System for Feeding Early Weaned Beef Calves

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Early weaning of dairy calves is a common practice, but early weaning of beef calves in the cattle-producing areas of the United State is very uncommon, particularly in southwestern North Dakota where cows and their calves normally graze native grass pastures from May until November. However, there are circumstances where early weaning of beef calves has been shown to be beneficial. Such circumstances include fall calving, drylot cow/calf production and drought.

When considering early weaning, a producer must decide how calves are to be handled and what they will be fed. Under drought conditions early weaning generally becomes an emergency measure rather than a customary practice. Drought conditions have prevailed in several southwestern and western North Dakota counties during four out of the past five grazing seasons. Severe drought conditions have caused producers to consider liquidating part of their cattle herd. Many have had to sell both cows and calves because pasture regrowth had not occurred and feed supplies were short or nonexistant. Others with some remaining feed supplies decided to keep their calves and sell only cows.

Before weaning calves early for drylot feeding, producers have asked, "Is there any profitability in feeding the early weaned calf, how and what should they be fed and what special handling is necessary?"

A survey of the literature shows that most early weaned calf research has been done with dairy calves (Hallman, 1971) and that a limited amount of work has been done with beef calves with regard to its effects on the interval from calving to first estrus. Bellows et al. (1974) reported that weaning calves from 3 to 10 days of age resulted in a shortening of the interval from calving to first estrus and that early weaned calf gains were normal and digestive problems minimal. Methods for handling early weaned calves were evaluated by comparing the performance of calves held in drylot with those kept on pastures with creep feed (Lusky et al., 1981). At seven months of age, early weaned calves weighed the same as calves weaned normally. Moving early weaned calves to pastures with creep feed reduced labor but gains were reduced by 44 pounds over a 73-day period. McKee et al. (1977) compared performance of early weaned calves with nursing calves that did and did not have access to creep feed. Total gain was highest for the early weaned calves and lowest for the nursing calves that were not creep fed.

It was determined from the limited amount of work conducted with beef calves and the differences in feeds used by these investigators when compared to those that are common to southwestern North Dakota, that a comparison of feeding systems for early weaned beef calves would be beneficial to drought stricken cattlemen. The purpose of this investigation was to compare calf rations suitable for an early weaned calf program that have been either commercially prepared or formulated from home grown ingredients.

Based on information gleaned from the literature and recommendations from Dr. Chung Park of the North Dakota State University Department of Animal and Range Sciences, it was determined that to be successful, adherence to the following would be necessary:

1. Calves should be at least 35 days of age if supplemental milk is not going to be used.
2. Calves should be supplied a highly palatable ration that is high in protein, available energy, vitamins and minerals.
3. Starter rations should be available to the calves during a two to three week adjustment period before calves are actually weaned.
4. Calfhood vaccinations for blackleg, malignant edema, hemoglobulinurea, pasturellosis, enterotoxemia and Vitamins A and D should be administered at the beginning of the adjustment period.
5. Calves should be checked regularly for respiratory problems and flies must be controlled.

Procedure:

To answer the questions most often asked by producers planning to early wean calves under ranch conditions, 82 calves comprised of Hereford, Angus X Hereford and Longhorn X Hereford breeding from young or poorer producing cows were randomized by age, sex, breed, size and age of dams into four feeding treatments as follows:

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1. Completely commercial pelleted starter and calf growing program.
2. Commercial pelleted starter and calf growing program during the critical first one-third of the growing phase followed by a home grown oat-based ration.
3. Home grown ration formulated around an oat base.
4. Home grown ration formulated around a barley based

The calves ranged in age from 38-89 days during the first year and from 64-105 days of age the second year.

At the start of the study, all calves were weighed and vaccinated with Electroid-7 and allowed to remain with their mothers in drylot for three weeks while they developed immunity and became accustomed to starter rations. The commercial and home grown starter rations were fed in low trough feeders inside a creep area that restricted the cows during the adjustment period. At weaning the calves were started on completely mixed self-fed rations that were either commercially prepared or blended from home grown feeds. High quality crested wheatgrass/bromegrass hay was provided free choice throughout the feeding study.

Commercial rations used were pelleted and formulated for specific age and weight of calves and changes were made according to the manufacturer's recommendations. Aureomycin/Sulfomethozine (As-700) medication was included during the first 28 days of feeding after weaning. In the treatment in which both commercial ration and home grown blend were used, the commercial medicated formulation was fed for 28 days, then the medication was removed and feeding was continued for an additional 28 days. An oat-based ration was used for the remainder of the feeding period.

