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1975 NEBRASKA BEEF CATTLE REPORT

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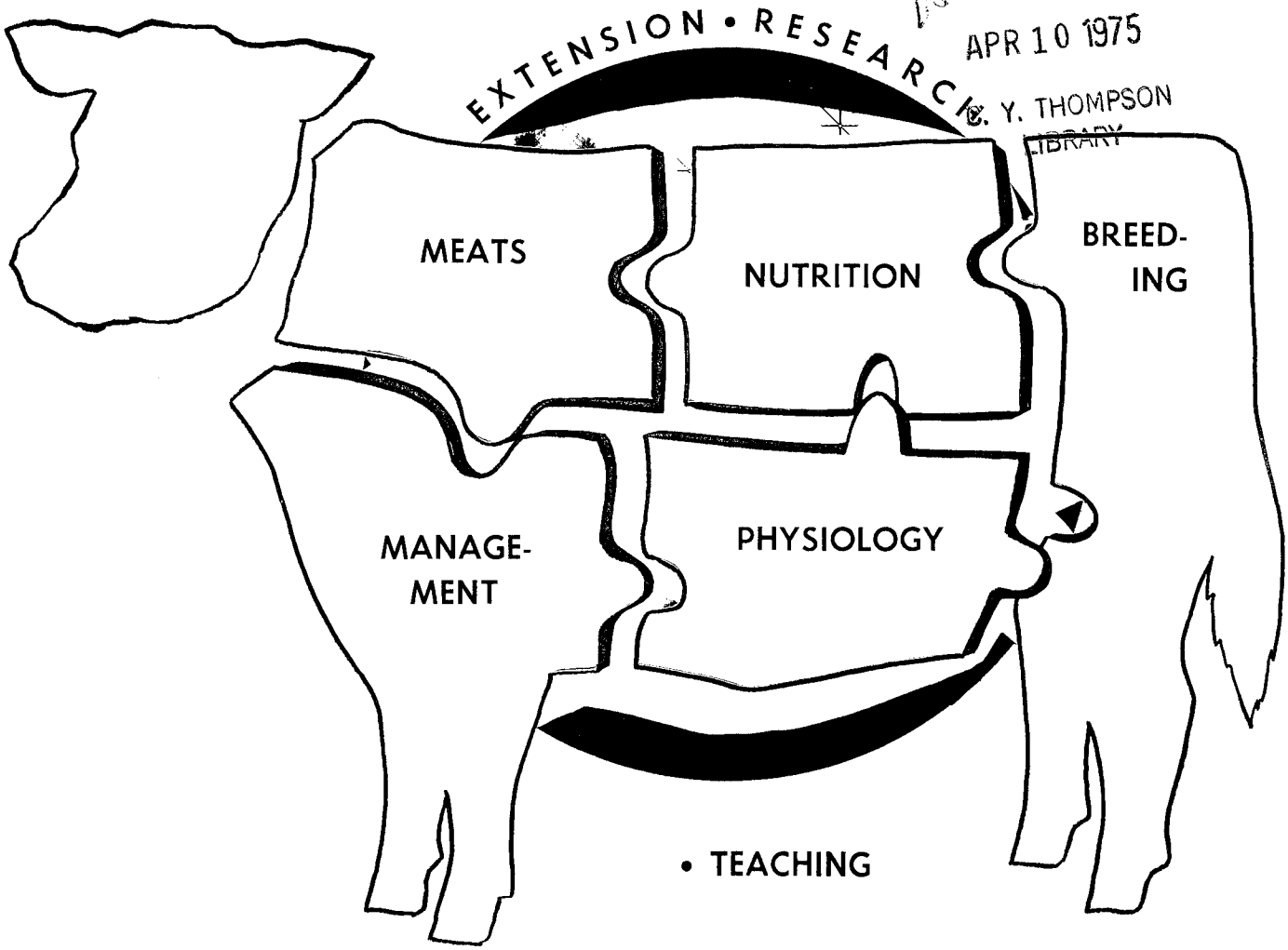

Prepared by the staff in Animal Science and cooperating Departments for use in the Extension and Teaching programs

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Issued February 1975, 10,000

High moisture corn fed in finishing experiments at Mead.

Feeding Value

Waxy vs Non-Waxy Corn

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Robert McCormick
Graduate Assistant

Recent interest in the value of waxy corn for cattle prompted three feeding trials to compare waxy corn to its normal counterpart. The corns were grown at the Mead Field Laboratory under irrigation during 1973 season. Yields did not differ.

In two cattle trials and one sheep trial, waxy corn produced essentially the same results as did its normal counterpart.

Trial 1 (Table 1) involved 64 yearling crossbred steers fed for 154 days. Waxy and normal corn was fed as dry or as high moisture (25–27 percent moisture) corn which had been treated with propionic acid preservative.

Yearling heifers implanted with 36 mg Ralgro were fed waxy corn or its normal counterpart for 98 days in Trial 2 (Table 2). Corn fed in this trial was the same as acid treated corn fed in Trial 1. Heifer gains and feed efficiencies were not different for waxy and normal corn; however, the cattle receiving normal corn required slightly less feed per pound of gain and gained slightly faster. Ration consisted of 85 percent whole corn, 10 percent cobs and 5 percent supplement.

Trial 3 involved a 68-day lamb finishing trial comparing waxy corn to its normal counterpart. Corn fed in this trial was grown with the corn used in Trials 1 and 2. High moisture corn was stored in plastic lined 55-gallon drums.

Lambs fed dry waxy and high moisture corn gained at the same rate as normal dry corn (Table 3). Lambs fed dry waxy corn were slightly less efficient than those receiving normal dry corn. High moisture waxy resulted in slightly more efficient gains than dry waxy corn. All corn in Trial 3 was fed as whole shelled corn.

Table 1. Waxy and non-waxy corn for finishing steers.[a]

	Waxy			Normal non-waxy		
	Dry	Acid HM	Av	Dry	Acid HM	Av
Steers/treatment	16	16	32	16	16	32
Final wt., lb [b]	673	664	669	667	664	666
Final wt., lb	1061	1063	1062	1092	1058	1075
Av daily gain, lb	2.52	2.59	2.56	2.76	2.56	2.66
Daily dry feed, lb	18.0	18.8	18.4	19.4	19.0	19.2
Feed required/lb gain	7.14	7.26	7.20	7.03	7.42	7.23
Dressing percent	60.50	59.45	59.66	59.60	61.07	60.34
Cutability,[c] %	49.47	49.06	49.27	48.34	48.84	48.59

[a] 154-day trial.
[b] Final weight adjusted to a standard dress.
[c] Percent of carcass weight in closely trimmed retail cuts from round, loin, rib and chuck.

Table 2. Waxy and normal corn in a finishing ration for heifers.[a]

	Waxy	Normal
Number of heifers	15	14
Initial weight, lb	598	607
Final weight, lb	872	889
Av daily gain, lb	2.80	2.88
Daily dry feed, lb	18.83	18.57
Feed required/lb gain	6.73	6.45

[a] 98-day trial.

Table 3. Waxy and normal corn for finishing lambs.[a]

	Waxy		Normal dry
	Dry	HM	
Number of lambs	8	7	8
Initial wt., lb	69.0	75.0	76.2
Final wt., lb[b]	101.3	109.3	107.6
ADG, lb	.48	.49	.46
Daily feed, lb	3.15	3.06	2.93
Feed/lb gain[b]	6.68	6.17	6.32
Dressing percent	53.5	54.6	55.9

[a] 68-day trial.
[b] Final weight adjusted to a standard dress. Daily gain and feed required per lb of gain calculated using adjusted final weight.

New Storage System Developed

Feed High Moisture Corn

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High moisture shelled corn stored whole in sealed bins and fed whole has been superior to the same corn either stored ground or dried before storage in six finishing experiments at the University of Nebraska Northeast Station, Concord. As a result, a new system of storage has been developed which combines the improved feeding value of whole high moisture shelled corn with rapid low cost storage in trench or bunker silos.

Mixtures of fine chopped damp roughage and whole shelled corn in proportions providing a complete finishing ration have been successfully stored in plastic covered concrete bunkers at the Station. Also, a mixture of ground and whole corn looked promising in one test. In all, seven experiments involving 1,460 finishing cattle have been conducted at the Station during the last six years to evaluate high moisture corn as cattle feed.

Gains, Savings Up

High moisture corn stored whole and fed whole in sealed bins averaged 7 percent more rapid gains with a 4 percent savings of total dry feed compared to the same corn stored dry in six tests (Table 1). The high moisture corn has excelled in each of these tests except one. Carcass quality and yield grade have not been influenced by different methods of corn storage. Limited molding and heating of whole high moisture corn did not appear detrimental to cattle performance. Extensive molding and heating did reduce intake substantially.

When high moisture corn was stored whole and rolled before feeding, performance was reduced compared to feeding whole in each of four comparisons (Table 2).

High moisture corn, ground before being stored in either upright silos or bunkers, has been consistently less satisfactory than dry corn in the low roughage finishing rations fed. Gains have averaged 8 percent less with 6 percent more dry matter required per unit gain than with dry corn (Table 3).

In early tests we were concerned that rate of feeding was too slow and heating before feeding may have been a problem. But improved storage conditions and rate of feeding to minimize heating, modification of moisture levels and study of several additives have not uncovered practices which will make high moisture corn stored ground equal to dried corn.

Corn has been stored satisfactorily from about 20 percent moisture to over 30 percent in either whole or ground form. There appears to be some trend toward increased efficiency but lower rate of gain with the wetter material.

Consider Methods

Method of feeding and reporting data should be considered in comparing Northeast Station data with other data. First, cattle were fed once daily. Some feeders say that intake may be somewhat higher when high moisture ground corn is fed more frequently. Possibly, once daily feeding is more acceptable for whole high moisture corn than ground high moisture corn—but we believe reduced performance from the ground corn is more deep-seated than this. Second, final live weights as reported are adjusted to a standard dressing percentage. Eating habits are such with high moisture ground corn that dressing percentage may be slightly higher than for cattle fed whole high moisture or dry corn.

In two experiments, a mixture of high moisture shelled corn and wilted fourth cutting alfalfa or alfalfa haylage stored in a bunker silo has been equal in feeding value to the same corn stored in an oxygen limiting bin and fed with alfalfa haylage (Tables 4 and 5). A corn and corn silage mixture

Table 1. Whole high moisture corn vs. dried rolled corn.

Season of test	Whole high moisture corn		Dry corn[a]		Improvement over ground dry corn	
	No. of lots	No. of cattle	No. of lots	No. of cattle	Gain	Feed required
Dec.–April[b]	2	20	5	49	17	4
Feb.–July[c]	1	11	4	43	8	8
Dec.–April	2	22	2	22	14	13
Apr.–July[c]	2	20	2	19	4	2
Jan.–July[d]	2	19	2	20	–5	–4
Feb.–May[e]	3	39	3	39	5	6
Total	12	131	18	192	Av 7	4

[a] Fed ground except for experiment number 6.
[b] Some heating and molding of high moisture corn.
[c] Considerable heating and molding of high moisture corn.
[d] One dry corn lot outperformed any other lot by a wide margin. No heating or mold developed in high moisture corn.
[e] No heating or mold development in high moisture corn.

Table 2. Feeding whole vs. rolled high moisture corn (stored whole in oxygen limiting bins).

	Fed whole		Fed rolled		Advantages to whole corn	
	Daily gain lb	Feed/gain lb	Daily gain lb	Feed/gain lb	Gain %	Feed/gain %
	2.50	7.8	2.19	8.0	11	3
	2.92	6.3	2.87	6.5	2	3
	2.15	8.7	2.04	9.2	5	6
	3.26	6.2	3.05	6.4	7	3
Av	2.71	7.3	2.54	7.6	6	4

stored in a bunker and fed with protein added gave good results in one comparison (Table 5).

A mixture of whole shelled and about 30 to 33 percent ground shelled high moisture corn also appears satisfactory if the moisture content is high enough for good packing and the material is well packed (Table 4). In our test, packing was somewhat less than desirable and excessive molding in the warm months near the end of the test appeared to reduce intake somewhat.

Ground Snapped Corn

Ground snapped corn was also evaluated in our last test. The material was field chopped through a recutter screen which chopped the shuck and cob rather fine but left 65 to 75 percent of the grain in whole form. Ground snapped corn kept well and made excellent appearing silage. When fed without additional grain, rate and efficiency of gain was significantly lower than other rations fed. When grain was added after 56 days, both rate and efficiency of gain improved significantly. Cattle fed additional grain after 56 days were rapidly compensating for the reduced gains from the higher roughage level fed earlier. The feeding period was too short for complete compensation for the slower rate of gain the first 56 days on test.

