Composition and Processing of Roasted High-Oleic Soybeans for Dairy Cow Nutrition

WRITTEN BY: *MIKAYLA BURATO, PHD*

Chances are, you have at one point this past year talked about high-oleic soybeans with your family, fellow dairymen, nutritionists, or someone here at AgCentral. High-oleic soybeans have been a hot topic of conversation – and for a good reason! This year, the state of Tennessee planted 1.55 million acres of high-oleic soybeans, according to USDA NASS and the United Soybean Board. This article will spill the beans on the composition and adequate processing of high-oleic beans, when compared to conventional soybeans.

Conventional soybeans have a more balanced mixture of oleic and linoleic fatty acids, while high-oleic soybeans have a lower linoleic and higher oleic fatty acid content. Therefore, high-oleic soybeans aren't necessarily higher in total fat percentage, the difference is just the composition of fatty acids. In the rumen, the microbial population modifies oleic and linoleic fatty acids into other forms of fatty acids that can be absorbed and used as an energy source. The modification of linoleic acid produces intermediate fatty acids that could cause milk fat depression if the rumen is in unfavorable conditions, such as low or unstable ruminal pH and too little physically effective fiber. Therefore, high-oleic soybeans in the ration can give the cow's rumen a more favorable fatty acid profile for maintaining milk fat.

Proper processing and roasting of soybeans is essential for optimizing ruminal microbial fermentation, protein degradability, and intestinal digestibility in cattle. High-oleic soybeans can be ground to a smaller size than conventional soybeans, without affecting milk fat synthesis. It was formerly recommended that conventional soybeans should be ground very coarse into halves or quarters, so that the intermediate fatty acids were not available in the rumen, causing milk fat depression as previously mentioned.



From Dr. Leoni Martins, Assistant Clinical Professor of Precision Dairy Nutrition from Penn State. Data from project titled: "Characterization of soybean processing in PA dairy farms."

For most diets, high-oleic soybeans should be ground to fine to medium particle size (750 to 1,200 microns), to allow for more fat digestion. The particle size for ground roasted high-oleic soybeans at AgCentral is 826 microns, on average (Pictured on the right).

The degree in which soybeans are roasted affects the availability of protein in the rumen and the amount of protein that bypasses the rumen to reach the small intestine for direct absorption. There must be a balance between degradable and rumen undegradable protein to optimize milk production and cow performance. Excessive roasting can cause the proteins to over bind, where they entirely bypass digestion at any point through the digestive tract.



To know if high-oleic soybeans are properly roasted, soybean samples can be subjected to 16 hours of incubation inside the rumen of a cow to determine the amount of rumen undegradable protein (RUP) present. A low RUP value indicates under-roasting, while higher RUP values indicate higher levels of roasting. When AgCentral's roasted high-oleic soybeans were subjected to this RUP analysis, approximately 64% of the crude protein was undegradable. The desirable RUP percentage is around 60%.

Therefore, the high-oleic soybeans that are roasted and ground at our Greenback location meet the established processing quality standards. If you are interested in including high-oleic soybeans in your dairy ration, please reach out to me at (423) 762-4849 or at mikayla.burato@agcentral.coop. Thank you for your time as I spilled the beans on high-oleic soybeans!