Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 2 *Dairy Research (1984-2014)*

Article 314

1998

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Abstract

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Keywords

Dairy Day, 1998; Kansas Agricultural Experiment Station contribution; no. 99-158-S; Report of progress (Kansas Agricultural Experiment Station and Cooperative Extension Service); 821; Replacement heifers; Rumensin; Bovatec

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GROWTH AND FEED EFFICIENCY OF GROWING DAIRY REPLACEMENT HEIFERS SUPPLEMENTED WITH RUMENSIN® OR BOVATEC®

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Summary

Ninety Holstein heifers were used to examine the effects of Rumensin® or Bovatec®. Average daily gain and feed efficiency was greater for heifers fed Rumensin® than for heifers fed Bovatec®. Heifers fed Rumensin® consumed more total dry matter per day but slightly less dry matter as a percent of body weight than heifers fed Bovatec®. No differences were observed in body condition score and hip height between dietary treatments. The primary goal of a heifer-feeding program is to obtain a desired rate of gain without fattening at the least possible cost. Results of this study support the use of Rumensin® in diets for growing dairy replacement heifers.

(Key Words: Replacement Heifers, Rumensin®, Bovatec®.)

Introduction

Dairy producers and managers of replacement heifer operations want to improve the efficiency of the growing phase of dairy heifers. The goal of many managers is to have dairy heifers calve by 24 mo of age at a precalving weight of 1360 lb or a postcalving weight of 1200 lb. Several studies indicate that this goal can be achieved, if the rate of gain averages 1.8 lb/day from birth to 24 mo. Increasing the rate of gain to 2 lb/day would result in a similar sized heifer at approximately 22 mo of age. Rates of gain greater than 1.8 lb/day have been discouraged between 3 and 9 mo of age because of the negative effect on future milk production documented in some studies. Others have suggested that the genetically superior heifers available today can grow at 2 lb/day without negative effects on future milk production. A key point for growing dairy heifers may be their body condition prior to puberty rather than daily gain. The second goal of producers is to minimize feed cost per lb of gain. Many of the diets fed to replacement heifers consist of poor quality forages fed free choice and a corn-soybean meal (12 to 14% crude protein) grain mix with assorted minerals and vitamins and an ionophore. Studies using range cattle fed low quality forages suggest that energy supplementation reduces fiber digestion in the rumen; thus, it is not cost effective in many cases. The use of ionophores has increased in dairy heifer replacement programs because of their positive effect on rate of gain and feed efficiency.

Rumensin® (Monensin: Elanco Animal Health) and Bovatec® (Lasalocid: Hoffmann-LaRoche) have claims for increased rate of weight gain in dairy replacement heifers in addition to claims regarding the control and prevention of coccidiosis in calves and improved feed efficiency in cattle fed for slaughter. No study has compared the efficacy of each ionophore in dairy replacement heifers weighing between 250 and 600 lb of body weight. The purpose of this study was to compare growth rate, feed intake, and feed efficiency of dairy heifers fed Rumensin® or Bovatec® beginning at approximately 250 lb of body weight.

Procedures

Ninety Holstein heifers were transported from Cimarron Dairy, located at Cimarron, KS, to the Kansas State University dairy facility in Manhattan on September 24 and 25, 1997. Gooseneck trailers were used to transport the heifers. The trip of 250 miles required 5 hr. All heifers received 1.5 cc of micotil per 100 lb of body weight immediately prior to leaving Cimarron Dairy and again at 5 days after their

arrival. The heifers had free-choice access to prairie hay and water upon arrival. All heifers received a total mixed ration (TMR) consisting of chopped prairie hay and a 16% protein concentrate beginning 12 hr after arrival and continuing for 6 days. Then they received a TMR consisting of chopped prairie hay, corn silage, and concentrate until the treatments were initiated.

Twenty-eight days after arrival, the heifers were ranked by body weight (average of weights on 2 consecutive days) from largest to smallest and alternately assigned to treatment diets containing either Rumensin® or Bovatec®. Within treatments, heifers were assigned to pens by initial weight and remained in the same pen throughout the study. Eighteen pens containing five heifers each were used. Pens were arranged in two rows, and treatment groups were assigned to alternating pens to reduce location effect. The amount of TMR fed was based on the number of calves per pen and the average weight per pen plus 14 lb (2 lb/day projected gain in 7 days). The amount fed was adjusted weekly, and the calves were weighed bimonthly. Treatment pens were paired based on the average body weight per pen; a pen of heifers receiving Bovatec was paired with a pen of heifers with similar average body weight receiving Rumensin. The amount of TMR fed to each of the paired pens was based on the average weight of heifers in the heaviest pen. This procedure was used to ensure that sufficient feed was available to achieve the desired rate of gain. All diets were formulated to provide sufficient energy to support 1.8 lbs of gain/day and sufficient protein to support 2 lb of gain/day in accordance with the values in Table 1 that slightly exceed NRC (1989) recommendations.

