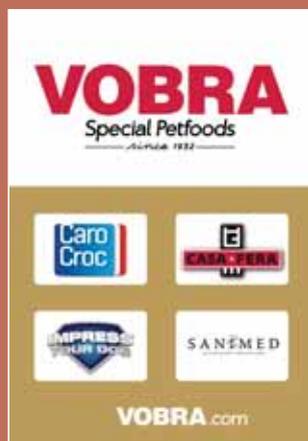




Dr A C Beynen was professor of veterinary nutrition at the Faculty of Veterinary Medicine, Utrecht University, The Netherlands in the period of 1993-2007.



# Salt in dog foods

*Commercial dog foods are customarily supplemented with table salt derived from mining. Ingredient lists declare the addition as salt, sodium chloride or iodized salt, or group it under “vitamins and minerals”. Quite some dog owners disapprove added salt because they believe it raises their pets’ blood pressure and jeopardizes heart health. Some petfood manufacturers have responded by using label-friendly sea salt or by touting “no added salt” on their websites.*

*Dry foods generally contain 0.1 to 0.4% added salt. The top-up amount is not disclosed by the petfood label, but the food’s total sodium content may be presented. Table/cooking and sea salt contain comparable amounts of sodium, about 38.5% by weight. Regular dry foods hold between 0.1 and 0.6% sodium. Sodium is an essential nutrient: the recommended allowance for adult dogs is 0.07% in dry food. It is clear that many dog foods greatly exceed the sodium requirement.*

*Added salt does not serve as a seasoning: dogs dislike salty taste, at least of drinking water. The added surplus salt in commercial dog food probably relates to inveterate habit or to a desired safety buffer. However, supplemental salt is unnecessary as the basic food ingredients along with drinking water normally meet the sodium requirement. Dogs take in dietary salt very efficiently and do not sweat out sodium appreciably during exercise.*

*Salt is thought to be bad for dogs: it would elevate blood sodium so that the blood holds onto fluid, causing an increase in blood volume and then high blood pressure. This belief is incorrect. Within a very wide range of sodium intakes, dogs maintain constant blood sodium concentration and constant blood pressure. Salt restriction is a mainstay of therapy for canine heart disease, but there is no evidence for efficacy (1).*

## Palatability

A salt selection study (2) was performed in five, adult dogs that were penned individually and received a fixed amount of food. Each cage had a bucket containing distilled water and another one with a NaCl solution of which the concentration was increased stepwise every four days from 0.29 to 1.76 % (w/v) over 24 days. Intakes of fluids were measured daily.

The ratio of salt solution to total fluid ingested fell, in a dose-dependent fashion, from 0.51 for zero sodium chloride in drinking water to 0.22 for the highest



concentration. Thus, the dogs showed disinclination toward salty water rather than a preference. The distaste was apparent for salt amounts added to commercial, dry dog food, but may be weakened by the food’s matrix.

## Drinking response

Consumption of salt tends to dehydrate cells by osmosis which arouses thirst by the same neuroendocrine signals as does lack of water. Gradually increasing dietary salt content, from 0.15 to 9.90% added salt in dry food (0.1 to 6.6 g salt/MJ metabolizable energy), produced a positive, linear drinking response by dogs (3). Adding 1 g

salt per MJ to a semi-moist or dry food raised the daily amount of water drunk by about 25% (4, 5). Dogs with free access to water produced more urine after salt had been added to their dry or wet food (5-7).

## Salt and blood pressure

In various studies, added salt as sole dietary variable did not affect blood pressure. Extra intakes of 0.9 and 3.1 g sodium chloride/MJ were effectless in healthy dogs (6, 8), and so were 1.6 and 3.1 g/MJ in instrumented, conscious dogs (9, 10), 0.9 g/MJ in partially nephrectomized dogs (11) and 2.4 g/MJ in dogs with experimental heart failure (12). Sodium-restricted, veterinary diets had no effect on blood pressure in dog patients with kidney (13) or heart failure (14, 15). Noteworthy, in partially nephrectomized dogs, replacement of tap water by 0.9 or 1.2% NaCl solution caused uncontrollable osmosis and raised blood volume (16) and blood pressure (16-18).

Extra consumption of 6 g salt/MJ did not affect plasma sodium concentration in healthy dogs (19). Likewise, an increment in salt intake by 1.6 g/MJ left plasma sodium unchanged in instrumented, conscious dogs (9).

## Sodium requirement

The minimal sodium requirement of adult dogs has been set at 18 mg/MJ (20). The recommended allowances of sodium and chloride are 48 and 72 mg/MJ (20), reflecting their atomic mass ratio in sodium chloride. The estimate for total inevitable sodium loss is 10 mg/MJ (21), equaling the lowest intake at which a standard, adult dog can maintain its body sodium content.

When a dry food contains 30% poultry byproduct meal and 50% corn, the two ingredients together may deliver 80 mg Na/MJ. When feeding a dry food, tap water may supply 8 mg Na/MJ (250 ml water/100



g dry food; 167 ml water/MJ food energy; 50 mg Na/l tap water). Thoughtless adding salt to dry dog food leads to excess.

## Heart disease

Therapy for canine congestive heart disease normally includes a low-sodium diet with a view to reduce sodium and water retention, and cardiac preload. However, efficacy of sodium restriction as the sole variable remains unknown (1). Commercial cardiac diets contain more than 10 mg sodium/MJ and may not cause loss of body sodium. Worse still, due to further aldosterone activation, low sodium intake by heart patient dogs may be detrimental as indicated by a dog model study (12).

List of references is available on request from the author (beynen@freeler.nl)

Dr Anton C Beynen writes this exclusive column on dog and cat nutrition every month. He is affiliated with Vobra Special Petfoods.