AN131

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Early Weaning: a Management Alternative for Florida Beef Cattle Producers[1]

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Introduction

Early weaning is a management practice involving the permanent separation of the cow and calf when the calf is 70 to 90 days of age. Although the practice has historically been associated with management around emergency forage shortages, significant evidence exists to suggest that early weaning may be a practical and profitable management consideration for Florida cow/calf operations.

Research from Purdue University has shown that early weaning may decrease the post-partum anestrus period by 24 days. As early-weaned cows begin to stop lactating, their dry matter intake decreases. Results from our research have shown that early-weaned, first-calf heifers require approximately 50% less TDN to achieve and maintain a body condition score of 5.0 compared to lactating heifers of the same age and body condition (Figure 1). The intake values represented by these data show the amount of TDN consumed by a lactating first-calf heifer, plus her calf, compared to an early-weaned first-calf heifer without her calf. These data illustrate a 40% improvement in converting TDN into body weight gain**.** This voluntary decrease in dry matter intake has important practical implications for the cow/calf producer, whereas the cow can maintain or gain body weight with almost 30% less forage. Working in our program, Sebastian Galindo (MS Thesis, University of Florida, 2004) investigated the effect of cow parity and early weaning on hay intake, cow body weight and condition change, and pregnancy rate. In that study, there was little difference in the effect of parity when measuring cow response to early weaning. We initially suspected that young, first-calf heifers would realize a greater production response to early weaning versus mature, cows when each were compared to normal-weaned contemporaries of a similar parity. This was not the case, because mature cows experienced a decrease in hay dry matter intake and an increase in body condition and pregnancy rate proportional to the first-calf heifers. In this study, cows with their calves consumed approximately 18% more hay than early-weaned cows. This value differs from the 30% decrease suggested earlier due to the presence of winter perennial pasture. The hay was a supplement to pasture, and pasture forage intake was not measured. The response summary over two years (96 cows) for both groups of cows is provided in Table 1.

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Considering a 100-day winter hay supplementation period and hay valued at $70/ton, early weaning can save nearly $9.00 per cow in hay costs alone. This production efficiency estimate does not take into account the value of increased pregnancy rate and decreased post-partum interval, which are the primary benefits realized by early weaning.

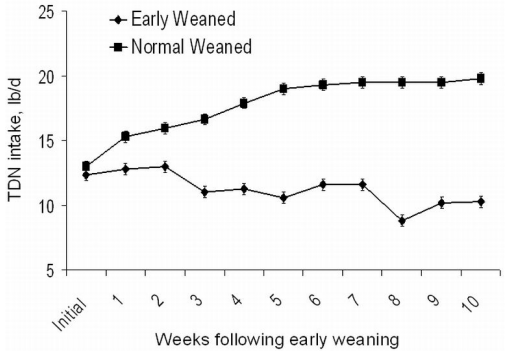

Figure 1. Effect of early calf weaning on voluntary dry matter intake of TDN in first-calf heifers. Early-weaned calves were removed on the first d of wk 1.

Calf Nurseries

In collaboration with agronomists at the University of Florida, we have been investigating the establishment of calf nurseries for the rearing of early-weaned calves. Each nursery has a small area (approx. 1/2 acre) of sod were water, feed, and mineral are offered. To exclude wildlife and prevent the escape of the small, early-weaned calf, we secure each nursery using woven-wire fencing. Each year, we graze early-weaned calves at an average stocking rate of four to six calves/acre. This stocking rate has proven acceptable during both dry and wet winters. Optimal stocking rate should be defined as the rate that best makes use of the available forage and results in maximum animal body weight gain. On non-irrigated land, this target rate is highly dependent upon the amount of effective precipitation received during pasture establishment. We have found a great deal of variability among ryegrass yield (Figure 2) and calf performance (Table 2) however, a stocking rate of four to six calves per acre has proven to be acceptable to achieve rates of body weight gain similar to or greater than the gain achieved by non-weaned calves of a similar age. In each of the studies reported in Table 2, early-weaned calves were provided supplemental concentrate feed at a rate of 1% of body weight. We were not certain of the best rate of supplementation, so we continued to adhere to this level so that results could be compared over multiple years. At an average annual stocking rate of five calves/acre, calf nurseries use a minimum of dedicated land. For example, using an early weaning rate of 10% (lactating cows with the lowest body condition) a 500-head cowherd would early wean 50 calves, requiring only 10 acres of land dedicated to the calf nursery.

