SDSU Extension

BEEF

Chapter 22

Creep Feeding Beef Calves

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Introduction

Creep feeding is a way to provide nursing calves with supplemental nutrients by using a gate or barrier to restrict the access of cows to the feeding area. The type of creep feeds used vary from grain-based feeds that primarily supplement energy, to limit-fed high-protein feeds, to "green creeps," which are high-quality pastures grown for the sole purpose of grazing by nursing calves. Goals for creep feeding may include enhancing weight and value at weaning, or filling a nutritional gap caused by poor milking cows or lack of forage. Careful consideration to the added cost of creep feeding and the potential returns to this practice should be done to increase the chances of a positive economic return.

Factors to consider include:

- The value of the additional gain and possible impacts on calf prices
- Feed costs
- Feed conversion
- Forage quality and quantity
- Labor availability
- Plans for retained ownership

Impact on Cattle Performance

The beef industry has utilized creep feeding to help correct nutrient deficiencies in nursing calves that may limit growth potential. The first limiting nutrient may be either protein (Lusby and Wettemann, 1986) or energy (Loy et al., 2002). Both nutrients can easily be supplied by creep feeds. The response to creep feed depends on forage species, timing within the grazing season, and calf growth potential.

Calves that are less than 90 days of age receive the majority of their nutrient intake from milk. After 90 days the calves consume an increasing proportion of their nutrients from forage. High-quality pasture is the most economical source of nutrients during this period. The increase in nutrient requirements and demand

Key Points

- Creep feeding is an option to supply additional nutrients to help calves reach their genetic growth potential.
- Creep feeding calves may or may not work in every operation, due to different production goals and financial considerations. Feed conversion, cost of gain, and especially the dollar value of additional weight gained can by highly variable and must be evaluated closely.
- Creep feeding may have benefits to post-weaning performance and carcass traits for calves moving to a grain-based diet after weaning.
- Creep feeding spring-born replacement heifers may be unnecessary for growth and could be detrimental to future milk production.
- A variety of commercial and home-mixed rations can be used as creep feed.

for forages by calves from spring-calving herds in the northern Great Plains comes at a time when the nutrient quality of pastures is rapidly declining (Figure 1). In such cases when forage quality is declining, or in situations such as fall-calving herds where forage growth may be nonexistent, creep feeding may be a viable option to increase calf gain.

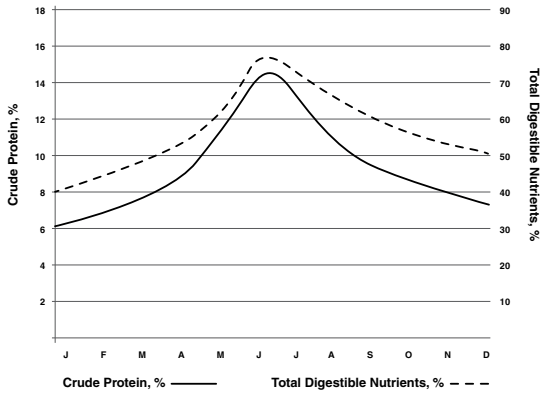

Figure 1: Crude protein and total digestible nutrient content of forages in the northern Great Plains.

Creep feeding calves by providing additional energy (Faulkner et al., 1994; Loy et al., 2002; Gadberry et al., 2012) or protein (Lusby and Wettemann, 1986; Lardy et al., 2001; Gelvin et al., 2004) has been shown to increase calf weight and ADG when forage quality or quantity are limited. However, these responses have not always been observed when the quality and quantity of the forage supply is ample enough to support optimal calf growth. Lusby and Wettemann (1986) observed that fall-born creep-fed calves had similar gains in March compared to non-creep fed calves when calves (and their dams) were grazing rapidly growing winter annuals. These researchers speculated that the control calves were able to supplement their diet with green forage. Similarly, growth performance in nursing calves grazing high quality ryegrass pastures (> 20% CP) was not statistically different between creep fed and the non-creep fed control group (Gadberry et al., 2012).

Feed Efficiency, Cost of Gain, and Profitability

Even though in most cases creep feeding will result in additional pounds of calf, whether or not that is profitable depends on the costs to put on the additional weight. Producers may assume that when calf prices are high, creep feeding is profitable; but that is not always true. The highest economic returns from creep feeding typically occur when: (1) forage is too mature for efficient utilization, (2) forage quantity is limited due to drought or overgrazing, or (3) calves are nursing poor-milking cows or heifers. There are genetic limitations on the rate of gain calves can achieve; therefore, when milk and high-quality pasture are abundant, the cost of additional gain from creep feeding will likely be quite high.