Success in trench or bunker storage of these high moisture mixtures depends on reasonably good mixing and packing and on effective covering with plastic. A "crawler" tractor with bucket has been satisfactory for mixing, pushing up, and packing the mixture. Wheel tractors cannot push the shelled corn, ground grain or low roughage mixtures up into a silo. Mixtures used (dry matter basis) were about 90 percent grain to 10 percent alfalfa (about a 3 or 3 1/2 to 1 volume ratio); 82 percent grain to 18 percent corn silage (again about a 3 to 3 1/2 to 1 volume ratio); and about 67 to 70 percent whole corn to 30 to 33 percent corn ground through a hammer mill.

Table 3. High moisture shelled corn stored ground vs. dried rolled shelled corn.

Season	High moisture corn		Dry corn			Gain advantage	Feed requirement advantage[a]
	No. of lots	No. of cattle	No. of lots	No. of cattle			
Dec.–April[b]	10	66	5	49		– 4	–8
Feb.–July[b]	4	43	4	43		–10	–2
Dec.–April[c]	6	65	2	22		–11	–7
Apr.–July[c]	4	38	2	19		– 8	–6
Jan.–July[b]	6	58	2	20		–11	–9
Total	30	270	15	153	Av	– 8	–6

[a] Total feed dry matter per unit gain.
[b] Some heating and molding of high moisture corn.
[c] High moisture corn kept well.

Table 4. Feeding corn stored by different methods, 1972–73.

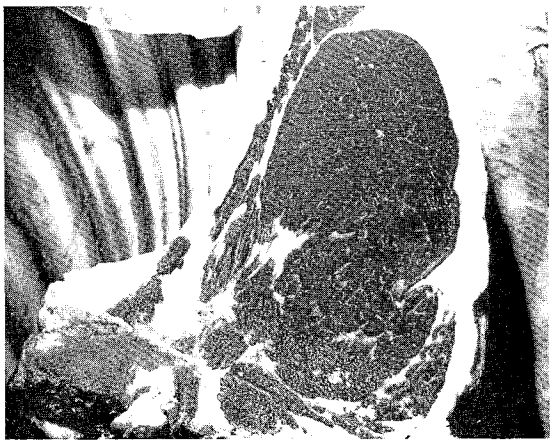
Processing	Dry corn	High moisture corn[a]			
	Whole	Whole	Ground	Whole-ground mix	Whole corn-alfalfa mix
Moisture (as fed), %	15.1	23.1	26.1	22.4	25.0
No. head	20	19	58	39	40
Initial wt., lb	730	733	730	726	739
Final wt., lb	1124	1101	1080	1086	1106
Daily gain, lb	2.45	2.31	2.17	2.24	2.28
Daily feed[b]					
Corn, lb	13.9	13.8	13.9	14.1	14.2
Haylage, lb	2.4	2.4	2.4	2.4	2.2
Silage, lb	.6	.6	.5	.6	.5
Supplement, lb	.9	.9	.9	.9	.9
Total, lb	17.8	17.7	17.7	18.0	17.8
Feed/Cwt. gain,[b] lb	7.35	7.69	8.26	8.05	7.87
Carcass grade[c]	12.7	12.6	12.5	13.3	13.0
Yield grade	3.4	3.6	3.3	3.5	3.4

[a] Methods of storage were: HMC whole-oxygen limiting bin; HMC ground-upright silo with top unloader; HMC whole (70%)-ground (30%) mixed, bunker silo mixed as filled; whole (90%)-alfalfa (10%) mixed, bunker silo mixed as filled.
[b] Feed dry matter.
[c] Low choice = 12, average choice = 13.

Table 5. Feeding corn stored by different methods, 1973–74.

Processing	Dry corn	High moisture corn[a]				
	Whole	Whole	Whole-Alf. mix	Whole corn-corn sil. mix	Ground snapped	Ground snapped[b] + whole HMC
Moisture (as fed), %	12.5	24.0	26.3	29.8	29.3	.....
No. head	39	39	79	80	40	40
Initial wt., lb	860	859	854	863	860	861
Final wt., lb	1164	1176	1179	1171	1111	1151
Daily gain, lb	2.89	3.01	2.92	2.92	2.38	2.75
Daily feed[c]						
Corn, lb	14.6	14.2	14.1	12.7	.....	5.9
Haylage, lb	2.2	2.2	2.3	.....	.....	.....
Corn silage, lb	1.8	2.0	2.4	5.2	1.8	1.8
Gr. snapped corn, lb	.....	.....	.....	.....	16.3	10.5
Supplement, lb	1.3	1.2	1.3	1.3	1.2	1.2
Total, lb	19.9	19.6	20.1	19.2	19.3	19.4
Feed/Cwt. gain,[c] lb	6.89	6.51	6.50	6.58	8.11	7.05
Carcass grade[d]	12.2	12.0	11.9	11.9	11.8	12.2
Yield grade	3.6	3.6	3.7	3.6	3.5	3.6

[a] Methods of storage were: HMC whole—oxygen limiting bin; whole (88%)-alfalfa (12%) mixed, bunker silo mixed as filled; whole (82%)-corn silage (18%) mixed, bunker silo mixed as filled; ground snapped corn—bunker silo; ground as picked.
[b] Ground snapped corn fed at approximately 42.5% of ration after 56 days to provide approximately 10% roughage.
[c] Feed dry matter.
[d] Low choice = 11, average choice = 12.



Increasing marbling in cattle with minimum outside finish is the focus of dexamethasone studies.

Dexamethasone Increases Quality

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V. H. Arthaud
Associate Professor, Beef Production

Current high prices of grains and roughages, along with beef prices that offer little profit potential, have stimulated interest in shorter feeding periods for finishing beef cattle. But will short fed or high roughage fed cattle have the minimum marbling required for grade especially when larger growthier type cattle are fed?

Dexamethasone was injected into steers, heifers and young bulls during finishing trials from 43 to 104 days preslaughter. Results were variable but marbling score and quality grade were improved in some trials. Grade was increased up to ⅓ of a grade in bulls and in Charolais crossbred cattle.

Bull Calf Trials

Two trials were conducted with young bull calves. Trial 1 involved feeding Angus bull calves for 120 days on an 80 percent concentrate (corn and supplement)-20 percent cob ration followed by 120 days on a 90 percent concentrate-10 percent cob ration. One third of the bulls were untreated, one third injected intramuscularly with 25 mg dexamethasone 92 days preslaughter and one third injected twice with 25 mg dexamethasone at 92 and 48 days preslaughter. Bulls were slaughtered at 15-16 months of age weighing about 1,040 pounds.

Dexamethasone injection significantly increased carcass quality grade with the two injections resulting in a higher grade than one injection (Table 1). The increase in carcass grade was within the good grade; however, this kind of a response may be meaningful in light of proposed changes in U.S.D.A. grading standards.

In Trial 2 a single 25 mg dexamethasone injection at 43 days preslaughter was evaluated in Angus and Charolais X Angus bulls and steers. All bulls and Charolais X Angus steers were fed an 80 percent concentrate ration for 12 weeks and a 90 percent con-

Table 1. Dexamethasone for increasing marbling in young bulls.

	Control	25 mg Dexamethasone injection[a]	
		Once	Twice
No. of animals	22	23	24
Quality grade[b]	9.83	9.90	10.83
Marbling score[c]	8.59	8.34	9.54
Moisture free longissimus fat, %	7.66	8.31	8.95

[a] Once at 92 days; twice at 92 and 48 days before slaughter.
[b] 9 = low good; 10 = average good; 11 = high good.
[c] 8 = slight minus; 9 = slight.

Table 2. Dexamethasone for increasing marbling in bulls and steers.

	No. of animals	Carcass wt	Quality grade[a]	Marbling score[b]	Moisture free longissimus fat, %	Cutability[c]
Angus steers						
Control	5	531	11.0	10.00	12.80	51.58
Dexamethasone	5	547	10.8	9.60	13.48	50.13
C X A steers						
Control	4	687	11.25	10.75	14.60	51.06
Dexamethasone	5	635	10.80	10.40	10.85	51.04
Angus bulls						
Control	8	701	10.38	10.25	10.87	49.99
Dexamethasone	8	662	10.50	10.00	13.43	50.46
C X A bulls						
Control	8	754	9.75	9.00	8.28	52.88
Dexamethasone	7	803	9.57	8.29	11.73	52.33

[a] 9 = low good; 10 = average good; 11 = high good.
[b] 8 = slight minus; 9 = slight; 10 = slight plus.
[c] Percent of carcass weight in closely trimmed retail cuts from round, loin, rib and chuck.

Table 3. Dexamethasone for Charolais X Angus steers and heifers.

	No. of animals	Carcass wt	Carcass quality grade[a]	Marbling score[b]
Heavy replication				
Steers				
Control	7	737	12.00	11.94
Dexamethasone	8	770	12.30	13.00
Heifers				
Control	8	670	12.83	13.72
Dexamethasone	7	678	12.11	13.00
Light replication				
Steers				
Control	15	669	12.00	12.33
Dexamethasone	15	656	12.27	13.67

[a] 11 = high good; 12 = low choice; 13 = average choice.
[b] 11 = small minus; 12 = small; 13 = small plus.

centrate ration for 20 weeks. Angus steers were grown on a high roughage ration until placed on a 90 percent concentrate ration for 17 weeks (Table 2).

Dexamethasone injected cattle tended to have a lower cutability than control cattle. Carcass quality grade and marbling score were not increased by dexamethasone. Injected animals had a slightly higher fat content in the ribeye.

Charolais Trials

Dexamethasone was tested in Charolais crossbred steers and heifers in Trial 3. Calves were started on an 80 percent concentrate (corn and supplement)-20 percent cob ration on February 1, 1973, followed by a 90 percent concentrate-10 percent cob ration on June 1, 1973. Half of heavy replication cattle were injected with 25 mg dexamethasone 104 days before slaughter on September 19, 1973. Half of light replication cattle were injected 76 days before slaughter on October 29, 1973.

Injected steers had slightly higher quality grade and marbling than control steers in the heavy replication. Heifers showed no response to injection. Injected steers in the light replication also had slightly higher marbling score and quality grades (Table 3).

Yearling Trials

Yearling cattle were used in Trial 4. Angus X Hereford steers were injected 104 days before slaughter. Charolais crossbred steers and heifers were injected 76 days preslaughter. The Charolais crossbred cattle used in Trial 4 were from the same group of calves as used in Trial 3; the difference being that these calves were wintered on a growing ration before being placed on a finishing ration as yearlings for five months.

In Angus X Hereford steers dexamethasone did not improve quality grade, although treated animals tended to have slightly higher marbling scores. The injected Charolais crossbred steers and heifers, however, had significantly higher quality grades and marbling scores than control animals (Table 4).

Table 4. Dexamethasone for yearling steers and heifers.

	No. of animals	Carcass wt, lb	Carcass quality grade[a]	Marbling score[b]	Longissimus fat, %
Angus X Hereford steers					
Control	24	691	12.17	13.25	5.10
Dexamethasone	24	695	12.17	13.46	5.22
Charolais crossbreds					
Steers					
Control	11	735	10.25	9.83	2.31
Dexamethasone	12	737	11.10	10.92	2.86
Heifers					
Control	12	678	10.83	11.25	3.38
Dexamethasone	12	689	11.42	12.75	3.83

[a] 10 = average good; 11 = high good; 12 = low choice.
[b] 9 = slight; 10 = slight plus; 11 = small minus; 12 = small; 13 = small plus.

Response to dexamethasone injection in these trials was not always consistent. The positive results obtained indicate that carcass quality grade as influenced by marbling can be altered. Means of increasing marbling would be useful in feeding programs designed to take advantage of young cattle of all sexes.

Amicloral Fights Energy Loss

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Eight to ten percent of the gross energy in a beef cattle ration is lost as methane gas from fermentation in the rumen. Amicloral may be useful in reducing this energy loss. A finishing study was started to test feedlot performance by adding 3.3 lb of amicloral per ton of feed.

Feed efficiency of cattle fed amicloral was not different from control cattle—but gains were 24 percent slower. Daily feed consumed was 23 percent less with amicloral than for control animals.

The trial, conducted at the Panhandle Station from October 26, 1973 to February 18, 1974, involved 160 yearling Angus, Hereford and Angus X Hereford crossbred steers. About half of the cattle had previously been on grass pasture—the others on a growing trial. Steers were allotted to 16 pens of 10 head each. Cattle were fed control and amicloral rations free choice.

Because amicloral cattle weighed 70 lb less at the end of the trial, they were fed the control ration for an additional 17 days after the trial ended. Carcass data were obtained at slaughter. Control carcasses averaged low choice and amicloral carcasses averaged high good. Carcass yield grade was 2.6 for control and 2.2 for amicloral. There was no significant difference in feed conversion.

Usually, poorer feed conversion results from depressed feed intake similar to that observed with amicloral. The fact that efficiency of gain was not depressed suggests that energy utilization may have been increased due to addition of amicloral.

Cattle previously on pasture gained significantly more than their dry lot counterparts. This was especially evident during the last 25 days.