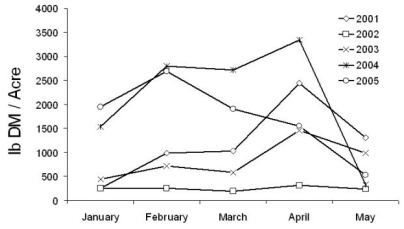

Figure 2. Annual ryegrass availability during the winter grazing months (2001 through 2005). Annual stocking rate = 3.3, 4.3, 4.0, 6.7, and 5.3 calves/acre and pooled SEM = 333, 81, 108, 133, and 219 for 2001, 2002, 2003, 2004, and 2005 respectively

In our system, calves are born in the fall (October-November) and early weaned at the start of the breeding season in the first week of January, at an average age of 70 days. 'Jumbo' ryegrass is established in mid-November. We prefer 'Jumbo' because tests have shown it grows later (approx. 30 days) into the spring compared to 'Gulf'. A complete fertilizer is applied at emergence and again approximately 6 weeks into grazing. We can expect about 100 days of grazing lasting into April. Ryegrass provides an excellent source of feed for early-weaned calves. In the first couple months of grazing, crude protein will be approximately 20% and in vitro organic matter digestibility will exceed 80% (Figure 3). Although ryegrass is rich in nutrients, we have found it essential to provide a concentrate supplement to the early-weaned calves. We have used both a commercial supplement containing 14% CP and 65% TDN and a commodity blend containing 85% soybean hulls and 15% cottonseed meal. In all years, supplement was adjusted monthly to target a rate of 1.0% of body weight. Both supplements have provided similar calf performance responses. We have also attempted to grow early-weaned calves on ryegrass without supplement; however, their performance has been much poorer compared to

supplemented calves. Joao Vendramini (PhD Dissertation, University of Florida, 2005) used early-weaned calves to assess the effects of varying rates of supplementation on performance during both the winter and summer grazing periods. In his studies, he found that voluntary forage intake (annual rye-ryegrass blend) decreased linearly as rate of supplementation increased from 1.0, 1.5, and 2.0% of body weight. Although body weight gain also increased with increased supplementation, the advantage may not offset the increased costs associated with supplementation (Table 3). The total cost calculation for maintaining an early-weaned calf should include the costs for ryegrass establishment, fertilizer, grain supplement, mineral, and fencing and feeding supplies.

Early weaning is an effective management tool for optimizing the reproductive performance of young cows. Our initial research indicates that early weaning will improve cow body condition by over 2 points (approximately 150 lb), resulting in an improved pregnancy rate. Establishing dedicated calf nurseries will provide Florida producers with the ability to optimize early-weaned calf performance and capitalize on the low cost of spring gain and the favorable spring markets.

Summer Grazing

In our system, a major shortcoming of the management of an early-weaned calf occurs once the winter annual ryegrass dies out in the spring. Once

