

Technical Bulletin

Information from Phibro Technical Services

Feedlot Performance and Carcass Parameters in Yearling Heifers Associated With Two Regimens of MGA® Feeding: Continuous vs Withdrawal 35 days Prior To Slaughter

Summary

- Continuous feeding of Rumensin®, Tylan®, and MGA® (RTM) increased final body weights, total gain, ADG, and hot carcass weights vs heifers continuously fed Rumensin and Tylan only (RT).
- RTM feeding improved the percentage of heifers grading choice/prime and reduced the percentage of dark cutting carcasses vs heifers fed RT.
- RTM fed heifers had increased final body weights, total gain, ADG, and hot carcass weights compared to heifers with all three additives withdrawn from the diet during the last 35 days on feed (RTMwd).
- RTM feeding improved the percentage of heifers grading choice/prime and reduced the percentage of dark cutting carcasses vs heifers fed RTMwd.
- There were no differences in mortality, feedlot, or carcass parameters (exception: dressing percentage) between RT fed heifers and heifers with Rumensin and Tylan withdrawn from the diet during the last 35 days on feed (RTwd).
- MGA feeding increased calculated yield grade and changed yield grade distribution when slaughtered at the same number of days on feed as the non-MGA groups.

MGA has been fed to heifers in US feedlots since 1968 and is labeled for improved gain, feed efficiency and estrus suppression. However, inquiries by both nutritionists and feedlot managers questioned the efficacy of MGA with current processing strategies and feeding programs. The purpose of this study was to determine the benefit of feeding MGA in conjunction with Rumensin/Tylan, and if withdrawal of the additive combinations 35 days preharvest affected feedlot performance, prevalence of digestive death loss and carcass characteristics.¹

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Materials and Methods

Approximately 4,000 head of 675 lb, Southern Plains, crossbred heifers were purchased by Cactus Feeders and randomly allotted to one of four treatment groups at Cactus Research Ltd:

- **Treatment 1:** Rumensin and Tylan continuous (**RT**);
- **Treatment 2:** Rumensin, Tylan, and MGA continuous (**RTM**);
- **Treatment 3:** Rumensin and Tylan, both additives withdrawn the last 35 days on feed (**RTwd**);
- **Treatment 4:** Rumensin, Tylan, and MGA, all three additives withdrawn the last 35 days on feed (**RTMwd**).

Each treatment group consisted of 10 pens (replications), with approximately 100 head per pen. All cattle were identically processed within 7 days of arrival using standard feedlot processing procedures (5-way modified live; 7-way clostridial; cattle treated for both internal and external parasites). All heifers were implanted at arrival with Revalor®-IH, and again at reimplant (approximately 90 days from harvest) with Revalor-200.

At initial processing each heifer was rectally palpated, checked for previous implants, weighed individually and identified with a uniquely numbered ear tag. Heifers were removed from the study if pregnant or if their body weight differed by more than two estimated standard deviations from the group mean arrival body weight.

Diets were formulated to meet or exceed NRC (1996) requirements. Primary commodities used were steam-flaked corn, dried distillers grains with solubles, chopped alfalfa hay, corn silage, animal fat, and supplements. Composition of the final basal finishing diet (% of DM was: steamflaked corn, 74.4; DDG, 8.1; alfalfa hay, 4.1;

corn silage, 6.8; animal fat, 2.7; and finisher supplement, 3.9. Rumensin, Tylan, and MGA were added during diet preparation using a micro-ingredient weigh machine (Micro Beef Technologies, Amarillo, Texas). Formulated dosages in the finish diets included 30 g/t (air dry basis) Rumensin, 90 mg/head/day Tylan, and 0.4 to 0.5 mg/head/day MGA. Diets were sampled daily. Daily samples were composited monthly and submitted to a commercial laboratory (Servi-Tech Laboratories, Amarillo, Texas) for analysis. Analyzed composition of the non-MGA and MGA finish diets is summarized in Table 4.