Table 1. Effect of amicloral in a finishing beef ration.[a, b]

	Control	Amicloral
No. steers	80	79
Av wt, lb		
Initial	781	775
Final	1059	989
Daily gain	2.42	1.85
Av feed consumed		
Daily	21.5	16.6
Per lb of gain	8.90	8.98

[a] 115-day trial.
[b] Ration contained 75 percent rolled corn, 20 percent alfalfa hay and 5 percent supplement to supply 11.5 percent protein, .4 percent calcium, .35 percent phosphorus, vitamin A and minerals. Amicloral substituted for 59 lb of corn per ton of supplement.

Monensin

A New Feed Additive for Beef Cattle

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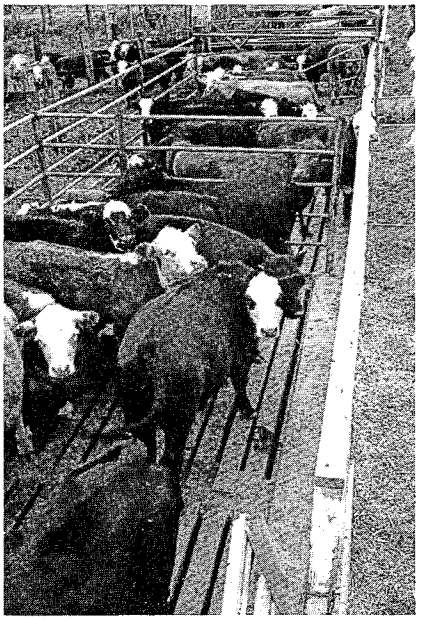
Feed additives which improve feed efficiency and rate of gain are economically important to cattle feeders. Results of four experiments have shown that monensin, a compound produced by *Streptomyces cinnamonensis* will improve feed efficiency significantly when added to beef cattle rations. Maximum reduction in feed required for gain with monensin was 13.2, 9.4, 9.7 and 1.4 percent in these trials.

Experiment 1 (Table 1) involved 119 heavy yearling steers fed a finishing ration of about 10 percent silage and 90 percent corn and supplement (dry basis) for 124 days. Monensin was added to the ration at levels of 0, 5, 10, 20, 30 and 40 grams per ton air dry ration. Improvements noted in feed efficiency were 8.5, 9.7, 1.5, 4.6 and 6.8 percent for the 5 through 40 gram levels of monensin. Gains were slightly reduced at the higher levels because of lowered feed consumption.

In Experiment 2 (Table 2) 0, 5, 10, 20, 30 and 40 gram levels of monensin were evaluated using 94 yearling steers fed a ration of 10 percent hay with 90 percent corn and supplement for 173 days. Feed required for gain was reduced 1.9, 5.8, 4.8 and 9.4 percent for 5, 10, 20 and 30 grams monensin per ton of ration. The 40 gram level increased feed required for gain by 2.3 percent. As level of monensin increased feed consumed decreased. Gains with monensin were similar to those obtained without monensin except at the 40 gram level.



Steers fed on slat and concrete floors and not covered with a roof for protection.

A third finishing trial involved 379 yearling cattle fed 0, 10, 20 and 30 grams of monensin per ton of ration for 161 days. The ration consisted of 10 percent hay, 85 percent corn and 5 percent supplement. Results (Table 3) indicated a slight improvement of 1.0, 1.2 and 1.4 percent in feed efficiency with 10, 20 and 30 gram levels of monensin. Feed consumption was reduced with increasing levels of monensin. Only slightly lower gains were observed with increasing levels of monensin.

Heifer Trial

Experiment 4 involved 95 heifers fed a growing ration of corn silage plus supplement for 101 days followed by a finishing ration of 10 percent corn silage with 90 percent corn and supplement for 102 days. Monensin was added to the rations during the growing and finishing periods at 0, 10, 20 and 30 grams of monensin per ton of ration.

Results (Table 4) are shown for the total 203 day trial since the effect of monensin was similar in both the growing and finishing periods. Feed efficiency was improved by 7.5, 9.8, and 13.2 percent with 10, 20 and 30 grams of monensin. Increasing level of monensin caused a decrease in feed consumed, however, rate of gain was slightly higher for the cattle receiving monensin.

Results of all four trials were similar. As level of monensin was increased feed consumption was consistently reduced. Monensin caused a consistent and highly important improvement in feed efficiency with the exception of the 40 gram level in Trial 2.

The effect of monensin on gain

Table 1. Effect of Monensin on performance of heavy steers (North Platte Station, 11/8/72 to 3/12/73).

	Monensin, g/ton ration					
	0	5	10	20	30	40
Steers per treatment	20	19	20	20	20	20
Av weight, lb						
Initial	828	826	828	828	828	828
Final[a]	1114	1123	1134	1086	1098	1095
Adj. daily gain[a]	2.30	2.40	2.46	2.08	2.18	2.16
Av feed consumed, lb DM						
Daily	20.1	19.2	19.4	17.9	18.2	17.6
Per pound of gain	8.74	8.00	7.89	8.61	8.34	8.15
Carcass data						
Grade[b]	12.85	13.05	12.85	13.10	12.60	12.75
Yield grade	3.8	3.6	3.7	3.6	3.7	3.7

[a] Adjusted to 62% dress using hot carcass weight.
[b] Choice = 13, low choice = 12.

Table 2. Effect of Monensin on performance of yearling steers (Lincoln Station, 11/2/72 to 4/24/73).

	Monensin, g/ton ration					
	0	5	10	20	30	40
Steer per treatment	16	16	15	16	16	15
Av weight, lb						
Initial	708	707	705	697	701	706
Final[a]	1092	1077	1082	1039	1075	1013
Adj. daily gain[a]	2.22	2.14	2.18	1.98	2.16	1.77
Av feed consumed, lb DM						
Daily	17.99	17.01	16.63	15.26	15.86	14.67
Per pound of gain	8.10	7.95	7.63	7.71	7.34	8.29
Carcass data						
Grade[b]	11.5	11.8	11.8	11.1	11.6	11.3
Yield grade	4.0	3.3	3.7	3.5	3.9	3.4

[a] Adjusted to 60.8% dress using hot carcass weight.
[b] Low choice = 12, high good = 11.

Table 3. Effect of Monensin on feedlot performance of yearling cattle (Mead Station, 6/28/73 to 12/6/73).

	Monensin, g/ton ration			
	0	10	20	30
Animal per treatment	95	95	95	94
Av weight, lb				
Initial	630	631	631	627
Final[a]	1071	1062	1049	1026
Adj. daily gain[a]	2.74	2.68	2.60	2.48
Av feed consumed, lb DM				
Daily	20.74	20.10	19.44	18.52
Per pound of gain	7.57	7.50	7.48	7.47
Carcass data				
Grade[b]	12.6	12.7	12.5	12.5
Yield grade	3.0	3.0	3.1	3.0

[a] Adjusted to 60.2% dress using hot carcass weight.
[b] Choice = 13, low choice = 12.

Table 4. Effect of Monensin in growing and finishing heifer rations (North Platte Station, 5/11/73 to 12/2/73).

	Monensin, g/ton ration			
	0	10	20	30
Heifers per treatment	24	24	23	24
Av weight, lb				
Initial	431	431	430	430
Final[a]	903	932	892	927
Adj. daily gain[a]	2.32	2.47	2.28	2.45
Av feed consumed, lb DM				
Daily	17.62	17.35	15.62	16.14
Per pound of gain	7.59	7.02	6.85	6.59
Carcass data				
Grade[b]	11.83	12.87	11.80	12.13
Yield grade	3.4	3.7	3.5	3.4

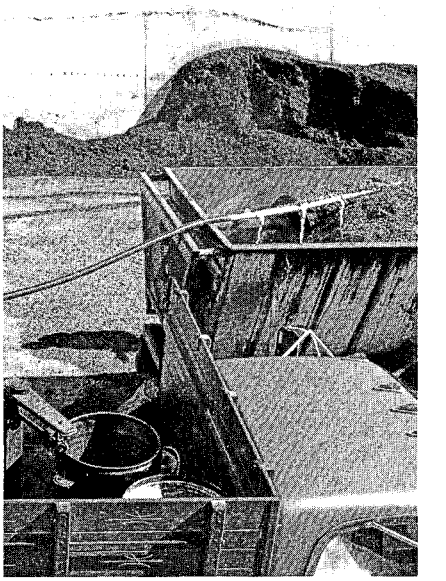
[a] Adjusted to 62% dress using hot carcass weight.
[b] Choice = 13, low choice = 12.

was not consistent, with some slight decreases and increases noted. However, monensin at lower levels will not reduce gains but may tend to slightly reduce gains at the higher levels because of the reduced feed consumption. The slight reduction seen in gains, however, is offset by the significant improvement in feed efficiency.

Potential Great

Monensin did not appear to have any consistent effect on carcass measurements and none would be expected unless a sizable difference in gain occurred.

Results indicate that monensin has great potential for improving feed efficiency of beef cattle without significantly changing rate of gain or carcass measurements.



Equipment used for adding chemicals to treated roughages.

Evaluation

Chemically Treated Crop Residues

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Graduate Assistant

John Waller
Graduate Assistant

T. J. Klopfenstein
Professor, Ruminant Nutrition

Two years data on chemically treated crop residues stored in bunker silos and fed to growing calves have now been evaluated.

Husklage was collected behind the combine with a bunch wagon, ground through a tub grinder, mixed with water and chemical and allowed to ensile.

Husklage was treated the first year with four percent sodium hydroxide (NaOH). To reduce the amount of sodium the second year, husklage was treated with three percent NaOH plus one percent calcium hydroxide [$Ca(OH)_2$].

In 1973, gains on the treated husklage were about 90 percent as rapid and as efficient as those on corn silage (Table 1). In 1974,

(continued on next page)

Table 1. Performance of calves fed treated husklage.

	1973[a]		1974[b]	
	Corn silage	Husklage	Corn silage	Husklage
Daily gain, lb	1.7	1.5	1.6	1.4
Daily feed,[c] lb	13.7	13.4	13.9	14.3
Feed/gain	8.1	8.8	8.7	10.4

[a] 12 head per treatment for 99 days. Husklage treated with four percent NaOH, moisture raised to 67 percent. SBM supplements.
[b] 12 head per treatment for 105 days. Husklage treated with three percent NaOH and one percent $Ca(OH)_2$. SBM supplements fed as 10 percent of corn silage rations and 20 percent of the husklage rations.
[c] Dry basis.

Residues Evaluated . . .

(continued from page 9)

calves gained 80 percent as rapidly and as efficiently on treated husklage as on corn silage.

These two trials suggest that husklage has value between 80–90 percent of corn silage. These data have been used for some economic calculations.

Feed Costs Calculated

We put no value on husklage in the field (Table 2). Our experience in collecting husklage indicates about \$8–\$15 per dry ton to bunch it in the field, grind it and haul it to the silo, add the chemical and water, and pack it. The chemical cost for three percent NaOH plus one percent $Ca(OH)_2$ is \$10 per dry ton. Total cost would range from \$20–\$30 per dry ton.

Using \$30 per dry ton, we calculated feed costs per pound of gain when husklage is fed with a soybean meal supplement priced at \$100, \$150, or \$200 per ton. Note that the cost of gain is 24¢ at the \$150 per ton supplement (Table 3). When corn is priced at \$2 per bushel, corn silage gives about the same feed cost per pound of gain as treated husklage. However, when corn is priced at \$3 per bushel, cost of gain in the corn silage is about 9¢ a pound greater than that for husklage. At \$3.50 and \$4 per bushel, cost of gain in the corn silage is 15¢ and 19¢ a pound greater, respectively. We conclude that treatment of husklage is economical whenever corn is \$2 per bushel or higher in price.

Table 2. Cost per dry ton of chemically treated husklage.[a]

	\$/ton	
	Lower	Upper
Value in field	±0	±0
Handling	8	15
Chemicals[b]		
NaOH	9	9
$Ca(OH)_2$	1	1
Ensiling loss	2	5
Total	20	30

[a] Delivered to feed bunk.
[b] NaOH priced at \$300 per ton; applied at three percent of dry matter. $Ca(OH)_2$ priced at \$100 per ton; applied at one percent of dry matter.

Performance Trial

To evaluate various ratios of calcium and sodium hydroxides, a performance trial using 40 heifers was conducted. Five rations (two pens per ration) were fed which contained 75 percent treated cobs and 25 percent brewer's dried grains (BDG) base supplement (dry matter basis).

Ground dry corn cobs (10 percent moisture) were increased to 60 percent moisture before the various combinations of hydroxide were added. The level of hydroxide used (Table 4) was based on providing an equivalent quantity of hydroxide present in four percent NaOH. Cobs were placed on concrete, packed, and covered with black plastic.

Table 4 shows performance of heifers fed the five combinations of hydroxides. The best gain and feed efficiency were obtained on a 3% NaOH–1% $Ca(OH)_2$ combination. The five rations involve changes of only one percentage unit of either sodium or calcium hydroxides. There does not appear to be appreciable difference between any of the rations containing one percent or more NaOH.

