Low choice	4	2		3	4
High good	4	1	2	3	3
Av. good	1	3	4	2	1
Low good		3	2		
High commercial			1		
Marbling:					
Slightly abundant	1		1		
Moderate					1
Modest		1		3	
Small	5	3	2	2	5
Slight	4	2	3	1	2
Traces		4	4	4	1
Av. external finish (thickness in cm. between 12th and 13th rib)	1.48	.83	1.51	1.28	1.34

Table 10a.—Average Daily Gain Per Head Based Upon Wintering Rations with 10 Animals Per Lot.

Previous treatment	Alfalfa hay	Atlas sorghum silage, 2 lbs. corn, 1 lb. SBOM	Atlas sorghum silage, special supplt.	Prairie hay 4.9 lbs. corn, 1.25 lbs. SBOM	Corn cobs, 4.9 lbs. corn, 1.9 lbs. SBOM
Av. daily gain during 91-day fattening period	1.93	1.95	2.00	2.05	1.68

Observations

1. Considering the extremely hot weather, all lots made satisfactory gains; however, the gains in Lot 2 were not as good as expected.
2. Rate of gain, economy of gain, and carcass quality were highest in the lots receiving the greatest amount of concentrates in relation to roughage. This indicates that for short feeding periods, the amount of grain should be high in relation to roughage.
3. Animals receiving milo grain ate more, gained faster, and showed less digestive disturbances than animals receiving the same ratio of corn; however, there was essentially no difference in feed or total cost per 100 pounds of gain.
4. The overall carcass values were the same for milo grain and corn fed animals. The external finish between the 12th and 13th rib of the milo-grain fed heifers was greater; however, they showed a slight tendency for less finish over the forequarter and rounds.
5. Animals receiving corn cobs as the roughage in a wintering ration did not gain as well in the feedlot as those receiving alfalfa hay, Atlas sorghum silage, or prairie hay.

Adapting Roughages Varying in Quality and Curing Processes to the Nutrition of Beef Cattle: A Comparison of Prairie Hay and Corn Cobs; a Special Supplement vs. Milo Grain and Cottonseed Meal, 1953-54.

PROJECT 370

E. F. Smith, D. Richardson, F. H. Baker, R. B. Cathcart, R. F. Cox

This is the second test in an experiment designed to compare the

value of certain roughages and supplements in the wintering ration of beef calves.

Experimental Procedure

Forty good quality Hereford heifer calves were divided as equally as possible into four lots of 10 animals each. The heifers originated in the vicinity of Snyder, Texas. They were dehorned, vaccinated, and branded before starting the experiment.

The rations used in this experiment are shown in Table 11. An attempt was made to keep the protein and total digestible nutrients on an equal basis between the prairie hay and corn cob lots. The animals receiving corn cobs as their roughage were given 50,000 International Units of vitamin A per head daily. The 3 pounds of special supplement fed daily to Lot 12 was composed of 2.25 pounds cottonseed meal, .50 pound molasses, .18 pound steamed bonemeal, .06 pound salt, and .01 pound vitamin supplement (2250 international units of vitamin A and 400 international units of vitamin D per gram). All lots were fed once daily during the morning.

Observations

1. There was no difference in rate of gain, daily feed consumption, or cost per hundred pounds of gain between Lots 1 and 2.
2. Animals in Lot 12 receiving 3 pounds daily of the special supplement made .08 pound more daily gain than animals in Lot 13 receiving 2 pounds of milo grain and 1 pound of cottonseed meal daily. However, the cost per 100 pounds gain was higher for Lot 12 because of the cost of the special supplement.

Table 11.—A Comparison of Roughages and Supplements for Wintering Beef Heifer Calves.

December 17, 1953-April 8, 1954—113 days.

Lot number	1	2	12	13
No. heifers per lot	10	10	10	10
Treatment	Prairie hay, cottonseed meal, milo grain	Corn cobs, cottonseed meal, milo grain, vitamin A[1]	Atlas sorgo silage, special supplt.	Atlas sorgo silage, cottonseed meal, milo grain
Av. initial wt. per heifer	294	296	296	296
Av. final wt. per heifer	438	437	491	483
Av. gain per heifer	144	141	195	187
Av. daily gain per heifer	1.27	1.25	1.73	1.65
Av. daily feed consumed:				
Prairie hay	6.48			
Corn cobs		6.23		
Atlas sorgo silage			23.38	23.47
Milo grain	2.59	2.26		2.0
Cottonseed meal	.98	1.50		1.0
Special supplement			3.0	
Mineral (bonemeal, salt)	.06	.05	.06	.06
Salt	.04	.04	.03	.03
Feed per cwt. gain:				
Prairie hay	508.26			
Corn cobs		499.50		
Atlas sorgo silage			1355.13	1418.45

1. 50,000 IU vitamin A per head daily. Total cost $14.75 for Lot 2.