Feed deliveries were managed to allow heifers to eat to appetite. The amount of feed offered to each pen was determined daily based on feed remaining prior to the first feeding of the day and cattle reaction to that feeding. Daily feed issue was recorded on a per pen basis. Feed weighbacks were conducted for each pen as needed and per feedlot standard operating procedures.

Cattle were fed for approximately 150 days and harvested on similar days across the four treatment groups. Data was collected on each carcass after a 24 to 36 hour chill by trained personnel who were masked to treatment.

Scale tickets were used for all pen weights. No pencil shrink was applied to the initial pen weights. All other pen weights were shrunk 4% ($scale\ weight \times 0.96$) to account for gastrointestinal fill. Carcass-adjusted final weights were calculated as pen shrunk weight \times pen dressing percentage \div trial average dressing percentage.

Animals were observed at least once daily during the acclimation and study periods by trained feedlot personnel. Any animal with abnormal signs was recorded and reported to the study investigator and if treatment was deemed necessary, the animal ID, date, nature and severity of the illness/condition, along with medical regimen, were recorded.

Results

Feedlot performance data (Table 1, live performance) indicates that RTM heifers had increases in: daily gain ($P < 0.01$), total gain ($P = 0.03$), final weights ($P < 0.01$) and dry matter intake ($P < 0.01$) with a numerical advantage in feed efficiency of 0.04 pounds compared to RT heifers. Withdrawal of all additives (treatment 4, RTMwd) during the last 35 days on feed was associated with a reduction in total gain of 16 lb ($P = 0.09$) and ADG by 0.12 lb/d ($P = 0.02$) vs RTM heifers (treatment 2).

There were no performance differences between heifers continuously fed Rumensin and Tylan (RT, treatment 1) and RTwd heifers (both additives removed the last 35 days).

Carcass performance data is summarized in Tables 2 and 3. RTM carcasses averaged 19 lb heavier ($P < 0.01$), graded choice/ prime 12% more often ($P < 0.01$), and were graded as dark cutting 2.4% less often ($P < 0.01$) than carcasses from RT heifers. Carcass weights of RTM heifers were 9 lb heavier ($P = 0.02$), graded choice/prime 6.4% more often ($P < 0.01$), and were graded as dark cutting 4.3% less often ($P < 0.01$) than carcasses from heifers in RTMwd.

Calculated yield grades of carcasses from RTM and RTMwd heifers were higher and ribeye area was reduced when compared to carcasses from non-MGA fed groups (Tables 2 and 3). KPH and liver abscesses were not different between treatment groups.

Table 1. Effects of Withdrawing Feed Additives for the Final 35 Days of the Feeding Period on Live- and Carcass-Adjusted Performance of Heifers (Dead/Removed Heifers Included)^{abc}

Item	Treatment					SE	Contrast P-value ^d		
	RT	RTM	RTwd	RTMwd	RTMwd		RT vs RTM	RT vs RTwd	RTM vs RTMwd
Pens (n)	10	10	10	10					
Head placed (n)	985	997	974	1026					
Died (n)	13	16	14	16					
Removed (n)	19	16	24	12					
Live performance: ^e									
Initial SBW (lb)	672	677	675	675	4.3	NS	NS	NS	
Days on feed (DOF)	150.4	150.5	150.2	150.8	2.8	NS	NS	NS	
Dry matter intake (lb)	17.20	17.81	17.42	17.80	0.2	<0.01	0.08	NS	
Final SBW (lb)	1129	1154	1128	1137	6.8	<0.01	NS	0.05	
Total gain (lb)	457	478	452	462	8.3	0.03	NS	0.09	
Average daily gain (lb)	3.06	3.21	3.05	3.09	0.1	<0.01	NS	0.02	
DMI:gain	5.66	5.62	5.78	5.82	0.1	NS	NS	NS	
Carcass-adjusted performance: ^f									
Final SBW (lb)	1126	1152	1129	1140	7.1	<0.01	NS	NS	
Total gain (lb)	454	475	454	465	8.9	0.03	NS	NS	
Average daily gain (lb)	3.04	3.19	3.06	3.11	0.1	<0.01	NS	NS	
DMI:gain	5.70	5.65	5.76	5.77	0.1	NS	NS	NS	