Based on heifer performance on the five rations used, the 3% NaOH–1% $Ca(OH)_2$ combination of hydroxide treated cobs, fed with BDG supplement at 75 percent and 25 percent, respectively, is recommended for use under similar conditions. Further research may confirm that lower levels of NaOH and higher levels of $Ca(OH)_2$ are nutritionally adequate and economically superior.

Table 3. Feed cost per pound of gain for treated husklage and corn silage rations.

	SBM supplement \$/ton		
	100	150	200
Husklage[a] ¢/lb	19 (21)[b]	24 (26)[b]	28 (31)[b]
Corn silagt[c] ¢/lb	41	43	45
Corn silage[d] ¢/lb	37	39	41
Corn sliage[e] ¢/lb	31	33	35
Corn silage[f] ¢/lb	22	24	26

[a] Husklage priced at \$30 per dry ton delivered to feed bunk.
[b] Calculations using 1974 performance data.
[c] Corn silage priced at \$101 per dry ton delivered to feed bunk equal to \$4 per bushel corn.
[d] Corn silage priced at \$90 per dry ton delivered to feed bunk equal to \$3.50 per bushel corn.
[e] Corn silage priced at \$73 per dry ton delivered to feed bunk equal to \$3 per bushel corn.
[f] Corn silage priced at \$50 per dry ton delivered to feed bunk equal to \$2 per bushel corn.

Table 4. Performance of heifers fed combinations of sodium and calcium hydroxide treated corn cobs.[a]

NaOH, %	$Ca(OH)_2$, %	Average daily feed[b] lb	Average daily gain lb	Feed/gain
0	4	19.89	2.14	9.35
1	3	21.93	2.79	7.85
2	2	21.72	2.50	8.66
3	1	22.72	2.95	7.71
4	0	22.23	2.58	8.62

[a] 75 percent cob, 25 percent brewer's dried grain supplement, fed 84 days, eight heifers per treatment.
[b] Dry matter.

Liquid streptomyces solubles were fed in a liquid supplement.

Liquid Streptomyces Solubles

Potential to Stimulate Gain

Terry Klopfenstein
Professor, Ruminant Nutrition

Low level feeding of liquid streptomyces solubles may have the potential to stimulate gain in growing calves fed urea supplements.

Two cattle feeding trials were conducted to determine effect of including liquid streptomyces solubles (LSS) in beef cattle rations.

Liquid streptomyces solubles is the byproduct of the production of an antibiotic by bacteria. Streptomyces solubles might contain some necessary growth factors and could, therefore, stimulate urea utilization and increase cattle performance.

In Trial 1, 200 Hereford heifers were allotted to eight pens with two replications on each of four treatments. Rations were a full feed of corn silage and liquid supplements (containing varying amounts of LSS) added to the ration as 10 percent of the dry matter. The treatments were:

1. Control-supplement with no LSS.
2. A supplement with six percent LSS.
3. A supplement with 12 percent LSS.
4. Six percent LSS for the first 28 days, then control supplement with no LSS.

Table 1. LSS as a supplement to growing rations using urea as source of supplemental nitrogen.[a]

	Daily gain lb	Daily feed lb	Feed/ gain
Control	1.34	11.6	8.79
6% LSS	1.25	11.4	9.16
12% LSS	1.21	10.8	8.85
6% LSS[b]	1.33	11.4	8.52

[a] 118 days. Supplement comprised 10 percent of ration dry matter, remainder silage.
[b] LSS removed after 28 days.

Lower Levels

In Trial 2, 400 head of Angus, Hereford and crossbred steers weighing about 400 pounds were allotted to eight pens, 50 head per pen. Two pens of cattle were randomly assigned to one of four treatments. Again, corn silage was fed ad lib and supplement as 10 percent of the ration dry matter. The treatments were:

1. A control supplement with no LSS.
2. A supplement with six percent LSS.
3. A supplement with three percent LSS.
4. Six percent LSS for the first 28 days, then control supplement with no LSS.

Results of Trial 1 are shown in *Table 1.* Calves fed the control ration gained as well as calves fed liquid streptomyces solubles. There was enough variation between pens within a treatment to prevent statistical differences between treatments. Calves fed the liquid streptomyces solubles for only the first 28 days were somewhat more efficient than the control cattle. The level of liquid streptomyces solubles might have been too high, especially after the first 28 days of the feeding period.

Table 2. Performance of steers fed liquid streptomyces solubles first 28 days.

	Daily gain lb	Daily feed lb	Feed/ gain
Control	1.46	12.3	8.77
6% LSS	1.35	12.1	9.30
6% LSS[a]	1.33	12.0	9.05
3% LSS	1.57	12.0	7.61

[a] LSS withdrawn after 28 days.

Table 3. Performance of steers fed liquid streptomyces solubles total 119 days.

	Daily gain lb	Daily feed lb	Feed/ gain
Control	1.39	13.8	9.96
6% LSS	1.32	13.5	10.21
6% LSS[a]	1.37	13.4	9.74
3% LSS	1.45	13.2	9.16

[a] LSS withdrawn after 28 days.

Performance of cattle for the first 28 days of the feeding period in Trial 2 is shown in *Table 2.* Steer calves fed the three percent LSS containing supplement gained .11 pounds per day more rapidly and over 15 percent more efficiently than the control cattle. Calves fed six percent LSS gained at a somewhat slower rate than calves fed the control ration. They ate slightly less feed and efficiency of gain was slightly less also.

LSS Use Beneficial

Gains for the entire feeding period are shown in *Table 3.* Cattle fed six percent LSS throughout the trial gained slightly less rapidly and efficiently than control cattle. However, when the LSS was withdrawn after the first 28 days, the cattle gained as rapidly and slightly more efficiently than the control cattle. Cattle fed three percent LSS in the supplement gained more rapidly and considerably more efficiently than the control cattle. The increase in daily gain was .06 pounds per day. The cattle fed the three percent LSS were 8.7 percent more efficient in converting feed to gain than the control cattle.

It appears that feeding six percent for longer than the first 28 days may not be beneficial. The three percent level of LSS in the supplement appeared to give a beneficial response.

Pressure Treatment of Corn Cobs

Terry Klopfenstein
Professor, Ruminant Nutrition

Treatment of low quality roughages to improve feed values may be of utmost importance as population growth approaches our food production potential.

Treatment of crop residues such as corn cobs with high pressure steam solubilizes some of the fiber and increases digestibility.

Feeding values of crop residues are low because of their high fiber content and poor digestibility of that fiber. Two lamb and one cattle feeding trials have been conducted to determine the feeding value of corn cobs which have been treated with 200 or 250 pounds per square inch (PSI) steam for 50 seconds.

A small experimental pressure device was used to treat cobs in these trials. This equipment is similar to that used for exploding grain. Ground cobs were mixed with water to increase moisture to 50 percent and then added to the pressure chamber. Steam pressure was applied for 50 seconds and the cobs were immediately blown from the chamber. The treated cobs (65 percent moisture) were fed wet with a natural protein supplement and compared to untreated cobs.

Table 1. Pressure treated vs. untreated cobs for lambs.[a]

	Cob treatment			
	Control	200 PSI	250 PSI	250 PSI[b]
DMD,[c] %	50.4	62.0	67.0	66.7
Daily gains, lb	.12	.22	.33	.30
Daily feed,[d] lb	1.5	2.3	2.6	2.3
Feed/gain	12.1	10.4	7.9	7.7

[a] 6 lambs/treatment fed for 69 days on 70 percent cobs and 30 percent soybean meal base supplement.
[b] 1.5 percent sodium metabisulfite added prior to treatment.
[c] In vitro (artificial rumen) dry matter digestibility.
[d] Dry matter basis.

Table 2. Sodium metabisulfite level for cob treatment for lambs.[a]

	% Sodium metabisulfite[b]			
	0	.5	1.0	1.5
DMD,[c] %	64.3	67.7	68.2	70.3
Daily gains, lb	.37	.45	.46	.39
Daily feed, lb	2.2	2.3	2.7	2.3
Feed/gain	6.0	5.2	5.7	5.9

[a] 6 lambs/treatment fed for 66 days.
[b] Sodium metabisulfite added prior to treatment of cobs at 250 PSI for 50 seconds.
[c] In vitro (artificial rumen) dry matter digestibility, untreated cobs were 57.5 percent.

Table 3. Value of pressure treated cobs in calf growing rations.[a]

	Control cobs	⅔ Control ⅓ treated	⅓ Control ⅔ treated	Treated cobs
Daily gain, lb	0.82	1.54	1.66	1.68
Daily feed,[b] lb	9.1	12.0	14.8	15.1
Feed/gain	11.1	7.8	8.9	9.0

[a] 5 heifers/treatment; 441 lb average initial weight; fed 103 days, 79 percent cobs, 21 percent soybean base supplement.
[b] Dry matter basis.

Lamb Trials

Twenty-four lambs were individually fed one of four rations in the first lamb trial. Treatments were:

1. Untreated cobs.
2. Cobs treated at 200 PSI for 50 seconds.
3. Cobs treated at 250 PSI for 50 seconds.
4. Cobs treated at 250 PSI for 50 seconds with 1.5 percent sodium metabisulfite added to retard browning.

Cobs comprised 70 percent of the ration dry matter and a soybean meal supplement 30 percent.

Pressure treatment of cobs at 200 PSI nearly doubled daily gains (Table 1). Treatment at 250 PSI produced a further increase in gains. Daily feed intakes and feed efficiency also increased with pressure treatment. Sodium metabisulfite reduced intake but increased efficiency. Dry matter digestibility was increased more than 15 percent.

In the second lamb trial, indi-

vidually penned lambs were fed cobs treated at 250 PSI for 50 seconds with 0, 0.5, 1.0, or 1.5 percent sodium metabisulfite added.

Dry matter digestibility increased with increasing levels of sodium metabisulfite (Table 2). Daily gains and feed efficiencies were highest for 0.5 and 1.0 percent metabisulfite.

Heifer Trial

Twenty Angus heifer calves were allotted to one of four individually fed rations. Rations contained 21 percent soybean meal supplement and 79 percent of:

1. Control (untreated) cobs.
2. Control cobs (2/3) and 1/3 treated cobs.
3. Control cobs (1/3) and 2/3 treated cobs.
4. Treated cobs.

Cobs were treated at 250 PSI for 50 seconds with .75 percent sodium metabisulfite added to the reaction mixture.

Daily gains increased with addition of treated cobs to the rations (Table 3). However, the increases did not follow a trend. The first 1/3 treated cobs increased gains by .7 lb per day while higher levels of treated cobs further increased gains by only about .1 lb/day. Feed efficiency was best for calves fed 2/3 control and 1/3 treated cobs.

Digestibility Increased

Steam pressure treatment of corn cobs increased digestibility, producing more rapid and efficient gains in calves and lambs. Sodium metabisulfite increased rate and efficiency of gains. The best level appeared to be between .5 and 1.0 percent.

When fed to calves, lower levels of treated cobs (26 percent of the ration) appeared to give a greater response than higher levels (52 or 79 percent of ration). While some energy is used to pressure treat cobs, the cost is not prohibitive. The increased rate and efficiency of gains in cattle appears to be adequate pay for processing and yet produces gains at a reduced cost compared to conventional growing rations such as corn silage or hay and grain.

Pasteurella Vaccine Evaluated

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(Veterinary Science)

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Professor, Animal Science

There are vaccines for only three viruses and one bacteria involved in cattle respiratory diseases: IBR (infectious bovine rhinotracheitis), BVD (bovine virus diarrhea), and PI_3 (para-influenza$_3$).

Many more viruses can start respiratory diseases for which no vaccines are available. Pasteurella vaccines have been effective in preventing general infection with Pasteurella or the old "hemorrhagic septicemia"; however, Pasteurella vaccines have been disappointing in producing "resistance" in the lungs to Pasteurella as a secondary invader.

If a vaccine was available that would prevent the secondary Pasteurella infection in calves, much of the death loss could be prevented.

New Vaccine Studied

This study was designed to evaluate a new Pasteurella vaccine in western Nebraska.

One-hundred and forty calves at the Sandhills Agricultural Laboratory were gathered, weighed, and 72 head were vaccinated on August 15, 1974, with Pasteurella bacterin (a suspension of killed bacteria).

Calves were brought in September 20, 1974, weighed, and the 72 calves revaccinated with Pasteurella vaccine. All calves were vaccinated with a combined modified live IBR, *Leptospira pomona* bacterin, and 4-way Clostridium vaccine. They were weaned and hauled 45 miles to the North Platte Station. These calves were put in close confinement with fresh water furnished in a large tank. They were started on prairie hay with silage added in increasing amounts until at the end of five days they were receiving only corn silage and protein supplement. No antibiotics were added to the starting ration.

Calves were checked two to three times a day for signs of sickness. Calves requiring treatment were put in the chute, their temperature checked, and antibiotics administered. These calves received antibiotic treatment until the temperature was back to normal, but not for less than three days, and returned to the herd.

