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# Efficacy of feed grade antibiotics in finishing diets containing distiller' grains with solubles (DGS)

## Abstract

Rumensin and Tylan, both marketed by Elanco Products Company, have proved to be valuable feed additives when fed to finishing feedlot cattle. Rumensin was approved in the mid-1970s to improve feed efficiency and average daily gain. Rumensin frequently is used to manage digestive disturbances associated with otherwise erratic intakes of high grain diets. Tylan is fed as a preventative for liver abscesses. Rumen disorders such as acidosis and rumenitis are predisposing factors for liver abscesses. Erratic intakes of high grain diets along with poor bunk management are important factors that predispose cattle to ruminal disorders. Abscessed livers can have deleterious affects on animal performance, and in extreme situations lead to excess carcass trim and reduced carcass yields. Distiller's grains with solubles (DGS) typically contain the protein, bran, and germ portions of the grain used in the fermentation process. In studies previously conducted at Kansas State University, corn germ fed at levels as low as 5% (dry basis) significantly reduced the incidence of liver abscesses. Since DGS also contain the corn germ, we hypothesized that a similar effect could be achieved by substituting DGS for corn. The objective of this study was to evaluate the efficacy of Rumensin and Tylan on growth performance, carcass characteristics, and carcass quality of yearling heifers fed diets based on steamflaked corn with and without 25% corn wet DGS.

## Keywords

Cattlemen's Day, 2007; Kansas Agricultural Experiment Station contribution; no. 07-179-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 978; Beef; Cattle; Distiller's grains with solubles (DGS); Rumensin; Tylan

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## EFFICACY OF FEED GRADE ANTIBIOTICS IN FINISHING DIETS CONTAINING DISTILLER' GRAINS WITH SOLUBLES (DGS)

*B. E. Deppenbusch, J. S. Drouillard, E. R. Loe, and M. J. Quinn*

### Introduction

Rumensin<sup>1</sup> and Tylan<sup>1</sup>, both marketed by Elanco Products Company, have proved to be valuable feed additives when fed to finishing feedlot cattle. Rumensin was approved in the mid-1970s to improve feed efficiency and average daily gain. Rumensin frequently is used to manage digestive disturbances associated with otherwise erratic intakes of high grain diets. Tylan is fed as a preventative for liver abscesses. Rumen disorders such as acidosis and rumenitis are predisposing factors for liver abscesses. Erratic intakes of high grain diets along with poor bunk management are important factors that predispose cattle to ruminal disorders. Abscessed livers can have deleterious effects on animal performance, and in extreme situations lead to excess carcass trim and reduced carcass yields.

Distiller's grains with solubles (DGS) typically contain the protein, bran, and germ portions of the grain used in the fermentation process. In studies previously conducted at Kansas State University, corn germ fed at levels as low as 5% (dry basis) significantly reduced the incidence of liver abscesses. Since DGS also contain the corn germ, we hypothesized that a similar effect could be achieved by substituting DGS for corn. The objective of this study was to evaluate the efficacy of Rumensin and Tylan on growth performance,

carcass characteristics, and carcass quality of yearling heifers fed diets based on steam-flaked corn with and without 25% corn wet DGS.

### Experimental Procedures

Three hundred and seventy-one crossbred-yearling heifers (660 ± 19 lbs) were obtained from a common source and used in a finishing study. Heifers were fed finishing diets based on steam-flaked corn with and without 25% of diet dry matter as corn wet DGS. Within each diet, heifers were fed no antibiotics (NONE), Rumensin only (RUMENSIN), or Rumensin plus Tylan (RUM+TYL). Rumensin was fed at 300 mg/heifer daily and Tylan at 90 mg/heifer daily. Diets are described in Table 1.

Heifers were housed in 54 concrete-surfaced pens (392 ft<sup>2</sup>) with overhead shade covering the bunk and half of the pen. Pens included automatic water fountains and 10.5 linear feet of bunk space. Pen weight of animals was determined on days 33, 61, 89, and 122 using a pen scale. Pen weights also were measured just prior to shipping to a commercial abattoir.

Cattle were harvested on day 150 at a commercial abattoir in Emporia, KS, at which time carcass data were collected. Hot carcass

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<sup>1</sup>Rumensin and Tylan are registered trademarks of Elanco Animal Health, Indianapolis, IN.

weight and liver abscess scores were obtained at the time of harvest. Measurements taken following a 24-hour chill were ribeye area; subcutaneous fat thickness over 12th rib; kidney, pelvic, and heart fat; marbling score; USDA quality grades; and USDA yield grades. Final body weight was calculated by dividing hot carcass weight by a common dressing percentage of 63.5.