Milo grain	203.00	181.49		120.86
Cottonseed meal	77.22	120.21		60.43
Special supplement			173.85	
Mineral (bonemeal, salt)	4.58	3.97	3.49	3.64
Salt	3.06	2.84	1.54	1.60
Feed cost per cwt. gain	$13.72	$13.74[1]	$12.59	$11.08

1. 50,000 IU vitamin A per head daily. Total cost $14.75 for Lot 2.

The Value of Ammoniated Molasses in Beef Cattle Wintering Rations, 1953-54.

PROJECT 517

D. Richardson, E. F. Smith, F. H. Baker, R. F. Cox, and K. L. McReynolds

There are microorganisms present in the paunch of ruminants which can utilize ammonia from urea, ammoniated products, and other simple nitrogen-containing compounds. In order to do this, readily available energy, minerals, and probably other nutrients must be present at the same time for efficient utilization of inorganic nitrogen by the microorganisms.

The products used in this experiment were ammoniated molasses containing 15 percent and 33 percent protein equivalent. The 15 percent ammoniated molasses was made by simply adding anhydrous ammonia to bring the molasses to a 15 percent protein equivalent. The sucrose in the molasses was inverted and anhydrous ammonia added to bring the ammoniated invert molasses to 33 percent protein equivalent. Sulfuric acid was used to adjust the pH to 7. Theoretically, these products could serve as a substitute for part of the protein in ruminant rations. The purpose of this experiment was to determine the value and amount to use in the wintering ration of beef calves.

Experimental Procedure

Forty head of good quality Hereford heifer calves were purchased from near Pueblo, Colo. They were divided as equally as possible into four lots of 10 heifers each. The starting ration for each lot is shown in Table 12. These rations were calculated to contain the same protein equivalent and total digestible nutrients per lot. The amount of silage was increased as the experiment progressed and all lots received the same amount. All animals were fed the control ration about a week before starting the experiment. During the experiment, the animals were fed once daily during the morning. The concentrates and molasses were spread over the silage and mixed. Warm water was mixed with the molasses in cold weather to make handling and mixing easier. As a result of thorough mixing, no animal was able to eat more than its share of any ingredient. A mineral mixture of steamed bonemeal and salt was fed free choice. Water was available at all times.

Table 12.—Daily Rations Used at the Beginning of the Experiment (Pounds).

Lot	Atlas sorgo silage	Cottonseed meal	Milo grain	15% ammoniated molasses	33% ammoniated molasses
8	20	1.0	2.0		
9	20	.5	1.6	1.46	
10	20	.5	2.0		.7
11	20		2.0		1.37

Results and Discussion

The over-all results of the experiment are shown in Table 13; however, a better idea of the results may be obtained from Table 14 which gives the average daily gains by weigh periods.

Lot 8 animals gained satisfactorily throughout the experiment. The gains probably would have been better if more silage had been fed. These calves cleaned up their feed by late afternoon each day; however, the amount of silage fed daily was maintained at the same level in all lots.

On the eighth day after starting the experiment, some animals in all lots receiving ammoniated molasses were stimulated or affected in some way to make them act in a very crazy manner. An affected animal would start by weaving and winding among and around other animals in the lot. Then it would suddenly dash across the lot and into whatever might be in the way. Fences and even some posts were smashed. One animal broke out part of its teeth. No definite explanation can be given at this time for this peculiar behavior. The blood urea of affected animals was normal.

After stimulation occurred, the ammoniated molasses was removed from the ration for one week. Feeding was resumed and some animals were affected after again eating the ammoniated molasses for a week. About one-third of the animals receiving the ammoniated molasses were observed to be crazy. It is possible that more were affected. The percentage protein equivalent or amount did not seem to be a factor.

Daily gains (Table 14) and feed efficiency (Table 13) were adversely affected by the ammoniated molasses. There was no apparent difference in mineral consumption between lots. When ammoniated molasses was removed or the amount lowered in the ration, the daily gains increased. At the end of the experiment, animals in Lot 10 were beginning to show signs of being affected, even though they were receiving only .5 pound of ammoniated molasses per head per day. All animals receiving ammoniated molasses had excessive watery drainage from the eyes.

Conclusions

1. The forms of ammoniated molasses used in this experiment, as part or all of the protein concentrate, are not satisfactory in the wintering ration of beef calves from the standpoint of rate of gain or welfare of the animal.

2. Further basic research needs to be done to determine the cause or causes of the trouble experienced.

Table 13.—Results of Feeding Ammoniated Molasses in Wintering Rations of Beef Heifer Calves.

December 17, 1953-April 7, 1954—112 days.

Lot number	8	9	10	11
Number heifers per lot	10	10	10	10
Number days on trial	112	112	112	112
Av. initial wt. of heifers, lbs.	356.9	358.8	358.0	357.6
Av. final wt. of heifers, lbs.	546.5	490.5	490.0	503.0
Av. gain per heifer	189.6	131.7	132.0	145.4
Av. daily gain per heifer	1.69	1.18	1.18	1.30
Av. daily ration per heifer:				
Sorghum silage	23.21	23.12	23.21	22.46
Ground milo grain	2.0	1.7	2.0	2.0
Cottonseed meal (41%)	1.0	.65	.53	.66