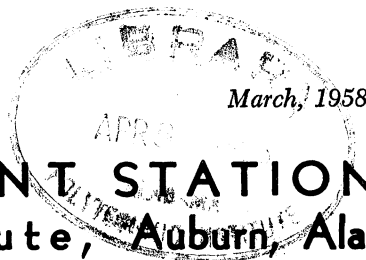


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USE of SALT *to* CONTROL INTAKE of PROTEIN SUPPLEMENT SELF-FED *to* WINTERED BEEF COWS¹

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IN MOST PARTS of Alabama, it is usually necessary to feed a protein supplement to beef cows during part of the winter period. Protein is commonly the most expensive item in the wintering ration and, for this reason, the amount fed must be limited.

Hand-feeding cottonseed meal or cottonseed meal pellets to the beef herd is normally done daily or every other day. A considerable amount of labor is involved in getting the proper quantity of supplement distributed equally among the herd. In an attempt to avoid daily distribution of protein, some livestock producers have used a diluent, such as salt, which, when mixed with cottonseed meal in proper ratio, makes it possible to self-feed the supplement.

The salt requirement of a cow nursing a calf is approximately 20 grams per day. Where salt is used to regulate the intake of protein supplement for self-fed cattle, the amount of salt consumed daily by a cow may be as much as 2 pounds. The influence of this relatively large daily salt intake on the health and productive performance of brood cows posed important questions to livestock producers.

¹ This study was supported in part by grant-in-aid funds provided by Educational Service, National Cottonseed Products Association, Inc.

² Resigned.

The experiment reported here was begun in 1953 to provide more information on the effects of high daily intake of salt on health, lactation, and reproductive efficiency in beef brood cows and on the performance of their calves.

EXPERIMENTAL PLAN

Twenty open, grade yearling Hereford heifers of breeding age were selected for this study and were divided into two groups as nearly alike as possible. For the second year of test, the number of cows in each group was increased to 12. During the winter test period each group of cattle had access to approximately 72 acres of woodland. The two groups were rotated at monthly intervals to minimize the effect of area differences. Two Hereford bulls were used during the breeding season and they were rotated between the two groups of cows on a yearly basis. The cows were exposed to the bulls from December 1 to July 1. After the winter test period, both groups of cows grazed together.

Cottonseed meal (41 per cent) was fed in open troughs, but the mixture of salt and cottonseed meal was fed in a weatherproof feeder. Both groups had access to common salt. Water was readily accessible to both groups from a flowing stream.

The ratio of salt to cottonseed meal for the ex-

perimental group was adjusted at weekly intervals to regulate the intake of cottonseed meal to an average of 2 pounds per head daily. The control group was hand-fed daily an amount of cottonseed meal equal to that consumed by the experimental group. Adjustment was made weekly as necessary. This regulation of cottonseed meal consumption was done throughout the test.

In addition to the protein supplement, Johnsongrass hay or wheat straw was fed in limited amounts to both groups of cattle.

The bases for evaluating the influence of high salt intake were live weight changes in the test cows (during each winter test period in each test year and for the entire experimental period), calving records of the cows, and weaning weight of calves adjusted to a common basis.

RESULTS

Cow performance and daily ration data for the first winter test are summarized in Table 1. Although the cattle in each group were exposed to bulls from December to July, only 6 heifers calved

TABLE 1. COW PERFORMANCE AND DAILY RATION DATA, FIRST WINTER, 117 DAYS (12/2/53 - 3/30/54)

Item	Lot 1	Lot 2
	cottonseed meal, hand-fed	cottonseed meal-salt, self-fed
Heifers started on test, no.	10	10
Heifers calving the next fall ¹ , no.	6	9
Initial average weight of heifers, lb.	700	730
Weight end of winter test, lb. ..	676	679
<i>Changes in live weight for wet cows</i>		
Beginning of winter test, lb. ...	649	742
End of winter test, lb.	638	689
Change during winter test, lb.	-11	-53
End of pasture season (11/17/54) ² , lb.	775	849
Gain in live weight on pasture, lb.	137	160
Change in live weight during year, lb.	+126	+107
<i>Average daily winter ration</i>		
Cottonseed meal, lb.	1.75	1.83
Salt free choice		0.50 lb.
Hay (No. 2 Johnsongrass last 45 days of winter test), lb.	12.00	12.00

¹ 4 animals in lot 1 and 1 in lot 2 failed to breed during breeding season.