## **Results and Discussion**

Yearling heifers fed the steam-flaked corn based diet with 25% corn-wet DGS gained 8% less weight and were less efficient than heifers fed no DGS. Addition of RUMENSIN and RUM+TYL did not significantly affect animal growth performance. Dry matter intake and feed to gain ratio were numerically lower for RUMENSIN and RUM+TYL, but this difference was not significant. Average daily gain and final body weights were similar among heifers fed NONE, RUMENSIN, and RUM+TYL.

Carcass weight and ribeye area were both less for the heifers fed 25% corn wet DGS. In addition, these heifers also had a lower dress yield. Percent liver abscess was not significantly altered with the inclusion of 25% corn wet DGS. Marbling score and carcasses grading USDA Choice or better were both significantly lower for heifers fed DGS. Carcass data from these heifers suggest that feeding 25%

corn wet DGS resulted in similar 12th rib fat thickness and kidney, pelvic, and heart fat, but with less lean muscle (i.e., ribeye area) and a smaller carcass. The net result from feeding 25% corn-wet DGS was a lower valued carcass.

Addition of RUMENSIN and RUM+TYL to finishing diets based on steam-flaked corn with and without DGS resulted in no significant differences in carcass merit or quality. We did observe some numerical decreases in liver abscess with the addition of RUM+TYL, but only in diets without DGS. In the steam-flaked corn diets, RUM+TYL reduced liver abscess by 66%. However, in the diets containing DGS, we observed no differences in liver abscess rates. Results from this study suggest that Tylan yields a reduction in liver abscesses when added to traditional steam-flaked corn diets, but it may lack efficacy in finishing diets containing DGS.

## **Implications**

Twenty-five percent corn wet DGS in steam-flaked corn diets reduced animal performance and carcass value. Rumensin did not result in any improvements in growth performance or carcass quality. Efficacy of Tylan in diets containing DGS appears to be less than in more traditional steam-flaked corn diets.

**Table 1. Composition of Finishing Diets Based on Steam-flaked Corn With and Without 25% Corn Wet DGS Fed to Yearling Heifers**

Ingredient, % (dry basis)	Steam-Flaked Corn	Steam-Flaked Corn with WDGS <sup>b</sup>
Steam-flaked corn	83.9	64.9
Corn wet DGS	-	25.0
Steep	5.0	-
Alfalfa hay	6.0	6.0
Limestone	1.3	1.3
Urea	1.0	-
Supplement <sup>a</sup>	2.8	2.8
Nutrient %, calculated		
Dry matter	78.8	61.0
Crude protein	14.0	14.8
Fat	3.3	5.4
Calcium	0.70	0.70
Phosphorus	0.30	0.36

<sup>a</sup>Supplement provided one of 3 different feed additive combinations:

NONE = Formulated to provide 0.5 mg MGA per heifer daily,

RUMENSIN = Formulated to provide 0.5 mg MGA and 300 mg Rumensin per heifer daily,

RUM+TYL = Formulated to provide 0.5 mg MGA, 300 mg Rumensin, and 90 mg Tylan per heifer daily.

<sup>b</sup>WDGS = Corn wet DGS was added to the diet at 25% (dry basis).

**Table 2. Growth Performance of Yearling Heifers Fed Diets Containing Either Steam-flaked Corn or a Combination of Steam-flaked Corn and Corn Wet DGS With Different Feed Additives (NONE<sup>a</sup>, RUMENSIN<sup>b</sup>, and RUM+TYL<sup>c</sup>)**

Item	Steam-Flaked Corn			Steam-Flaked Corn and WDGS <sup>d</sup>			SEM	<i>P</i> value		
	NONE	RUMENSIN	RUM+TYL	NONE	RUMENSIN	RUM+TYL		Diet	Additive	Diet × Additive
No. of head	63	62	62	62	63	59	-	-	-	-
No. of pens	9	9	9	9	9	9	-	-	-	-
Days on feed	150	150	150	150	150	150	-	-	-	-
Initial weight, lb	660	660	660	660	660	660	19.3	0.56	0.41	0.84
Final weight, lb <sup>e</sup>	1,096	1,079	1,093	1,059	1,049	1,054	24.4	0.01	0.39	0.90
Dry matter intake, lb/day	17.6	17.4	17.1	17.4	17.1	17.0	0.41	0.34	0.33	0.93
Average daily gain, lb/day	2.91	2.80	2.89	2.66	2.59	2.63	0.07	0.01	0.36	0.91
Feed:gain	6.05	6.20	5.91	6.51	6.61	6.42	0.13	0.01	0.20	0.87

<sup>a</sup>NONE = Formulated to provide 0.5 mg MGA per heifer daily.

<sup>b</sup>RUMENSIN = Formulated to provide 0.5 mg MGA and 300 mg Rumensin per heifer daily.

<sup>c</sup>RUM+TYL = Formulated to provide 0.5 mg MGA, 300 mg Rumensin, and 90 mg Tylan per heifer daily.

