**Kelp Meal Feeding Guide**

**Background**

Kelp meal is a common feed additive for organic dairy herds produced from drying the brown algae species *Ascophillum nodosum*. Kelp is rich in important minerals, most notably iodine. However, due to kelp’s high mineral content, it has low energy value. In addition, kelp contains significant contents of antioxidants, including β-carotene and fucoxanthin, which may improve animal health. Surveys conducted in the Northeast and Midwest revealed that up to 80% of organic dairy farmers feed kelp for three main reasons: (1) it improves body condition and overall animal appearance, (2) it decreases somatic cell count (SCC), reproductive problems, and incidence of pink eye, and (3) it helps control nuisance flies.

**Effect Kelp on Production Performance**

*Milk production and composition*. Results from studies that have tested the effects of kelp supplementation on milk production and composition varied significantly. In two studies conducted at the University of New Hampshire (UNH) Organic Dairy Research Farm, there was no effect of kelp on milk production or milk composition in Jersey cows during the winter and grazing seasons (2-6 oz/head/day). Likewise, kelp did not improve milk production or composition in a third study conducted at the UNH where conventional Jersey cows fed high-forage diets supplemented with kelp (2-6 oz/head/day). However, milk production was increased by 3.8 lb/day in a study conducted in Kansas using conventional Holstein cows (2 oz/head/day). Researchers from Arkansas found an increase in milk production (+5 lb/day) in large-frame cows (Holsteins, Ayrshires, and Brown Swiss), but no effect in small-frame cows (Jerseys, Milking Shorthorns, Holstein/Jersey crosses) when about 2 oz were fed to all animals.

*Feed efficiency and dry matter intake*. Studies have been shown that kelp meal supplementation does not affect dry matter intake. However, results are inconclusive on whether it improve feed efficiency. UNH research found no effect of the kelp on dry matter intake nor milk production, thus there was no change in feed efficiency. Research done in Kansas found an increase in milk yield with no change in dry matter intake; therefore, implying an increase in feed efficiency.

**Effect of Kelp on Animal Health**

*Antimicrobial and antioxidant activity*

Kelp produces biologically active phlorotannins, which are believed to protect this seaweed from stress, pathogens, radiation, and herbivory. Due to these properties, phlorotannins are said to act as antimicrobial and antioxidants when ingested by animals. In an in-vitro study of the isolated phlorotanins from kelp, it was found the phlorotanins prevented the growth of all four different strains of *E. coli* tested. Furthermore, when fecal samples from steers fed or not kelp meal were tested, a decrease in *E. coli* was found in supplemented animals. This not only implies antimicrobial effect of kelp, but also less chance of disease spread between animals.

There have been multiple accounts of the positive effect of kelp on milk microbiota, showing improvement in milk quality by reducing pathogenic bacteria such as *Pseudomonas* spp and increasing beneficial bacteria including mesophilic lactobacilli and mesophilic lactococci. Effects of kelp on reducing pathogenic bacteria may be associated with its high iodine content. Kelp also has been shown to decrease pathogenic bacteria in the gastrointestinal tract of cows including *Salmonella* spp., *Campylobacter* spp, and *Clostridia*. Studies on the antioxidant effects of kelp in various species have produced inconsistent results. For instance, UNH research does not support the antioxidant activity of kelp.

*Pink eye*.There is anecdotal evidence that kelp supplementation decreases the incidence of pink eye in cows. A study conducted at the University of Minnesota tested the effect of kelp on iodine levels in tears and blood of cows. They found a significant increase in serum iodine levels and a small increase in tear iodine levels in kelp-fed cows. Due to iodine’s antimicrobial effects, an increase in tear iodine concentrations would likely improve the immune system and allow the animals to more easily fight off infections from *Moraxella bovis*, the bacteria that can cause pink eye. As the iodine concentration in tears was small, it is unclear whether kelp would have a true effect in preventing this infectious condition in cows. Further studies need to be conducted with a larger number of cows. In addition, other factors are involved in pink eye infections, and a prevention of this infectious disease would probably not be based solely on increased iodine concentrations in tears.

*Blood cortisol*. UNH researchers tested the effect of kelp supplementation on blood levels of cortisol, the stress hormone, and found decreased levels in the winter months, but no significant effect during the grazing season. A third study done in the summer at UNH using confined Jersey cows confirmed our winter study done with organic cows; cortisol levels decreased after kelp supplementation. Decreased cortisol levels can be extremely beneficial to organic farmers in preventing herd diseases as stress reduces the animal immune defenses.

**Effect on Human Health**

The iodine ingested by cows does concentrate in the milk and, as a result, is an important source of this mineral for humans. Iodine is crucial in fetal neurocognitive development, reproductive function, and growth and development. In addition, iodine deficiency is the leading preventative cause of mental retardation worldwide. However, iodine excess can cause issues such as hypothyroidism, hyperthyroidism, and goiter, as well as impaired growth and neurocognitive development in children. Milk iodine concentrations need to be closely monitored in order to prevent these issues. The NRC (2001) recommends the safe upper limit for iodine consumption by dairy cattle at 50 mg/kg.

**Recommendations**

As several studies have shown no increase in milk production and milk composition, kelp meal supplementation may not be profitable for organic dairy farmers. However, high organic grain costs have been pushing farmers to feed less grain, which can ultimately result in shortage of minerals. Therefore, kelp meal may be helpful in that aspect as a mineral supplement, with little to no effect on the production of the animals.