



# Can diet affect behavior?

Ian Robinson BSc, PhD

WALTHAM Centre for Pet Nutrition, UK

The idea that diet can affect behavior has been around for many years – for example, high carbohydrate or milk drinks have long been thought to have a ‘calming’ effect on people and to aid sleep. More recently, there have been anecdotal reports linking diet or dietary components to hyperactive or aggressive behavior in some children, dogs, and, more rarely, cats. Some owners believe that changing a dog’s diet, either from a high protein diet (28–32% protein on a dry matter basis) to a low protein diet (16–20% protein on a DM basis), or from one protein source to another, can modify the animal’s behavior, even though no reliable studies support these beliefs. The number of confounding or conflicting reports about animal response to food suggests many mechanisms by which diet may influence behavior even if the behaviors ultimately displayed are very similar. However, we should also remember that one mechanism might give rise to different behavior in different individuals.

We know that when animals are hypersensitive or intolerant to certain foods, this may produce clinical signs (usually these manifest as cutaneous and/or gastrointestinal tract irritation). However, once the offending substance has been identified and eliminated from the diet, clinical signs and any associated behavioral derangement (such as intense scratching, self mutilation, etc.) will usually improve. Although the presence of the offending food can modify the animal’s behavior in a very obvious way (e.g., intense scratching), it may also affect it in ways which we are unable to appreciate at present (e.g., some food ingredients can induce migraines in certain people). We are also uncertain as to how an animal may modify its behavior in response to such a condition. For example, some individuals can become withdrawn and quiet in response to pain, others may become hyperactive or intolerant of handling.

Theoretically, protein level may have an effect on behavior since it may influence the uptake into the brain of certain amino acids that are known to enhance or reduce the rate of synthesis of different neurotransmitters (1). This in turn may alter the awareness, activity, and general ‘mood’ of the animal. It has been suggested that high protein diets may restrict the uptake of tryptophan because of the presence of other, neutral, amino acids that compete for uptake sites into the brain, which would result in a decreased production of serotonin. Low concentrations of serotonin have been implicated in aggression in humans. However, this is a complex area since the various neurotransmitters formed from different amino acids have different or opposing effects on excitability of the animal.

A recent study has examined the potential effect of protein on canine behavior (2). Fifty dogs (12 showing dominance behavior, 12 showing territorial behavior, 12 showing hyperactivity, and 14 with no owner-reported behavioral problems) were fed on three dry diets containing low (17%), medium (25%), or high (32%) levels of protein in a crossover design. The fat levels in these diets were manipulated so that all diets had similar energy levels. Dogs were fed each diet in a random order for a 2 week period, and the owners, who were unaware of the protein level being fed, were instructed to record their dog’s behavior on a daily basis.

For the majority of dogs (43 out of 50), no change in behavior was observed regardless of the level of protein in the diet. For the dogs

showing territoriality, lower scores for territoriality were observed when lower levels of protein were fed but **only** for the seven dogs whose territoriality was thought to be caused by an underlying fearful response. The remaining five dogs in this group showing territoriality based on dominance did not show any change in behavior with change in protein level.

The results of this study suggest that changes in dietary protein within the range generally found within prepared pet foods does **not** seem to alter the behavior of ‘normal’ dogs. In addition, a **reduction** in dietary protein does not appear to be generally useful in the treatment of a number of behavior problems in dogs. An accurate diagnosis of the underlying behavior is therefore required before any change in diet is considered. Care should also be taken in dogs with special dietary needs, such as pregnant or lactating females or growing puppies.

Outside a physiological response to food, other factors may influence behavior. Owners often report that animals on reduced calorie intake modify their behavior as they attempt to solicit food. Small reductions in calorie intake can increase animal activity, whereas more severe reductions in calorie intake can lead to a reduction in activity (3). Since many high protein diets also have high calorie densities, a switch from high to low protein could also lead to a reduction in calories consumed and a subsequent change in behavior. In addition, animals that are very protective of very palatable foods (often high protein and high fat) may show a reduction in this behavior when less palatable diets are fed.

The format of the food offered may also influence behavior in subtle ways. A study on cat feeding behavior conducted at the WALTHAM Centre (4) showed that the behavior displayed before a meal of dry food was significantly different from that before a meal of canned or fresh food simply because these foods took longer to prepare and cats had more time in which to display before feeding.

In summary, an animal’s behavior is influenced by many factors. When working with an apparent dietary-related behavior problem, a complete history of owner feeding activities together with the nutritional profile of the diets offered will help to elucidate the cause of the behavioral change.

## REFERENCES

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