INTERMITTENT OR CONTINUOUS FEEDING OF ANTIBIOTICS FOR FEEDLOT STEERS

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Story in Brief

One hundred fifty-nine yearling steers were fed whole shelled corn diets without additives or with Terramycin at a low level (75 mg/head daily) continuously or at a high level (1000 mg/head daily) for the first three days of each 28 day period without or with lasalocid (30 g/ton of feed) in a finishing trial lasting 103 days. Lasalocid was withdrawn from the feed when the high level of Terramycin was fed. High level, intermittent feeding appeared to control liver abscesses more completely than the lower level, but when fed intermittently with lasalocid, the high Terramycin level slightly depressed efficiency of feed use (4 percent) as compared with the lower level, continuous feeding of Terramycin with lasalocid.

Introduction

Antibiotics are commonly fed to feedlot cattle to reduce the incidence of liver abscesses and to improve rate and efficiency of gain. Several antibiotics including chlortetracycline (Aureomycin), oxytetracycline (Terramycin) and tylosin will reduce the incidence of liver abscesses, probably by reducing the population of pathogenic bacteria which may escape from the rumen and embed in the liver to start an abscess. Two methods are used for feeding antibiotics: 1) low level continuously fed, or 2) a higher, therapeutic level fed a few days every month. Information about the relative value of continuous versus intermittent antibiotics is limited. This is of particular concern due to FDA restrictions concerning drug combinations.

The FDA requires extensive proof of both the effectiveness and the safety of drugs prior to their use in feedlot diets. A combination of two drugs, such as an ionophore with an antibiotic, requires extensive documentation and clearance time. Consequently, some of the ionophores known to increase feed efficiency cannot be fed simultaneously with antibiotics known to reduce the incidence of liver abscesses due to FDA regulations. One alternative for feedlot operators is to withdraw the ionophore from the diet for several days each month to feed the antibiotic at the higher, therapeutic level. One combination of an antibiotic with an ionophore (monensin plus tylosin) has received FDA clearance. The objective of this experiment was to determine the effects of continuous low level and intermittent high level feeding of Terramycin with or without lasalocid on performance and carcass characteristics of feedlot steers.

Materials and Methods

One hundred sixty yearling crossbred steers with some Brahman breeding were selected from a group of 500 steers, which had received routine

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feedlot vaccinations and ear tags at Hitch Feedlot, Guymon, Oklahoma. Steers were adapted to a starting feedlot diet in a single pen for 30 days prior to trucking 6 miles to Goodwell, Oklahoma on May 21, 1983.

On arrival, steers had a shrunk weight of 759 lb. They were allocated to 5 treatments in 20 pens in 2 barns with one replication in the "steer" barn and three replications in the "bull" barn at Panhandle State University. One steer died during the experiment due to causes not related to experimental treatment. Compositions of the adaptation and finishing diets are presented in Table 1. Steers received diet 1 for 2 days, diet 2 for 2 days, diet 3 for 5 days, diet 4 for 7 days, diet 5 for 7 days and diet 6 for the remainder of the trial. Steers were weighed full on days 28, 56, 84 and 103.

Additives being tested in addition to 1) an additive-free diet included 2) Terramycin at 75 mg/head daily, 3) Terramycin (75 mg/head daily) plus lasalocid (30 g/ton of feed), 4) Terramycin at 1000 mg/head daily for three days at the start of each 28 day period, and 5) Terramycin (1000 mg/head daily for 3 days/period) and lasalocid at 30 g/ton of feed for 25 days each period. The combination of Terramycin and lasalocid is not cleared as yet by the FDA. Cattle being fed compounds currently approved by the FDA were slaughtered on either day 103, while the FDA test groups were switched to an additive-free diet for 9 days prior to slaughter on day 110. Steers were trucked 70 miles to Booker, Texas for slaughter, and slaughter and carcass data were obtained.

Table 1. Diet composition, dry matter basis[a].

Ingredient	Percentage
Corn, whole shelled	88.14
Corn silage	4.00
Soybean meal	3.71
Cottonseed meal	2.00
Limestone	1.00
Urea	.45
Molasses	.38
Salt	.30
Premix[b]	.02

[a] To provide 11.78 percent protein, .43 percent calcium, .34 percent phosphorus, .49 percent potassium and 3.23 mcal ME/kg dry matter.

[b] Pelleted supplement (7.86 percent of the diet) for specific treatments contained .478 percent Terramycin 10 (theory 96.64 g/ton, found 70 g/ton), 6.322 percent Terramycin 10 (theory 1264.43 g/ton, found 1057 g/ton), .2816 percent Bovatec 68 (theory 383.35 g/ton, found 369.5 g/ton). Vitamin A-30 also included at .281 percent of the supplement. These were formulated to supply lasalocid at 30 g/ton of air dry feed, Terramycin at 75 or 1000 mg/head daily (assuming a daily feed intake of 20 lb of dry matter/head).

Silage was substituted for whole corn to get the cattle on feed. Diet 1 contained 40 percent corn silage, Diet 2 30 percent, Diet 3 20 percent, Diet 4 18 percent, and Diet 5 10 percent and the final ration 4 percent as indicated in the table.

