Limit Fed Creep Feeds for Nursing Calves

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Before discussing the relatively scarce data concerning the role of limit-fed creep feeds for preconditioning, it is necessary to review the practice of creep feeding and to explain why limit-fed creep feeding has received no much attention in recent years. If the practice of creep feeding itself does not pay, its potential in preconditioning is very limited.

Efficiency of Gain from Creep Feeding

The most critical consideration for a creep feeding program is the cost of *added gain.* It must be remembered that there will be a weaning weight without creep and it is the cost of the added gain that must be calculated.

Conditions that permit heavy weaning weights without creep feed usually give poor responses to creep feeding. Why? The reason is that there are physical limits to the rate of gain a calf can achieve. If calves are already getting large quantities of milk and have abundant, high quality forage in addition to the milk, the calves will be gaining about as rapidly as their genetic ability will permit. Because creep feeding cannot significantly increase the rate of gain of rapidly growing calves, the result is that creep feed is substituted for forage and the conversion of creep feed to added weaning weight is very poor.

In general, the most efficient conversions of creep to added weaning weight will be seen when calves cannot reach weaning weights appropriate per the growth potential of the calf without supplemental feed. The best results from creep feeding are usually seen when:

1. Forage is too mature for utilization by nursing calves. (i.e., fall, winter and possibly late summer).
2. Forage quantity is inadequate.
3. Milk production is poor.

Creep Feeding—A Complicated Supplementation Program

An efficient forage supplementation program is one that gives a large increase in *added gain* per pound of *added supplement.* This is best achieved by the supplement having a positive effect on forage utilization, usually by increasing forage intake and digestibility. Feeding protein supplements to cattle grazing low protein grasses is a good example. Forage intake can be increased by as much as 30% and digestibility can be increased by up to 10 percentage units. In this case, feeding protein balances the diet for the rumen and causes a great increase in energy intake—because the cattle can eat more forage and get more energy from each pound eaten.

The next best situation is that of an energy supplement that does not reduce forage intake or forage digestibility, thus adding the supplemental energy on top of the energy already obtained from the forage. In the worst situation, a supplement (usually low in protein and high in starch) will cause a drastic reduction in forage intake and digestibility, resulting in little increase in total nutrients to the animal.

It is therefore necessary to understand the priorities of the nursing calf for nutrient intake. An efficient creep program must add nutrients (principally energy) to the diet, not substitute for something the calf would have otherwise eaten.

An Oklahoma study (Table 1) shows the priorities of the calf for feed sources and also shows why free-choice creep feeding can often be disappointing. In this study, crossbred calves born in January from excellent milking Hereford x Angus cows were used to study effects of free choice creep on milk intake, forage intake and gains. Calves averaged 4.2 lbs of creep from March 2 until weaning in September and weighed 40 lbs more than non creep-fed calves. The conversion of creep to added weaning weight was a disappointing 17.6:1. Analysis of forage intake and milk production data explained the poor utilization of creep feeding in this study. Calves eating creep feed consumed 11.7% less forage than non creep-fed calves while milk intake was not affected by creep feeding.

Table 1. Effects of free-choice creep feeding on weaning weights, forage intake and milk intake of beef calves.

	creep	no creep
Weaning weight[a], lb	565[b]	525[c]
Daily gain, lb	2.07[b]	1.90[c]
Creep intake/day	4.2	-
lb creep/lb added gain	17.6	
Relative forage intake, %	88	100
Milk intake/day, lb	11.4	11.1

[a]240 day weaning weights.
[ab]Means on a line with different superscripts (P<.05).

These calves were able to gain near their genetic potential from the level of milk received from their dams and the forage available to them. When a palatable creep was offered, it was consumed at the expense of forage intake. The result was an inefficient utilization of the creep and

the forage. This study points out the priorities of the calf for feed.

1. Milk
2. Palatable creep feed
3. Forage

If forage is more palatable than creep, the creep will not be consumed, but milk consumption is almost never affectd by creep feeding. While many producers believe they are giving the cow some relief from nursing by feeding creep feed, research has rarely shown any reduction in suckling by feeding creep feeds. Similarly, cow weight change has rarely been affected by creep feeding.

Because the nursing calf has three potential sources of nutrients (mik, forage and creep), it should not be surprising that creep feeding is an extremely variable supplementation practice. In fact, free-choice creep feeding is rarely efficient. A summary of 31 university trials involving free-choice creep feeds (Table 2) shows a conversion of 9 lbs of creep per pound of added gain. Feed would need to be cheap and/or calf prices high for this conversion to be cost effective. The other problem of excessive fleshing of creep-fed calves adds to the economic problems by reducing the value of the creep-fed calves and potentially damaging milking ability of overly fed heifers kept for breeding replacements.