Home grown rations blended on the farm were formulated to be highly digestible. Nutrient digestability was maintained between 71 and 73 percent. Protein levels during the early part of the feeding study ranged between 15.5 and 16 percent and were lowered to 14 percent as the calves matured. Table 1 gives the percentages of ingredients of the four rations.

Calves were weighed at selected intervals during the course of the investigation beginning at the trial's onset, when the calves were weaned from their mothers, and at 28-day intervals thereafter. Final weights were taken following an overnight feed and water shrink.

Calf performance under each system of feeding, feeding economics, and net returns over feed using a calf value of $78.50 per hundredweight have been summarized in table 2.

Starter ration consumption during the 21-day adjustment period averaged approximately 25 pounds per calf. The adjustment period seasoned the calves to dry feed and the transition from nursing to a completely dry ration was very smooth.

Growth rates for calves fed any one of the four ration types were satisfactory. Problems encountered with rations were small and easily rectified. Molasses was initially used to increase palatability and control dust, but unfortunately it attracted an unbearable number of flies and was discontinued early in the study.

Comparing the daily gains of calves fed the commercial/home grown oat base ration with those of calves fed either the oat or barley based rations showed slight differences but none of them were great enough to be statistically significant. Gains among calves fed the all commercial ration were significantly faster than those generated by calves receiving the barley or oat based rations. There was not a statistical difference between the average daily gains associated with the commercial and commercial/home grown oat base rations.

Table 1. Percentage of ingredients and various ration changes in the home grown oat and barley based rations.

	Oat Base				Barley Base			
Changes	Starter (1)	2	3	4	Starter (1)	2	3	4
Ingredients:								
Alfalfa, %	34	39	39	39	36	41	41	41
Corn, %	20	20	20	20	20	20	20	20
Oats, %	27	27	33	34	—	—	—	—
Barley, %	—	—	—	—	27	27	31.5	32.5
Soybean Meal, %	12	12	6	5	10	10	5.5	4.5
Molasses, %	5.1	—	—	—	5.1	—	—	—
Minerals & Vit.[1]								
Protein %, as fed	16	16.4	14.5	14.2	15.5	15.8	14.4	14.1
TDN, %	73.4	71.4	71.0	71.0	74.8	72.9	72.9	72.9

[1]Minerals and Vitamins: 1.0% dicalcium phosphate; 3% limestone; .6% T.M. salt; 2,000,000 IU vitamin A; 800,000 IU vitamin D.

Table 2. Summary of gains, feed consumption, ration economics and net return over feed costs for early weaned calves fed four different ration types.

	Rations			
	Commercial	Commercial/ home grown oat base	Home grown oat base	Home grown barley base
No. head	21	21	20	20
Days fed	142	142	142	142
Gains: Initial wt. (lbs.)	155	158	152	159
Final wt. (lbs.)	490	459	434	421
Gain (lbs.)	335 = 490 – 155	301	282	262
ADG (lbs.)	2.36 = (490 – 155)/142	2.12	1.98	1.84
ADG obtained by regression analysis that takes into account initial, final and intermediate weights[1] (lbs.)	2.43[a]	2.22[a,b]	2.08[b]	1.91[b]
Feed: Feed/head (lbs.)	1754	1384	1623	1409
Feed/hd/day (lbs.)	12.35 = 1754/142	9.75	11.43	9.92
Feed/lb of gain using regression ADG (lbs.)	5.08 = 12.35/2.43	4.39	5.50	5.19
Economics: Feed cost/hd/day ($)	1.24	.73	.70	.62
Feed cost/cwt of gain ($)	$51.03 = \frac{100}{2.43} \times 1.24$	32.88	33.65	32.46
Feed cost/hd for 142 days ($)	176.08 = 1.24 × 142	103.66	99.40	88.04
Returns: Gross return per head at $78.50/cwt and regression ADG value for 142 days ($)	392.55 = 155 × .785 + (142 × 2.43) × .785	371.49	351.18	337.72
Return per head over feed cost ($)	216.47 = 392.55 – 176.08	267.83	251.78	249.68

[1]ADG's with at least one letter in common are not significantly different at the statistical significance level of .05.

When these four ration types are evaluated in terms of economic efficiency and resultant profitability, the results take on an entirely different complection. The all commercial ration, which yielded the fastest daily gains, generated the lowest net return over feed cost of $216.47. Calves receiving the all commercial preparation during the critical first one-third of the feeding period followed by a home grown oat based ration had the most efficient feed to gain ratio of 4.39 pounds and had the highest net return per head over feed cost of $267.83.