The ionophores were delivered as a top-dressing at a rate of 100 mg/head/day for heifers weighing approximately 250 to 400 lb and 150 mg/head/day for heifers weighing >400 lb. The adjustment in the amount of ionophore fed was based on pen average weight. The date of the adjustment was determined by projecting the date when the heifers would weigh 400 lb based on the last weight and projected daily gain. Table 2 lists the daily feed allowance for heifers weighing 250 to 600 lb in 50 lb body weight increments. The amount of each ingredient fed is listed in pounds on an as-fed basis. The dry matter contributed by each ingredient can be calculated using the following dry matter values: alfalfa hay (85% DM); corn silage (34.5% DM); concentrate (87.8% DM); topdressing (88.4% DM). The concentrate mix contained ground shelled corn; trace mineral salt; dicalcium phosphate; and vitamins A, D, and E. The topdressing contained finely ground corn with either Rumensin® or Bovatec®.

Results and Discussion

The response of dairy heifers to Rumensin® or Bovatec® is shown in Table 3. Average daily gain and feed efficiency was greater ($P<0.01$) for heifers receiving Rumensin® than for those fed Bovatec®. Heifers fed Rumensin consumed more ($P<0.05$) total feed dry matter per day but slightly less ($P=0.06$) dry matter as a percentage of body weight than heifers fed Bovatec®. The diets were formulated to provide sufficient energy to support 1.8 lb of daily gain and sufficient protein to support 2 lb of daily gain. The reason for this formulation was to test the ability of the ionophores to improve energy efficiency through their effects on rumen fermentation. Additional protein was included to ensure that it was not limiting. Both treatments resulted in average daily gains above 1.8 lb, supporting the theory that they improved energy efficiency. The use of a control group (no ionophore) would have improved our ability to interpret these results. A criticism of Rumensin® has been that it depresses feed intake. Relative to Bovatec-fed heifers, this effect was not noted because the heifers were limit fed to achieve a desired rate of gain.

The primary goal of a heifer-feeding program is to obtain a desirable rate of gain without fattening at the least possible cost. Rumensin® improved ($P<0.01$) feed efficiency relative to Bovatec® and, thus, supported the desired growth rate at the least cost. No differences were noted between treatments in body condition and increase in stature, as reflected by hip height measurements.

Table 1. Crude Protein and Net Energy Requirements of Dairy Heifers for Projected Gains of 1.8 or 2.0 Lb/Day

	Live Body Weight, lb															
	250		300		350		400		450		500		550		600	
Item	1.8	2.0	1.8	2.0	1.8	2.0	1.8	2.0	1.8	2.0	1.8	2.0	1.8	2.0	1.8	2.0
Crude protein, lb	1.19	1.26	1.32	1.40	1.46	1.53	1.55	1.62	1.63	1.71	1.72	1.79	1.85	1.93	1.94	2.02
Neg, Mcal/day	1.77	2.00	2.03	2.29	2.28	2.57	2.52	2.84	2.76	3.10	2.98	3.36	3.21	3.61	3.42	3.85
Nem, Mcal/day	3.14	3.14	3.60	3.60	4.04	4.04	4.47	4.47	4.88	4.88	5.29	5.29	5.68	5.68	6.06	6.06

Table 2. Daily Feed Allowances for Growing Heifers

	Live Body Weight, lb							
Ingredient	250	300	350	400	450	500	550	600
Alfalfa hay	3.8	4.0	4.5	5.0	5.0	6.0	6.0	8.0
Corn silage	8.0	10.0	12.0	12.0	12.0	15.0	15.0	17.0
Concentrate	1.8	1.8	1.9	2.1	3.0	3.1	3.3	2.5
Topdressing	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5

Table 3. Response of Dairy Heifers to Rumensin® or Bovatec®

Item	Rumensin	Bovatec	SE	P-Value
Initial wt, lb	287.40	285.70	0.17	P<0.01
End wt, lb	525.00	508.00	2.81	P<0.01
ADG, lb	2.10	1.97	0.02	P<0.01
Feed efficiency, gain/feed	0.21	0.199	0.002	P<0.01
Dry matter intake	- - - - -- - - - - - - - - - - - - lb/day - - - - - - - - - - - - - - - - -			
0 - 28 days	8.25	8.22	0.02	P=0.24
28 - 56 days	9.76	9.67	0.07	P=0.36
56 - 84 days	10.80	10.66	0.05	P=0.09
84 - 112 days	11.47	11.27	0.06	P=0.03
0 - 112 days	10.07	9.95	0.035	P=0.04
	- - -- - - - - - - - - - - - - - % of body wt - - - - - - - - - - - - - - -			
Dry matter intake	2.48	2.51	0.0087	P=.06