² On this date all cows included in the averages had calved except 1 cow in each of the experimental groups.

TABLE 2. COW PERFORMANCE AND DAILY RATION DATA, SECOND WINTER, 112 DAYS (11/17/54 - 3/8/55)

Item	Lot 1	Lot 2
	cottonseed meal, hand-fed	cottonseed meal-salt, self-fed
<i>Experimental animals</i>		
Cows in test from first winter, no.	9	9
New heifers added 11/17/54, no.	3	3
Total number beginning second winter	12	12
Cows bred during winter test, no.	12	12
Cows that calved, no.	8	11 ¹
<i>Changes in live weight for wet cows²</i>		
Beginning of winter test, lb.	765	849
	(3 cows)	(7 cows)
End of winter test, lb.	740	729
Change in live weight, lb.	-25	-120
End of pasture season (11/25/55), lb.	823	935
Gain in live weight on pasture, lb.	83	206
Change in live weight during year, lb.	+58	+86
<i>Average daily winter ration</i>		
Cottonseed meal, lb.	2.08	2.08
Salt free choice		0.69 lb.
Hay (No. 3 Johnsongrass), lb.	11.54	11.54

¹ One poor individual was sold late in summer and her weight is not included in the averages. She was pregnant.

² Only cows that had calved and were nursing calves when weighed are included in averages.

in the control group and 9 calved in the experimental group. The average initial weight of each group of cows is given in Table 1. Since all of the cows did not calve, average change in live weight of cows in each group includes only those that were bred and calved the following fall. It is noted that when the test animals were weighed at the beginning of the second winter test (end of first pasture season) one animal in each group had not calved.

Results of the second winter test are summarized in Table 2. It is noted that three new heifers were added to each group at the beginning of the second winter period. As was true for the first year, breeding efficiency was better for the cows self-fed cottonseed meal-salt.

Results of the third winter feeding test are summarized in Table 3. It is noted that 5 of the original 10 cows were present in the control group

TABLE 3. COW PERFORMANCE AND DAILY RATION DATA, THIRD WINTER, 103 DAYS (11/25/55 - 3/9/56)

Item	Lot 1	Lot 2
	cottonseed meal, hand-fed	cottonseed meal-salt, self-fed
<i>Number of cows</i>		
Cows of the original group, no.	5	8
Heifers added second year, no.	3	2
Heifers added third year, no.	4	2
Total number	12	12
Cows bred during winter period, no.	12	12
Cows that calved, no.	12	12
<i>Changes in live weight for wet cows¹</i>		
Beginning of winter test, lb.	899	930
	(8 cows)	(8 cows)
End of winter test, lb.	876	833
Change in live weight, lb.	-23	-97
End of pasture season (12/12/56), lb.	987	1016
Gain in live weight on pasture, lb.	111	183
Change in weight during year, lb.	+88	+86
<i>Average daily winter ration</i>		
Cottonseed meal, lb.	2.30	2.30
Salt	free choice	0.98 lb.
Hay (wheat straw)	free choice	free choice

¹ Only cows that had calved and were nursing calves when weighed are included in the averages.

(lot 1) for the third and final winter feeding test. Eight of the original 10 were present in the experimental group (lot 2). Breeding trouble was not experienced in the third breeding season and of the 12 cows in each group that were bred, all calved normally.

TABLE 4. ADJUSTED 250-DAY WEANING WEIGHTS OF CALVES¹

Item	Lot 1	Lot 2
	cottonseed meal, hand-fed	cottonseed meal-salt, self-fed
	Lb.	Lb.
First calf crop, weaned in 1955	365 (5) ²	358 (8)
Second calf crop, weaned in 1956	366 (8)	392(10)

¹ The weaning weight data are corrected for age of dam, sex of calf, and weaning age. The calves were not weaned at the same age. Refer to Table 5.

² Numbers in parentheses are the number of animals involved.

Two calf crops were produced during this experiment. The average adjusted 250-day weaning weights of the calves are summarized in Table 4.

