

USE OF A

Dried Rumen Liquor Concentrate

IN DAIRY RATINGS

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Use of a Commercial Dried Rumen Liquor Concentrate in Dairy Cattle Rations

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In recent years, various digestion-aiding materials have been used to inoculate or "seed" the rumen of dairy animals in the hope of improving feed utilization. Most research in this area has dealt with the use of fresh cud material as the inoculum. This bulletin summarizes results of tests with commercial, dried rumen liquor inoculum in the rations of dairy calves and dairy cows.

Trial With Calves

Twenty purebred Holstein male and female calves and four purebred Jersey female calves were used in the study. After 48 hours with their dams the calves were placed in individual, solid-partitioned tie stalls and bedded on shavings. Each stall was equipped with a hay and grain manger and a pressure-flow water cup. The calves were isolated in individual stalls as long as milk was included in their diets. As soon as the rations consisted entirely of dry feeds all calves were exercised in a common, outdoor lot for two hours daily during favorable weather.

The calves were divided into four comparable groups with respect to breed, sex and size. All calves were offered prairie hay free choice and limited to 4 pounds daily of a starter with the following composition; cracked corn, 40 percent; crimped oats, 15; cottonseed meal, 20; dried skim milk, 15; and alfalfa meal, 10. Salt, steamed bone meal and finely ground limestone were added at the rate of one pound each per one hundred pounds of starter. Whole milk was fed at the daily rate of 10 percent of body weight. Groups A and B were limited to a maximum of 300 pounds while Groups C and D received 400 pounds.

Groups A and C were inoculated with the dried rumen liquor concentrate at a level of 4 grams per day according to the manufacturer's directions, while Groups B and D served as uninoculated controls. The inoculum was incorporated in the milk during the milk feeding period, but later was mixed with the starter.

Performance of the calves was measured weekly in terms of body-weight, height at withers and chest circumference. Feed consumption was measured weekly. Observations in this study were made for 26 weeks at which time the calves were 184 days old.

Results

The growth responses of the various groups of calves are summarized in Table I. Although the calves that received the larger amounts

Table I.—Growth Response to Treatments as Measured by Bodyweight Height at Withers and Chest Circumference.

Description	Group A	Group B	Group C	Group D
	Inoculated 300 lb. milk	Uninoculated 300 lb. milk	Inoculated 400 lb. milk	Uninoculated 400 lb. milk
Av. initial bodyweight, lb.	86	87	86	87
Av. days on milk	43	44	49	46
Av. total gain during milk feeding period, lb.	28	31	42	41
Av. daily gain during milk feeding period, lb.	0.66	0.71	0.87	0.88
Av. total gain after milk feeding period, lb.	190	197	164	187
Av. daily gain after milk feeding period, lb.	1.36	1.42	1.23	1.38
Av. final bodyweight, lb.	304	315	292	315
Av. total gain during trial, lb.	218	228	206	228
Av. daily gain during trial, lb.	1.20	1.25	1.13	1.25
Av. wither height, initial, in.	28.3	28.3	28.4	28.4
final, in.	37.8	38.3	37.8	38.7
Av. chest circumference, initial, in.	28.4	28.8	28.9	28.9
final, in.	44.1	44.1	43.7	44.4

of milk grew at a somewhat faster rate during the milk feeding period, this advantage was not maintained throughout the trial. Total average gains of the groups seemed to indicate a tendency toward faster growth in the uninoculated groups but an analysis of variance revealed that these differences were not significant. Body measurements tended to follow similar trends as those observed with respect to bodyweight.

The average starter and hay consumption per group, per period is summarized in Table II. Calves receiving the lesser amount of milk consumed the maximum amount of starter offered at a slightly earlier age, but there was no difference indicated between the inoculated and uninoculated calves in this respect. While there seemed to be a trend toward earlier consumption of hay by the uninoculated calves as compared to the inoculated animals, an analysis of variance showed no significant differences between any of the groups with respect to total hay eaten at the end of either the 13th or 26th periods of observation.

The health of all the calves was generally good. Although there were occasional outbreaks of relatively mild scours and respiratory disorders, such cases were not associated with any particular treatment.

Table II.—Average Weekly Starter and Hay Consumption Per Group.