A key component in determining the profitability of creep feeding is how efficiently the supplemental feed is converted into weight gain. A summary of research trials and the reported feed efficiency data is shown in Table 1. These studies have reported widely varying results in supplemental feed efficiencies, depending on the base forage and the particular feeding program.

Limit-Feeding Creep Feed

Limiting the amount of creep feed consumed per day has been successful in improving feed efficiencies (Lusby, 1986; Cochran et al., 1989; Faulkner, 1994). These data also suggest that limit fed high protein creep feeds are more efficient than limit fed low protein creep feeds (Houghton et al., 1988; Binns et al., 1989; Brazle et al., 1992). The supplemental feed conversion plays a significant role in the economic feasibility of creep feeding, as shown in Table 2.

Creep feed consumption can be limited by using salt in the creep diet at a rate of 3 to 10%.

Initially the calves should be introduced to creep feed without using limiters. Once calves start consuming creep at about 1 pound per day, introduce salt starting with about 3% salt in the ration. Make adjustments to no more than 10% of the diet until individual intake is around 1.5 to 3.0 lbs of feed per day. When using salt as a limiter in homemade creep feeds, meal forms work better than pellets, because it is easier to adjust the salt levels to maintain daily intake. One caution when using salt as an intake limiter is that it can cause additional corrosion to metal creep feeders. Other commercial products are available from feed companies to limit creep feed consumption. Follow label directions when using these products.

Table 1: Summary of feed conversion (F:G) from creep feeding studies.

Source	Diet	Supplemental feed conversion
Lusby, 1986	Limit fed, high protein	3.3:1
	Free choice, grain based	7.8:1
Lusby and Wettemann, 1986	Limit fed, high protein	2.4:1
Houghton et al., 1988	Limit fed, 16% CP creep	7.6:1
	Limit fed, 36%CP creep	2.7:1
Binns et al., 1989	Limit fed, 16% CP creep	6.8:1
	Limit fed, 36% CP creep	5.4:1
Cochran et al., 1989	Limit fed, 36% CP creep	13.8:1
	Free-choice, 36% CP creep	23.2:1
Brazle et al., 1992	Limit fed, 16% CP creep	6.6:1
	Limit fed, 36% CP creep	4:1
Faulkner, et al., 1994	Limit fed, Corn or soyhulls)	4.8:1
	Unlimited (Corn or soyhulls)	7.1:1
Loy et al., 2002	Limited (soyhull based)	2.7:1
Sexten et al., 2004	Free-choice, 14% CP creep	10.2:1
	Free-choice, 18% CP creep	8.3:1
Gelvin et al., 2004	Limited, (field pea based)	8.9:1
Gadberry et al., 2012	Unlimited, (corn and soyhull based, moderate quality forage)	4.4:1
	Unlimited (corn and soyhull based, high quality forage)	8.3:1
	Unlimited, corn based, low quality forage	12.5:1

Table 2: Cost of additional gain at various creep feed costs and conversion rates. *Adapted from Walker et al., 2013.*

Feed Cost, $/ton	Creep Feed Conversion					
	4	6	8	10	12	16
200	0.40	0.60	0.80	1.00	1.20	1.60
220	0.44	0.66	0.88	1.10	1.32	1.76
240	0.48	0.72	0.96	1.20	1.44	1.92
260	0.52	0.78	1.04	1.30	1.56	2.08
280	0.56	0.84	1.12	1.40	1.68	2.24
300	0.60	0.90	1.20	1.50	1.80	2.40
320	0.64	0.96	1.28	1.60	1.92	2.56
340	0.68	1.02	1.36	1.70	2.04	2.72
360	0.72	1.08	1.44	1.80	2.16	2.88
380	0.76	1.14	1.52	1.90	2.28	3.04