It was necessary to convert the calf data to some common basis for comparison to be made because of (1) unequal distribution of first-calving heifers, (2) male and female calves in the two experimental groups, and (3) all the calves were not weaned at the same age. To accomplish this, the calf data were adjusted to weight gained per day of age and are summarized in Table 5.

TABLE 5. ADJUSTED WEIGHT GAIN PER DAY OF AGE FOR CALVES¹

Item	Lot 1	Lot 2
	cottonseed meal, hand-fed	cottonseed meal-salt, self-fed
	Lb.	Lb.
First group, weaned in 1955 ²	1.24 (5) ³	1.20 (8)
Second group, weaned in 1956 ² ..	1.21 (8)	1.33(10)

¹ Weaning weights for calves of cows calving for the first time were increased 5 per cent; weaning weights of heifer calves were increased 23 pounds.

² Difference between treatment means was not significant.

³ Numbers in parentheses are the number of animals involved.

DISCUSSION

In this experiment, cows hand-fed cottonseed meal lost less weight during the winter feeding period than cows that received the same amount of cottonseed meal diluted with salt. Yearly gains for the two groups of cows were quite similar because the cows self-fed cottonseed meal-salt gained more during the summer grazing period. These findings are in agreement with other published results^{3,4}. Obviously as reflected in changes in body weight, the cows hand-fed a daily ration of cottonseed meal maintained nutrient intake fully comparable to the cows self-fed a cottonseed meal-salt mixture. In addition to the hay or straw provided, there was an abundance of pine trees and other browse available to both groups of cattle, but apparently the ingestion of an abnormally

³ Cardon, B. P., E. B. Stanley, W. J. Pistor and J. C. Nesbitt. The use of salt as a regulator of supplemental feed intake and its effect on the health of range livestock. University of Arizona Agr. Exp. Sta. Bul. 239. 1951.

⁴ Riggs, J. K., J. C. Miller and A. J. Gee. Self-feeding mixtures of salt and cottonseed meal to beef breeding cows wintering on pasture. Texas A & M College Agr. Exp. Sta. Progress Report 1276. 1950.

large amount of salt did not stimulate cows to eat an uncommonly large amount of browse.

Although there was less breeding trouble in the group self-fed the cottonseed meal-salt mixture, it is believed that this represents a sampling difference and is not a result of the dietary treatments. The data indicate that the high daily salt consumption during the wintering period did not adversely affect reproductive performance of the cows. This is supported by other published results.^{3 4 5}

No scouring or other abnormal physiological function was observed among the cows self-fed the cottonseed meal-salt mixture.

The calf performance data summarized in Tables 4 and 5 show that there was no real difference in growth between calves suckled by cows self-fed a mixture of cottonseed meal and salt and calves suckled by cows hand-fed an equal amount of cottonseed meal. It is noted, however, that the performance of calves in both groups was less than desired. Inadequate winter feeding of both groups may account, in part, for the poor growth made by the calves. Expenditure of effort to ensure adequate nutrient intake is of greater importance

⁵ Weir, W. C. and R. F. Miller, Jr. The use of salt as a regulator of protein supplement intake by breeding ewes. *Journal of Animal Science* 12: 219. 1953.

than choice of method for supplying a minimum daily ration of cottonseed meal.

The use of self-feeding methods usually results in only periodic observation of the cattle. During critical periods, losses from lack of attention could easily offset any labor saved in feeding.

SUMMARY

1. Cottonseed meal containing 25 to 30 per cent salt was self-fed to beef brood cows for three consecutive winter periods of over 100 days each.

2. No harmful effect was noted on the health of cows or in performance of their nursed calves when salt was used to regulate the daily intake of cottonseed meal to approximately 2 pounds per head.

3. Cows self-fed cottonseed meal-salt mixture lost more weight during the winter feeding period than the group hand-fed cottonseed meal at the same level of intake. However, during the following pasture season, cows self-fed cottonseed meal-salt mixture gained more. Total gains for the year were about the same for both groups.

4. Weaning weights of calves in both groups were decidedly low. This suggests that a higher level of nutrition was needed for both groups and, to supply proper feed units, justified more consideration than the method of supplying protein supplement.