

# Disease Problems in A Dog Nutrition Laboratory

*Clive M. McCay \**

THE study of disease and pathology forms an inseparable union with research in nutrition. A nutrition laboratory usually devotes part of its attention to the production and cure of disease. Four centuries ago when men were discovering the first vitamin, namely C, it was found that men suffered from bleeding gums, loose teeth and failure of broken bones to mend. If such men were given foods containing vitamin C such as sorrel, scurvy grass, lime juice or pine needle tea, it was found that these symptoms disappeared and the scurvy was cured.

Nutrition research has thus followed the pattern of thinking for several hundred years which associates nutrition with the production and cure of disease. Most nutritionists, like other scientists, like to deal with single variables. They like to feed a given deficient diet and produce a disease with given symptoms. They then like to feed a single vitamin, or mineral, or essential amino acid and cure the disease. Unfortunately biology is not so simple. Disease is usually accompanied by a chain of chemical reactions that involves hundreds of variables. The whole body and its relation to the world around it is changed. Hence the dog may be made to suffer from a vitamin or mineral deficiency. Its body becomes emaciated and may be more sub-

ject to some parasite such as hookworms. The nutritional need may later be supplied but this may not weaken the hold of the parasite which was able to gain a substantial foothold while the body was depleted.

## Nutritional research

Research upon the nutrition of the dog falls into three types of experiments in the Cornell kennels. The first concerns basic research upon young, growing puppies to define their requirements for such factors as vitamins, minerals and protein. Under this first section during the past two years much attention has been devoted to the growth rates upon vegetarian diets and the need for vitamins of the B<sub>12</sub> group.

A second type of research that is followed consistently concerns the improvement of commercial dog feeds. These studies are operated at cost under non-profit, industrial contracts. Under this heading work is directed at the improvement of feeds by the use of long continued tests. At present much attention is being devoted to the study of changes of food in the gastro-intestinal tract and the factors responsible for the prevention of diarrhea in biscuit-type feeds. In commercial testing of feeds, dogs are usually kept from weaning until adult size upon a given diet. The same dogs are often put through gestation and lactation upon a given feed. Under these conditions dogs may become emaciated and die. Bitches

\* Editor's note: Dr. McCay is Professor of Nutrition in the Department of Animal Husbandry, New York State College of Agriculture, Cornell University.

may perish during lactation. Puppies may be born dead or die before weaning. The problem is always present concerning what the diet lacks that must be added. In addition there is the question of handling the invading parasites that thrive as a body becomes depleted.

The third and major phase of research concerns the diseases of old age. Our kennel has a special group of old dogs that have been assembled for the study of gerontology or aging, if you prefer a shorter word. These dogs are subject to the chronic diseases that come with old age in spite of the best care and optimum nutrition. An example of this type of dog was "Old Nick" a Beagle who came into our laboratory with a bad heart. He was used in feeding radioactive calcium to follow this element into the blood and bones. He was given digitalis until he was put into the chemical balance cage for a couple of weeks. One day shortly after the end of this period while still in the cage he dropped dead. He had served his purpose and his bones were used for radioautographs to determine the relative amounts of radioactive calcium deposited by an old dog in the various bones of the body. Upon this dog the discovery was first made that much more radioactive calcium was deposited in the vertebrae than in the long bones such as the humerus. Nick did not live in vain.

#### **Purebred Dogs**

Since the kennel at Cornell has increased from a few purebred dogs in 1936 to an operation that involves from one to two hundred animals at the present time, the problems of epidemic diseases has increased. Due to the nature of the research only purebred dogs are used and these are all kept registered in the American Kennel Club. Thus the age and breeding of every dog is known. Furthermore purebred pups that are uninjured in many studies, such as those involving growth on commercial feeds, can be sold and the proceeds turned back into the research fund.

Most puppies are produced in the Ithaca kennels and some puppies are even pro-

duced at cost for other research laboratories. Thus, during the past year 60 male Beagle pups were produced for the atomic energy project at the University of Rochester. Due to the fact that the females of these litters could be used on growth studies, the estimated cost of producing these pups at three months of age was 30 dollars each.