Table 3: Example creep feed formulations. *Adapted from Walker et al., 2013.*

Examples	Creep Feed Number					
	1	2	3	4	5	6
	Percentage, As Fed Basis					
Dry rolled corn	50	50	25	---	---	50
Whole oats	---	50	---	---	---	---
DDGS	---	---	25	25	---	50
Soybean Meal	---	---	---	---	20	---
Soybean Hulls	50	---	50	70	75	---
Molasses	---	---	---	5	5	---
Nutrient Analysis						
Crude Protein, %	10.6	11.4	15.9	16.4	19.5	19.8
TDN, %	83.9	80.3	84.5	82.0	80.5	89.0

Determining the Value of Added Gain

Determining the value of the additional pounds of calf due to creep feeding deserves additional discussion. A common misconception is that each additional pound is worth the price of calves. Often producers use the expected selling price to determine the feasibility and profit/loss of creep feeding. What is overlooked in that analysis is that as calf price increases, the price received per pound of calf decreases. The example shown in Table 4 illustrates this concept. In that case a 525 pound calf that sells for $2.90 is worth $129.50 less than a calf that because of creep feeding weighs 590 pounds and sells for $2.80 per pound. Dividing the $129.50 per head by 65 pounds of additional gain equates to a value of gain of $1.99 per pound, which is only about two-thirds of the selling price per pound. Failing to properly calculate the value of adding growth enhancing technology such as creep feeding could lead managers to adopt practices that aren't economically justified.

Other Effects of Creeping Feeding

Effect of Creep Feeding on Milk and Forage Intake

A commonly held belief is that creep feeding calves will reduce the nutrient requirements of the cow because the calf will consume less milk. However, research trials that have measured milk consumption have not shown significant reductions in milk consumption in calves that were creep fed compared to the non- supplemented controls (Cremin et al., 1991; Faulkner et al., 1994; Gelvin et al., 2004.) In most cases calves will nurse to capacity before moving to other feeds. It is also possible that creep fed calves may have increased milk demand due to their greater body weight. Therefore, pressure on lactating cows is not reduced as a result of creep feeding. Fall calving cows may be an exception. Researchers in Iowa observed that when fall-born calves were offered ad lib access to creep feed, their dams had a body condition score that was 0.6 units (on a 9-point scale) compared to the unsupplemented controls (Lasley et al., 2007). If the nutrient demands on lactating cows needs to be reduced due to feed availability or to increase the chances of reproductive success, weaning calves earlier than normal would be a possible management strategy (Lusby and Wettemann, 1986).

Another perceived advantage that is often given for creep feeding is that providing creep feed will result in less forage being consumed by the calf. Results from controlled experiments measuring forage intake in creep fed calves have been mixed. Some trials have indeed shown that creep feeding results in reductions in forage consumption when measured by weight (Cremin et al., 1991; Faulkner et al., 1994) or as a percentage of the calf's body weight (Lardy et al., 2001; Reed et al., 2006). In other studies creep feeding did not result in any differences in forage consumption (Loy et al., 2002; Gelvin et al., 2004). Just as in the case of milk production, if the objective is to reduce forage demand the effect of early weaning would likely be more predictable.

Table 4: Example budget for calculating creep-feeding returns. *Adapted from Walker et al., 2013*

Budget Items	1	2	Formula
	No Creep	Creep Feeding	
A. Weaning Weight	525	590	
B. Creep feed fed, pounds		550	
C. Calf value, $/pound	$2.90	$2.80	
D. Calf Value	$1,522.5	$1,652.00	A*C
E. Value/pound added gain		$1.99	(D2-D1)/(A2-A1)
F. Creep feed cost, $/ton		$240	
G. Expected conversion, pounds feed per pound of gain		8	
H. Feed cost/pound of added gain		$0.96	(F2/2000)*G2
I. Value of added gain, $/head		$129.50	D2-D1
J. Cost of added gain, $/head		$62.40	(A2-A1)*H2
K. Return per head, $		$67.10	I2-J2

Post-Weaning Calf Performance and Carcass Traits

Creep feeding will not only increase calf growth rate but also may provide an easier transition for the calf from pasture to a grain-based diet. The creep feed will help familiarize the calves with dry feeds, and research has shown that this can result in greater feed intake and reduced stress during and after weaning (Faulkner et al., 1994). In other studies, creep feeding had a negative impact on subsequent feedlot performance. Researchers in Oklahoma observed that fall-born calves that were creep fed from January to April did not gain as quickly or as efficiently after they were weaned and delivered to the feedlot in July when compared to their counterparts that did not receive creep feed (Mayo et al., 2002).