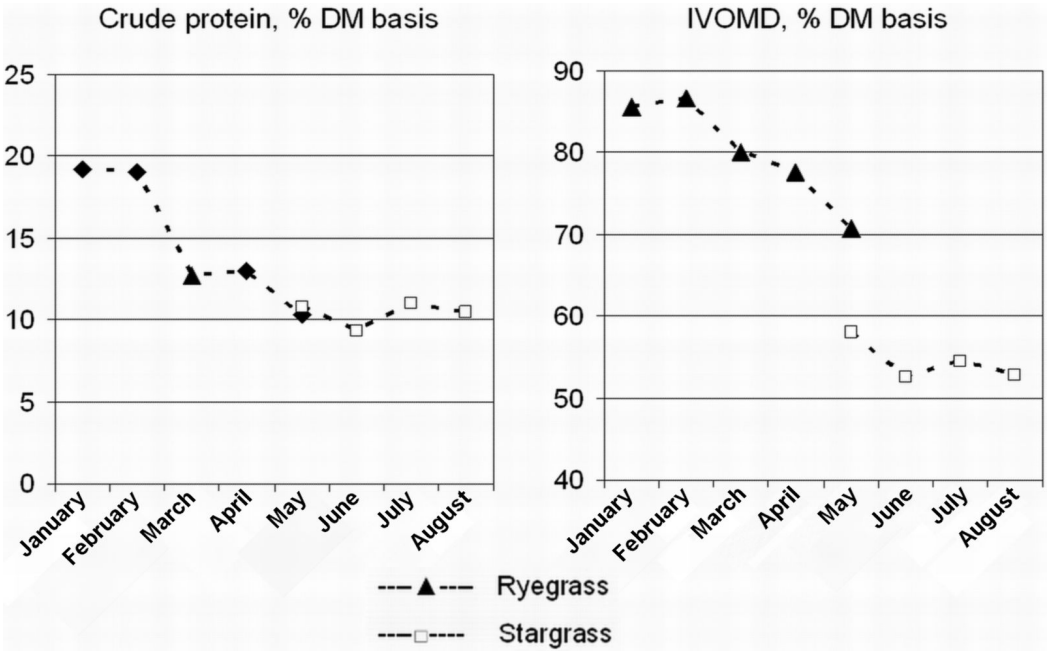

Figure 3. Average ryegrass an stargrass quality over two consecutive seasons (2003 and 2004). Average stocking rate = 1.6 calves/acre. Average SEM = 0.65 and 0.29, and 1.37 and 1.27 for ryegrass and stargrass crude protein and IVOMD, respectively.

That cow performance is improved by early weaning is clear: at the time of normal weaning, early-weaned cows are demonstrably heavier and have better body condition than normal-weaned cows (Tables 4 and 5) This improvement in body condition was associated with a higher pregnancy rate and 21-day shorter calving interval for early-weaned versus normal-weaned cows (89.5 vs. 50.0% pregnant for early- and normal-weaned, respectively).

early-weaned calves are moved onto summer pastures, their performance declines rapidly. Our annual ryegrass is grazed out by early to mid-May, leaving about a 100-day deficit period until the time of normal weaning (early August). Over six years of investigation, performance of our early-weaned calves drops by an average of 25% in the summer compared to their performance during the winter (Table 2). Although performance in the winter is similar among early- and normal-weaned calves, performance in the summer period is usually inferior

for the early-weaned calves compared to those left with their dams. This decline in performance often results in a greater overall ADG for normal-weaned compared to early-weaned calves when calculated from January (time of early weaning) to August (time of normal weaning). We attribute this decline in summer performance to the lesser digestibility of our summer perennial pastures compared to the winter annual ryegrass (Figure 3). For Florida producers, these data would support the marketing of early-weaned calves in late April or early May. Historically, calf markets are at their greatest at this time of the year. Also, early-weaned calves are lighter at this time, enabling producers to enjoy the benefits of lower transportation costs.

Feedlot Performance of Early-Weaned Calves

program and North Carolina State University, we examined the productivity of early- versus normal-weaned calves in the feedlot. In that study, early-weaned calves were lighter at the time of normal weaning (492 versus 611 lb), but gained body weight at a faster rate during the feedlot receiving period (Figure 4). By day 28, body weight was similar (538 versus 617 lb for early- and normal-weaned calves, respectively). Overall, early-weaned calves gained over 1 lb/d more than normal-weaned calves, despite no differences in daily feed dry matter intake (Table 6)

The most striking response to early weaning in our feedlot study was the significant improvement in feed efficiency (Table 6). We have attributed this response to a reduction in stress among early- versus normal-weaned calves in response to weaning and

