

anisms of action include modulation of eicosanoid production, inhibition of cellular activation and an increase in the epidermal barrier function. Eicosapentaenoic acid (omega-3) and dihomo-gammalinoleic acid ([DHGLA], omega-6) both compete with arachidonic acid ([AA], omega-6) as a substrate for cyclo-oxygenase and 5-lipoxygenase, which converts these fatty acids to prostaglandins (PGs) and leukotrienes (LTs), respectively (Wright 1991). Pro-inflammatory PGs such as PGE<sub>2</sub> and PGF<sub>2α</sub> and LTs such as LTB<sub>4</sub> are derived from AA. Eicosanoids derived from DHGLA and EPA have less inflammatory or anti-inflammatory action (Miller and others 1991, Gallai and others 1995). Increases in anti-inflammatory eicosanoids and concurrent decreases in their pro-inflammatory counterparts presumably decrease cutaneous inflammation. Decreased concentrations of cutaneous LTB<sub>4</sub> and decreased production of LTB<sub>4</sub> by activated neutrophils have been reported in dogs after receiving diets with lower omega-6:3 ratios and diets higher in omega-3 fatty acids, respectively (Vaughn and others 1994, Byrne and others 2000).

A number of clinical studies have been published evaluating fatty acid supplementation for the treatment of canine atopic dermatitis. However, to the authors' knowledge, none have quantified the total fatty acid intake by calculating the sum of dietary intake and supplementation. In this study, intake of omega-3 and omega-6 fatty acids, as well as their ratios, varied enormously before the trial due to variable dietary intake (240 to 942 mg/kg omega-6, 20 to 260 mg/kg omega-3 fatty acids and 0.84:1 to 20:1 omega-6:3 ratio) and during the trial due to the combination of dietary intake and supplementation (Table 1).

However, there was no correlation between omega-3 intake, omega-6 intake or omega-6:3 ratio and pruritus scores, clinician scores or owner scores before and after the trial. This suggests that the effective dose depends on more than the total intake or ratio of essential fatty acids. As of

yet unidentified individual idiosyncratic factors may be relevant for individual responses. Fatty acids can influence the immune system by acting as second messengers, regulators of signal transducing molecules or transcription factors (Hwang 2000). They have been reported to suppress interleukin-2 (IL-2) production and mononuclear cell proliferation (Endres and others 1993). To what degree direct effects of fatty acids on immune function are responsible for the clinical effects of omega-3 supplementation in the atopic dog is unknown.

In this study, the response to flax oil supplementation was less pronounced than supplementation with a commercial product containing EPA and DHA. Flax oil contains predominantly α-linolenic acid which is desaturated and elongated in various steps to EPA, a substrate competing with AA for cyclo-oxygenase and lipoxygenase to be processed to less inflammatory eicosanoids. Final concentrations of EPA attained are therefore potentially widely variable, depending on the capabilities of the individual to process the α-linolenic acid as outlined above. To the authors' knowledge, there are no data quantifying this conversion in the dog to date. In contrast, commercial EPA/DHA capsules contain predominantly EPA, which should be immediately available for competitive metabolism with AA. Based on the results in this study, it is difficult to determine the preferred fatty acid (α-linolenic acid versus EPA and DHA) for supplementation in dogs with atopic dermatitis, due to the small number of dogs in each group.

In this study, approximately half of the 10 dogs in each treatment group improved by more than 50 per cent. Complete remission was achieved in 10 to 20 per cent of dogs. However, although the only significant improvement in scores with treatment was seen in dogs treated with the commercial product containing EPA and DHA, there was no significant difference between treatment groups and the placebo group (in which one dog improved by

more than 50 per cent) at the end of the study. Neither total intake of omega-3 or omega-6 fatty acids nor their ratio was correlated to clinical improvement. Further studies with larger numbers of animals are needed to explore these findings further and to examine the benefit of supplements containing predominantly omega-6 fatty acids for the treatment of canine atopic dermatitis.

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