WINTERING BEEF ON LOW QUALITY WITH NITROGEN

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Growth responses were obtained in tests with yearling steers fed a low-protein roughage by making available in a salt-lick, non-protein nitrogen (urea or biuret). Levels of at least 2 or 3 lbs per head per day of cottonseed meal supplement were needed to obtain comparable growth rates. Urea was also fed in a liquid supplement, using phosphoric acid to control intake, and resulted in a benefit from both the urea and the molasses. Yearling steers restricted for 3 to 4 months to a low-protein roughage diet made satisfactory gains when given a high energy ration in the feedlot.

RATES AND METHODS of feeding nitrogen supplements to wintering cattle were studied in this trial with beef steers fed low-protein rations at Davis. The effect of four-month restriction to low-protein roughages on subsequent feed lot performance was also measured.

Sixty-four head of yearling beef steers, wintered at the Sierra Foothill Range Field Station, were allotted at random to eight treatment groups each of 8 head (following individual identification, worming, spraying for external parasites, vaccination for IBR and Leptospirosis, and injection with 100,000 I.U. of vitamin A). The steers were fed free choice in a dry lot using a basal ration of either a low-protein milled feed (0.81% nitrogen) or low protein chopped oat hay (0.73% nitrogen). Three groups received the milled ration and five groups the oat hay. Two control groups were fed the basal rations only. Of the four other groups, two were given the milled ration and two the hay ration, all four were supplemented with cottonseed meal (CMS) or urea. An additional two treatment groups were given the oat hay basal ration; one supplemented with biuret, and the other with molasses plus urea liquid supplement. Salt was mixed with the CSM, urea and biuret to control intake of the "lick." Steers not receiving the urea and biuret licks were given a trace mineralized salt-phosphate lick (table 2). The liquid supplement was fed in a drum-type self-feeder (see photo) with 6.5% phosphoric acid incorporated into the mixture of molasses plus urea to control the intake.

Steers taking the liquid phosphoric acid, molasses, urea supplement. (The inner drum rotates on a spindle within the larger drum.)

TABLE 1. COMPONENTS OF THE LOW-PROTEIN RATIONS

Dry milled ration		Chopped oat hay	
Oat hay	40%	Oat hay	97.75%
Almond hull and shell mix (50–50)	58%	Fat	2%
Fat	2%	Gypsum	0.25%
Gypsum	0.25%		
Crude fiber	24.8 32.1	Crude protein	5.1 4.5

TABLE 2. COMPOSITION OF SALT-SUPPLEMENTED LICKS

	Basal*	Basal + nitrogen
Plain white salt	16.5%	10%
Trace mineralized salt	16.5%	10%
Dicalcium phosphate	67%	40%
Urea or biuret	0	40%

* Fed free choice without supplement or used to control intake of CSM.

STEERS ROUGHAGES SUPPLEMENTS

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Planning

During planning of the experiment, it had been anticipated that the intake (per head per day), of the basal rations would be roughly 15 lbs per day, and the intake of the supplements: 2 lbs of the CSM, ½ lb of the urea or biuret lick, and 2 lbs of the molasses, plus urea liquid mixture. This intake would have satisfied the NRC requirements of 0.15 lb total protein per head per day for a ½-lb average daily gain. At the end of the first 84 days, it was found that intake of the urea lick and the urea plus molasses liquid supplements were as planned, but that CSM intake was only 1 lb per head per day and biuret intake was also lower than planned. During the next 34 days, 3 lbs of CSM were added daily on top of the basal ration, and only a salt lick was given. Also the biuret percentage was increased to 50% in the salt lick. No changes were made in the percentages of urea in the salt lick, or in the molasses-urea liquid supplement.

Gains

Table 3 shows that steers given the non-protein-nitrogen supplements showed significantly greater rates of body weight gain than those given either of the basal rations alone, or with CSM. The response in body weight gain to the urea lick was greater for steers given the milled ration than for those given the oat hay ration. In both cases, urea-supplemented steers had a greater daily feed intake than steers in the control group or those supplemented with CSM or biuret. The molasses and urea liquid supplement had little effect on intake of the basal ration, but the total energy intake was greater for these steers than for the control steers —because of the additional energy in the molasses supplement.

TABLE 3. EFFECTS OF SUPPLEMENTS ON BODY WEIGHT, FEED AND NITROGEN INTAKE OF STEERS GIVEN TWO LOW PROTEIN RATIONS

	Dry milled			Chopped oat hay				
Supplements	none	CSM	urea	none	CSM	urea	biuret	molasses + urea
First period—84 days								
Initial weight, lb.	570	546	590	558	554	571	562	554
Final weight, lb.	558	543	702	583	566	658	619	675
Avg. daily gain, lb.†	−0.14[a]	−0−[a]	1.39[c]	0.30[a]	0.13[a]	1.04[c]	0.68[b]	1.09[c]
Basal cons/hd/day, lb.*	11.3	13.9	18.8	13.7	13.6	17.3	13.8	14.6
Lick cons/hd/day, lb.*	0.6	1.4	0.6	0.3	1.3	0.5	0.4	2.2
Amt. N cons/hd/day, lb. total	0.10	0.14	0.22	0.10	0.12	0.17	0.14	0.21
Protein consumed, % of ration	5.3	5.7	7.1	4.5	5.0	6.0	6.2	7.8
Second period—34 days								
Final weight, lb.	543	614	744	579	638	681	619	686
Avg. daily gain, lb.†	−0.44[a]	2.10[d]	1.24[c]	−0.13[a]	2.12[d]	0.66[b]	−0−[a]	1.19[c]
Basal cons/hd/day, lb.*	13.7	17.4	22.1	17.9	15.6	20.1	19.1	17.2
Lick cons/hd/day, lb.*	0.3	3.1	0.7	0.2	3.1	0.4	0.2	2.4
Amt. N cons/hd/day, lb. total	0.11	0.35	0.25	0.13	0.32	0.18	0.18	0.24
Protein consumed, % of ration	4.9	10.6	6.8	4.5	10.7	5.5	5.5	7.6

* As fed basis.

† a, b, c, d, means on the same line having the same superscript do not differ significantly.

When the CSM was increased to 3 lbs per head per day, average daily gain increased from 0 to 2 lbs per head per day. Increasing the percentage of biuret in the lick apparently resulted in a decrease in palatability, because the intake of lick was less during this period than during the first 84 days. The steers showed considerable loss of weight by this time.

There was a linear relationship between average daily gain and nitrogen intake. It appeared from calculation of nitrogen intake, in relation to daily gain, that both urea and biuret were very well utilized while CSM was poorly utilized at the lowest level fed. It appears that more than 1 lb of CSM per head per day should be fed to achieve economic results when it is used as a supplement to low-protein roughage. However, data reported herein were obtained in a dry lot using milled feed and might not be applicable to grazing conditions.

At the end of 188 days on the low-protein roughage rations, one-half of the steers from each treatment were slaughtered and the remainder fed an 85% concentrate ration for a 134-day fattening period (no stilbestrol was used). They had an average daily gain of 2.59 lbs per head per day with a conversion of 7.4 lbs feed per pound of gain for this period. At the end of the fattening period, they averaged 980 lbs, and graded choice with an average yield grade of 2.5. At the end of this fattening period, carcass quality did not appear to have been affected by the low protein rations, or the amount of nitrogen which had been fed during the wintering period.

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