



DAIRY SOLUTIONS

High-oleic soybeans: A protein consideration for lactating dairy cattle rations

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Incorporating soybeans and their byproducts into dairy cattle rations is a fairly common practice throughout the United States. Depending on how they are processed, soybeans can provide high-quality protein and energy from fat. Soybeans are also an excellent source of essential amino acids and complement most forages, but they do have some limitations.

Roasted soybeans continue to be a very popular protein source for rations in certain dairy-producing regions. Soybeans that are farm-grown and locally available — and especially those that are roasted on-farm or locally — can serve as an economical ingredient in many situations. With the combination of the rumen-degradable protein, the bypass protein and the fat that the roasted beans provide, producers can easily replace some purchased protein and fat, allowing them to raise a higher percentage of their feed right at the farm gate.

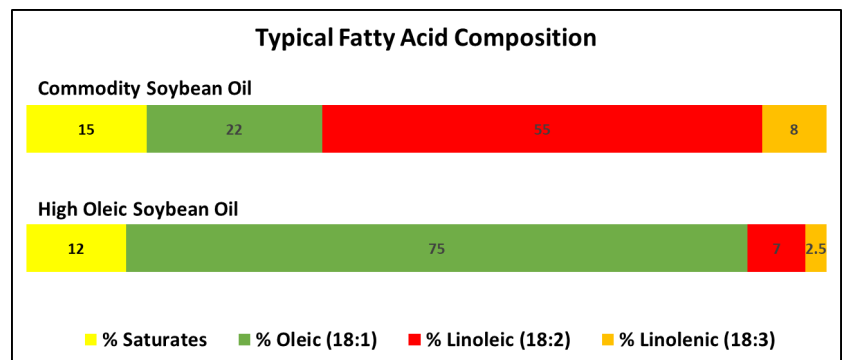
Historically, producers were limited in the amount of roasted conventional soybeans they could incorporate into their rations due to increasingly high levels of polyunsaturated fatty acids (PUFAs) as inclusion levels increased. Elevated levels of PUFAs are widely known to be toxic to rumen microbes, which can disrupt normal rumen function, leading to the production of the bioactive fatty acids that cause milk-fat depression. Until recently, producers could only decide how to process the soybeans and how much to feed. Now, however, they also have the opportunity to choose high-oleic acid soybeans, which can reap additional advantages in their dairy rations.

High-oleic soybeans

High-oleic soybeans have been around for a number of years, mostly as the result of research and contracted growing scenarios (primarily in the eastern U.S.). Over the past few years, high-oleic soybeans have slowly trickled into the market, and their presence will likely increase over the next few years.

So, what is the difference between conventional soybeans and high-oleic soybeans? Overall, their protein and fat levels remain the same — but there are drastic swings in the fatty acid profiles of their fat percentages (Figure 1). In conventional soybeans, only around 22% of the fat is oleic, with approximately 63% of the fat being made up of PUFAs (linoleic and linolenic). In high-oleic soybeans, that ratio shifts to 75% oleic and 9–10% PUFAs (linoleic and linolenic). For the dairy cow, this is a big deal, as the cow can more easily utilize oleic fatty acids to increase their milk fat synthesis — as opposed to PUFAs, which, at high levels, can greatly decrease overall milk-fat production.

Figure 1



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Recent research

A recent study conducted at Penn State University compared normal to high-oleic-acid roasted soybeans fed at 5% and 10% of the diet. The soybean type and level had no effect on milk yields, but high-oleic-acid soybeans resulted in a 0.17-unit higher milk fat concentration and a 0.2-pound higher fat yield. This increase was explained by a decrease in the diet-induced milk-fat depression. Additionally, increasing the amount of roasted high-oleic soybeans in the diet from 5% to 10% of the cows' diet increased milk fat numbers by 0.2 units. A second study conducted by Penn State University compared conventional extruded soybean meal with extruded high-oleic soybean meal and whole high-oleic heated soybeans. Their findings highlighted a 0.2-unit increase in milk-fat percentages when feeding either of the high-oleic treatments compared to the conventional extruded soybean meal. A third study conducted at the University of Wisconsin compared whole raw conventional soybeans to whole raw high-oleic soybeans. Their findings revealed a 0.23-unit increase in milk fat percentages for cows on their second lactation or more when feeding whole raw high-oleic soybeans versus conventional whole raw soybeans.

Ration scenarios

In rations where conventional roasted soybeans are in use, high-oleic soybeans can safely be swapped in at rates of 125–175% of the prior inclusion levels. We would also expect an increase in milk fat alongside a reduction in purchased feed costs from conventional soybean meal, bypass protein and possibly even bypass fat sources. Even more notable increases in milk-fat percentages may be obtained in herds with lower milk-fat levels or rations with lower dietary fat levels.

Another benefit to raising your own protein sources on-farm is the advantage of not having to play the open market for purchased protein sources. By growing your own high-oleic soybeans, you can establish your feed costs up front on a large percentage of the protein you will be feeding your herd for the coming year. Additionally, utilizing a higher level of high-oleic soybeans may allow for the increased use of other economical byproducts that are higher in polyunsaturated fats, such as distillers grains. It is also important to note that to optimize the bypass protein of the roasted soybean, the optimal processing method is to halve and quarter the soybeans prior to feeding. Finely ground roasted beans are more likely to degrade rapidly in the rumen than larger-particle protein. It is also a good idea to conduct regular analyses of the final roasted beans to determine their dry matter, protein and fat levels and the protein dispersibility index (PDI) to identify potential changes from batch to batch.

Agronomic aspect

High-oleic soybean seed sells for a comparable price to normal seed and does not differ in its yields or protein and fat concentrations. Furthermore, producers raising high-oleic soybeans have been able to contract an additional \$1–2.05 a bushel premium over the board price for the 2023 harvest.

One downside is that growers have limited seed and elevator options. Anyone wishing to grow high-oleic soybeans to sell must be near an elevator that is contracted to specifically receive high-oleic soybeans, which need to be stored separately from conventional soybeans. One of the most challenging issues with high-oleic soybeans for farmers today is weed control. Water hemp and ragweed can cause headaches in fields with limited chemical options for spraying the crops. Future varieties, which will incorporate traits that allow for more ease in controlling the weed population, are expected to be released by 2025.

From a dairy perspective, if adequate tillable acres are available and purchased protein costs are a concern, now may be a great time to consider raising some of your own high-oleic soybeans with the intent of roasting them and/or incorporating them directly back into your lactating cow rations. As with all major ration and feed ingredient changes, remember to calculate your return on investment while taking into account the potential performance increases for your operation. For assistance evaluating or incorporating high-oleic soybeans into your ration, please contact your [local Hubbard Dairy representative](#).