Eleven days after weaning, all calves were dipped in a hydraulic dipping vat containing an organic phosphate insecticide.

The calves were weaned, put on silage and dipped before any calves required treatment.

Results

Five days following dipping, four calves required treatment for respiratory disease. On day 6, four more calves required treatment. On day 7, twenty-three calves were treated. With this explosive outbreak, antibiotic (aureomycin crumbles, 2 gm/lb) was added to the diet at a rate to supply one-half pound (1 gm) per head per day for 4 days; then reduced to one-fourth pound (500 mg) per head per day for 4 days.

Some calves required individual treatment after antibiotics were added to the diet. Nineteen percent of the unvaccinated calves and 25 percent of the vaccinated calves required individual treatment for respiratory disease.

The first 28 days following weaning the calves had an average daily gain of 0.77 lb and 0.69 lb per head per day for the vaccinates and unvaccinates, respectively.

Respiratory disease is a complex problem. It has been attributed to viral agents plus bacterial agents plus stress. In this trial with calves vaccinated with modified live IBR vaccine, *Pasteurella multocida* vaccine was ineffective in the prevention of respiratory disease following the stress of dipping.

Pour-on grub insecticides are safe and efficient.

Safe and Efficient

Pour-on Grub Insecticides

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Systemic pour-on grub insecticides are both safe and efficient in controlling cattle lice, when applied in January or February.

Losses due to cattle lice may be serious, especially during severe winters. Heavy infestations may cause anemia, anemic abortion, susceptibility to disease, weight loss, and even death. Calves, yearlings, and older cattle have the heaviest infestations of blood sucking lice. Lice numbers increase in winter and decrease in summer, and are transmitted between cattle by contact.

1971–74 Studies

Systemic pour-on grub insecticides for control of cattle lice were studied at the North Platte Station in the winters of 1971–74. This method does not subject animals to cold stress when treating for cattle lice with dips or sprays in the winter. There is a possibility of the "host-parasite reaction" occurring when grubs are killed in the gullet or spinal canal by the insecticide. However, many cattle in Nebraska are not treated for lice until late January or early February when grubs migrate to the loin or back area and treatment would thus be safe.

Cattle for the trials were from University herds and cooperating ranchers located on a north-south transect from the South Dakota to Kansas borders. This large area and the number of cattle treated (2,500) should account for any possible variation in the life cycle of either the Northern or Common grub species.

In most cases all animals in the herd were treated, so there were

Table 1. Efficacy of various systemic pour-on insecticides or rates in controlling cattle lice, Nebraska, 1971-1974.[a]

No. herds	No. cattle	Insecticide	Application rate	Lice rating[b]					
				Pretreatment			Post treatment[c]		
				Heavy	Moderate	Light	Heavy	Moderate	Light[d]
7	83	Warbex 12.5%	½ oz/100 wt.	11	33	39	0	0	9
6	44	Warbex 12.5%	¼ oz/100 wt.	1	16	27	0	0	7
5	56	Korlan 8E[e]	½ oz/100 wt.	3	6	47	0	0	0
6	57	Neguvon 8.0%	½ oz/100 wt.	3	17	37	0	0	0
6	58	Tiguvon 3.0%	½ oz/100 wt.	7	16	36	0	0	1
1	10	Tiguvon 3.0%	¼ oz/100 wt.	0	1	9	0	0	0
2	83	Tiguvon 3.0%	1 oz/100 wt.	21	41	20	0	0	12
1	20	Reulene 13.5%	1 oz/100 wt.	0	2	18	0	0	0
5	37	Reulene 13.5%	¾ oz/100 wt.	2	8	27	0	0	6
1	20	Reulene 13.5%	½ oz/100 wt.	13	7	0	0	0	4
6	58	Co-Ral 4.0%	½ oz/100 wt.	3	13	42	0	1	3
2	82	Tiguvon 7.0% (Water mixable) 8:1 Ratio	1 oz/100 wt.	21	41	20	0	0	12

[a] Primary louse species *Linognathus vituli* (L.), *Haematopinus eurysternus* (Nitzsch) and *Bovicola bovis* (L.) secondary.
[b] Lice ratings: 5 hairparts on face, neck, back and tailhead on one side of animal, average of 0-3=light, 3-10=moderate, more than 10=heavy.
[c] Counts made 14-30 days after treatment.
[d] On post treatment counts, 1 live louse=a rating of light.
[e] Korlan (ronnel) not considered a systemic insecticide.

enough numbers to evaluate safety of this treatment method. Untreated check cattle were left only where facilities were available to keep them separate since reinfestation with lice can occur from animal contact. A number of animals in each herd were restrained, identified and evaluated for lice infestations (both before and 14 to 21 days after treatment).

Safe and Efficient

Results of these trials (Table 1) indicated that systemic insecticides are both safe and efficient in controlling lice. Skin burn on three calves was the only detrimental report received following treatments. This was probably due to the petroleum carried in the insecticide formulation.

Reduction in numbers of lice was at least equal to reduction by most sprays. Insecticide rates lower than necessary for grub control appeared to control lice. Korlan (ronnel), an insecticide not considered systemic (it doesn't kill grubs), looked very good. This is

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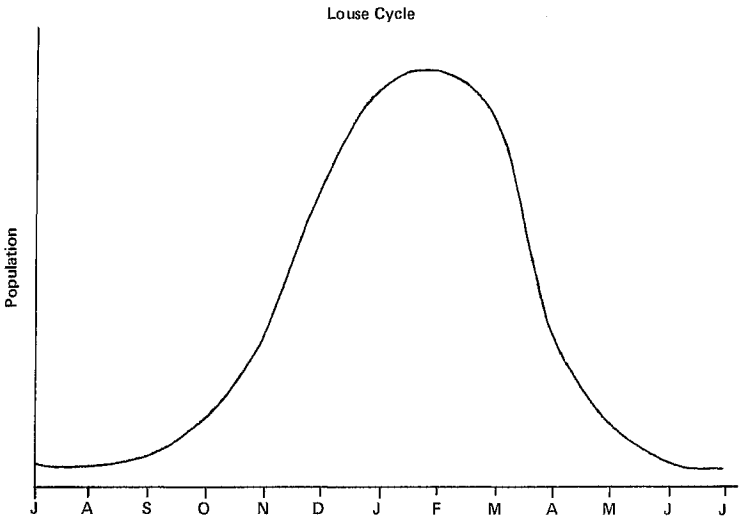


Figure 1. Insecticide treatment times vs effectiveness.

Table 2. Efficacy of Tiguvon (spot-on formulation at several rates) and Korlan 2 in controlling cattle lice, Nebraska, 1971–74.[a]

No. herds	No. cattle	Insecticide	Application rate	Lice rating[b]					
				Pretreatment			Post treatment[c]		
				Heavy	Moderate	Light	Heavy	Moderate	Light[d]
3	80	Korlan 2	1 oz/100 wt.	16	44	20	0	0	18
3	44	Tiguvon 20%	4 cc/300 wt.	4	33	54	0	0	13
2	15	Tiguvon 20%	3.5 cc/300 wt.	2	13	0	0	0	5
3	23	Tiguvon 20%	3 cc/300 wt.	8	15	0	0	0	4
1	10	Tiguvon 20%	2.5 cc/300 wt.	7	3	0	0	0	1

[a] Primary louse species *Linognathus vituli* (L), *Haematopinus eurysternus* (Nitzsch) and *Bovicola bovis* (L.) secondary.
[b] Lice ratings: 5 hairparts on face, neck, back and tailhead on one side of animal, average of 0-3=light, 3-10=moderate, more than 10=heavy.
[c] Counts made 14-30 days after treatment.
[d] On post treatment counts, 1 live louse=a rating of light.

Table 3. Efficacy of insecticide dust bags and new spray formulations in controlling cattle lice, Nebraska, 1971–74[a].

No. herds	No. cattle	Insecticide	Application rate	Lice rating[b]					
				Pretreatment			Post treatment[c]		
				Heavy	Moderate	Light	Heavy	Moderate	Light[d]
2	34	Co-Ral 40% F	½ gal. 0.06%	0	24	10	0	0	3
3	65	Ravap	½ gal. 0.25%	15	17	33	0	0	13
1	99	SD 7859 (Shell)		9	45	45	0	0	13
1	19	Rabon	3.0% Dust (Dust Bag)	0	5	14	0	0	4
1	30	Rabon	Free Choice	0	9	27	0	0	6
1	19	Co-Ral	1.0% Dust (Dust Bag) Free Choice	0	0	19	0	0	5
1	68	Famphur	5.0% Dust (Dust Bag) Forced Use	0	12	56	0	0	14
1	35	Tiguvon	5.0% Dust (Dust Bag) Free Choice	2	20	13	0	0	10

[a] Primary louse species *Linognathus vituli* (L.), *Haematopinus eurysternus* (Nitzsch) and *Bovicola bovis* (L.) secondary.
[b] Lice ratings: 5 hairparts on face, neck, back and tailhead on one side of animal, average of 0-3=light, 3-10=moderate, more than 10=heavy.
[c] Counts made 14-30 days after treatment.
[d] On post treatment counts, 1 live louse=a rating of light.

Pour-on Insecticides . . .

(continued from page 15)

important since it can be applied any time during the winter with no apparent danger of inducing the host-parasite reaction.

Further trials were started with Tiguvon in a higher concentration but at dosages that could be applied with a syringe dermally and with ronnel (Korlan 2). Results of these trials (Table 2) indicated that both the spot-on technique and ronnel cause a considerable reduction in lice numbers.

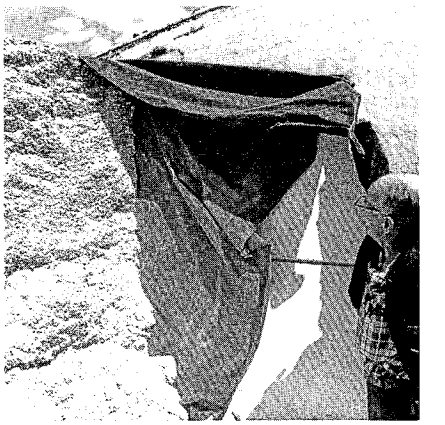
Dust Bags

The last phase of the lice control studies was to evaluate insecticide dust bags, both forced and free choice, and some new insecticide spray formulations. Herds have been observed that did not need winter treatments for lice when they had used dust bags for fly control and then had the bags available at the wintering grounds. Our trials were established to determine if dust bags were adequate to control louse populations after a buildup in numbers had occurred.

The sprays (all in low concentrations) did give good reductions in lice numbers (Table 3), indicating that these new formulations in low concentrations may be satisfactory. The time period for the dust bags was longer (30 days), but results indicated that they will reduce louse populations adequately and, if made available to cattle early enough, prevent buildup of lice numbers.

It is more difficult to reduce lice numbers to zero on an animal that has a population rating of heavy or moderate than on one rating light. Also, an insecticide treatment for lice in January or February is more apt to be effective in preventing any further problem than one applied in the fall, because of the probable trend in the normal population cycle of lice (Fig. 1). The few lice that remain after a fall treatment can re-establish a problem population. Cattle should be examined two or three weeks after treatment to determine if a second treatment is necessary.

Plastic is used to cover corn silage and minimize top spoilage.



For Growing Cattle

Alfalfa Additions to Corn Silage

Paul Q. Guyer
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Walter Tolman
Dist. Extension Beef Specialist (Retired)

Corn silage needs supplemental protein and calcium for the most efficient use of the energy it contains. Alfalfa usually contains more protein and calcium than needed by growing cattle. Thus, these feeds should compliment each other when used in a growing ration.

Four trials were conducted to compare combinations of corn silage and alfalfa with corn silage and a concentrate supplement at the Northeast Station, Concord.

Adding alfalfa did not improve rate of gain when added to a corn silage growing ration supplemented with a soybean based protein-mineral-vitamin supplement (Table 1). When fed at the rate of 4 lb daily, a pound of hay replaced about 2.5 lb silage. Feeding 4 lb of hay daily without supplement resulted in a reduction of about .3 lb daily gain. Adding corn cobs to increase dry matter reduced rate and efficiency of gain.

Rate of Gain Reduced

When alfalfa hay was fed to provide the supplemental protein needed for the growing ration of steers and heifers, rate of gain was reduced slightly (Tables 2, 3 and 4).

The 1966–67 study (Table 2) indicated alfalfa was effective in supplying protein and relatively effective in supplying energy for the growing ration. A relatively high level of hay was fed assuming that it would result in a wider spread in weight gains than actually occurred.