^a Abbreviations: RT = Rumensin and Tylan fed continuously; RTM = Rumensin, Tylan, and MGA fed continuously; RTwd = Rumensin and Tylan fed until 35 days prior to slaughter; RTMwd = Rumensin, Tylan, and MGA fed until 35 days prior to slaughter; SE = standard errors from mixed model analysis; SBW = shrunk body weight (applied a 4% pencil shrink on actual weight); DMI = dry matter intake; NS = not significantly different ($P > 0.10$) (treatment means were not considered different).

^b Least squares means and contrasts were calculated from a mixed model analysis.

^c Estimates of heifer gain and DMI included dead and removed calves.

^d Contrasts were not estimated for descriptive summary statistics.

^e Final shrunk body weight was estimated as: $(\text{final pen weight} \times 0.96) + \text{total weight of removals and deads}) \div \text{initial pen head}$.

^f Carcass adjusted final shrunk body weight was estimated as: $\text{Final shrunk body weight} \times (\text{pen dressing percentage} \div \text{trial mean dressing percentage})$.

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Table 2. Effects of Withdrawing Feed Additives for the Final 35 Days of the Feeding Period on Carcass Characteristics of Heifers^a

Item ^b	Treatment					Contrast P-value		
	RT	RTM	RTwd	RTMwd	SE	RT vs RTM	RT vs RTwd	RTM vs RTMwd
Carcass measures: ^{cd}								
Dressing percent	64.5	64.6	64.8	64.9	0.18	NS	0.04	0.01
HCW (lb)*	743	762	747	753	3.49	<0.01	NS	0.02
HCW gain (lb)	373	389	375	382	4.29	<0.01	NS	0.04
Marbling score	4.95	5.09	4.92	4.99	7.90	<0.01	NS	<0.01
Color score	5.07	4.98	5.10	5.07	0.02	<0.01	NS	<0.01
Rib fat (in)	0.54	0.63	0.53	0.58	0.01	<0.01	NS	<0.01
KPH fat (%)	1.77	1.77	1.75	1.75	0.04	NS	NS	NS
REA (in ²)	14.2	13.5	14.3	14.0	0.13	<0.01	NS	<0.01
Calculated yield grade	2.47	2.99	2.44	2.68	0.05	<0.01	NS	<0.01
Proportional carcass measures: ^e								
Color score >6 (%) ^c	3.1 (0.6)	0.7 (0.3)	4.6 (0.8)	5.0 (0.8)		<0.01	0.10	<0.01
Quality grades Prime and Choice (%) ^f	35.1 (2.7)	46.8 (2.9)	32.7 (2.6)	40.4 (2.8)		<0.01	NS	<0.01
Yield grades 1, 2, or 3 (%) ^f	95.2 (1.1)	88.2 (2.1)	96.3 (0.9)	92.7 (1.4)		<0.01	NS	<0.01
Abscessed livers (%) ^c	8.9 (1.0)	8.8 (1.0)	9.8 (1.1)	11.5 (1.2)		NS	NS	NS

* Actual hot carcass weights (excluding dead and removed heifers): NOT calculated as *final SBW × dressing percent*.

^a See Table 1 for treatment abbreviations and contrast P-value definitions.

^b Carcass characteristic abbreviations: HCW=hot carcass weight; HCW gain=(HCW-(average placement weight × 0.55)); KPH=kidney pelvic and heart; REA=rib eye area.

^c Carcass characteristics reported by the Beef Carcass Research Center, West Texas A&M University, Canyon, Texas.

^d Treatment least squares means and contrasts for carcass measures were calculated from a mixed model analysis.

^e Treatment least squares means and contrasts for proportional carcass measures were calculated from a generalized linear mixed model analysis. Estimates of standard error for each treatment are listed in parentheses.

^f USDA grades were assigned by USDA graders as reported by the packing plant and distributions represent the percentage of carcasses assigned a given grade.

