Finishing Heifers on High vs Low Roughage Feedlot Diets With and Without Monensin

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Story in Brief

Sixty-four 535-lb crossbred heifers were allotted to four finishing treatments: 1) high roughage (50 percent) ration, no monensin; 2) high roughage + monensin; 3) low roughage (10 percent), no monensin; and 4) low roughage + monensin. Monensin was included in two of the four rations at 30 g/ton, to provide about 300 mg per head per day at a 20-lb daily feed intake. The heifers were slaughtered after 119 days on feed, and routine carcass parameters were measured.

The 10 percent roughage finishing ration resulted in a higher average daily gain (+.32 lb), final live slaughter weight (+ 38.6 lb), dressing percent (+ 2.5 percent) and carcass weight (+ 44.2 lb) than the 50 percent roughage ration. Interestingly, the increase in carcass weight approximated the increase in final live slaughter weight. Monensin had no effect on gain. Intake was reduced slightly by monensin as in past trials, but feed efficiency (lb feed/lb gain) was improved only + 3.6 and + 3.3 percent on the 50 and 10 percent roughage rations, respectively. This is less improvement from monensin than generally reported in other feedlot trials where high concentrate rations were used. Nevertheless, a $1 expenditure on monensin would have saved approximately $4 on feed cost in this trial.

Introduction

A major limitation of finishing cattle on high forage diets is lower gains and usually higher costs of gain. Unless fed much longer, such cattle also tend to grade lower, using past or existing grading standards. However, cattle finished on higher forage diets should be leaner or lower in fat content while containing nearly the same quantity of total protein. The type of fat may also differ although this has received only very limited study. The long-term trend in the beef industry will likely be toward the production of leaner market beef than we have been accustomed to in the past. Reasons include high costs of production (fat is expensive to produce), consumer desire for leaner beef, more worldwide demand for grains, etc. Past changes in the grading standards have fostered a gradual shift to leaner beef. Potential future changes (several proposals for changes in grading are currently under consideration) will further promote the production of beef with a lower fat content. In general, such changes should result in a shorter feeding period on high grain diets and/or permit greater use of forages in market beef production.

Monensin is a biologically active compound with the trade name Rumensin. It is produced by an organism *Streptomyces cinnamonesis* in a fermentation process

and has been shown to improve efficiency of feed utlitzation in high concentrate finish rations and in high forage diets in stocker programs. The effect of monensin on certain carcass characteristics in different types of finishing diets has received very limited study, including the effects of fat content and composition (e.g. type of fat and cholesterol level).

The objective of this study was to determine the feedlot performance and carcass characteristics of feedlot cattle fed conventional, high concentrate or high roughage finish rations, with or without monensin. Although not reported here, lipid analyses are being conducted to assess effects of roughage level and monensin on carcass fat composition.

Materials and Methods

Sixty-four Angus × Hereford heifers were blocked into four groups by weight and then randomly allotted within block to four treatments, giving 16 animals per treatment (four animals/pen and four pens/treatment). The treatments were:

1) 50 percent roughage finish ration, no monensin
2) 50 percent roughage finish ration + monensin
3) 10 percent roughage finish ration, no monensin
4) 10 percent roughage finish ration + monensin

Composition of the rations is shown in Table 1.

Table 1. Composition of high and low roughage finishing rations

Ingredient	High roughage[1]		Low roughage	
	− Monensin	+ Monensin	− Monensin	+ Monensin
	%	%	%	%
Corn, rolled	21.5	21.5	39.9	39.9
Sorghum, rolled	21.5	21.5	39.9	39.9
Cottonseed hulls	25.0	25.0	10.0	10.0
Dehydrated alfalfa pellets	25.0	25.0	—	—
Cottonseed meal	4.0	4.0	7.0	7.0
Molasses, blackstrap	2.0	2.0	2.0	2.0
Salt, T.M.	0.2	0.2	0.2	0.2
Ca carbonate	0.5	0.5	0.7	0.7
Dicalcium phosphate	0.3	0.3	0.3	0.3
Monensin	——	30g/ton	——	30g/ton

[1]Vit. A added.

Monensin was incorporated in the two monensin-containing rations at 30 g/ton to yield an intake of approximately 300 mg per head per day. The heifers averaged 535 lb at the beginning of the experiment and were fed 119 days before slaughter. Routine carcass measurements were obtained after 48 hr. A one-inch steak from the 12th rib section was removed from the right side of the carcass for later lipid analyses.

