

# Impact of a Natural Feed Additive using Direct Fed Microbes on Finishing Beef Cattle Performance and Liver Abscess Rate

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## Summary with Implications

A feedlot study with individually fed steers (n=60) was conducted comparing a natural feed additive (Direct Fed Microbial) to no feed additive (control) on performance and liver abscess rate of finishing beef cattle. There were no significant differences between treatments on intake, gain, feed conversion, or hot carcass weight and carcass traits. Liver abscess occurrence and severity were similar for both treatments with 4/29 steers having abscessed livers in the control group and 3/29 steers in the group that received direct fed microbes. The direct fed microbial feed additive fed in this exploratory study did not significantly affect performance, liver abscess rate, or the severity of liver abscesses of finishing beef cattle.

## Introduction

The most common and effective method to control liver abscesses today is feeding tylosin, but it requires a veterinary feed directive. An effective alternative for liver abscess prevention that does not require veterinary approval or require feeding an antibiotic is of great interest. The direct fed microbial (DFM) feed additive used in this study was specifically developed to target and reduce the population of the liver abscess causing *Fusobacterium necrophorum* and the major lactic acid producing bacteria *Streptococcus bovis* in the rumen. The DFM has been validated in laboratory cultures and is naturally occurring in the rumen and was isolated from cattle. The objective of this study was to determine

**Table 1. Diet composition of feed delivered to steers during the finishing period (% of diet DM).**

Ingredient	% Diet DM <sup>1</sup>
High-moisture corn	36.5
Dry-rolled corn	24.5
Modified distillers grains plus solubles	20.0
Corn Silage	15.0
Supplement <sup>2</sup>	
Limestone	1.64
Fine Ground Corn	1.40
Urea	0.50
Salt	0.30
Tallow	0.10
Beef Trace Minerals Premix	0.05
Vitamin A-D-E Premix	0.015

<sup>1</sup> Diet DM: 65.81%

<sup>2</sup> Supplement fed at 4% of dietary DM for all treatments

the effect of this specific DFM on finishing beef cattle performance, liver abscess occurrence, and severity of liver abscesses derived from ruminal acidosis.

## Procedure

A finishing study conducted at the Eastern Nebraska Research and Extension Center utilized 60 head of crossbred steers (initial shrunk BW 604 lb SD = 26.2 lb). Steers were individually fed in 2 pens (barn of 30 steers) using Calan gates. To avoid DFM contamination from social housing systems, barn was assigned randomly to DFM treatment. Based on past performance studies, barn was found to not impact performance. The two treatments consisted of a control diet (CON) without DFM and a diet with DFM (DFM). The CON treatment is designed to represent the effect from the diet when no means of liver abscess prevention are used. The GRAS approved DFM strain used for this study was top dressed in the feed targeting 1 billion bacterial cells/steer daily. Bacterial cells were cultured and confirmed to be the correct strain using 16S rRNA sequencing and cell counts were estimated using cell cytometry.

Cattle received a diet consisting of high moisture corn, dry rolled corn, modified distillers grains plus solubles, 15% corn silage, and supplement once a day (Table 1). High moisture corn was processed through a roller mill before ensiling. Ensiled HMC averaged 69% dry matter to maximize starch availability and digestion rate to increase the potential for lactic acidosis in this study. Cattle were fed this diet for the duration of the trial, 189 days. On day 0, cattle received 80 mg trenbolone acetate and 16 mg estradiol via implant (Revalor-IS). On day 100, cattle were re-implanted with 200 mg trenbolone acetate and 20 mg estradiol (Revalor-200). Weights were collected on days: -2, -1, 0, 57, 100, 148, and 189. The finishing diet was fed on Day 1 of the study at 1.8% of BW of feed DM delivered. Steers were adapted to ad libitum intakes by increasing DM offered by 0.5 lb DM from day 2 of the study until ad libitum intake by individual was attained (approximately 20 days).

Steers were shipped to Greater Omaha for harvest, where carcass data were recorded. On day of harvest, HCW and liver abscess scores were collected. Following a 48-hour chill, USDA marbling score,

**Table 2. Performance and carcass characteristics of beef steers fed a finishing diet with a novel Direct Fed Microbial.**

Item	Treatments <sup>1</sup>		SEM	P-value
	CON	DFM		
<i>Carcass-Adjusted Performance</i>				
Initial BW, lb	604	603	4.9	0.93
Final BW, lb <sup>2</sup>	1297	1289	16.5	0.76
DMI, lb/d	21.3	21.0	0.36	0.51
ADG, lb	3.67	3.63	0.08	0.77
F:G	5.81	5.76	-	0.75
<i>Carcass Characteristics</i>				
HCW, lb	817	812	10.41	0.76
Marbling <sup>3</sup>	465	448	20.35	0.57
LM area, in <sup>2</sup>	13.8	13.0	0.42	0.21
12 <sup>th</sup> rib fat, in	0.57	0.53	0.29	0.28
Liver Abscesses, % <sup>4</sup>	13.79	10.34	-	-

<sup>1</sup> Treatments included control and DFM (top dressed)

<sup>2</sup> Calculated from HCW divided by a common dressing percentage (63%).

<sup>3</sup> Marbling score 400 = small, 500 = modest, etc.

<sup>4</sup> Calculated as a percentage of total animals for that treatment; lame and dead animals removed.

LM area, and 12<sup>th</sup> rib fat thickness were recorded. Carcass-adjusted performance was calculated using final BW based on HCW divided by a common dressing percentage.

Data were analyzed using the PROC Mixed procedure of SAS evaluating the individual animal as the experimental unit. Steers were stratified by weight, as such no block was used. Liver abscesses were analyzed as binomial since all liver abscesses received the same score and cattle either had an abscessed liver or they did not. One steer was removed from the study due to lameness issues and one steer was removed due to mortality derived from abomasum hemorrhage. Final calculations do not include the dead or removed steers. Treat-

ment differences were declared significant for all statistical analysis at  $P \leq 0.05$ .

### Results

Throughout the feeding period, no significant differences ( $P > 0.51$ ) in final BW, DMI, ADG, or F:G (Table 2) were detected. Similarly, no significant differences between treatments ( $P > 0.21$ ) in HCW, marbling, LM area, 12<sup>th</sup> rib fat, or liver abscesses were observed. Liver abscess incidences were low, with only 4 out of 29 observed for control and 3 out of 29 steers fed the DFM. Abscess rates were low overall despite not feeding any additives and a diet with high-moisture corn.

### Conclusion

Feeding this specific DFM at 1 billion bacterial cells/steer daily to finishing beef cattle did not significantly affect performance, carcass characteristics, liver abscess rate, or the severity of liver abscesses.

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