Estrus activity was not recorded on a daily basis. However, a large proportion of heifers were detected in heat within 1 to 3 days following MGA removal in RTMwd. Additionally, MGA has a cautionary statement on the label, which advises against withdrawing MGA due to the possibility that heifers may “come into heat.” Withdrawing MGA from the diet is not a protocol recommended by Phibro Animal Health, and the results

of this study confirm feedlot and carcass performance loss when MGA is removed from the diet during the last 35 days.

Finally, there were no differences in morbidity or mortality between treatments, with total deaths ranging from 13 to 16 head/treatment group (Table 1; approximate 1.5% death loss per treatment group).

Table 3. Summary of the Proportion of Carcasses Within USDA Quality and Yield Grade Categories.^{ab}

Item	Treatment			
	RT	RTM	RTwd	RTMwd
Carcasses (n)	953	965	936	998
Quality grade distributions (%)				
Prime	0.3	0.7	0.4	0.2
Choice	35.3	45.9	32.6	40.2
Select	53.0	48.1	53.4	49.3
Standard	7.2	4.6	10.0	6.8
Dark	3.9	0.6	3.5	3.5
Miscellaneous	0.3	0.1	0.1	0.0
Yield grade distributions (%)				
YG 1	23.0	10.2	24.0	14.7
YG 2	42.5	35.2	46.5	40.2
YG 3	29.2	42.0	25.4	37.1
YG 4	4.1	10.9	3.8	6.8
YG 5	1.3	1.8	0.2	1.2

^a See Table 1 for treatment abbreviations.

^b USDA grades were assigned by USDA graders as reported by the packing plant and distributions represent the percentage of carcasses assigned a given grade.

Summary: Heifers Continuously Fed MGA vs Non-MGA Fed Heifers

RTM heifers that were continuously fed Rumensin, Tylan, and MGA vs RT heifers that were continuously fed Rumensin and Tylan experienced:

- 25 lb heavier final body weight ($P < 0.01$)
- 0.15 lb/d improvement in ADG ($P < 0.01$)
- 19 lb improvement in HCW ($P < 0.01$)
- 12% increase in carcasses grading choice/prime ($P < 0.01$)
- 2.4% reduction of dark cutting carcasses ($P < 0.01$)
- An increase in calculated yield grades

RTM heifers continuously fed Rumensin, Tylan, and MGA vs RTMwd heifers that had all three additives withdrawn from the ration 35 days prior to slaughter experienced:

- 17 lb heavier final body weight ($P = 0.05$)
- 0.12 lb/d improvement in ADG ($P = 0.02$)
- 0.2 less DMI:Gain (NS)
- 9 lb improvement in HCW ($P = 0.02$)
- 6.4% increase in carcasses grading choice/prime ($P < 0.01$)
- 4.3% reduction of dark cutting carcasses ($P < 0.01$)
- 0.3% decrease in dressing percent ($P = 0.01$)
- An increase in calculated yield grades

Table 4. Summary of MGA® and Non-MGA Finish Ration
Nutrient Analysis; Bunk Samples Taken Daily, Composited, and
Analyzed Monthly (Feb - July).

Average of feed analysis (%, DM)	MGA finish ration	Non-MGA finish ration
As-fed DM	74.9	74.9
Crude protein	14.0	13.6
Non-protein nitrogen	3.4	3.4
Neutral detergent fiber	14.7	14.2
Fat	6.7	6.9
Calcium	0.55	0.45
Phosphorus	0.32	0.30
Magnesium	0.19	0.17
Potassium	0.71	0.67

Reference

¹ Sides G.E., R.S. Swingle, J.T. Vasconcelos, R.C. Borg, W.M. Moseley. 2009. Effect of feeding meleengestrol acetate, monensin, and tylosin on performance, carcass measurements, and liver abscesses of feedlot heifers. Prof. Anim. Sci. 25:459-464.

Caution: Federal law restricts medicated feed containing this veterinary feed directive (VFD) drug (Tylan) to use by or on the order of a licensed veterinarian.