

# Early Weaning – A Management Alternative for Improving Heifer and Young Cow Productivity

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## Abstract

Low cow body condition is the number one reason for reduced conception rates and overall poor cowherd productivity. Cows grazing pastures with inadequate forage availability or forage with low nutrient value will lose body condition if not provided with supplemental nutrients to meet their requirements. This typically occurs after calving, when nutritional demands are at a maximum. This is most pronounced in young cows and heifers, which have higher nutritional demands to support both lactation as well as their own continued growth. When managing these young cows, producers are faced with a limited number of options, one of which is early calf weaning. By weaning calves at the start of the breeding season (50 to 90 days of age), young cows are able to stop lactation and begin diverting nutrients toward improved body condition and attainment of postpartum estrus. Recent results from our research have shown that early-weaned, first-calf heifers require approximately 50% less energy to achieve and maintain moderate body condition compared to lactating heifers of the same age. Early weaning also has positive implications on the value of calves post-weaning. The use of early weaning, followed by 100 days of winter annual grazing, produces calves that have recovered from weaning stress and know how to eat. Further, researchers from the University of Illinois have reported that early weaning improved the percentage of calves grading USDA Choice or higher by over 30% compared to normal weaned calves.

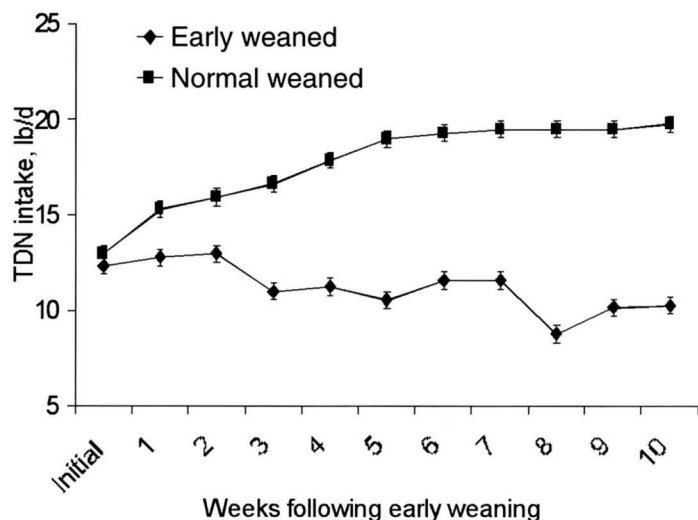
## Introduction

The importance of cow body condition on reproductive performance has been realized for many years. Cattlemen understand that the nutritional value of Florida's forages, in combination with poor winter yield, limits cow reproductive performance. Nevertheless, even today, low cow body condition is the number one reason for reduced conception rates and overall poor cowherd productivity. Cow body condition is a subjective estimate of the amount of fat cover on a cow and is the most reliable method for evaluating a nutritional program. Cows grazing pastures with inadequate forage

availability or forage with low nutrient value will lose body condition if not provided with supplemental nutrients to meet their requirements. For moderate frame-score cows, one body condition score is equal to about 75 pounds (lb) of body weight. Body condition typically declines after calving, when the nutritional demands of the cow are at a maximum. It is during this time that supplemental nutrition is most needed. Research from the University of Florida has shown that cows with low body condition scores ( $\leq 4.0$ ) have a 30% reduction in pregnancy rate compared to cows in optimum body condition (5.0 to 6.0). The cows with low body condition score that do conceive often do so late in the breeding season. This increase in post-partum interval results in later calves the following year. This is most pronounced in young cows and heifers, which possess higher nutritional demands to support both lactation as well as their own continued growth. When managing these young cows, producers are faced with a limited number of options, including, 1) provide adequate nutrient-dense supplementation, 2) early weaning, therefore removing the nutritional demands associated with lactation, or 3) breed heifers at three years of age when their own growth demands are less.

