

FAT FEEDING FACTS 5

Milk Fat Depression

Milk fat depression (MFD) has been around since a report in 1845. It is related to many factors, but the ruminal biohydrogenation (BH) theory seems to best describe its etiology. The normal pathway for BH of the unsaturated linoleic fatty acid to the fully saturated stearic fatty acid is shown on the left side of Figure 1. Only with enhanced analytical techniques were Cornell researchers able to

identify the much more minor BH pathway on the right side of Figure 1. They also noted that conditions which resulted in more of this intermediate *trans*-10, *cis*-12 CLA (conjugated linoleic acid) being produced in the rumen were closely related to its content in milk fat and reduced milk fat % (Figure 2).

Figure 1

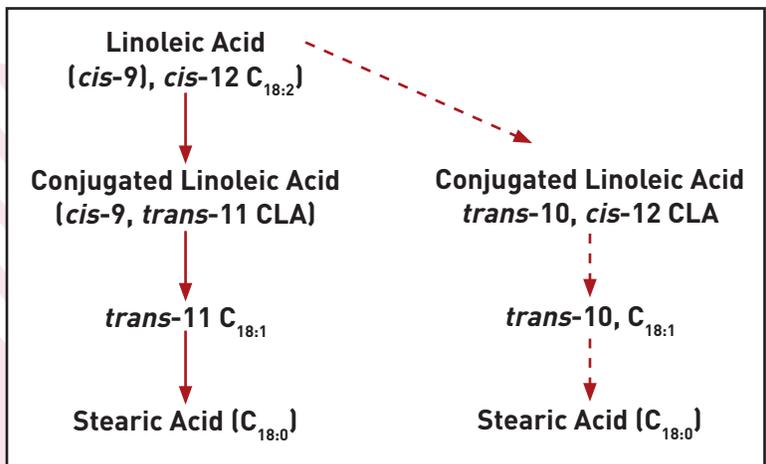
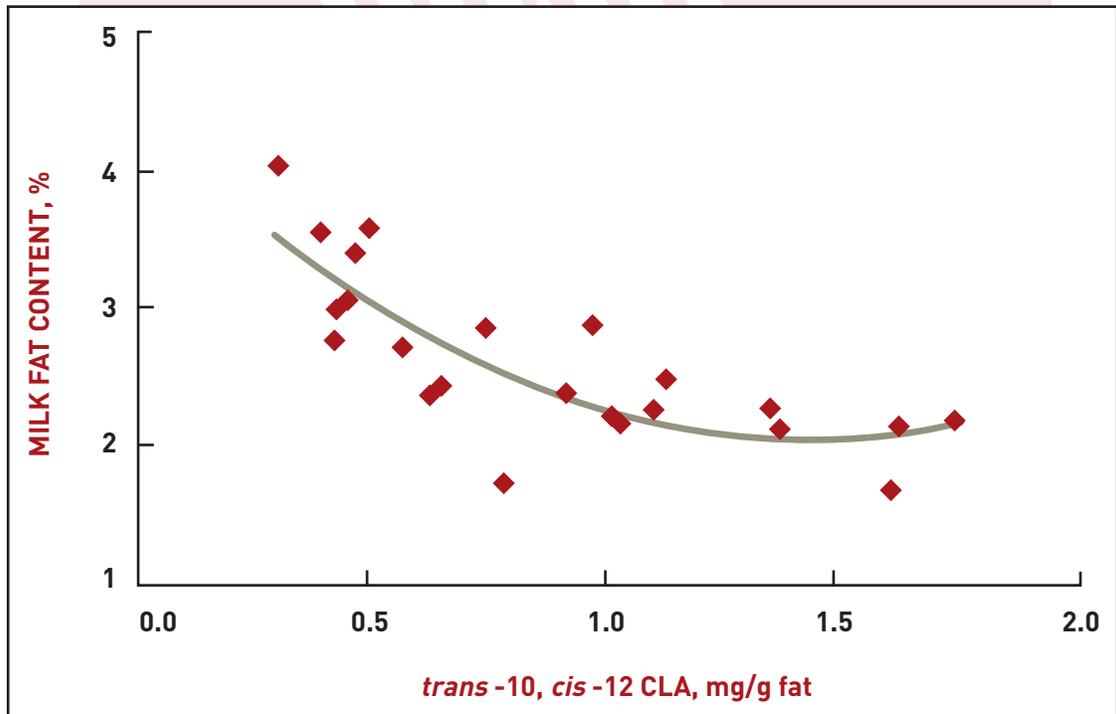


Figure 2



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The induction of MFD requires both an altered rumen fermentation and the presence of poly unsaturated fatty acids (PUFA) in the rumen: and within each of these categories there are a number of potential risk factors and areas to address when developing nutritional strategies designed to minimize effects on milk fat production (Table 1). Experience indicates that MFD occurs as a result of several concurrent diet or management factors rather than as a result of a single factor.

Table 1. Partial list of potential risk factors for reduced milk fat and areas to address when developing nutritional strategies designed to avoid diet-induced MFD (Lock et al., 2006 Cornell Nutrition Conference).

Table 1

Altered Rumen Fermentation	Supply of Polyunsaturated Fatty Acids (PUFA)
<ul style="list-style-type: none">• Low rumen pH/ low peNDF• Feed particle size• Fiber• Starch (NSC)• Rumensin• Feeding pattern	<ul style="list-style-type: none">• Amount (especially linoleic acid intake)• Availability• PUFA:SFA (saturated fatty acids)• Feeding pattern• Variation in fat content and fatty acid (FA) composition of feed ingredients

A single factor that can be readily calculated in many dairy feeding programs is the daily amount of linoleic fatty acid coming from all ingredients in the ration. For instance, rations which contain corn, corn distillers grains, hominy, corn silage, rye silage, whole cottonseed, tallow or lard, and calcium salts of fatty acids can provide over 1 lb of linoleic which fuels the right side of Figure 2 and produces more of the trans-10, cis-12 CLA (conjugated linoleic

acid). As little as 2-3 grams of that fatty acid produced in the rumen daily can depress milk fat % by about 25%. Nutritionists can limit the amount of linoleic fatty acid in the ration by minimizing the various dietary sources and not using fat supplements which further contribute linoleic fatty acid. Also, remember that in Fat Feeding Facts 4, we learned that more unsaturated dietary fatty acids decrease dry matter intake.