



# CATTLE SENSE

Information that makes sense helping you make cents

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## /// Glycerin: What's New

I am writing this on a plane on my way back from the annual meeting of the American professional animal science societies. For the past few days I have read and heard about new research results until my mental “hard drive” was full! The presentation mix always includes some cutting edge innovation as well as thought-provoking new ways of looking at old information. But most reports deal with experiments designed to contribute one specific bit of data that becomes part of the overall knowledge on a substance or practice that is currently of interest.

One of the “in” topics in the nutrition area this year was glycerin as a feed ingredient. There were at least a dozen abstracts written and presented on glycerin research, and together they can provide insight and confidence into utilizing this byproduct.

### A Quick Review

Glycerol, or glycerin, is a clear, colorless, odorless liquid with a thick, syrupy texture. It is oily to the touch and very sweet tasting. Chemically it is  $C_3H_8O_3$  –a sugar alcohol—and it is soluble in water and alcohol, but not oils. The biofuels industry basically splits fat or oils into biodiesel and glycerin. Raw glycerin will contain varying amounts of soap, methanol, chemicals used as catalysts in the manufacturing process, and water. Acidulation and distillation are commonly used to purify glycerin before it enters the pharmaceutical, chemical, or animal feed trade.

Nutritionally, glycerin is readily metabolized in the rumen as an energy source. It is valued as a glucose-precursor, but previous research indicates that when fed at more than 13-15% of the diet, fiber digestion can be negatively impacted. It could be fed directly, or as part of a liquid supplement.

### Recent Findings

**KANSAS STATE UNIVERSITY:** Beef heifers, confined, stepped up to a 90% concentrate diet  
Treatments: 0, 7.5, or 15% glycerin-for-corn

- No treatment differences in ADG, yield grade, or most carcass measurements
- Linear decrease in feed intake, improving Gain:Feed from .148 to .151 to .158 with glycerin
- Glycerin treatments exhibited lower marbling and quality grades.

**UNIVERSITY OF MINNESOTA:** 830-lb yearlings, confined, steam-flaked corn finishing diets  
Treatments: replaced SFC with 0 or 10% glycerin and 0 or 35% DGS

- No treatment differences in ADG or carcass traits
- Intakes increased in distillers grains diets
- Concluded glycerin had similar energy to SFC, whereas DGS had a lesser energy content.

**BRAZIL:** 750-lb beef bulls, confined, 50% corn silage/50% concentrate diets  
Treatments: 0, 5, 10, 15, or 20% glycerin-for-ground corn

- No treatment differences in ADG, intake, feed efficiency, dressing percent, or carcass traits

- BRAZIL:** 600-lb Nellore steers, confined, 30% silage/70% concentrate diet  
Treatments: 0, 7.5, 15, 22.5, or 30% glycerin-for-concentrate  
-- Increasing glycerin tended to decrease intake, lower NDF digestion, and improve CP digestion  
-- No treatment differences in digestion of ADF or the total diet.
- TUSKEGEE UNIVERSITY:** Weaned Boer goats, fed 30% Bermudagrass hay/70% concentrate  
Treatments: 0, 5, 10, 15% glycerin in concentrate  
--No treatment differences in ADG, intake, efficiency, dressing percent, or carcass traits.
- TEXAS A&M UNIVERSITY:** 660-lb beef steers, Bermudagrass hay plus cottonseed meal  
Treatments: rumen infusion of 0, 2/3, or 1 1/3 lb glycerin daily  
-- No treatment differences in digestibility of the fiber (NDF) or diet (OM)  
-- Unexplained quadratic impact on hay intake (14.9, 13.0, and 14.2 lb for 0, 2/3, or 1 1/3 lb glycerin).
- BRAZIL:** Red Norte bulls, 30% silage finishing diet  
Treatments: 0, 6, 12, or 18% glycerin-for-corn  
-- No treatment differences in ADG, carcass weight, backfat, or other carcass measurements  
-- Linear increase in dressing % with glycerin addition: 55.4, 55.5, 56.8, and 56.5%, respectively.
- SOUTH DAKOTA STATE UNIVERSITY:** Spring-calving beef cows, late gestation, brome hay (7.6% CP)  
Treatments: equal CP from SBM, SBM + glycerin, or SBM + soy hulls  
-- No treatment differences in cow body weight or diet digestibility  
-- Change in cow BCS was -0.8 for soybean meal only, and +.42 with glycerin.
- KANSAS STATE UNIVERSITY:** Lab work evaluating impact of glycerin on digestion  
Treatments: rumen fluid from cattle adapted or not to glycerin  
-- Glycerin appeared to depress digestion in the unadapted rumen, but increased it when adapted.

Taken together, these results certainly validate the use of glycerin as a feedstuff when availability and economics dictate its use in a diet. Two additional studies looked at slightly different aspects of glycerin feeding. There has been concern about the potential negative effect of the methanol contained in feed-grade glycerin. Dietary methanol will fuel methane production in the rumen, which is energetically inefficient. And there is a legal limit of just 150 ppm methanol in beef cattle diets, based on safety concerns. Yet published values for the methanol content of glycerin range from near 0 to over 26%.

A study at Texas A&M evaluated direct infusion of 0, 70, 140, or 210 g of methanol per day. This was the equivalent of 6563, 13356, and 19831 ppm, far above the published limit. There were no differences observed in dry matter intake or diet digestion.

Because dietary changes can lead to shifts in the microbial population of the gut, researchers at Kansas State looked at the potential impact of feeding glycerin on presence of *E. coli* 0157:H7. Beef heifers received 0, 4, or 8% glycerin in a growing diet. There was a linear decrease in the occurrence of this pathogenic bacteria in fecal samples (found in 5.8, 4.3, or 2.4% of samples, respectively).

Both of these trials support additional research with glycerin; I'm sure I can learn more at next year's meetings!