## Early Weaning

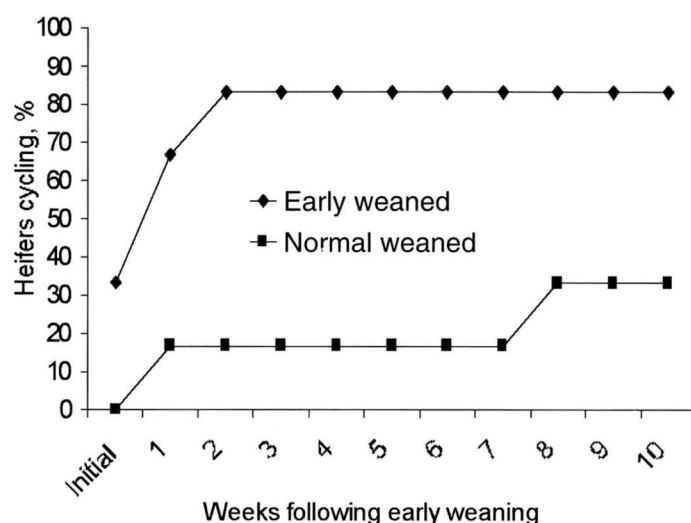
Early weaning may be a practical and profitable management consideration for Florida cow-calf operations. Research from Purdue University has shown that early weaning may decrease the post-partum anestrus period by 24 days (d). As early-weaned cows begin to stop lactating their dry matter intake decreases. Recent 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 (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. Combined with the highly efficient feed:gain ratios of early weaned calves, these data show greater than 40% improvement in converting TDN into calf gain. As well, early-weaned heif-



**Figure 1.** Effect of early calf weaning on TDN intake in first-calf heifers. Early-weaned calves were removed on the first day of week 1.

ers in this study had a shorter period of postpartum anestrus (Figure 2). This response is similar to the 48-hour calf withdrawal management system, whereas, the removal of the suckling calf initiates an endocrine response responsible for initiating estrus in postpartum cows. These data have significant practical value to the productivity of cowherds, especially for heifers and young cows. In any given year, the majority of open females are heifers and young cows. The use of early weaning will allow these females to regain their lost body condition, and do so with less forage and supplemental feed. As well, the decrease in post-partum interval means these females will become pregnant earlier in the upcoming breeding season, and therefore produce calves that will be older and heavier at next year's weaning.

Early weaning also has positive implications on the value of calves post-weaning. In many ranch settings, calves are shipped immediately after separation from the cow. When shipped as a complete group (not commingled) these calves typically perform well, nevertheless, buyers have often discounted fresh-weaned calves due to the potential for stress-related disease. The use of early weaning, followed by 100 days of winter annual grazing, produces calves that have recovered from weaning stress and understand how to eat. Once received into the feed yard, these calves will likely have a lower risk of illness. In a recent study conducted in collaboration with our laboratory and Dr. Jerry Spears at North Carolina State University, we examined the productivity of early- vs normal-weaned calves during a 28-day feedlot receiving period. In that study, early-weaned calves were lighter at the time of normal weaning (492 vs 611 lb). By d 28, BW was similar (538 vs 617 lb for early- and normal-weaned calves, respectively). Overall, early-weaned calves gained an aver-



**Figure 2.** Effect of early calf weaning on post-partum cyclicity of first-calf heifers. Early-weaned calves were removed on the first day of week 1. Date of return to estrus was determined as the first week when progesterone concentrations were greater than 1 ng/mL for two consecutive weekly samples.

age of 1.3 lb/d more than normal-weaned calves. Feed efficiency was improved for early- vs normal-weaned calves (F:G = 6.4 vs 13.0). As an indicator of stress during the receiving period, plasma concentrations of two acute phase proteins were examined. Ceruloplasmin concentrations increased in normal-, but not early-weaned calves, and peaked on d 7 (27.6 and 34.2 mg/100 mL for early- and normal-weaned calves, respectively). Haptoglobin concentrations increased in both groups and were highest ( $P < 0.05$ ) in normal-weaned calves on d 3 (7.63 vs 14.86 HgHpB/100 mL). These data suggest that early-weaned calves, which are maintained on-site prior to shipping, are more tolerant to the stressors associated with transportation. This improved tolerance results in improved feedlot performance during an initial 28-d receiving period.

Early weaning also has positive benefits beyond animal health and performance. Researchers from the University of Illinois have been investigating the effect of early weaning on carcass merit. They reported that early weaning improved the percentage of calves grading USDA Choice or higher by over 30% compared to normal weaned calves. In a comparison of weaning age (90, 150, or 210 days), they found that calves weaned at 90 days tended to produce higher quality carcasses. This year we will be finishing all our early-weaned calves, in addition to their normal-weaned contemporaries, at the Animal Sciences Research Feedlot at North Carolina State University, Raleigh. This collaboration will allow us to capture additional feedlot and carcass data on this management system, which will be reported in later updates.

