

CONSULTANT'S DIGEST

How to Give Ration Energy Density a Shot in the Arm Without Shooting DMI in the Foot

Energy intake is frequently the limiting factor for milk production in high-producing cows and that makes them prime candidates for fat supplementation. But fat supplements need to be chosen with care to achieve the desired results. Critical to achieving success with the feeding of supplemental fats is the effect of the fat on overall feed dry matter intake (DMI).

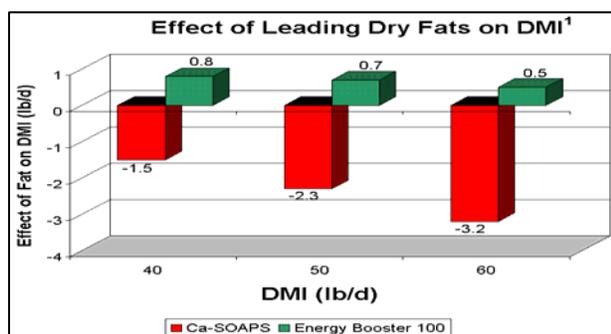
Increasing dietary energy density by adding fat will not necessarily contribute to increased total energy intake if DMI declines. With some fats, DMI can be depressed enough to reduce total caloric intake, even though dietary energy density is increased.

Different types of fats have dramatically different effects on DMI. Among the dry fats, which include partially hydrogenated fats (PHFs), calcium soaps (Ca-SOAPS), and free fatty acids (FFAs, only available as Energy Booster 100®), Ca-SOAPS significantly reduce DMI at any feeding rate, especially in high-producing cows. FFAs and PHFs have no effect on DMI.

Effect of DMI, % Change			
Reference	PHFs	Ca-SOAPS	FFAs
Allen, 2000	-0.5	-5.0	-0.5
Chilliard, 1993	0.0	-3.6	0.0
Davis, 1993	--	-5.1	+1.1

Fatty Acid Profile and Palatability Affect DMI

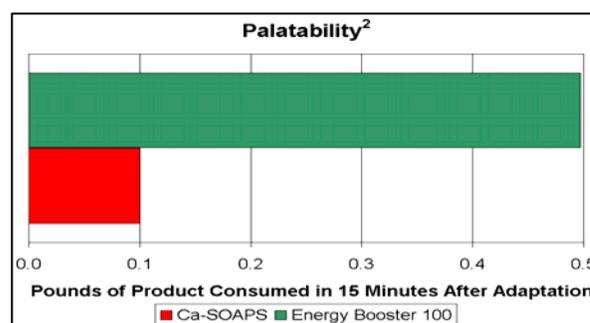
Fats high in unsaturated fatty acids negatively affect DMI. Unsaturated fatty acids impair fiber digestion, are toxic to rumen bacteria, and signal the cow to stop eating by stimulating the release of the hormones CCK and GLP-1, all of which lead to reduced DMI. Ca-SOAPS depress DMI because they contain 45% unsaturated fatty acids.



The hydrogenation of PHFs to make them more saturated alleviates problems with DMI, but the trade-off is markedly decreased digestibility – as low as 40% or less. The hydrogenation of FFA does not affect its 80.5% digestibility.

Fat palatability also affects DMI. An offensive smell or taste, like that of Ca-SOAPS, causes cows to reduce their intake.

In a study conducted by the University of Wisconsin, researchers determined palatability of the leading premium dry fats by feeding 103 cows for one week rations containing FFAs or Ca-SOAPS. They then offered the cows each product by itself and measured the portion eaten in 15 minutes. The palatability of FFAs far exceeded that of the Ca-SOAPS.



It All Comes Down to Economics

Calculating the cost per calorie of NEL of the various dry fats results in similar figures: \$0.198 for PHFs, \$0.196 for Ca-SOAPS and \$0.186 for FFAs. However, once you factor in the total calories supplied by the fat and the fat's effect on DMI, the end result is quite stunning. Compared to PHFs, FFAs can net \$100 more per cow per lactation. Ca-SOAPS can actually result in a net loss.³ The more a fat depresses dry matter intake, the less valuable that fat is in providing extra energy to the cow.

Fat Fast Facts

- The goal when adding fat to the diet is to increase total caloric intake, not just dietary energy density.
- Fats touted as high energy can't deliver on promises when dry matter intake suffers. The amount of energy associated with the reduction in DMI must be subtracted from the energy value of the fat supplemented.
- Saturated, rumen-inert fats do not depress DMI.
- To increase energy consumption, choose fats proven to maintain or increase DMI.

¹Source: "A Comparative Evaluation of Energy Booster 100® versus Megalac® for Lactating Dairy Cows," by Dr. Carl L. Davis, Professor Emeritus of Nutrition and Nutritional Sciences, University of Illinois (1997).

²Source: Grummer, R.R., et al., 1990. J. Dairy Science, 73:852-7.

³For more details on how fat supplementation net profit/loss is calculated, contact the MSG technical service team at the number listed below.