# Nutritional imbalances cause reproductive problems in dairy cattle

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**Reproductive Problems Can Have Nutritional Causes**

NEWARK, Del. – Several reproductive problems in dairy cattle result from physiological (glandular) changes caused primarily by nutritional imbalances, not disease organisms. Abortion, repeat breeding, anestrus, silent estrus, and retained placenta can all be influenced severely by nutrition. Of course, changes in amount of daylight and hormone implanation or injections also affect reproduction.

Four major nutritional categories influence reproductive performance: energy, protein, minerals, and vitamins. Fifty years ago, scientists at the University of Wisconsin discovered the role and importance of vitamin D in bovine diets. More recently, interest was focused on vitamin E in relation to reproductive problems. Currently, beta-carotene and selenium are receiving much attention.

Let's take a closer look at the effects of certain nutrients and their imbalances in dairy cattle.

**Energy**–"Hollow belly disease," poor pastures, drought, unpalatable feed (silage, hay and concentrates), reduced feed intake, scouring, and loss of body weight due to heavy milking are conditions that lower the cow's energy supply. The opposite condition–so-called "flushing" or increased supply of energy–can stimulated ovulation and estrus. This practice has long been used by sheep breeders to synchronize estrus and to increase the lamb crop.

Energy supply is directly related to normal reproductive function in dairy cattle. Newborn calves that are weak due to lack of energy in utero have trouble surviving. Puberty and first estrus will sometimes be delayed several months in calves that are fed low levels of energy. Those becoming fat on too much energy will experience irregular estrus cycles and delayed conception. Heifers that have conceived but are unthrifty because of a lack of energy will have problems in calving or may even abort. Reduced milk secretion also results.

Thus, energy shortages are serious impediments at all stages of reproduction, but energy supply excesses are just as detrimental. Overconditioning, especially when cows or heifers are prepared for shows or are on a show circuit, is a frequent problem. Remember this as the annual show season gets under way again.

Under range conditions, shortages of energy supplies stunt the growth of young pregnant heifers and may cause so-called stress abortions due to low blood-glucose levels that trigger hyperactivity of the adrenal gland.

In our dairy herd at the University of Delaware we have now placed all our cows, as well as our heifers down to 6 months of age, on electronic feeders. This enables us to feed each individual exactly what she needs or deserves–no more, but also no less–and not just energy.

**Protein**–A shortage, as well as excess, of this nutrient also causes reproductive problems, though these are not quite as dramatic as those caused by a lack of energy. Protein and energy interact, so when energy supplies are adequate but protein is deficient, estrus, puberty, and pregnancy are delayed or impaired. Amino acids are a basic part of protein needs but the cow's specific amino acid needs have not been clearly defined under normal production circumstances. Methionine has shown some promise in cattle experiments.

**Minerals**–A phosphorus shortage is more likely than a calcium deficiency under high roughage conditions because forages are short on phosphorus. Adequate phosphorus supplies are critical for normal reproductive efficiency. A level of 0.4 percent phosphorus in the total diet and a Ca to P ratio of about 1.2 to 1.0 is recommended.

This ratio also indicates that calcium is an essential feed ingredient for normal reproduction. But its bioavailability and intestinal absorption vary widely, depending on content, pH, lipids that form insoluble soaps, carbohydrates and vitamin D activation. Interaction with other minerals, such as manganese, is also critical. The large amounts of calcium the cow loses daily in milk must be replaced.

Selenium is of particular interest in relation to reproductive problems because it has been linked to a reduction in retained placenta. Soils in certain parts of the U.S.–the East Coast, Great Lakes, New England, Florida, and the Northwest–are deficient in selenium. In these regions, routine supplementation in feed or by injection is indicated. Brewer's grain is a good natural source of selenium.

Salt shortages will cause reduced feed intake, dirt chewing, poor haircoat, and heat stress, all of which indirectly affect reproductive efficiency. Normally, cows should receive 1 percent salt in their concentrate supplement. Salt is also a convenient carrier for trace minerals such as zinc, manganese, iodine, cobalt, iron, molybdenum, copper, and sulfur, which have a role in normal reproductive performance. Zinc and manganese affect the production of eggs and sperm, libido and the sex rations of calves.

**Vitamins**–Vitamin A and its precursor, carotene, are of particular importance for efficient reproductive function. Vitamin A is essential for normal sperm production. It's also important for the normal function of mucal membrances, including those in the reproductive tract.

Conversion of carotene to vitamin A may be inhibited by nitrates in the feed from drought-stricken grasses or from corn and small grains which were fertilized heavily with nitrogen. It may also be affected by phosphorus deficiency, protein deficiency, a high energy-low roughage diet, or by heat stress.

Possible effects of vitamin A shortage include the birth of dead or weak calves, retained placentas or even abortions. Vision abnormalities are typical diagnostic symptoms of vitamin A deficiency. Fresh and dried green forages are good sources of vitamin A, but commercial supplements of vitamins A, D, and E are quite inexpensive and should be added to commercial concentrate mixtures at ratios of 5 to 1 to 0.01. Cattle should receive 3,500 international units of vitamin A equivalent per day for every 100 pounds of bodyweight for maintenance, pregnancy, growth and milk production.

Vitamin D is implicated in reproductive losses through its effects on phosphorus and calcium utilization. Supplementation is important for unthrifty animals.

It has been suggested that Vitamin E may play a beneficial role in reproduction, but hard evidence is lacking. However, it is important as a feed supplement and antioxidant to prevent off-flavors in milk. It also has excellent healing properties for injured tissue.

Although it is assumed that rumen microbes produce enough of the B vitamins to meet cow requirements, different microbial species have different vitamin B-producing abilities and changing the cow's diet will change her rumen microbe population. For example, corn is known to be low in the amino acid precursors required for some rumen B vitamin synthesis, so if more corn is suddenly added to a cow's ration, problems due to B vitamin deficiencies can develop which affect reproduction indirectly.