<sup>d</sup>WDGS = Corn wet DGS was added to the diet at 25% (dry basis).

<sup>e</sup>Carcass adjusted final weight calculated by dividing carcass weight by a common dress yield of 63.5%.

**Table 3. Carcass Characteristics of Yearling Heifers Fed Diets Containing Either Steam-flaked Corn or a Combination of Steam-flaked Corn and Corn Wet DGS With Different Feed Additives (NONE<sup>a</sup>, RUMENSIN<sup>b</sup>, and RUM+TYL<sup>c</sup>)**

Item	Steam-Flaked Corn			Steam-Flaked Corn and WDGS <sup>d</sup>				P value		
	NONE	RUMENSIN	RUM+TYL	NONE	RUMENSIN	RUM+TYL	SEM	Diet	Additive	Diet × Additive
Hot carcass weight, lb	696	685	694	673	666	669	15.5	0.01	0.37	0.93
Dress yield, %	62.3	61.6	61.7	61.3	61.1	61.4	0.24	0.01	0.90	0.30
Ribeye area, inches <sup>2</sup>	12.77	11.97	12.41	12.16	11.74	12.09	0.26	0.05	0.04	0.71
Kidney, pelvic, and heart fat, %	2.65	2.62	2.68	2.68	2.64	2.66	0.05	0.73	0.55	0.79
12th –rib fat, inches	0.47	0.46	0.48	0.47	0.48	0.47	0.03	0.80	0.96	0.79
Liver abscess, %	24	22	8	15	16	16	5.1	0.53	0.27	0.24
A+ <sup>e</sup>	16	12	3	8	6	10	3.5	0.48	0.30	0.09
A <sup>f</sup>	2	3	2	0	0	2	1.5	0.17	0.79	0.50
A- <sup>g</sup>	6	7	3	6	10	4	3.2	0.35	0.35	0.87

<sup>a</sup>NONE = Formulated to provide 0.5 mg MGA per heifer daily.

<sup>b</sup>RUMENSIN = Formulated to provide 0.5 mg MGA and 300 mg Rumensin per heifer daily.

<sup>c</sup>RUM+TYL = Formulated to provide 0.5 mg MGA, 300 mg Rumensin, and 90 mg Tylan per heifer daily.

<sup>d</sup>WDGS = Corn wet DGS was added to the diet at 25% (dry basis).

<sup>e</sup>A+ = One or more large or multiple, small, active abscesses with or without adhesions.

<sup>f</sup>A = Two to four small, well-organized abscesses.

<sup>g</sup>A- = One or two small abscesses or scars.

**Table 4. USDA Yield and Quality Grade of Yearling Heifers Fed Diets Containing Either Steam-flaked Corn or a Combination of Steam-flaked Corn and Corn Wet DGS With Different Feed Additives (NONE<sup>a</sup>, RUMENSIN<sup>b</sup>, and RUM+TYL<sup>c</sup>)**

Item	Steam-Flaked Corn			Steam-Flaked Corn and WDGS <sup>d</sup>				<i>P</i> value		
	NONE	RUMENSIN	RUM+TYL	NONE	RUMENSIN	RUM+TYL	SEM	Diet	Additive	Diet × Additive
USDA yield										
grade, %	2.67	2.73	2.65	2.58	2.71	2.70	0.10	0.81	0.54	0.74
YG 1	6	6	2	7	5	5	2.73	0.78	0.46	0.68
YG 2	33	31	46	43	37	34	5.25	0.77	0.40	0.06
YG 3	48	47	39	37	41	48	6.54	0.63	0.95	0.31
YG 4	13	16	11	11	17	13	5.34	0.84	0.62	0.93
YG 5	0	0	2	2	0	0	1.00	0.91	0.61	0.24
USDA quality										
grade, %										
Choice or better	75	80	74	62	70	65	6.52	0.02	0.44	0.95
Prime	2	0	1	0	2	0	1.25	0.55	1.00	0.24
Choice	73	80	73	62	68	65	6.78	0.04	0.48	0.93
Select	22	20	24	37	27	35	6.21	0.02	0.45	0.81
Standard	3	0	2	2	2	0	1.85	0.95	0.73	0.31
Marbling score	464	444	448	428	439	428	12.64	0.03	0.77	0.38

<sup>a</sup>NONE = Formulated to provide 0.5 mg MGA per heifer daily.

<sup>b</sup>RUMENSIN = Formulated to provide 0.5 mg MGA and 320 mg Rumensin per heifer daily.

<sup>c</sup>RUM+TYL = Formulated to provide 0.5 mg MGA, 320 mg Rumensin, and 90 mg Tylan per heifer daily.

<sup>d</sup>WDGS = Corn wet DGS was added to the diet at 25% (dry basis).

<sup>e</sup>300 to 399 = Select, 400 to 499 = Choice, 500 to 599 = Prime