#### **Veterinarian**

Every large research kennel such as ours should have one or more veterinarians associated with it. When this has been neglected in the past, research has suffered and in some cases failed. The function of the veterinarian is to diagnose and help control any diseases that fall within his domain. The duty of the nutrition specialist is to design the experiments, devise the diets and handle the biophysical and biochemical work. The veterinarian cannot be expected to operate and keep the Geiger counter working nor can the nutritionist expect to handle the immunization for distemper.

At the close of World War II, the kennel for nutrition research with dogs was reopened at a new location. A former dairy farm with an excellent barn was rebuilt into kennels. Although this has a capacity for handling 400 to 500 dogs it has never been used to this extent.

The outside disease problem of greatest importance in nutrition research is distemper. This must be controlled or all other work is invalidated. Our veterinarian, H. J. Milks, has done a remarkable job in keeping all dogs immunized. He has used active immunization with only one major break, which was not the fault of the method. This happened because some Beagles were being used for several months in another laboratory and were forgotten when their litter mates were immunized. When these Beagles were in the cages they developed distemper. They were returned to the kennel and several puppies between two and three months of age also contracted the disease. Two adult sires that had just come into the kennel and that had been treated by one of the passive methods also contracted

distemper. The disease did not spread to any other of the 100 odd dogs in the kennel since these had been immunized.

These experiences have given us added confidence in the value of active immunization and have provided no evidence that puppies have been lost as a result of contact with dogs undergoing active immunization.

Although our original stock of dogs came from high grade kennels in 1946, there were almost no dogs free from one or more intestinal parasites. Almost all had varying degrees of infestation with common ascarids. From conversations with kennel owners and letters that have come in during the past decade, it would seem that ascarids are a major source of loss in kennels. By consistent vigilance and study of this problem, the importance of the ascarid in injury to puppies has been reduced substantially in our kennel. The problem has been attacked both from the angle of sanitation and treatment.

In the original design of floor space for our major kennel every pen was provided

with its own drain into the central waste channel. All pens were designed in units that are four feet square. Great Danes are each allowed two of these units or a space four by eight feet when indoors. In early months of operation the kennel floor was hosed down each day. However this tended to leave the kennel rather damp in spite of large ventilators built into the original dairy barn. During this period each dog was provided with a wooden sleeping shelf about a foot above the floor and duckboards on the floor.

This whole plan was soon changed. The floor of the pens are now kept covered with a clean layer of straw. About once each week the pens are washed down and limed before dry straw is put in. The dire results in the form of skin diseases from the use of straw were prophesied by many, but never came true. The kennels have been free from diseases of both the skin and lungs.

Studies have been in progress for two years in keeping dogs off the straw upon bottoms of expanded metal. The dogs have ranged in size from Beagles to Col-



**Registered Beagles reared from weaning upon vegetarian diets without meat or milk. No evidence that vitamin B<sub>12</sub> was needed for growth.**

lies. Dogs live very well under such conditions. These bottoms have even been employed in some whelping pens. In these a wooden floor with a 6 in. side has been used to keep the very young puppies off the false bottoms. Under such pens both bagasse and straw have been used. The former costs about twice as much per pound but the amount used is less.

Outdoor runs in our kennels are made of cement for dogs on special diets, and dirt for others. Roundworm infestation seems to remain low in both types of runs and many dogs have been found free from roundworms after many months on such runs.

### **Handling Puppies**

In handling puppies the routine practice is to make a rough count of ova at the thirty-fifth day of age and treat with tetrachlorethylene on the thirty-sixth day. This is repeated 10 days later. Puppies are kept in individual pens so that the number of ascarids excreted can be counted. During the past year all litters have been divided into halves for preliminary treatment on the tenth and twenty-first days. Half of each litter has been given Caricide dissolved in 40 percent alcohol and half has had no treatment. Twenty-five mg. of Caricide per pound of body weight have been used. The halves of litters thus treated have suffered a very low infestation as indicated at the time of weaning. This method promises to make the ascarid a matter of minor importance in purebred kennels if sanitation is controlled at the same time. Much more does need to be known about rate of development of ascarids in the intestine in order to know the best time to destroy them during the lactation period. An alcoholic solution of Caricide is administered easily either with an eye dropper or tuberculin syringe. The puppy swallows this solution readily when it is placed on the back of its tongue. No evidence of injury has been found.

