

# Effect of Glycerol Level in Feedlot Diets on Animal Performance and Carcass Traits

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The supply of glycerol (or glycerine) may increase dramatically with the development of the biodiesel industry. Glycerol is a three-carbon alcohol produced by trans-esterification of vegetable oil (e.g. soybean) or animal fat. Approximately 10 percent of the original weight of the vegetable oil is converted to glycerol in the process to produce biodiesel. The energy value of glycerol is about equal to corn on a pound for pound basis and therefore could be of great value for a livestock feed based on competitive pricing and availability. These trials were designed to study the effects of glycerol in receiving and finishing rations on animal performance. Two separate feedlot trials were conducted with different sets of animals to evaluate the effects of increasing levels of glycerol on animal performance.

## *Receiving Trial*

Mixed breed steers ( $n=198$ ;  $BW = 622.6 \pm 34.3$  lbs.) from 40 different ranches that participated in the Dakota Feeder Calf feedout program were utilized in the receiving trial.

Steers were weighed and allotted by weight block in a randomized complete block design and sorted into 16 identical pens (four pens per treatment). Treatments were 0, 6, 12, and 18 percent glycerol on a DM basis replacing dry-rolled corn and co-products in the diet (56 Mcal/lb NEg). Dry matter intake was quadratically affected during the 30-d feeding period ( $P = 0.05$ ) with 20.38; 21.07; 21.13; 19.47 pounds DM consumed for 0, 6, 12, and 18 percent glycerol treatments, respectively. Gains were not affected by glycerol level ( $P = 0.79$ ) and feed efficiency was similar ( $P > 0.92$ ) among treatments.

## *Finishing Trial*

One hundred thirty-two yearling Black Angus cross heifers ( $BW = 911.5 \pm 33.2$  lbs.) were purchased from a commercial source and utilized for the finishing trial.

Glycerol levels were increased in stepped increments as follows: all glycerol treatment groups were fed the 6% glycerol ration during the first seven days of the trial; the 12 and 18% treatment groups were increased to 12% during the second week; and the 18% glycerol treatment pens were increased to the final glycerol level at the start of the third week.

Heifers were weighed at 28-d intervals during the 102 days on feed. All heifers were marketed at the same time when visual appraisal of the animals determined that 60 percent would grade USDA choice. Dry matter intake linearly decreased during the 102-d feeding period with increasing glycerol level ( $P = 0.05$ ; 28.11; 27.97; 27.71; 26.16 lbs. for 0, 6, 12, and 18% glycerol, respectively). Gains were not affected by glycerol level ( $P = 0.26$ ) during any of the four individual 28-d weigh periods or overall. Feed efficiency was also similar ( $P > 0.22$ ) among treatments. The results of this study suggest that glycerol is an excellent energy source for finishing diets up to 18 percent of dry matter intake. The fact that corn decreased from 60 percent of the diet to 0 percent while glycerol increased, along with the co-products, wheat middlings and distillers grains, indicates that high percentage co-product diets can be competitive with corn-based diets in animal performance. The protein content of the diet increased with co-product level, with excess protein potentially metabolized as an energy source.



**Heifers on glycerol finishing trial replacing corn in TMR diet up to 18%.**

### **Handling glycerol**

Glycerol was handled as a liquid even though the lab analysis reports it at 85 percent DM. Feed grade glycerol, a three-carbon alcohol, has a high viscosity and does not flow well in colder temperatures, essentially below freezing. Flow properties improve when water is added to the product. Adding up to 50 percent water will improve flow properties down to -30° F. This practice is necessary if glycerol is to be used as a single ingredient throughout the winter. Ration adjustments must be made to account for the change in dry matter content.

### **Acknowledgement**

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For a more detailed report of this study, the reader is referred to the 2009 NDSU Beef Feedlot Research Report available at [www.ag.ndsu.nodak.edu/carringt/](http://www.ag.ndsu.nodak.edu/carringt/) under the livestock bullet or upon request from the Carrington Research Extension Center.