Better COWS
Better MILK

with

HIGH OLEIC SOYBEAN

Feeding high oleic soybean provides new opportunities for dairy producers, including more milk fat production and a healthier cow.

MISSOURI SOYBEANS

MOSOY.ORG
(573) 635-3819

734 S Country Club Dr.
Jefferson City, MO 65109

brought to you by Missouri soybean farmers and their checkoff

High Oleic soybean and soybean meal ***increased milk fat production*** by at least 70 grams, or about 2.5 oz per day.

Feeding High Oleic soybean and soybean meal can ***increase concentrations of oleic acid*** in milk.

Benefits of High Oleic soybean indicate ***less impact of lipid*** on ruminal fermentation.

Milk is one of the most versatile sources of human food. Today's dairy cow has tremendous potential to produce milk used in beverages, frozen desserts, yogurts, ice cream, cheeses, and butter. ***A cow's milk production can be limited by the amount of feed available and amount of energy in its diet.*** Starch from corn or other cereal grains is commonly added in lactating cows' diets to increase energy density and improve milk production; however, ***high starch intake can increase metabolic disorders*** (e.g., acidosis) that have long-term impacts on lactation and cow health.

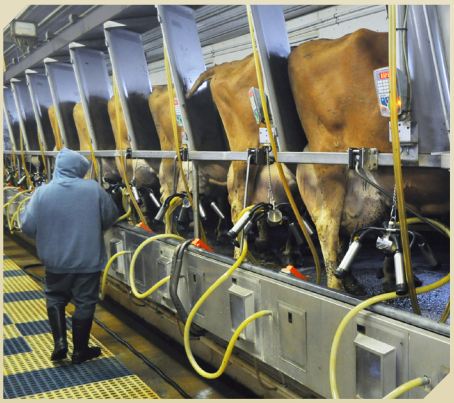
Lipids from plants contain more than twice the amount of energy than starch. However, ***consuming large amounts of lipids can suppress feed intake and diet digestibility,*** which can reduce production of milk and milk components. High consumption of lipids can also result in production of bioactive lipids by the rumen. When absorbed, these ***bioactive lipids reduce milk fat production***, a challenge exacerbated in most modern diets fed to lactating cows. Greater amounts of grain in comparison to forage result in greater production of bioactive lipids that reduce production of milk fat (Jenkins and McGuire, 2006). Consequently, most dairy producers limit the plant-based lipids included in the diets of lactating cows to less than 3.5 percent of dry matter (Jenkins and Harventine, 2014).

Not all lipids are the same. Reducing the function of lipids to nothing but energy storage fails to appreciate that they consist of a broad array of molecules uniquely important to supporting life in both animals and plants. Lipids can contain saturated (palmitic and stearic), monounsaturated (oleic), and polyunsaturated (linoleic and linolenic) fatty acids, each of which are essential to supporting various functions. For example, diets high in saturated fats have been related to atherosclerosis (high blood pressure), coronary heart disease, and certain types of cancer in humans. But, when oleic acid or other unsaturated fatty acids replace saturated fats ***in human diets, there can be improvements in inflammation, immunity, and health*** (Sales-Campos et al., 2013). ***In dairy cows, changes in diet fat content can have large impacts on production of different components of milk.***

Of all the components found in milk, **milk fat content is the most sensitive to diet changes** (Jenkins and McGuire, 2006). Lipids found in milk fat can be synthesized within the body or can be incorporated from preformed fatty acids absorbed from the diet. Feeding cows greater amounts of monounsaturated lipids can result in increased preformed fatty acids in milk that can improve the fatty acid profile for human health. Also, greater concentration of monounsaturated fatty acids in milk can improve the spreadability of butter and could ***reduce rates that lipids oxidize in milk, a primary factor limiting shelf-life***.

Most plant-based lipids are made up of primarily polyunsaturated fats. Direct additions of polyunsaturated fats to cow diets results in the greatest production of bioactive lipids that reduce milk fat synthesis and have toxic effects on ruminal microbes. These ***bioactive lipids from polyunsaturated fats can lead to reductions in feed intake and suppress digestion, which results in less milk production***. However, negative effects of polyunsaturated fat are less when polyunsaturated fats are provided from full-fat oilseeds, such as soybean (Mohamed et al., 1988). Still, polyunsaturated fats in traditional soybean have negative effects in cows when included in diets at about 10 percent of dry matter or more.

Development of soybean varieties containing 75 percent or greater of oleic acid (a monounsaturated fat) provides new opportunities for dairy producers. Feeding High Oleic soybeans can alleviate energy-based limitations in performance and reduce



ration costs by including greater amounts of oil in diets. ***Oleic acid has fewer negative effects on ruminal microbes, diet digestion, and milk fat production than polyunsaturated fats***. High Oleic soybean may provide an opportunity for greater amounts of plant-based lipid to improve the energy density of cows' diets instead of using increasing amounts of starch.

Feeding dairy cows whole, roasted soybean or soybean meal with high concentrations of oleic acid resulted in a more than 5 percent increase in milk fat concentration. C***ows fed soybean with high concentrations of oleic acid had a tendency to produce 70 grams, or about 2.5 oz, more milk fat per day*** compared to cows fed conventional soybean meal (Lopes et al., 2016). In a following series of experiments, researchers reported similar increases in milk fat concentration in response to feeding soybean with high concentrations of oleic acid, but indicated responses were likely related to reducing the impact of polyunsaturated fatty acids on ruminal fermentation than to altered function of mammary tissue (Weld and Armentano, 2018). Specifically, in these studies, ***feeding whole soybean with high concentrations of oleic acid resulted in a 140-gram increase in milk fat production***, but responses were limited to cows not in their first lactation. Benefits of feeding soybean with high concentrations of oleic acid were observed when cows were fed ground, but not whole soybean.

Milk fat production was increased 150-grams when cows were fed ground soybean containing high concentrations of oleic acid compared to when cows were fed ground conventional soybean. In total, these experiments provide firm evidence that ***feeding High Oleic soybeans to dairy cows increases oleic acid concentration in milk fat.*** Soybean with high concentrations of oleic acid also have fewer negative impacts on ruminal fermentation than conventional soybean.

High Oleic soybean can also create an opportunity to increase amounts of soy proteins in cow diets. Soy is a higher quality protein source than corn and many other plant-based proteins available for feed. The potential to feed cows greater amounts of soy proteins in addition to plant-based oils provides an added advantage to dairy producers by potentially r***educing the need to purchase more costly sources of protein*** or ruminally protected amino acids when balancing diets to meet protein and amino acid requirements for lactation.

Unlike early High Oleic soybean varieties, **recent advancements in soybean breeding do not rely on genetically modified organisms, which has led to SOYLEIC® (a non-GM, High Oleic soybean).** SOYLEIC® soybean provide an expanded opportunity for milk producers to market into programs seeking milk from cows fed non-genetically modified feeds. This High Oleic soybean could also provide the simultaneous benefit of improving milk shelf-life and consumer acceptance by increased concentration of monounsaturated fatty acids in milk products.

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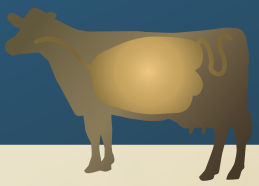

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