The 1971 study (Table 3) was designed to supply rations with

Table 1. The addition of roughage and protein supplement to corn silage for growing steer calves.[a]

	Soybean meal, mineral and Vitamin A supplement				No Supplement
	Silage alone	Silage + 4 lb alf. hay	Silage + 2 lb alf. hay	Silage + 2 lb cobs	Silage + 4 lb alf. hay
No. head	20	19	20	20	20
Initial weight, lb	518	521	516	519	520
Av. da. gain, lb	1.58	1.55	1.48	1.42	1.25
Daily feed[b]					
Silage, lb	43.1	32.6	37.8	36.0	33.4
Supplement, lb	1.25	1.25	1.25	1.25	—
Alfalfa hay, lb	—	4.00	2.00	—	4.00
Cobs, lb	—	—	—	2.00	—
Feed/Gain[b]					
Silage, lb	2734	2105	2544	2532	2669
Supplement, lb	80	80	84	89	—
Alfalfa hay, lb	—	259	134	—	320
Cobs, lb	—	—	—	141	—

[a] Conducted fall of 1966.
[b] "As fed" weights—no correction for moisture.

equal protein (11 percent crude, dry basis) and supplemental energy; minerals and vitamins were equalized by feeding a corn base supplement to the cattle fed alfalfa. The slight reduction in rate of gain reflected the lower energy content of alfalfa compared to corn silage dry matter. Subsequent gains during the finishing period and carcass quality were not influenced by difference in gains during the short growing study.

The 1972 experiment (Table 4) was designed to provide 12 percent protein. This required a higher percentage of alfalfa in the ration. Supplements provided equal minerals and vitamins but energy in the supplement for the alfalfa containing ration was kept at a minimum level. Because of this and the higher level of alfalfa, there was a substantial spread in energy between the two rations. This resulted in about .3 lb less daily gain and 30 percent larger dry matter requirement per hundredweight. Again, gains during the finishing period apparently were not influenced by differences in the relatively short growing phase.

Moderate increases in energy during the growing period did not reduce rate of gains or increase feed requirements in the finishing period.

Table 2. Alfalfa protein for growing calves.[a]

	Silage + soybean meal base sup.	Silage + hay + corn base sup.
No. head	36	36
Initial weight, lb	558	558
Final weight, lb	744	736
Daily gain, lb	1.66	1.58
Daily feed[b]		
Silage, lb	36.2[d]	24.9[e]
Alfalfa hay, lb	—	6.9
Supplement, lb	0.4	0.4
Feed/gain[b]		
Silage, lb	2184[e]	1570[d]
Hay, lb	—	437
Supplement, lb	26	28

[a] 30 steer and 6 heifer calves per treatment fed from December 8, 1966-March 30, 1967, 112 days.
[b] "As fed" weights used—no corretion for moisture.
[c] ⅔ treated silage (10 lb urea per ton), ⅓ untreated silage, av dry matter 35%.
[d] Untreated silage, 34% dry matter.

Table 3. Soybean protein vs. alfalfa protein for growing heifers.[a]

	Silage + soybean meal base supplement	Silage + alfalfa haylage + corn base supplement
No. head	40	40
Initial weight, lb	530	532
Final weight, lb	680	672
Daily gain, lb	1.85	1.74
Daily feed[b]		
Silage, lb	15.6	12.5
Alfalfa, lb	—	3.0
Supplement, lb	1.3	1.4
Feed/gain, lb	9.2	9.8

[a] Fed from September 30, 1971-December 21, 1971, 81 days.
[b] Dry weight.

Trial Results

To summarize, these trials studying alfalfa additions to corn silage indicate that:

1. Rate of gain can be expected to decline slightly due to the lower energy content of alfalfa.
2. When alfalfa is a competitive source of protein it can be used to reduce costs of gain.
3. Where alfalfa substitutes for protein in growing rations of 500 pound or heavier feeders, 12 percent crude protein appears to be higher than needed in the ration.
4. The small differences in rate of gain during the growing period in these tests did not result in differences in rates of gain or feed efficiency during the finishing period.

Table 4. Concentrate vs. alfalfa haylage as protein supplement to corn silage rations for growing steer calves.[a]

	Silage + soybean meal base supplement	Silage + alfalfa haylage + corn base supplement
No. head	48	48
Initial weight, lb	510	508
Final weight, lb	654	625
Daily gain, lb	1.39	1.11
Daily feed[b]		
Silage, lb	12.6	9.4
Alfalfa, lb	—	5.2
Supplement, lb	1.7	0.5
Feed/gain[b]		
Silage, lb	9.1	8.5
Alfalfa,[c] lb	—	4.7
Supplement, lb	1.2	0.7

[a] Fed from October 25, 1972-February 6, 1973, 104 days.
[b] Dry weight.
[c] First cutting alfalfa stored in plastic covered pile.

Vacuum packing in sealed plastic is satisfactory for storing small amounts of haylage.

Treated vs Untreated

Alfalfa Haylage

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Extension Livestock Specialist (Beef)

Wilted alfalfa treated with an additive[1] (hydroxyproprionic acid with added minerals) produced about equal gains with slightly less feed per unit of gain than drier untreated haylage in two tests at the University of Nebraska Northeast Station, Concord. Differences were not significant (Tables 1, 2).

The wetter haylage was more difficult to harvest and to handle at feeding. In the first trial, haylage was stored in small piles between plastic sheets and packed by pumping air from between the sealed sheets. Temperature maximum in storage was about 125° Fahrenheit in both piles. In the second trial, haylage was stored in

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[1] "Hylage" supplied and applied by MaNuVa Products, Inc., Salinas, Calif.

Table 1. Treated vs. drier untreated alfalfa haylage for growing steers (Trial 1).[a]

	Treated haylage[b]	Untreated haylage[c]
No. head	20	20
Initial weight, lb	633	650
Final weight, lb.	702	728
Daily gain, lb	1.56	1.76
Daily feed[d]		
Alfalfa, lb	12.5	16.1
Corn, lb	3.4	3.3
Feed/gain[d]		
Alfalfa, lb	8.0	9.2
Corn, lb	2.2	1.8

[a] South Missouri steers fed Nov. 20, 1972-Dec. 8, 1972 (44 days).
[b] Fine stemmed second cut with 27% dry matter and 19.4% protein (dry basis).
[c] Fine stemmed second cut with 57% dry matter and 22.6% protein (dry basis).
[d] Dry weight.

Alfalfa Haylage . . .

(continued from page 17)

well packed plastic-covered piles and maximum temperature was about 110° Fahrenheit in both piles. Observations indicated that heating developed less rapidly in the treated haylage than in the untreated, when both were exposed to air at feeding. There was some seepage from the treated haylage pile in the first test.

Haylage was full fed to heavy steer calves fed 4 pounds of either rolled or whole shelled corn per head per day. Some feed was wasted by cattle getting whole corn as they pushed the drier haylage from the bunk to reach grain that had settled to the bottom of the bunk (Table 3).

Both gain and feed requirements were equal between whole and rolled corn rations when no adjustment was made for wasted feed.

In evaluating the economics of preservative treatment, storage losses and the cost of the preservative and its application should be considered in addition to feed requirements and rate of gain.

Table 2. Treated vs. drier untreated alfalfa haylage for growing steers (Trial 2).[a]

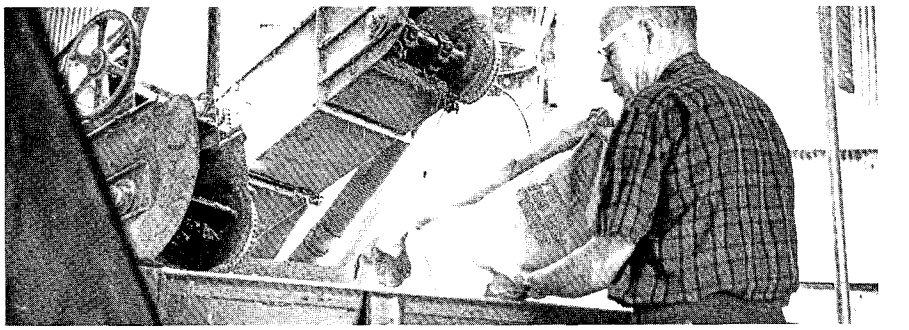
	Treated haylage[b]	Untreated haylage[c]
No. head	27	27
Initial weight, lb	715	718
Final weight, lb	877	873
Daily gain, lb	1.39	1.34
Daily feed[d]		
Alfalfa, lb	15.6	17.0
Corn, lb	3.5	3.5
Feed/gain[d]		
Alfalfa, lb	11.3	12.7
Corn, lb	2.5	2.6

[a] From California mountains fed from Sept. 28, 1973-Jan. 22, 1974 (116 days).
[b] First cut with 36% dry matter and 16.8% protein (dry basis).
[c] First cut with 59% dry matter and 16.7% protein (dry basis).
[d] Dry weight.

Table 3. Effect of rolling corn for steers fed limited grain in growing rations.

	Trial 1		Trial 2	
	Whole corn	Rolled corn	Whole corn	Rolled corn
No. head	20	20	18	18
Daily gain, lb	1.68	1.66	1.36	1.36
Feed/gain,[a] lb.	10.9	10.8	14.6	14.6

[a] Dry basis; no adjustment for feed wasted.



Rations mixed in a stationary mixer for tests at the Northeast Station.

Grain Additions to Alfalfa

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Paul Q. Guyer
Extension Livestock Specialist (Beef)

Alfalfa may supply more protein and calcium than needed for growing cattle. However, it is relatively low in energy. When alfalfa is fed alone, protein is wasted and gains are usually so low that fixed costs for interest, labor, and equipment use are excessive.

Higher energy feeds may be combined with alfalfa to increase gains and reduce total feed requirements and cost per unit gain. The amount of energy to be added to an alfalfa ration will be determined, in part at least, by the rate of gain desired and relative costs of the feeds available.

Response to Corn

Three experiments at the University of Nebraska Northeast Station, Concord, provide information on the response of young cattle to corn additions to alfalfa rations.

When alfalfa-brome hay was fed long in equal amounts, each pound of supplemental grain replaced 4.5 lb of hay (Table 1) and increased rate of gain by .13 lb daily per head. When steers were grazed on lush brome pasture following this growing test, cattle wintered on hay alone gained 0.1 lb less daily than those which had been wintered on both hay and grain.

In a second test, adding grain to alfalfa resulted in about .1 lb increase in daily gain and a hay replacement value of 2 to 2.5 lb per pound of grain (Table 2). Daily gains were exceptional in this test indicating response to one or more of the following: excellent quality alfalfa, compensatory gain potential in the cattle, or good feeding weather.

In a subsequent test, the hay replacement value for corn was quite similar but increases in rate of gain were less, .05 to .08 lb daily per pound of corn (Table 3). Daily gains were considerably lower in this test than in the previous study.

In the finishing period which followed, rate and efficiency of gain and carcass traits were about the same regardless of the growing treatment. Gains as high as 1.6 lb per head daily during the growing phase did not hurt subsequent rate of gain.

Summary

1. Where protein is adequate, one pound of corn up to 35 to 40 percent of the ration will replace

Table 1. Mixed alfalfa and brome hay with and without grain for growing calves.[a]

	Hay only	Hay + 4 lb corn daily
No. head	41	42
Initial weight, lb	536	538
Final weight, lb	617	698
Daily gain, lb	0.52	1.05
Daily feed[b]		
Hay, lb	16	14
Corn, lb	—	3.9
Feed/gain		
Hay, lb	30.4	13.4
Corn, lb	—	3.7

[a] Alfalfa and good quality brome hay fed long in about equal amounts to fleshy Hereford steer calves from December 15, 1965 to May 16, 1966, 152 days.
[b] Weights "as fed."

Table 2. Grain additions to alfalfa haylage for growing short yearlings.[a]

Daily corn fed	0	2 lb	4 lb	6 lb
No. head	20	20	20	20
Initial weight, lb	644	638	650	642
Final weight, lb	798	814	841	842
Daily gain, lb	1.83	2.08	2.24	2.38
Daily feed[b]				
Alfalfa,[c] lb	21.0	19.5	19.0	16.0
Corn, lb	0	1.8	3.6	5.4
Feed/gain[b]				
Alfalfa,[c] lb	11.6	9.4	8.5	6.8
Corn, lb	0	0.8	1.6	2.1
Corn in ration, %	0	8	15	24
Hay replaced by 1 lb corn, lb	—	2.75	1.94	2.29

[a] Thin Hereford steers fed from September 9, 1969 to December 2, 1969, 84 days.
[b] Dry weight.
[c] First and second cutting alfalfa haylage at 63% dry matter.

about 2¼ to 2½ pounds of alfalfa hay.

2. Feeding 1 pound of corn increases rate of gain about .1 lb per head daily when fed at 2-4 lb per day and somewhat less, .05-.08 lb per day, when fed at the rate of 6 to 8 pounds per head daily.

3. Gains of up to 1.6 lb per day did not appear to be detrimental to subsequent performance in the one trial where cattle were followed through the finishing phase.