Little trouble has arisen from other intestinal parasites, although some pups during an experiment on retarded growth

with a low calorie diet were lost after becoming heavily infested with hookworms. After realimentation and treatment no further problem arose from the hookworm. The bitches from this study produced excellent litters that were not infested. Hookworm infested dogs came into the kennel at the beginning, but this parasite is seldom seen and has never been a problem except in these emaciated dogs fed low calorie diets.

### **Demodectic Mange**

Three outbreaks of demodectic mange have occurred since 1946. In the first case the disease was introduced with a pair of Dalmatians that were purchased for breeding stock. For a long period these Dalmatians resisted the conventional drugs and treatment. Finally they cleared after extensive external use of phenothiazine.

The two later outbreaks of demodectic mange have occurred in litters of pups fed deficient diets until the animals were relatively thin. One of these litters was destroyed and the other used to attempt to determine if diet and drug treatment must be integrated in the treatment of this disease. In spite of a long tedious experiment no evidence has come to light thus far to indicate the merit of special dietary essentials, in treating demodectic mange. Phenothiazine has continued to appear promising for external treatment. Some kennels, such as those devoted to long time blood regeneration studies with dogs, sacrifice long-studied animals that contract this disease. Evidence in our hands indicates this is not necessary. The disease spreads very slowly if at all even under kennel conditions. Phenothiazine seems to be an effective agent in clearing the disease among infested animals and in preventing the spread to others.

Among minor problems in a large kennel are ear mites. These yield to the usual treatment but require constant vigilance.

In conclusion a brief discussion of feeding may be worth while. The matter of greatest surprise to most veterinarians



Dalmatian used in Nutrition Laboratory.

but accepted as a matter of course by the nutritionists who visit the kennel is that a mixed dry feed with very little supplementing proves satisfactory for growth, maintenance and reproduction. The dry feed is a typical commercial mixture such as those described in the Nutrition of the Dog. The only supplements used are some milk for sick dogs or puppies at the time of weaning. A small amount of frozen, ground raw meat is fed to bitches such as Great Danes because only a small number of this breed is maintained and litters must come through on schedule. In the case of Beagles large numbers of bitches go through lactation and gestation with no other supplement than a small allowance of cod liver oil.

In this brief discussion attention has been devoted to problems of disease that arise parallel with investigations in nutrition. These diseases are unwanted while those of nutritional origin are created intentionally for study. However, these diseases must be controlled. A puppy with a pot belly distended with ascarids makes a poor start in a study of growth to evaluate a special diet. The veterinarian has a vital role to play in a team organized for the study of canine nutrition.

No attention has been devoted to prob-

lems of record keeping, registration, tattooing for identification, breeding, breeds, exercise, food preparation equipment, food storage, fencing, drainage, draft proof housing and many other problems that must be handled in the conduct of sound nutritional research with purebred, registered dogs. However much of the nutritional work of the past is unsound because some of these factors have been neglected.

---

## New Rabies Vaccine

The development of an entirely new rabies vaccine for dog immunization was announced recently by Lederle Laboratories. The new vaccine is produced from live virus which has been modified by growth in chick embryos. It is completely modified and does not contain mammalian brain or spinal cord tissue.

Advantages cited for the new chick embryo vaccine include its ability to be easily standardized; greater stability than killed vaccines; and maintenance of uniformly high immunizing capacity for more than a year.

---

The cat is a natural animal of prey, though it seldom devours its catch. Many times it will bring rats, mice or young rabbits home and place them close to its regular feeding area. It is said that this habit indicates it is paying for its food and keep. A good Fox Terrier will kill 20 rats or mice while a cat is catching and playing with one.

---

Farm property losses from lightning average about 10 million dollars per year. An estimated 400 lives are lost and from 800 to 1,000 rural people are injured each year by lightning.