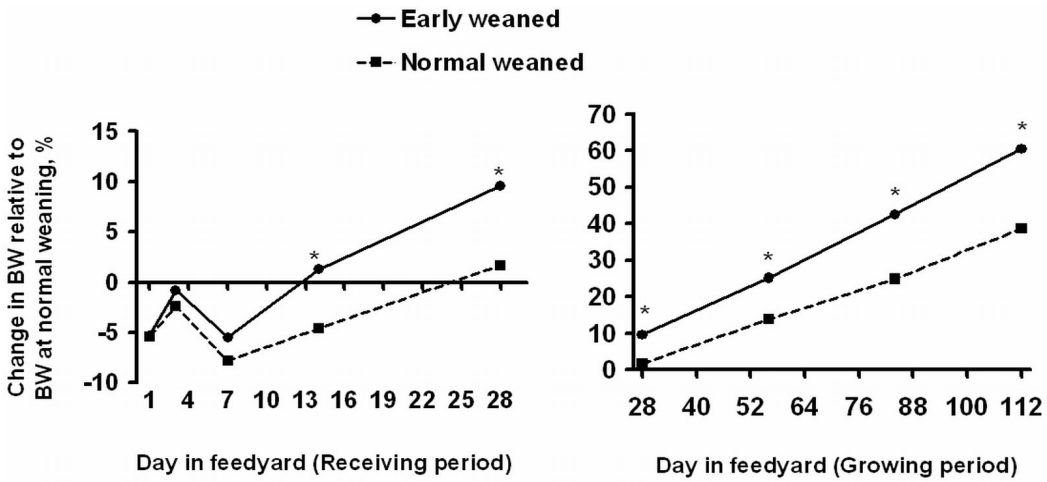

Figure 4. Percent change in body weight relative to weaning weight for early- and normal-weaned calves. Calves were shipped during the first week in August. Early-weaned calves were weaned (early January) and retained on the ranch of origin until the time of normal weaning. Normal weaned calves were shipped the day of weaning. * = indicates that means differ on these sampling dates.

In many ranch settings, normal-weaned calves are shipped immediately after separation from the cow. When shipped as a complete group (not commingled), these calves typically perform well; nevertheless, buyers often discount freshly weaned calves because of the perceived potential for these calves to contract stress-related disease. The use of early weaning, followed by 100 days of winter grazing, produces calves that have recovered from the stress of weaning and that have learned how to eat. Once they are received into the feed yard, these calves are likely to have fewer incidences of illness. In a recent study conducted in collaboration with our

transport. During normal stress events, the body reacts by producing a group of stress proteins called acute phase proteins. In our study, early-weaned calves had a lesser acute phase protein response following transport and entry into the feedlot. Further, a relationship between blood stress proteins and daily body weight gain was observed in normal-weaned steers during the feedlot receiving period. Other researchers have shown that, upon entry into the feedlot, feeder calves with lower plasma acute phase protein concentrations have reduced incidences of morbidity and the subsequent number of required medical treatments.

General Healthcare of the Early-Weaned Calf

One common question related to weaning calves at this young age is health status. It is understandable that one would be concerned with the viability of calves of this age. In fact, ranch-derived calves at 50 to 90 days of age have a very high health status. This is related to the passive immunity that they obtained from their mothers through colostrum. This colostrum provides important immunity to calves of this age. In comparison, calves of normal weaning age (6 to 8 months) have little to no remaining passive immune protection. If normal-weaned calves are not properly vaccinated, they will be more susceptible to succumbing to disease at the time of weaning compared to 70 to 90 day old early-weaned calves. We do not recommend vaccinating calves at the time of early weaning, as the vaccine will likely be neutralized by the calf's own passive immunity. Early-weaned calves should be vaccinated according to the same schedule used for the normal-weaned calves in the herd. One exception to this rule relates to producers that may "gather" early-weaned calves from multiple sources. In this situation, the producer often does not know the health status of the herds from which the calves are sourced. Further, the stress of transport and commingling may elicit the onset of disease. In these situations producers should work with their veterinarians to develop a health-care plan that will take into consideration the balance between disease pressure and immune protection.

One important difference that we have noticed in early-weaned calves is their susceptibility to internal parasites. We typically treat our early-weaned calves for internal parasites two to three times during the 200-day grazing period. By following this management schedule, we have noticed significant improvements in calf body weight gain following treatment.

Summary of Important Concepts

1. Early weaning must occur prior to the start of the breeding season to gain the full reproduction benefits associated with this management practice. Calves should *not be less than 60 days of age* at the time of early weaning.
2. Early-weaned calves grow well on high-quality annual pastures such as ryegrass when provided supplemental grain at a rate of 1% of body weight. When high-quality pastures are not available, early-weaned calves will require access to greater rates of a high-quality supplemental concentrate. At the time of early weaning (50 to 90 days of age), the crude protein requirement of the early-weaned calf diet may be as high as 20% on a dry matter basis.
3. If you are planning to ship both early- and normal-weaned calves at the same time, vaccinate the early-weaned calves on the same schedule as the normal-weaned calves. Calves should not be vaccinated at the time of early weaning because the vaccine will be neutralized by the calf's own passive immunity. Early-weaned calves are highly susceptible to internal parasites. Consider treatment for intestinal parasites every 60 days.
4. In our experiences in Florida, we have been unable to maintain the high growth rate of the early-weaned calf into the summer. This is most likely a result of the poor nutritional quality of perennial forages with respect to the requirements of the calf. Depending on the region of the country, producers should carefully examine their pasture forage options and consider the efficiency of moving the calf to regions closer to feeding and finishing.
5. When received into the feedlot at the time of normal weaning, early-weaned calves have greater feed efficiency compared to their normal-weaned contemporaries. This is an important production response for producers to consider when evaluating retained calf ownership opportunities.
6. Early-weaned calves have been shown to have carcasses of greater USDA quality score compared to their normal-weaned contemporaries. This response is likely the result of being placed onto concentrate diets at an earlier age. Our early-weaned calves have similar USDA carcass quality scores as normal-weaned calves when grazed on pasture until the time of normal weaning,