Weights are reported on a full basis while gains and feed efficiencies were calculated using a 5 percent pencil shrink. Gains and feed efficiencies for the total trial were calculated from hot carcass weights assuming a dressing percentage of 62. After removal of barn effects, treatment means for performance and carcass data were compared using the statistical analysis package of SAS (Barr and Goodnight, 1976) and Duncan's Multiple Range Test.

Results and Discussion

Averaged across Terramycin levels, lasalocid increased carcass adjusted weight gain by 5.8 percent and feed efficiency by 4.9 percent (Table 2). Daily gains during the second half of the feeding period tended to be reduced with added Terramycin though differences were not significant. When no ionophore was present, addition of Terramycin at a low level tended to decrease feed intake, gain and efficiency. The higher intermittent Terramycin level neither decreased nor improved performance. However, when lasalocid was fed 25 of each 27 days, the intermittent feeding of Terramycin tended to decrease feed intake, gain and efficiency as compared with the continuous low level feeding of Terramycin. Overall, neither the continuous or intermittent feeding of antibiotic in this study increased animal performance in this trial.

Table 2. Steer performance with continuously or intermittently fed Terramycin with or without added lasalocid.

Antibiotic	None	Terramycin	Terramycin	Terramycin	Terramycin
Level	0	75	1000	75	1000
Days/period	0	28	3	28	3
Ionophore	None	None	None	Lasalocid	Lasalocid
Steers	32	32	32	32	31
Weights					
Initial	754	758	756	758	770
56 days	929[ab]	933[b]	936[ab]	962[a]	954[ab]
103 days	1061[ab]	1059[b]	1066[ab]	1090[a]	1075[ab]
Daily gains, lb					
0-56	2.30	2.29	2.39	2.78	2.43
57-103	2.68	2.54	2.61	2.58	2.44
0-103	2.47	2.41	2.49	2.69	2.43
0-slaughter	2.91	2.74	2.94	3.11	2.90
Daily feed, lb					
0-56	19.5	19.1	19.6	20.3	19.6
57-103	18.6	18.4	18.8	19.2	17.9
0-103	19.1	18.8	19.2	19.8	18.8
0-slaughter	19.0	18.7	19.1	19.4	18.8
Feed/gain					
0-56	8.57	8.42	8.35	7.28	8.25
57-103	7.02	7.28	7.31	7.51	7.32
0-103	7.74	7.86	7.80	7.37	7.78
0-slaughter	6.55	6.86	6.56	6.25	6.51
Metabolizable energy					
mcal/kg	2.98	2.92	2.99	3.08	3.02

Carcass weight differences reflect weight gains during the trial with lasalocid-fed cattle having heavier carcass weights (Table 3). The incidence of liver abscesses was low with all treatments. The only difference was between the intermittent high level versus continuous low level feeding of Terramycin with lasalocid. The feeding of antibiotic intermittently decreased the incidence of liver abscesses from 9 percent to 0 percent. More animals and experiments are needed to assess whether this effect is repeatable. No other carcass differences were apparent.

Intermittent high level feeding of antibiotic with lasalocid is the only currently legal way to feed an antibiotic together with lasalocid. This procedure appears to decrease the incidence of abscesses as compared with feeding of lasalocid without an antibiotic (reported in another article of this publication) for which the incidence of liver abscesses was 18.8 percent. But the apparent depression in gain and efficiency compared to results in that trial from intermittent feeding of Terramycin (2.90 vs 2.96 lb/day gain and 6.51 vs 6.37 lb of feed/pound of gain) must be economically balanced against the benefit of reduced liver abscesses to judge whether this practice is economical. The lower, continuous level of Terramycin did not depress gain or efficiency but did not completely prevent liver abscesses in this study. Continuous feeding would have the practical advantage to simplify management of the diet and ingredients and would appear preferable when it is approved by the FDA.

Table 3. Carcass characteristics of steers continuously or intermittently fed Terramycin with or without added lasalocid.

Antibiotic	None	Terramycin	Terramycin	Terramycin	Terramycin
Level	0	75	1000	75	1000
Days/period	0	28	3	28	3
Ionophore	None	None	None	Lasalocid	Lasalocid
Carcass weight	656[ab]	648[b]	659[ab]	682[a]	663[ab]
Dressing percent	64.8	64.2	64.9	64.7	64.9
Liver abscess					
Incidence, %	3.1[ab]	3.1[ab]	3.1[ab]	9.4[a]	0[b]
Severity[c]	2	1	1	1	0
Rib eye area,	12.3	12.3	12.3	12.3	12.2
Kidney-heart-pelvic					
fat, %	1.50	1.48	1.55	1.73	1.57
Fat over rib					
in.	.36	.36	.42	.43	.42
Marbling score[d]	10.2	10.1	10.6	10.8	10.5
Cutability, %	51.6	51.6	51.1	50.8	51.0
Percent choice	15.6	3.1	18.8	13.8	9.8

[a,b] Means in a row with different superscripts differ (P<.05).
[c] 1 = small size; 2 = many or moderate sized abscess.
[d] 10 = slight minus; 11 = average slight.

Literature cited

Barr, A.J. and J.H. Goodnight. 1976. A Users Guide to SAS. Sparks Press, Raleigh, NC.