Results and Discussion

Feedlot performance data are shown in Table 2. Heifers on the 10 percent roughage treatments gained approximately 0.3 lb/day more than those on the two 50 percent roughage rations, resulting in a 38-lb heavier slaughter weight. Monensin had no effect on gain or slaughter weight on either the high or low

Table 2. Feedlot performance (119 days)

Item	High roughage		Low roughage	
	− Rumensin	+ Rumensin	− Rumensin	+ Rumensin
No. of animals	16	16	16	16
ADG, lb	2.33[a]	2.33[a]	2.69[b]	2.61[b]
Initial wt, lb	535.2	534.9	534.8	535.6
Final wt, lb	812.9[a]	812.6[a]	855.4[b]	847.2[b]
Feed intake/day, lb	21.3	20.5	17.9	16.8
Feed/gain, lb/lb[c]	9.14[a]	8.81[a]	6.63[b]	6.41[b]
Improvement, %		+ 3.6		+ 3.3

[a,b](P<.05).
[c]DM basis.

roughage treatment. This is in agreement with other research showing similar daily gains when monensin is included in high concentrate feedlot rations. Monensin supplementation resulted in a slight reduction in daily feed intake and produced only a 3.6 and 3.3 percent improvement in feed efficiency on the high and low roughage finishing rations, respectively. The improvements from monensin noted in this trial are considerably less than that generally reported in most other studies. However, an economic analysis would still show a favorable cost/benefit ratio for using monensin. In this trial, a $1.00 input for monensin would have produced approximately a $4.00 saving in feed costs, using realistic current prices.

Carcass parameters are indicated in Table 3. Generally, the low roughage rations resulted in somewhat higher carcass weights, including dressing percent. Little difference was noted in most other carcass parameters between the high and low roughage finishing programs, but fat thickness averaged .10 in. more on the low roughage diets. Monensin produced no major changes in carcass parameters on either diet, but monensin tended to produce a small increase in rib eye area, marbling score and quality grade on both the high and low roughage diets. This is in agreement with carcass trends repoted with monensin use in a previous study emphasizing a higher roughage finishing program (Ostlie et al., 1981).

Table 3. Carcass measurements

Item	50% Roughage		10% Roughage	
	− Rumensin	+ Rumensin	− Rumensin	+ Rumensin
Carcass weight, lb	483.7[a]	486.3[a]	532.3[b]	526.0[b]
Dressing percent	59.5[a]	59.8[a]	62.2[b]	62.1[b]
Rib eye area, in^2	9.21	9.45	9.87	10.2
Fat thickness, in	.55	.47	.60	.62
Marbling score[c]	15.7	16.8	14.8	15.81
Quality grade[d]	12.4	12.9	12.2	12.6

[a,b](P<.05).
[c]Marbling score: 14 = avg small, 17 = avg modest, 20 = avg moderate.
[d]Quality grade: 10 = avg good, 13 = avg choice.

Literature Cited

Ostlie, S.C., D.G. Wagner and Phil Sims. 1981. Finishing steers on conventional grain diets vs forage plus grain, with and without monensin. Okla Agr Exp Sta Res Rep, MP 108:165.

Protein Deposition Prediction Equation

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Story in Brief

The protein deposition prediction equation which is a component of a model being developed by the S-156 Regional Project to simulate forage-beef production is as follows: protein gain (lb/day) from conception to maximum rate of gain = .37485 $[e^{(1n(.006174/.37485)(DC-566)^2/566^2)}]$; protein gain (lb/day) from maximum rate of gain to maturity = .37485 $[e^{(1n(.00002867/.37485)(DM^2/1177^2))}]$ where e is 2.71828, ln is the natural logarithm, DC is days after conception and DM is days after maximum rate of gain. Comparison with other protein deposition and gain predictions indicates that the equation predictions agree with predictions of other equations, particularly at lighter cattle weights.

Introduction

A computer model to simulate forage-beef production in the Southern region is being developed by the S-156 Regional Project. The purpose of this paper is to present a component of this forage-beef model which describes the protein deposition from conception to maturity.

Materials and Methods

Data reported by Moulton et al. (1922) were used to determine parameters of a sigmoid curve to describe protein deposition of steers from conception to maturity. The following parameters of a sigmoid curve were estimated:
Rate of protein gain at conception (lb/day) = .006174;
Maximum rate of protein gain (lb/day) = .37485;
Rate of Protein gain at maturity (lb/day) = .00002867;
Days from conception to maximum rate of protein gain = 566;
Days from maximum rate of protein gain to maturity = 1177.