## Calf Nurseries

Most of the research studying the effects of early weaning on cow and calf productivity has come from the midwest and high plains regions. At the time of early weaning these producers are often without adequate pasture forage, therefore, their studies have focused on the use of dry lot feeding of the early-weaned calves. An opportunity to rear early-weaned calves on high-quality pasture forage should provide important value toward the costs of maintaining an early-weaned calf.

Producers may choose to market early-weaned calves immediately after weaning versus accepting the management of these young animals. In collaboration with Dr. Rob Kalmbacher, at the Range Cattle REC, we have been investigating the establishment of calf nurseries for the rearing of early-weaned calves. Calf nurseries consist of ryegrass grown on a selected piece of land that slopes from a lower wet area upward to a higher dry area. This provides a dedicated piece of land that should respond favorably to variation in rainfall, whereas the higher land will yield better in wet winters and the lower in dry winters. Each nursery has a small area (approx. 1/2 acre) of bahiagrass sod where water, feed and mineral are offered. We learned that hogs enjoy rooting through the nurseries; therefore, woven-wire fencing surrounds each nursery. Over the past three years, we have grazed early weaned calves at an average stocking rate of four calves / acre. Despite dry winters in 2000 and 2001 this stocking rate turned out to be acceptable, as available forage often exceeded that which the calves could consume. We expect the optimal stocking rate to be around four to five calves/acre. At this rate, 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.

In our system, calves are born in the fall (October-November) and early weaned at the start of the breeding season on January first, at an average age of 70 days. 'Jumbo' ryegrass is established on cultivated soil 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 (20:5:15) is applied at emergence (300 lb/acre) and again using (20:0:15) on 45-day intervals. We can expect about 100 days of grazing lasting into April. Ryegrass provides an excellent source of feed for calves. Using a feed:gain ratio of 4.2 to 1, our calf nurseries provided 1.2 tons of ryegrass DM / acre, which was 81 % digestible and contained 35 % crude protein. To supplement the ryegrass, calves are provided with grain (16 % crude protein) at a targeted rate of 1.0 % of body weight daily. Last year, our early-weaned calves had a higher ADG from the time of early weaning until the end of ryegrass grazing com-

pared to their contemporaries left with their dams (Table 1). Throughout the entire ryegrass-grazing period (112 days), the early-weaned calves gained an average of 288 lb/calf (2.04 lb/day). Considering the total costs for ryegrass establishment, fertilizer, grain, mineral and supplies, our overall cost of gain was \$0.32/lb.

For temperate regions of the United States, other grass varieties should be considered. It is important to note that forage varieties that may not be tolerant to cow grazing may work well in an early-weaned calf grazing system. Young calves are much gentler on the pasture, consuming forage much like a deer or goat. As well, because the calves are smaller the dry matter intake is much less than a mature cow.

Once early-weaned calves were moved onto perennial, summer limpgrass pastures, their performance declined rapidly. From May 15 to weaning (Aug 6), early-weaned calves had an ADG of 0.66 lb/day less than normal-weaned. This decline in performance resulted in a higher overall ADG for normal-weaned compared to early-weaned calves from January to August (Table 1). These data would support the marketing of early weaned calves in late April or early May. Historically, calf markets are at their highest this time of the year.

Cow performance is improved by early weaning. Last year, early weaning resulted in heavier cows in better condition at the time of normal weaning (Tables 2 and 3). 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).

The use of early weaning is an effective management tool for optimizing reproductive performance of young cows. Our initial research indicates that early weaning will improve cow body condition by over 2 points (approx. 150 lb) resulting in a 30% improvement in pregnancy rate. Establishing dedicated calf nurseries will provide Florida cattlemen with the ability to optimize early weaned calf performance, while capitalizing on low cost of gain and favorable spring markets.

### Common Questions on Early Weaning

Since we have begun our research on this management topic, we have gotten many good questions from interested producers. Some of these questions have become common, so we have listed them in this article.

