunosuppression in naturally infected cats. Research has shown that the virus causes general suppression of the production of T cell - derived lymphokines, including SYMBOL-interferon and interleukin-2. Some FIV cats suffer from infections that could be opportunistic in nature, including: haemobartonellosis, bacterial pneumonia, toxoplasmosis, pyothorax, severe intestinal coccidiosis, systemic candidiasis, atypical mycobacteriosis, feline infectious peritonitis, and generalized notoedric and demodectic mange. Prognosis is relatively poor, although in some cases, the cats may survive for many years.

Immunity to Cryptococcus is primarily cellular and the disease occurs principally in humans and animals suffering from an underlying disease condition that depresses cellular immune reactions. Cryptococcosis has been described frequently in AIDS patients.

According to the authors' results, FIV infection may also predispose to cryptococcosis and all cats affected by cryptococcosis should be tested for the presence of FIV antibodies. Furthermore, cryptococcosis in FIV-infected cats provide a useful animal model for the study of cryptococcosis in AIDS-positive humans. **--Veterinary Medical Extension, Iowa State University, Newsletter #388-V736, December 1993, as reported in Animal Health Beat, Vol. 9, No. 2, February 1993.**

RENAL TRANSPLANTATION IN CATS AND DOGS

Renal transplantation is an accepted treatment for feline patients in endstage renal failure. It extends life and provides a good to excellent quality of life. Transplantation offers treatment, not cure. A transplanted feline kidney can function well for three or more years. Cats are very unique in the fact that, following transplantation of a kidney from an unrelated donor, they rarely suffer acute rejection while receiving cyclosporine and prednisolone as immunosuppressive agents.

Dogs, unfortunately, usually reject kidneys from unrelated donors unless complex immunosuppressive measures are taken. If cyclosporine and prednisolone are used to immunosuppress canine patients, the donor and recipient must be closely related or have very similar tissue types.

The best candidate for renal transplantation is the patient in early decompensated renal failure. Feline or canine patients must be free of secondary disease conditions. Transplantation should not be performed on patients with heart disease, urinary tract infection, diabetes or inflammatory bowel disease. Cats must be free of infection by the FeLV or FIV virus. Patients awaiting transplantation must be kept hydrated and are diuresed using parenteral administration of balanced electrolyte solutions. A restricted protein diet is fed ad libitum. Anemia is treated using erythropoietin and whole blood transfusions. Cyclosporine and prednisolone are started a few days prior to surgery to begin immunosuppression of the rejection response.

During the transplant surgery, blood vessels of the donor kidney are anastomosed to the external iliac artery and vein next to the bladder of the recipient. The donor ureter is anastomosed to the bladder. The native kidneys are usually left in situ to act as a reserve if the donor kidney fails to function or if function is delayed. The native kidneys may be removed three or more months after transplantation if warranted.

Most transplanted kidneys are functioning well by 72 hours after surgery and the plasma creatinine surgery and the plasma creatinine and urine specific gravity of the patient return to normal by the fifth postoperative day. The patient can then return to a normal diet and a normal style of life. Patients are discharged from the hospital when renal function is stable, appetite is good, and cyclosporine blood levels are adequate. Initially, an examination and an assessment of renal function is done weekly. Gradually, the interval between examinations is extended to four to six weeks.

Complications may occur. Most perioperative complications (shock, heart failure, death) can be avoided by careful patient selection. Bacterial (especially urinary tract) and systemic fungal infections have been reported in cats receiving high doses of cyclosporine. Upper respiratory infections can be a recurrent problem, but respond in most cases to medical therapy. Over time, (two and one half to three years or more) the transplanted kidney may begin to fail due to chronic rejection. Retransplantation is an option for these patients, but must be performed before severe weight loss and debilitation occurs.

The fact that the procedure is undertaken in terminally ill animals and that the immune system must be modified to maintain the transplanted kidney makes the treatment difficult and challenging. Some patients will not survive long term due to infections, chronic rejection and other problems that have not yet been recognized. Survival times have steadily improved as more patients have been treated, problems recognized and complications avoided. Despite the possible complications, renal transplantation is the only treatment that offers long-term survival with a normal quality of life for patients in decompensated renal failure.

Editors Note: This article did not discuss the quality of the donor kidney. It must be presumed that the donor should be in good health and screened for FIV and FeLV in the case of cats. A donor cat could be kept by any individual or group of clinics. **--Gregory, Clare R., Vet. Forum, (1992), p. 21-22, as reported in Communications in CE, Iowa State University, Oct. 1992.**

VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE
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CONTINUING EDUCATION OPPORTUNITIES
FALL 1993

Date	Subject	Location	Contact Hours
September 30	Small Animal Medicine Update	Charlottesville	4
October 1-2	Gastrointestinal Endoscopy Intermediate Course	Blacksburg	10
October 8-9	Orthopedic Surgery Canine Hindlimb	Blacksburg	10
November 5-6	Clinical Fish Medicine	Blacksburg	10
November 11	Small Animal Behavior Problems	Charlottesville	6
November 19-20	Practical Eye Surgery	Blacksburg	10
December 3-4	Clinical Hematology & Transfusion Medicine	Blacksburg	10
December 10-11	Wound Management & Reconstructive Surgery	Blacksburg	10

*Limited enrollment course which features hands-on experience.

Note: Program brochures are mailed out six-eight weeks prior to the course date. No registrations accepted until course brochures go out. For further information, please contact:

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MEETING ANNOUNCEMENTS

- Goat & Sheep Medicine — Friday, May 14, 1993
  North Carolina State University — 8:30 am - 4:00 pm
  Raleigh, NC — Six hours CE credit
  Registration fee: $50 (includes handouts, breaks, lunch)
  Sponsored by the American Association of Small Ruminant Practitioners.
  Telephone (607) 539-6181, Ithaca, New York.

- Virginia Veterinary Medical Association - Summer Meeting — June 25-26, 1993
  Virginia Beach Resort and Conference Center
  For more information, telephone (800) 937-8862

- Society for Theriogenology Annual Conference — August 12-14, 1993
  Omni Hotel - Jacksonville, FL

Canine Symposium - American College of Theriogenologists — August 15-16, 1993
Omni Hotel - Jacksonville, FL
For more information, please contact:
Don Ellerbee, Executive Director, Hastings, NE (402) 463-0392

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