The amount of condition that a calf gains due to creep feeding can impact price received at weaning and post-weaning calf performance. Calves that become too fleshy can have reduced performance, especially if they are destined to a summer grazing program. Regardless of whether calves will be fed a finishing diet in a feedlot, entering a backgrounding program, or are to be grazed as yearlings, care should be taken to avoid getting the calves so fleshy that they will receive steep discounts.

The potential for increased marbling development as a result of creep feeding may also be beneficial, particularly for producers who will retain ownership. The development of marbling occurs much earlier than what was previously thought (Bruns et al., 2004). Research from the University of Illinois has shown that when calves grazing endophyte-infected fescue were offered limited or unlimited amounts of either soyhulls or corn, the number of cattle reaching the USDA Choice grade was increased. The greatest response in quality grade was observed in calves that had unlimited access to corn creep (Faulkner et al., 1994). However, the effect of creep feeding on quality grade has not been consistent as other researchers have reported no differences in marbling scores or quality grade due to creep feeding (Tarr, et al., 1994; Reed et al., 2006; Gadberry et al., 2012). Other factors such as nutrient intake from forage and milk may influence the extent that creep feeding impacts carcass merit.

Creep Feeding Fall-Born Calves

Calves born in the fall would be much more likely to respond favorably to creep feeding, especially in the northern plains (Kreft et al., 1998, Lasley et al., 2007). These calves are born when forage quality is typically declining and eventually reaches the point where the only forage available is low in protein and not adequate to support the nutrient requirements of a rapidly growing calf or a cow that is in early- to mid-lactation. Compounding the shortage of dietary energy is colder environmental temperatures, which increase the maintenance energy requirements of the calf. In these situations, providing creep feed resources would be warranted.

Creep Feeding Replacement Heifers

Creep feeding can negatively influence future milk production and lifetime productivity (Hixon et al., 1982). Providing nutrients in excess of those required for lean tissue growth potential can result in fat deposition in the udder during the prepubertal mammary growth phase. Offering creep feeds that are higher in crude protein (CP) may lessen the negative impact of excess pre-weaning nutrient intake on future milk production as observed by Sexten et al., (2004). In that study non-creep fed heifers produced the most milk, heifers fed a 14% CP creep produced the least milk, with heifers receiving an 18% creep intermediate in milk production. However, those differences in milk production did not affect calf performance.

The traditional recommendation has been that heifers should reach 65% of their mature weight by the beginning of the breeding season; however more recent research in this area indicates that heifers will successfully breed when developed to either 55 or 60% of mature weight (Funston and Deutscher, 2004). When the effects of creep feeding on subsequent reproductive performance was examined, providing additional nutrients pre-weaning led to increased body weight at weaning and breeding, but had no effect on the reproductive performance of spring-born heifers (Sexton et al., 2004).

Creep feeding replacement heifers would be warranted if heifers would be unlikely to reach target weights without supplemental feeding pre-weaning. Fall-born replacement heifers would be the most

likely candidates Therefore, there is little value in providing creep feed to gain additional weight pre-weaning in spring-born replacement heifers. Sorting based on sex of calf, if possible, and only creep feeding the steer calves and non-replacement heifer calves would result in more efficient use of resources.

Managing a Creep Feeding Program

Starting Calves on Creep Feed

Occasionally, getting calves started on creep feed can be a challenge, especially when cows are milking well and pastures are in good condition. Typically, feeding cows small amounts of ground feed a few days prior to starting creep feeding will help calves learn to consume creep. Baiting cows to the creep area with feed also will help expose calves to creep feed. Including highly palatable dust-free rations that include ingredients such as molasses, distiller's grains, or soybean hulls in the creep feed will also help to attract calves to the feeder.

Creep feeders should be placed in areas that cows visit regularly such as water sources or shade. These sites should be shaded and open to prevailing winds, have water or salt and mineral in close proximity, and the area should be large enough that whole herd can congregate. If the herd is in a relatively large pasture, more than one creep site may be necessary.

Labor resources

Creep feeding increases labor requirements, especially if the ration is mixed on site. Purchasing commercial creep feeds generally won't greatly increase labor requirements if delivery service is included, but this will add to the cost of the feed. In addition to mixing and delivering the ration, creep feeders need to be monitored to ensure the feed is free flowing and maintaining its integrity and consistency. Additionally, after heavy rains the feed trough will likely require cleaning out. Producers using a pre-pelleted feed may also need to routinely clean dust and fines from the trough as well.