Frequently Asked Questions

1.If I use early weaning as a management tool to improve young cow reproductive performance, won't I be selecting females with poor reproductive traits that would otherwise have been culled?

Answer: This has been an interesting question and one that truly illustrates our mindset on cow culling. Certainly poor reproductive performance is a trait that should be highest on our cull list. In the past, producers often were unable to cull for other poor cow traits because the number of cows available for culls was taken up by open females. Many of these were young cows that simply did not breed because of poor body condition. The use of early weaning enables these females to become pregnant. You may still cull them the following year by using calving date as the culling criteria. In this manner, you've achieved the same outcome (culled cow), but now have a calf to market.

2.What if I can't grow enough ryegrass!?

Answer: A 200-lb, early-weaned calf will only consume about 5 to 6 lb of dry matter per day. We recommend a supplementation rate of 1.0 % of body weight; therefore, the calf is only consuming 3 to 4 lb of ryegrass dry matter daily. Most producer perceptions of the amount of ryegrass cattle require come from the attempt to graze mature cows. In contrast to an early-weaned calf, a mature cow may consume 30 lb of ryegrass DM daily, almost 10 times the amount a calf will consume. Therefore, even miserable looking stands of ryegrass will support modest growth in early-weaned calves. Remember, you can use supplemental energy feeds if the ryegrass stand fails to support optimal growth. In many cases, the savings realized from reduced cow dry matter intake and improved reproductive performance may still offset the purchase of additional feed.

3.Which cows should be considered for early weaning?

Answer: The cows with low body condition are most likely to be the ones that will either not conceive or conceive late in the breeding season. Therefore, these should be the candidates for early weaning. Typically, these will be the young females of the herd.

4.After early weaning, can I sell my calves instead of feeding them on the ranch?

Answer: Sure, there is always a market for lightweight calves. However, our experiences suggest that keeping early-weaned calves at the ranch and rearing them on calf nurseries achieve highly efficient gains.

5.Why not just provide adequate feed and supplement to my lactating heifers so that they will maintain body condition and become pregnant?

Answer: Sure, this is fine. However, it is always more efficient to feed the calf directly versus feeding the cow so that she can feed the calf. These costs will be different for every situation depending on availability of pasture, quality of hay, and price of supplemental feed.

Table 1. Effect of early weaning on supplemental hay intake and performance of beef cows wintered on perennial bahiagrass pasture (average of two years; n = 96 cows).

Item	Early-weaned	Normal-weaned	SEM	P =
Hay intake, lb/cow/d [a]	14.2	16.7	0.5	< 0.01
Body condition change [a,b]	+ 0.5	- 0.5	0.08	< 0.01
Pregnancy rate, %	80.4	69.6	-----	0.23

[a] Calves early weaned at an average age of 85 days. Hay intake and body condition change calculated for 75 days after early weaning, after which all cows were exposed to mature bulls as a single group for 45 days.
[b] Body condition scored on a 1 to 9 scale (1 = emaciated and 9 = obese).

Table 2. Performance of early weaned calves in both winter and summer grazing seasons over six consecutive years (average daily body weight gain; lb/d ± standard deviation).[a]

Year	Winter grazing [b]	Summer grazing [b]	Stocking rate, calves/acre	
			Winter	Summer
2000	1.89 ± 0.04	1.21 ± 0.07	3.3	3.3
2001	2.08 ± 0.06	-------	3.3	-------
2002	1.35 ± 0.07	1.31 ± 0.18	4.4	2.4
2003	1.60 ± 0.06	1.34 ± 0.06	4.0	1.2
2004	1.73 ± 0.11	1.48 ± 0.05	6.7	2.0
2005	2.15 ± 0.10	-------	5.3	-------
Average	1.80 ± 0.07	1.34 ± 0.09	4.7	2.2