Table 3. Grain supplementation of alfalfa for growing heavy steer calves.[a]

Daily corn fed	2 lb	4 lb	6 lb	8 lb
No. head	44	66	44	44
Initial weight, lb.	562	558	559	559
Final weight, lb	738	759	780	798
Daily gain, lb	1.20	1.37	1.50	1.62
Daily feed[b]				
Alfalfa,[c] lb	15.0	13.6	12.2	10.8
Corn, lb	1.7	3.5	4.9	6.3
Feed/gain[b]				
Alfalfa,[c] lb	12.6	9.9	8.1	6.7
Corn, lb	1.4	2.5	3.2	3.9
Corn in ration, %	10	20	28	37
Hay replaced by 1 lb corn, lb	—	2.45	2.50	2.36

[a] Mixed breed calves from south Texas fed from September 10, 1970 to February 24, 1971, 147 days.
[b] Dry weight.
[c] Alfalfa haylage replaced by alfalfa hay at 84 days.

Metabolizable Protein and BDG

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Whitney Rounds
Graduate Assistant

Protein supplementation makes up a large part of the cost of many growing rations, making efficient use of protein mandatory. In times of high energy cost, it is also important that protein not limit energy utilization.

The best use of natural protein and maximum use of non-protein nitrogen (NPN) have been goals of nutritionists and cattle feeders for years. Recently, a new concept for describing protein metabolism in the rumen was proposed by workers at Iowa State.

Proteins fed to ruminants are broken down in the rumen to ammonia and volatile fatty acids (VFA). Not all plant protein is broken down to the same extent. Soybean meal protein is broken down to a greater extent than protein from grain or brewer's dried grains.

Plant protein not broken down in the rumen is ultimately bypassed to the lower intestinal tract where it is utilized more efficiently. The microbial population in the rumen reforms the ammonia and VFA's into new protein.

Metabolizable Protein

The new system for evaluating protein needs of feedlot cattle is called metabolizable protein (MP). An important feature of this new system is its ability to predict the quantity of NPN that can be efficiently utilized with a given ration. From calculations, the metabolizable protein system predicts 10.4 grams of microbial protein are formed for every 100 grams of TDN consumed. This may partially explain why urea utilization has never been as good on high roughage rations as on high concentrate rations. TDN of high roughage rations is lower than high concentrate rations, thus, energy limits maximum microbial protein synthesis.

Protein solubility determines the extent to which protein is degraded in the rumen and, conversely, the amount that bypasses rumen digestion and is digested in the small intestine. In theory, an ideal protein would be only slightly soluble in the rumen and highly digestible in the lower tract. Brewer's dried grains appear to have these qualities. Such a protein source when fed in combination with urea supplies the ruminant with enough nitrogen for maximum microbial protein synthesis plus natural protein bypass.

The MP system becomes beneficial when used to formulate high roughage growing rations for calves. The growing calf has a high protein requirement. As he de-

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Table 1. Cattle performance when fed various rations.[a]

	Soybean meal	Urea	Brewer's dried grains + urea[b]	Brewer's dried grains[c]
Initial weight, lb				
light rep	403	423	413	420
heavy rep	510	513	503	530
average	456	468	458	475
Daily gain, lb				
light rep	2.11	1.63	2.02	2.14
heavy rep	1.73	1.42	1.83	1.93
average	1.92	1.53	1.93	2.04
Feed/gain				
light rep	5.92	6.01	6.89	5.79
heavy rep	7.74	9.46	7.30	6.82
average	6.83	7.74	7.09	6.31

[a] Trial lasted 106 days, 12 head per treatment.
[b] Ration balanced for metabolizable protein and urea fermentation potential estimating 40 percent bypass of brewer's dried grains protein.
[c] Brewer's dried grains fed to provide same crude protein as soybean meal.

Metabolizable Protein . . .

(continued from page 19)

velops, his protein needs drop. The MP system evaluates the protein status of the growing calf and predicts the amount of NPN that can be utilized throughout the feeding period (UFP).

Feeding Trial

Using the MP system to more thoroughly evaluate the use of brewer's dried grains (BDG), a 106-day feeding trial with growing steer calves was conducted at the University of Nebraska Field Laboratory at Mead. Forty-eight steer calves were allotted to a light or heavy replication based on shrunk weight. Animals were weighed at 28-day intervals after a 15-hour shrink. The basal ration in this trial was 50 percent corn silage and 50 percent sodium hydroxide treated ground corn cobs.

The urea and soybean meal control rations were balanced to meet the UFP and MP requirements, respectively. BDG were fed in two rations. In one, 40 percent bypass of BDG protein was estimated and the ration balanced for MP and UFP using BDG and urea (BDG-urea). In the other ration, BDG was fed to supply the same amount of crude protein as the SBM ration. Rations were rebalanced every 28 days to correct for the changing MP requirement of the animal.

Calves fed BDG-urea gained as fast as calves fed SBM (Table 1), while those fed urea gained .4 lb per day less. The best performance was from calves fed BDG at the same protein level as SBM.

The MP system can be used to explain performance of these calves. The four rations fed are shown in the table with the calculated MP and UFP values. The urea control ration supplied about 350 grams of MP per day. The SBM and BDG-urea rations supplied about 440 and 413 grams of metabolizable protein per day. This difference in MP content of the rations demonstrates why the urea control calves did not perform as well as SBM or BDG supplemented calves.

Based on average daily gain, calves fed SBM or BDG-urea performed 26.2 percent better than calves fed urea. These data indicate there was not sufficient energy available in the urea ration to allow the microbial population to synthesize microbial protein in adequate quantities to meet the growing calf's requirement. Apparently, BDG protein is more than 40 percent bypassed.

Table 2. Metabolizable protein content and urea fermentation potential of rations fed in the performance trial.

Ingredient	kg/day	Metabolizable protein (MP)	Urea fermentation potential (UFP)
Soybean ration			
Corn silage & cobs	5.08	173.1	55.3
Molasses	.30	6.8	6.0
Soybean meal	.71	121.1	–76.0
		301.0	–14.7
		from UFP[a] 136.5	
		437.5	
Urea ration			
Corn silage & cobs	5.08	173.1	55.3
Molasses	.81	18.4	16.2
		191.5	71.5
		from UFP 159.2	
		350.7	
Brewer's dried grains-urea ration[b]			
Corn silage & cobs	4.95	168.9	53.9
Molasses	.30	6.7	6.0
Brewer's dried grains	.68	104.3	–27.8
		279.9	32.1
		from UFP 133.4	
		413.3	
Brewer's dried grains ration			
Corn silage & cobs	4.66	159.0	50.8
Brewer's dried grains	1.34	205.2	–54.7
		364.2	– 3.9
		from UFP 113.1	
		477.3	

[a] Represents the amount of metabolizable protein derived from the positive urea fermentation potential.
[b] Ration balanced for metabolizable protein and urea fermentation potential estimating 40 percent bypass of brewer's dried grains protein.

Table 3. Cost of brewer's dried grains and soybean meal protein.

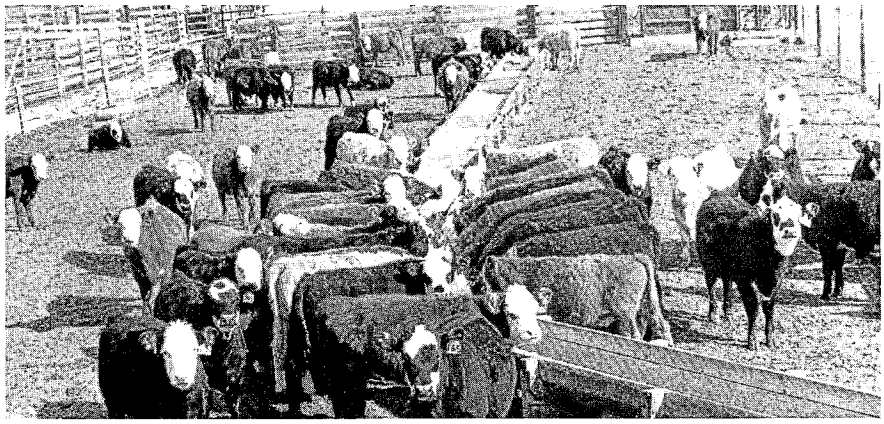
Protein source	Amount fed per day, lb	Lb protein fed per day	Cost[a] $
Soybean meal	1.73	.780	.147
Brewer's dried grains-urea	1.67	.457	.092[b]
Brewer's dried grains to supply same MP as soybean meal	2.16	.592	.119

[a] Soybean meal calculated at $170 per ton; brewer's dried grains calculated at $110 per ton.
[b] $.009 per day for urea to meet UFP.

Can Mean Savings

BDG fed as a supplemental protein source can produce gains equal to SBM with a savings to the cattle feeder (Table 2). Cattle fed BDG-urea gained the same as cattle fed SBM but did it on 40 percent less natural protein. This represents a savings of 5.5¢ a day in the cost of natural protein. Urea would cost .9¢ per day so the total savings would be more than 4.5¢ per day. If BDG are fed (without urea) to supply the same MP as SBM, less crude protein (.78 vs .59 lb/day) is necessary, so the cost of protein supplementation is less (14.7 vs 11.9¢). This occurs because protein is wasted as lost ammonia when SBM is fed.

Cattle fed BDG at the same crude protein level as SBM gained faster and more efficiently than any other treatment. These results indicate that the MP requirement of the cattle fed SBM and BDG-urea may have been slightly underestimated.



Cattle on test.

Dried Poultry Waste

Supplement for Cows, Calves

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Livestock Technician

Finding alternate sources of nitrogen (protein) for ruminant animals is a continuing process. A new target for research in this area is dried poultry waste (DPW).

At this time, DPW is a rather indefinite product which has had little standardization. Its chemical analyses vary tremendously depending upon the type of birds and their use, the drying procedures used, and the general handling procedures.

The two general sources of waste are from caged layers and from broiler production. The former is a much more consistent product in that it is 100 percent excrement, whereas the latter contains litter and other material not of poultry origin. The DPW used in these experiments was from caged layers.

Results of these experiments indicate that DPW can be used as a portion of the supplement when fed to growing calves or lactating cows receiving silage.

Table 1. Composition of dried poultry waste from caged layers.

Nutrient	Range, %
Moisture	5 to 18
Protein equivalence	15 to 38
Preformed protein	8 to 14
Ash	18 to 42
Calcium	5 to 12
Phosphorus	2 to 3

Introduction

If and when the Food and Drug Administration approves the use of DPW in ruminant rations, it is likely that first approved will be DPW from caged layers. It would be much easier to standardize. There will be many regulations accompanying the approval, such as possible pasteurization procedures to render the product pathogen free.

Fresh poultry droppings contain two types of components: (1) materials that were undigested, such as cellulose and lignin, minerals, fatty acids, etc.; (2) compounds of metabolic origin, such as uric acid, creatine, creatinine, ammonium salts, etc. Most of these compounds contain some form of nitrogen which can be utilized by microorganisms in the rumen; thus, the interest in using this kind of product for a nitrogen source for ruminants.

The chemical composition of DPW from caged layers can vary greatly, primarily because of the different drying procedures (Table 1). One of the biggest factors affecting the nitrogen content of DPW seems to be the time span between droppings and drying, and the amount of heat used in drying. The shorter the time and the lower the temperature the higher the nitrogen content in the final product. DPW is a low energy product. It is a good source of calcium and phosphorus, however.

Several experiments have been reported regarding DPW's use as a protein source in finishing cattle rations. Little data are available on its use as a protein supplement for growing calves or lactating beef cows. The following two experiments were conducted to evaluate this possible use of DPW.

Calf Trial

During the winter of 1974, a trial with growing calves was conducted using 48 heifers, assigned at random to six pens of eight head each. Three 24 percent protein supplements, each replicated, were used (Table 2).

The supplement containing 35 percent DPW had a fourth of the protein equivalence from DPW; the supplement containing 70 percent had half of the protein equivalence from DPW. The DPW used in this trial contained 17 percent protein equivalent, 11 percent calcium, 2.5 percent phosphorus and 40 percent total ash.

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Table 2. Composition of supplements used in the growing experiment.

	Control	35% DPW	70% DPW
	%	%	%
DPW	—	35.0	70.0
Soybean meal	50.0	38.5	26.8
Corn	20.3	10.0	—
Molasses	3.0	3.0	3.0
Dicalcium phosphate	10.0	5.0	—
Limestone	16.5	0.3	—
Trace minerals	0.2	0.2	0.2
Vitamin A	←	15000 IU/day	→
Protein	24.1	24.1	24.0
Calcium	7.8	7.8	7.8
Phosphorus	2.3	2.3	2.3

Dried Poultry Waste . . .

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Each supplement was fed at the rate of two pounds per head per day with a full feed of corn silage.

The performance of the calves receiving the three supplements for 113 days is shown in Table 3. Differences in the performance of the calves receiving the three different supplements approached significance.

Trends in the data indicate that a small amount of DPW is not undesirable, but too high levels could be undesirable. Poor palatability has been encountered in other studies and the higher the level of DPW the more pronounced the problem. In this study, poor palatability was not encountered, but supplement formulation and pelleting was designed to overcome a palatability problem.

