

referred to as kelp, and the red algae *Porphyra* sp. and *Rhododymenia palmata* (L.) Grev. [now known as *Palmaria palmata* (L.) Kuntze], also referred to as dulse, and the materials derived from these species, that demonstrates or suggests reasonable grounds to suspect a hazard to the public when they are used at levels that now seem to be current or that might reasonably be expected in the future if their use is confined to ingredients of spices, seasonings, and flavorings.'

A vibrantly positive view of dietary intake of algae is taken by Teas (1983), when she speculates about the possible positive influence of eating *Laminaria* spp. for cancer prevention (see Stein & Borden 1984). This, she argues, might be due to its content of indigestible fibre, antibiotic effects or content of  $\beta$ -1,3-glucans, which alter the enzymatic activity of the faecal flora and stimulate the host-mediated immune response. She concluded that, on the basis of current information, the brown seaweeds seem to be neither carcinogenic nor toxic.

A relatively modest amount of specially produced meal from *Laminaria* spp., and some seaweed meal from *Ascophyllum nodosum*, is used for human consumption. This is sold on the basis of the content of fibre, minerals and vitamins. It may be taken mixed with water or a few spoonfuls may be added to the dough when making bread. Its use in bread for a slimming diet is even part of a French patent (Leriche 1971). Seaweeds are now also firmly anchored in the healthfood market. Many humdrum oriental seaweeds and seaweed products are thus resold in Europe as specialities. One can also find neatly packaged seaweed meal in gelatin capsules fetching high prices. But even if this market increased many times it would hardly register as a major volume increase in the total seaweed consumption in Europe.

## CONCLUSIONS AND OUTLOOKS

### ANIMAL NUTRITION

When performing feeding experiments it is vital to keep in mind that even small reductions in the protein content of the diet may cause considerable decrease in growth rates, especially at relatively low protein levels. The chemical composition of seaweed meal, as from *Ascophyllum nodosum*, immediately characterizes the material as being low in energy, especially for non-ruminants. The overall content of vitamins and minerals is also too low to contribute significantly as a sole source of these substances. The only exception is an iodine content that will cover the needs of domesticated animals. Iodine requirements vary with various animals, in the range 0.2–0.6 mg kg<sup>-1</sup> dry matter. With about 500 mg iodine kg<sup>-1</sup> seaweed meal, 1–3 g seaweed meal kg<sup>-1</sup> dry matter of fodder will suffice.