*1. Do we need to early wean our calves before the start of the breeding season?*

**Answer:** This is not essential. Actually, the start of the breeding season is a good time to consider which cows will be early weaned. Certainly, the sooner you

**Table 1.** Effect of early calf weaning on calf growth.

Treatment	Calf body weight <sup>1</sup>			Calf ADG		
	Jan	April	Aug	Jan to April	April to Aug	Jan to Aug
	----- lb -----			----- lb -----		
Control	192	326	509	1.48	1.87	1.68
Early-weaned <sup>2</sup>	200	358	492	1.89	1.21	1.50
Pooled SEM	4.6	6.4	10.8	0.04	0.07	0.04
P =	0.26	0.005	0.28	< 0.001	< 0.001	0.006

<sup>1</sup>Individual calf body weight collected at the time of early weaning (January 23), mid-spring (April 17 and 24 for early-weaned and control, respectively) and at normal weaning (July 31 and August 8 for early-weaned and control, respectively).

<sup>2</sup>Early-weaned calves grazed on winter ryegrass from January 23 to May 15 and then on limpgrass from May 15 to August 8. Early-weaned calves were provided dry feed at a rate of 0.86 % of body weight from January 23 to August 8.

**Table 2.** Effect of early calf weaning on cow body weight.

Treatment	Cow body weight <sup>1</sup>			Cow body weight change		
	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	19	18	22	12	13	16
P =	0.21	0.19	0.008	< 0.001	0.004	< 0.001

<sup>1</sup>Individual cow body weights collected at the time of early weaning (January 23), mid-spring (April 24) and at normal calf weaning (July 31).

**Table 3.** Effect of early calf weaning on cow body condition.

Treatment	Cow BCS			Cow BCS change		
	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	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

<sup>1</sup>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).

can remove the calf, the sooner the cow will gain the nutritional benefits of not lactating. If you generally breed your heifers 30 days before the mature cows, then these calves will be plenty old enough to be early weaned at the start of the breeding season of the following year. Calves need to be at least 60 days old before they should be weaned.

*2. 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 should have otherwise been culled?*

**Answer:** This has been an interesting question and one that truly illustrates our mindset on cow cull-



ing. Certainly poor reproductive performance is a trait that should be highest on our cull list. In the past, producers often are unable to cull for other poor cow traits because the number of cows available for culls is taken up by open females. Many of these are young cows simply did not breed because of poor body condition. By the use of early weaning these females will 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.

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 light-weight 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.

## Dedication

The Ona Research and Education Center gathers to congratulate Matthew Tomlinson on 43 consecutive years of service.

Mr. Tomlinson started at the Center in November 1960. He was hired by the very first Center Director, Dr. W. G. Kirk. Matthew has outlasted the first, the second, Dr. H. L. Chapman, but not the third, Dr. F. M. Pate.

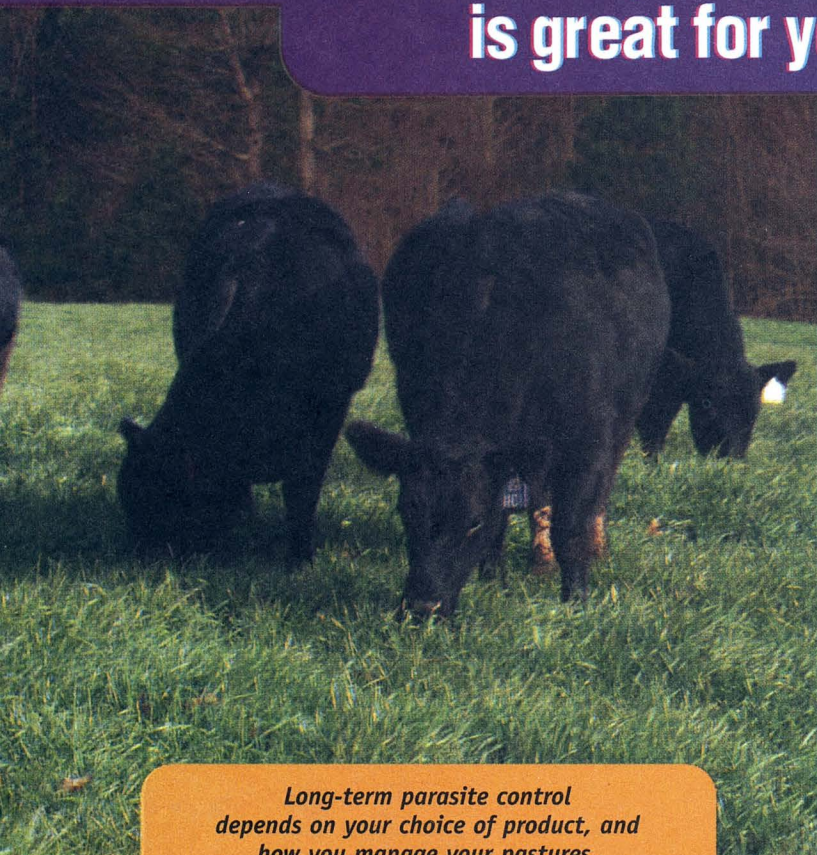
Shortly after starting at the Range Cattle Station (the name back then), Dr. Elver Hodges helped Matthew get his driver's license. Since then, Matthew has had a hand in every aspect of daily ranch work – cowboy, tractor driver, and chief fence builder. There is not a Doctor he hasn't worked for nor a job he hasn't performed. Of course, our favorite job Matthew held was bar-b-que cook.

