

Essential Fatty Acids Kraig Peel, Ph.D.

What are essential fatty acids and does the dairy cow really need them? Essential fatty acids are required by the dairy cow, that is why they are called “essential.” The dairy cow cannot synthesize these essential nutrients. The two fatty acids that have garnered the most attention in animal and human diets are Omega 6 (linoleic acid) and Omega 3 (linolenic acid). There are some “essential” things to know when considering adding these to dairy cow diets.

Most current dairy cow rations have plenty of fatty acids that are coming from ingredients used to compose the ration. Whole cottonseed, corn and corn silage contribute toward Omega 6 requirements. Omega 3's are found in grasses fishmeal and flax seed. Most dairy rations contain adequate amounts of these essential fatty acids. The problem in the ruminant animal is the microbes in the rumen. The microbes take the fatty acids from feed ingredients and turn them into stearic acid and saturated fats. The essential fatty acids cannot be absorbed in the small intestine if they don't get to the small intestine in the right form. The essential fatty acids have to be treated so that they can avoid microbial breakdown in the rumen and arrive at the small intestine intact. We have heard a lot over the years about “bypass” protein. All feed ingredients that are labeled bypass just means that they bypass microbial degradation in the rumen. There are now bypass fats that have been treated so that they are not broken down in the rumen. If the essential fatty acids reach the small intestine they will be absorbed and able to enter the circulatory system where they can be utilized to meet the needs of the animal.

Essential fatty acids are needed by the animal for a multitude of metabolic functions primarily at the cellular level. We normally think about fats supplying extra energy for the lactating dairy cow. Essential fatty acids may be used to supply energy but if energy requirements are met by other sources, then the essential fatty acids will be utilized in areas of requirement. There has been multiple research studies conducted that indicate an increase in cow performance during lactation when essential fatty acids are included in the diet and are able to reach the small intestine intact. Recent research has also identified the need for Omega 6's and Omega 3's reach the small intestine in the right ratio. Dr. Jose Santos at the university of Florida is likely the most respected authority in this area. His research has shown that when rations are balanced for lower ratios of omega-6 to omega-3 fatty acids there is positive influence on milk production, embryo quality and subsequent pregnancy rates. Cows fed a ratio of 4:1 omega-6 to omega-3 produced more milk than other ratios that were tested. The predominant theory on improved reproduction is that the fatty acids are more readily available to be used as a substrate in the synthesis of reproductive hormones. Progesterone is believed to be the primary benefactor for improved synthesis. Progesterone is required to maintain pregnancy. Most of the studies have shown an increase in early embryonic health and less embryonic loss in the first 30 days. Progesterone is also essential to prime the hypothalamus to respond to a non-pregnancy status and resume cyclicity.

There is also some recent data that would suggest that cows fed essential fatty acids in a late gestation secrete colostrum that is higher in essential fatty acids

which when fed to calves, provides an increase in immunity protection. There are other researchers that have shown a potential fetal programming effect. Heifers raised from cows that were supplemented essential fatty acids during gestation produced more milk during the first lactation than heifers raised from cows that were not supplemented. These heifers also had increased first service pregnancy rates when compared to controls.

There is mounting evidence of benefit of feeding protected essential fatty acids to developing heifers. Studies have shown a younger age at puberty and an increase in first service pregnancy rates. The increased pregnancy rates are likely due to increased serum progesterone levels that help to maintain pregnancy.

There are several companies that are producing bypass fatty acid products. The evidence is strong that we can increase animal performance with the use of protected fats when fed in the correct ratio. Fatty acid inclusion in the diet at the correct time can be a good tool to increase the bottom line.