Common Creep-Feed Rations

Many different feed ingredients can be utilized in creep feeds. Grains utilized in creep feeds should be coarsely processed. However, if the price of grain is low, the added efficiency may not be enough to cover the expense of processing the grain, with the exception of barley and grain sorghum. Feeding these grains in an unprocessed form reduces their digestibility because of their harder seed coats. Grains should be coarsely cracked if they are processed to minimize the amount of fines and the risk of digestive upsets.

Higher fiber feedstuffs such as soyhulls or wheat middlings are very well suited for inclusion in creep diets. Feeding higher levels of starch from grain increases the potential for digestive upsets and can have a negative impact on forage digestibility. Feed conversions (F:G) when suckling calves were offered a corn-grain based creep diet while grazing low quality forage (CP < 6%) were 12.5:1 (Gadberry et al., 2012). In contrast when soyhull based creep diets were utilized in calves on native range in North Dakota, conversions of 2.7:1 were observed (Loy et al., 2002).

Carefully consider the particle size and density of feed ingredients. Feeds that are dramatically different in these respects are likely to flow out of the feeder at different rates and are more subject to sorting by the calves. Ionophores have been shown to improve feed efficiency, and should be added to the creep feeds unless a producer is participating in a natural- or drug-free beef program. Adding viscous compounds such as molasses or sunflower oil can reduce dust problems and improve palatability.

Creep rations do not have to be complex; however, in some situations purchasing higher-quality (and higher-priced) commercial feeds may be a better alternative. Some of the key advantages include consistency of formulation and composition, less sorting and segregation of the pelleted feeds, and the ability to more easily incorporate feed additives such as ionophores. The time and equipment required for mixing and delivering home-made creep diets also should be considered. Examples of creep feed rations using common ingredients are shown in Table 3.

Calculating Creep-Feeding Returns

Although creep feeding can significantly increase weaning weight, costs associated with creep feeding can result in minimal economic benefit. It is important to understand the relationship between the cost of the creep feed consumed and the value of the additional weight gained. An important concept often overlooked by producers is that heavier

calves sell for less per pound than their lighter counterparts. Therefore it is inaccurate to use current market prices as a guide to making the creep feeding decision. Table 4 shows an example budget for calculating returns per head for creep feeding. In this example, because of the price slide for heavier calves, the value of an extra pound of weaning weight was worth $1.99 per pound. To evaluate returns from creep feeding in specific situations, a worksheet outline which can be adapted to computer spreadsheets is provided in Table 5.

Summary

Creep feeding may be advantageous to producers if the value of the added gain exceeds the total cost of the creep feed (feed plus labor and delivery), or if the combination of milk production and forage availability is inadequate to support the genetic potential of the calf. Additionally, if the calves will be finished on a high-grain diet following weaning there may be advantages due to the calves being trained to eat from a bunk. Fall calving operations and drylot operations may benefit from creep feeding as an additional feed resource for the calves.

Conversely there are times when the addition of creep feeding may not benefit the operation, such as when the value of the added pounds gained is less than the cost of creep feeding or if substantial discounts for fleshier calves are likely. Additionally, if the feed and milk resources are not limiting the calf's growth potential a growth response to creep feeding would be less likely. Creep feeding spring-born heifer calves destined to be replacements may be detrimental if excess fat is deposited in the udder, and the added weight gain might not improve overall pregnancy rates in yearling heifers. Smaller-framed, early maturing calves that are likely to become fleshy would not be good candidates for creep feeding.

Table 5: Worksheet to calculate creep-feeding returns. *Adapted from Walker et al., 2013*

	1	2	Formula
	No Creep	**Creep Feeding**	
A. Weaning Weight			
B. Creep feed fed, pounds			
C. Calf value, $/pound			
D. Calf Value			A*C
E. Value/pound added gain			(D2-D1)/(A2-A1)
F. Creep feed cost, $/ton			
G. Expected conversion, pounds feed per pound of gain			
H. Feed cost/pound of added gain			(F2/2000)*G2
I. Value of added gain, $/head			D2-D1
J. Cost of added gain, $/head			(A2-A1)*H2
K. Return per head, $			I2-J2

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