Week	Group A Inoculated 300 lb. milk		Group B Uninoculated 300 lb. milk		Group C Inoculated 400 lb. milk		Group D Uninoculated 400 lb. milk	
	Starter lb.	Hay lb.	Starter lb.	Hay lb.	Starter lb.	Hay lb.	Starter lb.	Hay lb.
0	0.3	0.1	0.4	0.1	0.7	0.1	0.4	0.0
1	0.9	0.0	1.6	0.1	2.1	0.0	1.2	0.1
2	2.7	0.4	4.4	0.2	4.2	0.1	3.4	0.1
3	3.7	1.0	6.5	0.5	6.2	0.4	4.6	0.4
4	5.6	1.0	8.7	0.7	7.4	1.0	6.5	0.6
5	6.5	1.9	8.9	1.2	7.9	1.1	7.1	1.2
6	11.5	2.7	10.5	2.6	9.3	1.9	8.9	1.2
7	17.1	3.0	14.1	4.5	13.6	3.1	16.8	2.5
8	22.5	4.2	22.4	4.3	19.9	4.3	19.9	4.5
9	25.0	4.2	25.9	5.7	24.0	5.0	23.5	6.2
10	26.1	5.1	25.7	7.7	24.9	5.9	26.4	7.4
11	27.6	8.9	27.4	11.4	27.9	8.5	27.6	11.3
12	28.0	11.6	28.0	12.9	28.0	9.9	26.7	14.5
13	28.0	15.6	28.0	19.5	25.9	10.3	27.0	16.3
14	28.0	19.6	28.0	20.7	27.6	15.0	27.4	19.9
15	28.0	21.7	28.0	25.6	28.0	18.2	27.3	22.7
16	28.0	25.7	28.0	28.3	28.0	18.0	27.7	25.6
17	28.0	27.5	28.0	28.9	28.0	22.0	28.0	28.5
18	28.0	30.2	28.0	30.9	28.0	25.5	28.0	31.3
19	28.0	34.0	28.0	35.7	28.0	24.4	28.0	32.9
20	28.0	36.6	28.0	36.8	28.0	28.8	28.0	37.1
21	28.0	38.7	28.0	38.2	28.0	31.7	28.0	39.3
22	28.0	41.0	28.0	43.5	28.0	33.1	28.0	41.4
23	28.0	41.0	28.0	46.9	28.0	39.0	28.0	43.0
24	28.0	47.0	28.0	49.5	28.0	37.5	28.0	48.3
25	28.0	46.1	28.0	53.5	28.0	38.3	28.0	50.6
26	28.0	53.4	28.0	55.0	28.0	45.9	28.0	49.5

Continuous Trial with Lactating Cows

A *second experiment* was conducted to determine if the inoculum might be effective in bringing immediate post-calving production to a higher peak and earlier than usual. Ten Holstein cows were divided into two comparable groups from the standpoint of age, productive ability and size. The cows received alfalfa hay and sorghum silage free choice and were fed concentrates according to production based on Morrison's Grain Feeding Tables. Concentrates were fed in individual stanchions immediately before milking, but roughage was fed with the college Holstein herd. The concentrate mixture consisted of 5 parts milo, 4 parts oats and 1 part wheat bran with steamed bone meal, finely ground limestone and salt added at the rate of 1 percent each.

One group of cows (A) served as untreated controls and cows in the other group (B) were inoculated with 2 grams of the rumen liquor concentrate according to the manufacturer's instructions. Observations with respect to milk production and bodyweight changes were made for 100 days after calving.

Results

The data collected during this trial are shown graphically in Figure 1. While it appeared that the inoculated cows tended to maintain a somewhat higher level of production after the 15th day, this apparent difference was of doubtful significance due to the daily variations in both average lactation curves. An analysis of variance showed that there was no significant difference between the two groups from the standpoint of average total production for the period of 100 days. Production per animal in Group A, the controls, averaged 4301.2 pounds. Group B, the inoculated group, averaged 4517.7 pounds of 4 percent fat-corrected milk during the observation period. No effects upon bodyweight were noted. The control animals gained an average of 32 pounds while the treated animals gained an average of 34 pounds during the 100-day observation period.