In the 43 years of service Matthew has been a dedicated employee. To note how dedicated, he has accumulated approximately 11 months of unused sick leave. That is amazing.

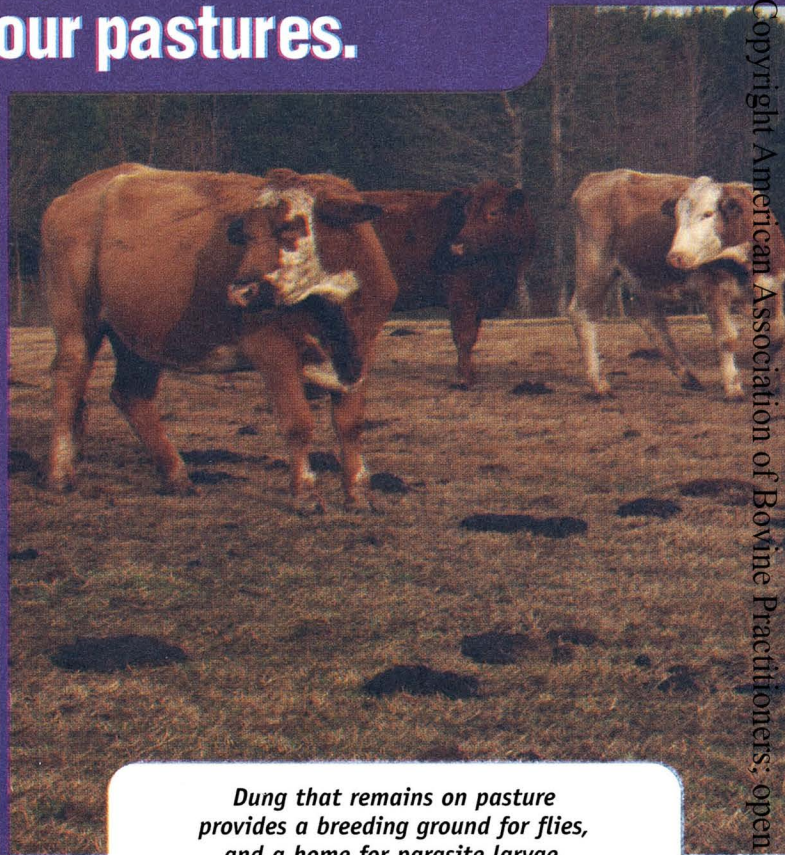
We will tell stories about Matthew when we are reminiscing of the good old days. We will miss the great bar-b-ques, but most of all we will just miss him. Thanks Matt for all the years.



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<sup>1</sup> Wardhaugh, K. and Ridsill-Smith T. *Antiparasitic Drugs, the Livestock Industry and Dung Beetles – Cause for Concern?* Australian Veterinary Journal, 1998, 76(4): 259-261.

<sup>2</sup> Fincher, G.T. *The Potential Value of Dung Beetles in Pasture Ecosystems.* Journal of the Georgia Entomological Society 16: p. 301-316, 1981.

<sup>3</sup> Floate, K.D. Colwell, D.C. and Fox A.S. *Reductions of non-pest insects in dung of cattle treated with endectocides: a comparison of four products.* Bulletin of Entomological Research, February 2002.

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