3-year-old Cow Trial

Fifty-one three-year-old cows were used in the experiment. As cows calved starting March 12, 1974, they were placed in one of two small traps on a rotation basis. By the end of calving each area had half of the cows and calves and the average age of the calves was the same in both groups. They remained in the traps until May 31, 1974, at which time they were put together in a pasture for breeding which started June 5, 1974.

Both groups of cows were fed a full feed of silage and one of two supplements while in the traps. The control ration was one pound per head per day of a 40 percent natural protein supplement mixed with the silage. The other was a self-fed block with the following composition: protein, 37 percent; calcium, 2–4 percent; phosphorus, 1 percent. The block contained 40 percent DPW, 27 percent molasses, 15 percent salt, 12 percent cottonseed meal and 6 percent urea plus vitamin A and D. It had 17 percent crude protein equivalence from urea. Another 8 or 10 percent protein equivalence from non-protein nitrogen in the DPW could be possible making a high non-protein nitrogen supplement.

Table 3. Plant protein vs. supplement containing dried poultry waste for growing calves.

	Control	35% DPW	70% DPW
Number of calves	16	16	16
Av weights, lb			
Initial	410	402	410
Final	588	596	580
Daily gain	1.58	1.72	1.50
Av feed consumption			
Daily	39.2	38.2	37.6
Per lb of gain	24.8	22.2	25.0

Table 4. Plant protein vs. supplement blocks containing dried poultry waste for cows nursing calves.

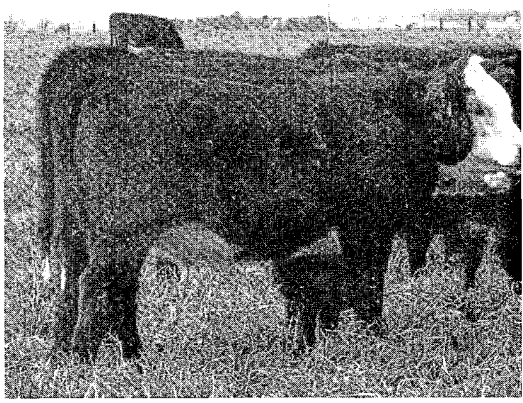
	40% natural protein pellets	37% protein blocks with DPW
Number of cows	26	25
Av daily intake, lb		
Silage	53.2	55.9
Supplement	1.0	.72
Av weights, lb		
Cows following calving	839	855
Cow gain to 5-31-74	42	32
Cow gain to 9-5-74	66	47
Calf gain to 5-31-74	95	93
Calf gain to 9-5-74	253	246
Reproductive performance		
Av days, calving to 1st estrus	50	45
No. cows open following 50 day breeding	1	2

Cows on the natural protein supplement had access to a salt and mineral mix, whereas those on the block received no salt except that in the block. Preliminary use indicated 1 to 1.25 lb per head per day consumption could be expected.

The average consumption of cows receiving the block was less than expected, 0.72 lb per head per day. Their silage consumption was slightly greater than that of cows receiving the natural supplement (Table 4).

Although the cow and calf gains were slightly greater for those receiving natural protein, it was not significant. Those on the free choice blocks ate less, so one would expect lower performance.

Both groups of cows showed similar reproductive performance. They were artificially inseminated for 30 days and a clean up bull used for 20 days.



Steers full fed on irrigated pasture.

Alternative Methods

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With higher feed grain prices, cattle feeders must search for methods of finishing cattle to an acceptable grade using less grain.

Finishing cattle on corn silage or limit feeding grain on pasture are two methods of reducing grain inputs. These are old methods that lost their usefulness because fixed costs or costs associated with time became more costly than feed. In recent years, however, this relationship may have reversed itself, and we need to reevaluate these feeding methods.

Finishing on Corn Silage

Forty Angus-Hereford heifers were weaned in October, 1973, then grazed on irrigated pasture regrowth until mid-November. They were then placed in lots and fed corn silage and a supplement containing adequate protein, vitamins and minerals.

On January 10, 1974, the calves were weighed and started on a growing ration consisting of a full feed of corn silage and 2 lb of 24 percent protein supplement. The experiment was to test sources of protein. No significant differences were observed.

On June 24, corn silage intake was stabilized at 49 lb per head per day and fed with 1 lb of 40 percent

for Finishing Cattle

protein supplement. The silage ranged from 30 to 32 percent dry matter. During this time all 40 heifers received this ration. On October 2, 1974, they were divided into three groups by weight and fed 4 lb corn in addition to the corn silage and protein supplement until slaughter. The heaviest group was slaughtered first after receiving the grain for only 13 days. The next two groups were slaughtered at 28 and 34 days, respectively. Data are shown in Table 1.

This trial demonstrates that beef cattle can be finished on less grain and larger amounts of corn silage than is conventionally used. This method is not without the disadvantages of lower average daily gains which result in extended finishing periods and increase fixed costs. However, grain may be more costly than time under current conditions.

Feeders with sufficient quantities of corn silage can produce desirable market beef with little or no additional corn. These heifers weighing 404 lb on January 10, 1974, finished in an average of 291 days at 860 lb (feedlot weight less 4 percent), consuming 27.3 bushels of corn, assuming the silage dry matter was 40 percent grain.

Table 1. Finishing heifers with silage (1974).

No. of heifers		40	
Weight, 1/10 (shrunk overnight)		404	
Weight, 6/24 (shrunk overnight)		661	
Av daily gain, 1/10 to 6/24 (165 days)		1.56	
Weight, 10/2 (shrunk overnight)		798	
Av daily gain, 6/24 to 10/2 (100 days)		1.37	
Av feed consumed, lb/day			
1/10 to 6/24 (165 days)			
Silage		36.00	
Supplement (24% protein)		2.00	
6/24 to 10/2 (100 days)			
Silage		48.25	
Supplement (40% protein)		1.00	
	Slaughter groups		
	1	2	3
No. heifers	10	20	10
Wt., 10/2 (shrunk overnight)	730	800	860
Adj. final wt.[a]	791	847	869
Days, 10/2 to slaughter	34	28	13
Av daily gain,[a] 10/2 to slaughter	1.79	1.68	0.69
Av feed consumed, dry matter, lb			
Daily, 10/2 to slaughter			
Corn silage	13.8	14.0	13.9
Corn	3.3	3.3	3.2
40% protein supplement	.9	.9	.9
Total, days	299	293	278
Corn silage	3807	3728	3518
Protein supplement	418	412	399
Corn	113	93	42
Total corn grain[b]			
Lb	1656	1502	1456
Bushel	29.6	26.8	26.0
Carcass data			
Yield[c]	58.7	58.5	58.2
Quality grade[d]	11.8	12.4	11.9
Choice, %	80	85	60
Yield grade	2.50	2.50	2.40

[a] Final weight adjusted to 60% yield.
[b] Silage analyzed 31% dry matter and 40% of silage dry matter was corn (estimated).
[c] Yield based on slaughter wt. (full wt. less 4%), and warm carcass weights.
[d] High good=11 and low choice=12 (1974 grading system).

Finishing on Irrigated Pasture

During a 103-day individual feeding experiment in the summer of 1974 designed to study ways of limiting grain intake, 20 yearling steers grazing irrigated pasture received an average of 5.14 lb corn per head per day. Their average daily gain during this period and a 32-day period they were on the pasture before feeding of corn was 2.25 lb (Table 2).

Following the summer study (September 13) the steers were kept on irrigated pasture with their corn intake gradually raised to a full feed and maintained at this level for 60 days. Throughout this time the steers were group fed in a bunk. They had access to a 50-50 mixture of dicalcium phosphate and salt, but they did not receive supplemental protein. The average daily consumption of corn (Table 2) was 16.21 lb with 8.62 lb of corn required per lb of gain.

Adjusted daily gain was 1.88 lb —considerably below feedlot gains (drylot, receiving a conventional finishing ration) of 3.57 lb per day reported by Lake *et al* (1973 Beef Cattle Progress Report).

The poorer performance of cattle in this trial may have been due to an inadequate intake of protein or calcium, or both. The assumption that grazed forage would adequately supplement the corn was probably not valid. The animals would have had to consume 6 lb of forage dry matter (14 percent crude protein) per day in addition to a full feed of corn to meet their protein needs. This quantity of forage (at 0.5 percent calcium) would provide only about half of their supplemental calcium requirement.

Although these cattle did not perform as well as expected they were marketed on 26.82 bushels of

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Finishing Cattle . . .

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corn while animals grown on a corn silage program and finished on a high grain feeding program would consume about 50 bushels (includes grain in corn silage). Supplementation would probably improve performance.

The carcass characteristics (Table 2) generally reflect the other performance data with 40 percent of the carcasses grading "choice." If the proposed new grading system had been in effect the number grading choice would have approached 80%. Another factor which may influence carcass characteristics is the fact that these steers were wintered on native range, gaining near 0.75 lb per day before going on irrigated pasture.

Further studies of this nature with emphasis on proper supplementation are necessary. Proper supplementation of animals grazing irrigated pasture is quite difficult because the quantity of forage grazed and its nutrient content vary from one pasture to another.

Table 2. Feeding corn on irrigated pasture (1974).

No. of steers	20
Limited feeding period (103 days)	
Av weights, lb[a]	
Initial	559
Daily gain	2.25
Av daily corn consumption, lb	5.1
Full feeding period (60 days)	
Av weights, lb	
Initial	863
Final[b]	976
Adj. daily gain[b]	1.88
Av corn consumed, lb	
Daily	16.2
Per lb of gain	8.6
Total corn consumed	
Lb	1502
Bushels	26.8
Carcass data	
Yield[c]	59.6
Quality grade[d]	10.8
Choice, %	40.0
Yield grade	2.7

[a] The steers were on pasture 32 days before grain feeding started. The initial weight is the on pasture weight and average daily gain is over 135 days.
[b] Final weight adjusted to 60% dress.
[c] Yield based on full feedlot weights shrunk 4% and warm carcass weights.
[d] Medium good=10, and high good=11.

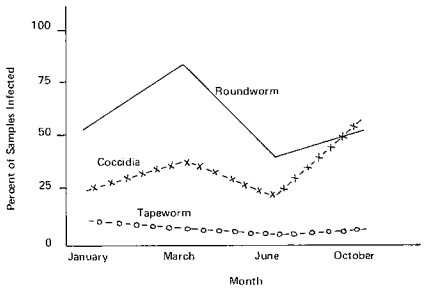

Figure 1. Monthly variation in internal parasite infection.

Internal Parasites of Beef Cattle

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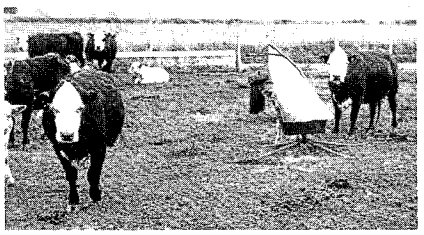
The relative importance of internal parasites in beef cattle varies with locality, season, year and individual herd. Internal parasites, which usually go undetected, may cause serious economic loss in only about 5 percent of our animal population.

Study Design

This study was started in the winter of 1971 to determine the level of infection of an eastern Nebraska cow herd over a period of several consecutive years. The initial herd consisted of 130 bred Angus-Hereford heifers sampled quarterly for four years. Fecal samples were taken in January, March or April, June and October. Roundworm egg counts per gram of feces and the presence of coccidia or tapeworm eggs were determined.

Cows were grazed on brome-alfalfa pasture during spring, summer and fall and wintered for



Cattle on internal parasite test.

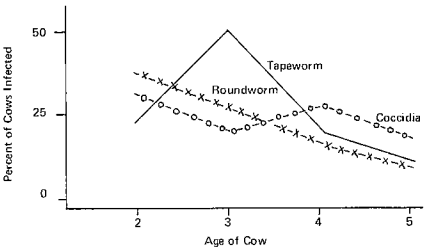


Figure 2. Effect of cow age on internal parasite infection.

3-4 months on cornstalks. The average infection over the four-year period is shown in Table 1. Monthly variation is shown in Figure 1.

Observations

No clinical cases of internal parasite infection were observed. More than 89 percent of the samples taken had less than 10 eggs per gram (EPG) with no samples over 100 EPG. All cows sampled over the four-year period at one time or another were infected with roundworms.

At some time during the four years, 90 percent of the cows showed coccidial infection. Tapeworm infection involved 32 percent of the cows during the four-year period. A consistent decline in roundworm infection occurred as cows became older (Figure 2). Coccidia and tapeworm infection also tended to decline in older cows.

Summary

1. At no time during the four-year period was a clinical case of internal parasites detected.
2. Cow herds managed under conditions described show some monthly and yearly variation in internal parasite load.
3. The highest rate of infection was observed in the March samples with a June drop and subsequent rise in October.

Table 1. Percent gastrointestinal parasite infection of beef cows.

Parasite infection	Percent[a]
Roundworm	53.7
Tapeworm	5.2
Coccidia	32.2

[a] Percent infection of 1722 samples collected during a four-year period.