Switch Over Trial With Lactating Cows

A *third experiment* was conducted with 14 cows of mixed breeds which were divided into two comparable groups, and observations made under inoculated and uninoculated conditions in a reversal design. The cows were fed and handled alike with the same system of management as that used in the second experiment. The trial was initiated 90 days after parturition which was beyond the peak of lactation. Group A received inoculum at the rate of 2 grams of the rumen liquor concentrate daily per cow for 30 days after which the inoculum was withheld for 30

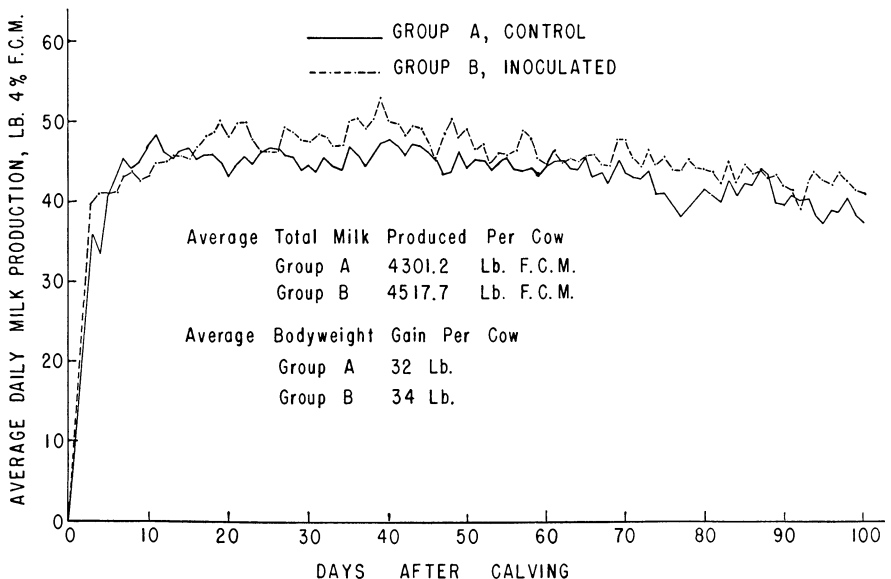


Fig. 1—Performance of cows not inoculated and cows inoculated for 100 days after parturition.

Table III.—Total Production of 4 Percent FCM Per Cow Per Period When Inoculated and Not Inoculated.

Group	Cow No.	Period		
		a	b	c
		lb.	lb.	lb.
A		Inoculated	Uninoculated	Inoculated
	10	691.1	588.4	475.5
	172	1023.6	898.2	788.7
	31	923.8	886.0	785.5
	101	908.4	856.9	801.9
	171	1055.1	901.4	848.4
	120	859.3	804.6	745.8
	18	800.6	599.8	423.8
Av.		894.6	790.8	695.7
B		Uninoculated	Inoculated	Uninoculated
	129	853.9	909.1	911.4
	38	495.5	351.6	280.3
	155	1099.2	959.5	812.0
	24	853.9	807.4	799.9
	5	760.0	633.6	521.7
	130	417.4	345.7	309.9
	83	1081.0	906.0	820.4
Av.		794.4	701.8	636.5

days and then re-introduced in a third 30-day period. Group B cows were not inoculated during the first 30-day period, were inoculated during the second 30 days of observation and carried again as uninoculated controls during the third 30-day period. The total production of 4 percent fat-corrected milk was measured during each 30-day period for each cow and compared by the standard technique of reversal analysis.

Results

The milk production data are summarized in Table III. There was no indication of any response related to the experimental treatment, and a test of the variance showed that the inoculation had no significant effect upon the production response of these animals. Bodyweight changes were comparable under all conditions observed.

Summary

Three experiments were conducted to test the value of a commercially prepared, dried rumen liquor concentrate as an adjunct to dairy calf and cow rations. The material was intended to serve as an inoculum for the rumen. Effect upon growth was tested with 24 calves at two levels of milk feeding with free choice hay. Starter was limited to 4 pounds daily. Two experiments were conducted with milking cows to test for effects upon milk production from parturition to the peak of lactation and during the early decline of lactation.

Under the conditions of this study there were no significant effects upon the performance of the animals with respect to growth, or milk production during various stages of lactation.