[a] Calves are approximately 60 to 90 days of age at the time of early weaning. All calves are provided supplemental feed at a target rate of 1.0% of body weight during both grazing seasons. A commercial feed (14 and 65% CP and TDN, respectively) was used in 2000, 2001, 2002, and 2003, and a commodity blend of soybean hulls and cottonseed meal (85:15) was used in 2004 and 2005.
[b] Winter and summer grazing periods each are approximately 100 days. Winter grazing always occurred on annual ryegrass. Ryegrass was typically fertilized twice using a complete fertilizer, once upon emergence and again approximately 50 days into grazing. Summer grazing consisted of established limpograss in 2000 and established stargrass in all other years.

Table 3. Performance of early-weaned calves grazing winter rye-ryegrass pastures and supplemented with different levels of concentrate. [a]

Item	Concentrate, % BW [b]			SEM	Response	P =
	1.0	1.5	2.0			
Average daily gain, lb/d	1.63	1.79	1.96	0.07	Linear	< 0.05
Forage placeOM intake, % BW [c]	1.8	1.3	1.1	0.01	Linear	< 0.01

[a] J. M. Vendramini. 2005. PhD Dissertation. University of Florida – IFAS.
[b] Values represent a rate of supplementation calculated as a % of calf body weight (BW).
[c] Forage organic matter intake determined on grazing calves by the use of a sustained-release bolus containing an indigestible.

Table 4. Effect of early calf weaning on cow body weight

	Cow body weight [a]			Cow body weight change		
Treatment	Jan	April	Aug	Jan to April	April to Aug	Jan to Aug
	---------- lb ----------			---------- lb ----------		
Control	941	919	982	-22	63	41
Early-weaned	907	954	1074	46	120	166
Pooled SEM [b]	19	18	22	12	13	16
P =	0.21	0.19	0.008	< 0.001	0.004	< 0.001

[a] Individual cow body weights collected at the time of early weaning (January 23), mid-spring (April 24) and at normal calf weaning (July 31).
[b] SEM = Standard error of the mean.

Table 5. Effect of early calf weaning on cow body condition

	Cow BCS			Cow BCS change		
Treatment	Jan	April	Aug	Jan to April	April to Aug	Jan to Aug
	---- Scale (1 to 9) ----			---- Scale (1 to 9) ----		
Control	3.88	4.27	4.50	0.38	0.20	0.61
Early-weaned	3.90	5.11	6.25	1.21	1.39	2.35
Pooled SEM [b]	0.18	0.14	0.19	0.12	0.17	0.21
P =	0.96	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

[1]Individual cow body condition (BCS) collected at the time of early weaning (January 23), mid-spring (April 24) and at normal calf weaning (July 31) using a 1 to 9 scale (1 = emaciated and 9 = obese).
[b] SEM = Standard error of the mean.

Table 6. Effects of early versus normal weaning on calf feedlot performance[a]

Period[b]	Early-weaned	Normal-weaned	stocktickerSEM [c]	*P* =
Receiving				
ADG, lb/d	1.92	0.88	0.22	0.03
stocktickerDMI, lb/d	12.5	11.6	0.62	0.36
G:F	0.154	0.076	0.010	0.01
Growing				
ADG, lb/d	3.04	2.60	0.11	0.05
stocktickerDMI, lb/d	19.4	19.6	0.77	0.84
G:F	0.157	0.133	0.006	0.06
Finishing				
ADG, lb/d	3.02	2.91	0.12	0.77
stocktickerDMI, lb/d	19.2	20.2	0.64	0.33
G:F	0.157	0.144	0.007	0.35
Overall				
ADG, lb/d	2.71	2.76	0.24	0.82
Total BW gain, lb	650	589	20.5	0.10
Total stocktickerDMI, lb	4,231	4,357	165.2	0.62
G:F	0.154	0.135	0.004	0.02

[a] Early-weaned calves were removed from their dams at 85 d of age. Normal-weaned calves remained with their dams until the day of normal weaning (average age = 300 d).

[b]Receiving diet = d 0 to 28; Growing diet = d 28 to 112; and Finishing diet = d 112 to Table values are least square means. ADG = average daily body weight gain. DMI = dry matter intake of feed. G:F = ratio of gain to feed intake (feed efficiency).

[c]Largest standard error of the mean (SEM) of least square means (n = four pens/treatment).