Table 2. Summary of 31 trials with free-choice creep feeding.

	creep	no creep
Total gain, lb	279	221
Daily gain, lb	1.83	1.45
Total creep/calf, lb	524	-
Lb. creep/lb. added gain	9.0	-

Limit-Fed creep feeding

Researchers at several universities have looked at ways to make creep feeding a more economically viable practice. With a better understanding of the principles of supplementation, limit feeding of creeps has emerged as an alternative. With specific attention to correcting nutrient deficiencies and maintaining forage intake of the nursing calf, results have been encouraging.

A study conducted at Oklahoma State (Table 3) compared performance of spring-born calves fed no creep, limit-fed high protein creep (cottonseed meal), or free-choice 15% protein creep. Calves fed the free-choice creep gained 79 lbs more than controls with a conversion of 7.8 lbs creep per lb of added gain. This conversion is very similar to the average reported by Kuhl (1984). Notice, however, that calves fed cottonseed meal limited to 1.0 lb/day consumption with 10% salt gained 30 lbs more than controls with a conversion of 3.3 lbs creep lb added gain. This level of efficiency indicates that the cottonseed meal was increasing forage intake by the nursing calves. Note the cow weight change was not significantly affected by creep feeding.

Table 3. Effects of Protein or Grain Creep on Cow and Calf Performance—Oklahoma.

	Control	Protein Creep	Grain Creep
No. Calves	15	14	15
Initial calf wt., lb	201	205	200
Calf gain (6/4 - 10/15)	230[a]	260[b]	309[c]
Creep/calf, lb (133 days)	—	99	614
Pound creep/lb added gain	—	3.3	7.8
cow weight change (6/4-10/15)	101	88	89

Means on a line with different superscript letters (P<.05).

Similar results were seen in three subsequent studies at the Oklahoma station. Louisiana workers (Wyatt, et. al., 1986) compared 1.0 lb. of cottonseed meal creep with and without Bovatec (120 mg/lb) fed to calves of fall calving cows. All cattle grazed dallisgrass-bermuda pastures and were fed round bales of grass hay from Feb. 26 to May 21. Intakes of creep were maintained at 1.0 lb/day by adding an average of 8% sale to the cottonseed meal treatment and 4.3% salt to the cottonseed meal-Bovatec treatment. Calves receiving the cottonseed mealcreep gained 27 lb (.32 lb/day) more than Controls. No advantage was seen for adding Bovatec to the creep feed.

Kansas researchers have conducted several trials with limit-fed creeps consisting of lower protein formulations. In one trial (Table 4) conducted beginning in mid-August, a 16% protein creep feed with 50 mg/lb. Rumensin was offered the last 85 days before weaning. Creep intakes were limited to 1.5 lb/day with salt. Calves consuming the limit-fed creep gained .31 more per head daily and required 4.4 lb. creep per lb. of added gain.

Table 4. Effects of Limit-fed 16% Protein Creep on Calf Performance—Kansas.

	Limit-creep + Rumensin	Control
No. Calves	31	27
Initial wt., lb.	308	290
Daily gain, lb	1.84[a]	1.53[b]
Daily creep intake, lb	1.46	
Creep/added gain	4.4	

[ab]Means on a row with different superscripts (P<.01).

Carry over effects of limited creep feeding on postweaning calf performance.

A second Kansas trial (Table 5) compared limit-fed 16% protein creep (1.4 lb/head/day) with and without Bovatec (68 mg/lb).

During the 63 days before weaning, calves fed limit-fed creep gained .26 lb/day more than Controls. No advantage was seen for the ionophore during the creep feeding phase. At weaning, calves were shipped 100 miles to a growing lot where they were fed for 50 days. Calves fed limit-fed creep lost significantly more weight than either Controls or calves fed creep with Bovatec during shipment to the growing lot. Gains of calves previously fed limit-fed creep were greater ($P<.05$) than for non creep-fed calves during the 50 day growing period. This would suggest some positive carry over effect of creep feeding to the start of drylot feeding.

Table 5. Effects of Limit-fed 16% Protein creep with or without Bovatec—Kansas.

	Control	Limit-fed Creep	Limit-fed Creep + Bovatec
Preweaning (63 days)			
No. of Calves	57	60	57
Initial wt, lb.	374	373	373
Daily gain, lb.	1.16[a]	1.42[b]	1.42[b]
Lb. creep/lb. added gain	-	5.5	5.2
Postweaning (50 days)			
Shiping loss, lb.	11.7[a]	19.8[b]	11.0[a]
Daily gain, lb.	2.09[a]	2.29[b]	2.33[b]
Treatment days/calf	3.2	2.6	2.7

[ab]Means on a row with different superscripts ($P<.05$).

