Many factors are involved in causing or allowing udder infections (mastitis) to occur. In some dairy herds the incidence of mastitis may be higher because of certain nutritional deficiencies. If cows are not consuming or absorbing enough of the trace minerals or vitamins needed to have a strong immune system, there may be more mastitis. This situation could possibly occur because a weakened immune system can not successfully fight off bacteria that invade the udder.

Dr. Bill Weiss from The Ohio State University discussed the relationship between certain trace minerals and vitamins with the immune system and udder infections in his presentation at the 2002 National Mastitis Council annual meeting. Some of his comments are summarized below.

Several studies have measured the relationship of certain trace minerals and vitamins with the immune system function and clinical mammary gland health data. The results from those experiments were used to establish the recommendations for the daily intake requirements of certain trace minerals and vitamins that are printed in the latest version of the National Research Council (NRC) publication on dairy cattle nutrient requirements. The studies reviewed showed the importance of an adequate intake of vitamin A or beta carotene, selenium, vitamin E, copper, and zinc for maintaining proper immune function and mammary gland health. The word adequate is important, because excess intake or supplementation of these nutrients may decrease immune function and increase health problems, just the opposite effect that is desired.

Daily intake recommendations established by the NRC for the above mentioned trace minerals and vitamins are as follows:

**Vitamin A:**
The NRC recommends that lactating and dry dairy cows consume about 50 IU of supplemental vitamin A per pound of body weight per day. The average lactating Holstein cow should therefore be consuming about 72,000 IU/day, and the dry Holstein cow about 77,000 IU/day of supplemental vitamin A.

**Beta-carotene:**
No NRC requirement was established. One study suggested that plasma concentrations of beta-carotene in dairy cows should be greater than 3mg/liter to optimize udder health. Diets based on good quality silage or fresh forage probably provide adequate beta-carotene, and supplementation would not be economical. If low quality forage is fed, supplementation should be considered.

**Vitamin E:**
The new NRC requirement is for 0.36 IU/pound of body weight for lactating cows, and 0.7 IU/pound of body weight for dry cows. Average body weight and milk production level Holstein lactating cows should be supplemented with 500 IU vitamin E/day, while average body weight dry Holstein cows should be receiving 1,000 IU/day.

**Selenium:**
The importance of an adequate intake of selenium on reducing udder infection levels has been shown. Since the U.S. FDA regulates the concentration of selenium that can be included in dairy cattle diets at 0.3 ppm of dry matter consumed, feeding above that level is not permitted. No clinical data are available that suggest that more selenium intake per day will improve mammary gland health.

**Copper:**
Assuming normal bioavailability and typical ingredients, an average dry Holstein cow needs to consume about 175 mg of copper/day. An average lactating Holstein cow producing 50 or 100 pounds of milk needs to consume 225 mg or 300 mg of copper/day, respectively. Since excessive intake of copper can be toxic (only four to five times the requirement), copper supplementation should be avoided unless feed analysis data indicate otherwise.

**Zinc:**
Clinical data are not available that show the minimal daily requirement level of zinc needed for optimal mammary gland health. The NRC recommends that the average dry Holstein cow consume about 300 mg/day, and the average lactating Holstein cow consume between 900 and 1,400 mg/day, depending on level of milk production. Since there is an interaction between zinc and copper absorption, don’t over supplement zinc because it could cause a copper deficiency.

Before deciding to supplement dairy cow rations with the levels of trace minerals and vitamins indicated above, dairy producers should have their animal feeds tested and their rations evaluated by a competent dairy cattle nutritionist to be sure what levels of supplementation may be warranted. While inadequate intake and absorption of certain nutrients may result in a weakened immune system and perhaps more mastitis, unjustified supplementation can be expensive and lead to other animal health problems.