The completely mixed home grown oat and barley rations returned similar net dollars and were substantially higher than the all commercial ration, returning $251.78 and $249.68 over feed costs, respectively. Feed costs per hundredweight gain had the greatest effect on net return in the comparison of these rations.

Table 3 gives the minimum feed cost per day advantage at various selling prices needed to maintain the relative economic rankings indicated in Table 2. This is assuming the average daily gains of 2.43, 2.22, 2.08 and 1.91 pounds and equal initial weights and days on feed. The figures show that in order to maintain their economic advantage as the selling price increases, the rations that result in lower gains have to become cheaper to feed than those rations that give faster gains.

Flies and pinkeye are problems that are frequently encountered and must be controlled. Fly tags should be used on the calves to control those fly species that are susceptible to ectrin and permethrin type compounds. Residual barn sprays for buildings and facilities should also be considered.

Calves that are weaned early are more susceptible to disease and therefore need to be under close surveillance. Respiratory problems are one of the major disease problems that might be encountered. When the first sign of a respiratory problem or other disease arises, it should be treated immediately according to the recommendations of a veterinarian.

These data clearly indicate that livestock producers wanting to wean beef calves early have several feeding options at their disposal depending on individual circumstances, available feed supplies and processing and handling equipment. These data also indicate quite strongly that choice of feeding method can definitely have a strong influence on profitability.

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The current level of infection of trichomoniasis in North Dakota beef herds is unknown. A limited survey which is in its second year has told us several things:

1. *T. foetus* infections are present in North Dakota beef herds.
2. *T. foetus* infection should be considered in the differential diagnosis of infertility in beef cattle.
3. Trichomoniasis can be diagnosed on mailed-in samples if they are properly collected, packaged, and shipped.

In 1984, nine veterinary practices submitted 89 samples from 30 herds. *T. foetus* was found in 10 samples (11 percent). Five herds (17 percent) were infected, and a sixth herd, which shared a pasture, was also considered postive.

In 1985, 13 veterinary practices submitted 54 samples of which four (7.4 percent) were positive and four herds (17 percent) were positive.

Infertility rates in infected herds as established by fall pregnancy examination were as high as 10 percent. Data from several herds that treated bulls indicates that the fertility generally improved 5 percent the following year. Some herds reported no discernable infertility problem and chose to sell affected bulls for slaughter. Unfortunately, fertility data was not available from all positive herds nor was breed or age. However, a majority of positive bulls were three years old. This is younger than expected for persistent infection in bulls.

It is hoped that this survey will create an awareness of trichomoniasis during its three-year duration (one year remains) since this is both a preventable and treatable disease. The presence of trichomoniasis in North Dakota cattle increases the necessity of annual fertility examinations of breeding bulls. However, the costs of diagnosis and treatment are minimal when compared to the loss of fertility caused by breeding with an infected bull.

LITERATURE CITED

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Table 3. Minimum feed cost per day advantages, at various selling prices, needed to maintain the relative economic rankings indicated in table 2 assuming the ADG values of 2.43, 2.22, 2.08 and 1.91 and equal average initial weights and equal numbers of days on feed.

For instance: Assuming ADG values of 2.43 and 2.22, return per head over feed costs for commercial/home grown oat base ration would exceed that of the commercial ration as long as the feed costs per day of the commercial/home grown oat base ration are less than that of the commercial ration by at least the following amounts:

Selling price	Minimum feed cost per day advantage needed for commercial/home grown oat base
.50 $/pound	$ .10
.55	.12
.60	.13
.65	.14
.70	.15
.75	.16
.80	.17

The other five analogous comparison values of minimum feed cost per day advantage needed are:

Selling price	Home grown oat base over commercial[1]	Home grown barley base over commercial	Commercial/home grown oat base over home grown oat base	Commercial/home grown oat base over home grown barley base	Home grown oat base over home grown barley base
.50 $/pound	.18	.26	.07	.16	.08
.55	.19	.29	.08	.17	.09
.60	.21	.31	.08	.19	.10
.65	.23	.34	.09	.20	.11
.70	.24	.36	.10	.22	.12
.75	.26	.39	.10	.23	.13
.80	.28	.42	.11	.25	.14

[1]In other words, if the calves are sold at weaning for $.50/pound, the home grown oat base costs have to be only at least $.18 cheaper; but at a selling price of $.80 the home grown oat base costs have to be at least $.28 cheaper.