Perhaps the best data on using limit-fed creep feeding as a preconditionig tool is found from Florida researchers. In fact, theirs is probably the first with using limit-fed creep feed. A summary of four trials conducted at the Belle Glade Experiment Station is shown (Pate, 1981) in Table 6. Because the primary interest in limited creep feeding was its feasibility as a preconditioning tool, the creep period only included a period of two weeks before weaning. Limit-fed creep calves were fed from .5 to 1.0 lb of a 14% protein creep composed of corn, molasses, citrus pulp and cottonseed meal. After weaning, both control and creep-fed calves were fed equal amounts of concentrate supplements while grazing St. Augustine grass pasture. Over the four trials, limit creep calves gained an average of 10 lbs. more during the four week postweaning period. The authors suggested that since there was little difference in feed intake immediately following weaning, the added gain may have been derived from better adaptation of the digestive system to concentrate feeding after weaning rather than "teaching the calves to eat."

In a subsequent study, the Florida workers (Pate, 1981), in cooperation with a U.S. Sugar Corporation ranch, creep-fed about half of 217 calves for 21 days before weaning (Table 7). Intake of the creep was slightly over one pound per day with most calves observed to be eating. After

Table 6. Postweaning weight gains of limited creep-fed and non-creep-fed calves—Florida.

	Control	Limit-fed Creep
No. of calves (4 years)	124	135
Weaning weight, lb.	480	490
Gain 4 weeks postweaning	3	13

weaning, calves were offered concentrate free-choice until intake reached 10 lb./head/day and grazed for 35 days. In contrast to the Belle Glade study, no attempt was made to equalize intake between the two groups. After 35 days, supplementation was discontinued and all calves were grazed for another 40 days. After 35 days, calves that had been creep-fed had gained 20 lb. more than previously non-creep-fed calves. During the following 40 days of grazing, there was little difference in calf gains. Previously creep-fed calves ate 3.3 lb/head/day of concentrate during the first 7 days after weaning compared to .9 lb for non-creep-fed calves, again suggesting that creep feeding may have "taught" these calves to eat mixed feed more quickly.

Table 7. Effects of 21 days of limited creep feeding on postweaning growing performance of ranch-raised calves—Florida.

	Control	Limit-fed Creep
No. of calves (4 years)	115	102
Weaning weights	423	423
Concentrate intake/day/calf		
first 7 days postweaning	.9	3.3
Wt gains postweaning		
0-35 days	41	61
35-75 days	70	73
total 75 days	111	134

Advantages of Limited creep feeding can include:

1. Conversion of creep to added gain are improved over what is expected from ad libitum creep feeding.
2. Labor and the amount of feed handled are greatly reduced.
3. Calves are not fattened sufficiently to have any great impact on sale price/pound.
4. The increased weaning weight from limited creep feeding is usually no more than 30 lbs., not enough to have much negative impact on subsequent feeding performance.
5. Because of efficient conversions of creep to added gain the practice of limited creep feeding frequently is profitable by itself.
6. Calves learn to eat mixed feed and research suggests that performance during the early stages of postweaning feeding can be improved.

There are, however, problems with management of limited creep feeding programs. These include:

1. Calves must eat the creep feed. Both Kansas and Oklahoma researchers have encountered problems in getting calves to eat the creep feed. Some producer education is required to ensure proper placement of creep feeding stations and proper formulation of feeds. Calves are very sensitive to the taste of salt and much less is required to limit intake than is needed with cows. Salt levels of 5 to 10% are maximums in most cases. Calves should be started on creep without salt and the salt level adjusted as needed to hold intake within desired ranges—usually 1.0 lb./head/day for high protein creeps, and 1.5-3.0 lbs/head/day for medium to low protein formulations.
2. For significant added weaning weight (20 lbs. or more), the creep needs to be fed for a period of over 60 days. Benefits from feeding only two or three weeks preweaning must come from improved postweaning performance.
3. Although more research is needed on carry over effects of limited creep feeding on postweaning performance, available research suggests that limited creep feeding can accomplish much of what full creep feeding would have done in training calves to eat. For full advantage, ionophores or coccidiostats may need to be included in the creep feeds, especially just prior to the stress of weaning.

Summary

Research has generally shown that advantages from preconditioning are from less sickness and greater gains during the early phase following weaning. Further, a full preconditioning program can require substantial purchases of feed. If calves make good gains during pre-conditioning, subsequent gains during the following grazing and finishing period may be reduced. Limited creep feeding may obtain many of the benefits of feeding during preconditioning while greatly reducing the amount and cost of feeding involved. The rancher must, however, be in a situation that permits management of a creep feeding program.

References

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