Brain food for puppies

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.

Puppy training is important for successful socialization and owner interaction. Teaching complex tasks concern future sporting, hunting, police or service dogs. Many new puppy owners turn to veterinary practices or obedience schools for advice and assistance. These same people may be taken by foods that claim to support healthy brain and make puppies smarter and more trainable. Such puppy foods feature omega-3 DHA (docosahexaenoic acid) for strong brain development.

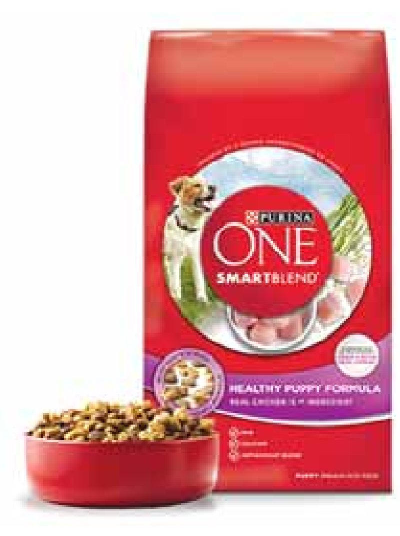
Newborn puppies have only 10 % of their adult brain mass and considerable growth occurs during the first three months of life. DHA is a key building block for neural tissues and undoubtedly is important in brain function. Puppy foods for brain health highlight DHA, but nutrition is not the only source of brain DHA. The brain can produce DHA from ALA (alpha-linolenic acid), EPA (eicosapentaenoic acid) and DPA (docosapentaenoic acid) or take up blood DHA synthesized in other tissues.

Dry foods claiming to bring about DHA-mediated improvement of a puppy's learning ability contain around 0.14% DHA. The function claim is not convincingly supported by published research data. DHA was not the only dietary variable or not reported as such. Taken together the testing of three research groups, increasing dietary DHA, from 0.02% or less to 0.14% or more, was associated with lack of benefit in 7 out of 13 learning and memory tasks.

Trainability relates to puppy's ability to understand what the owner or caregiver wants, willingness to learn and remembering the tasks being taught. Nutrient-deficient diets may disrupt trainable performance, but for a puppy fed a regular, nutrient-adequate, commercial food, its intelligence and the method of training determine success.

DHA requirement

The dietary amount of DHA needed for growth of young dogs has not been determined experimentally. This also applies to the other omega-3 fatty acids, ALA and EPA. The adequate intakes are based on canine milk composition and an arbitrary multiplying factor (1). The recommended total amount of DHA plus EPA is 0.05% in the dietary dry matter. The minimum requirement of ALA equals 0.08% at 1.3% linoleic acid (LA).



The high concentrations of DHA in the brain and retinas point at a functional role in these tissues. As happens with rat pups, omega-3 fatty acid deficiency may cause subnormal growth and impaired cognitive and visual development in juvenile dogs. In puppies that had been exposed during gestation, lactation and weaning to a dry diet that approximates omega-3 requirements (ALA-EPA-DHA-LA = 0.14-0.02-0.02-1.75%), electroretinographic abnormalities were not detected (2).

Extra DHA pre-and post-weaning

Kelley et al. (3-9) have reported on learning ability in puppies born to bitches fed diets containing different amounts of DHA during gestation and lactation and weaned to the same diets. The diets, which were presumably dry, contained 0.02, 0.08 or 0.14% DHA (4), but ALA and EPA contents are not disclosed. It is unknown whether DHA was the only dietary variable and whether cognitive testing was blinded.

Puppies aged 9 weeks were taught to associate a square or circle with the treat location in a two-arm maze (3, 6). Then, each symbol was seen 5 times in randomized order per session in a total of 60 sessions. Successful was defined as 8 treat rewards in two consecutive sessions with 10 attempts. The frequencies of dogs with at least one success criterion were 6/19, 8/19 and 13/20 for the low, medium or high DHA intakes (3, 8).

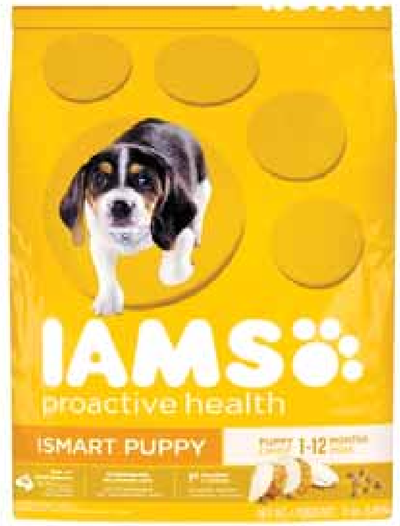
Extra DHA post-weaning

Seven-week old puppies received a diet containing 0.02 or 0.13% DHA (9, 10); no further dietary information is provided. Nine weeks later, the puppies were familiarized with a radial arm maze consisting of eight equidistantly spaced arms. Invisibly from the central platform, the end of one arm held a food treat as reward for a correct choice in 10 sessions per puppy. Group mean (n = 12) memory errors were 6.9 and 4.6 for the low- and high-DHA diet.

From 3 weeks of age, puppies consumed a soaked, commercial diet supplemented, as percentage of total fat intake, with 3% corn oil or 2% DHA plus 1% arachidonic acid (11, 12). Fatty acid sources are not given. The diet contained less than 0.02% DHA (13). Nine weeks later, each puppy was tested on navigating through a rectangular maze to a food reward. Group mean (n = 20) failures in solving the maze during the second set of 9 sessions were 4.2 and 2.8 for the control and DHA supplement. Three other cognitive tests were without diet effect (12).

DHA dose response

Until one year of age, weanling puppies (16/dietary group) were fed one of three commercial dry foods differing in



ingredients and supplements, and also in omega-3 fatty acids (14). The contents of ALA-EPA-DHA-LA were 0.12-<0.01-<0.01-2.6, 0.12-0.13-0.10-2.8 and 0.80-0.31-0.19-3.6, in terms of percentages of the diets as fed. Clearly, DHA was not the only dietary variable. The profile of the maternal diet was 0.17-<0.01-0.01-2.1.

Seven visual discrimination learning and memory tests were done in blinded fashion. In three tasks, puppies fed the diet with 0.19% DHA outperformed their counterparts that consumed less DHA. In two of these tasks there was no DHA dose response: the diets with <0.01 or 0.10% DHA gave similar results. Despite substantial ALA supply, puppies fed least DHA had reduced retina function as based on electroretinography.

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.