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Weaning Management of Beef Calves [1]

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Introduction

Weaning is considered one of the most stressful periods in the productive life of a beef calf. During the weaning process, calves are exposed to various stressors that include removal from their dam, physiological changes (actively developing lean tissue or muscle), castration, vaccination, dehorning, exposure to novel pen or pasture environments, possible changes in feed and water sources, and for many spring-born calves, exposure to season climate changes. These various stressors (individually or in various combinations) can result in tremendous challenges to the calf's short-term and long-term health, gain performance, and economic viability. Calves that are sick or become sick during the first 30 days at the feedlot typically have lower daily gains, increased costs of gain and reduced carcass quality and tenderness (Fulton et al., 2002; Gardner et al., 1999; McNeill, 1999). Depending on how cow-calf producers market their calves, the aforementioned challenges can vary in their impact on the producer. Producers that retain ownership of their calves through the feedlot until slaughter are directly affected by all health and gain variables, whereas producers that market calves at weaning may not see the post-weaning impacts but their reputation as a source of feeder calves may diminish resulting in reduced future weaning prices. From an industry perspective, how we manage our calf crop, pre-weaning, at weaning, and post-weaning, can have dramatic effects on economic viability, consumer acceptance and end-product quality.

Pre-weaning Management

Pre-weaning management is important to ensure that calves have the ability to perform and function when exposed to the stressors associated with weaning. The nutritional status of the calf determines how well the calf will mount an immune response to vaccination and challenges associated with stress of weaning. Pre-weaning diets should be balanced in protein, energy, mineral and vitamins to ensure calf's health, welfare, and performance. Please see BEEF003 (Basic nutrient requirements of beef cattle) for additional information regarding nutritional management of growing beef calves. Further, immune responses to vaccination are not immediate. Therefore it is suggested that ranchers vaccinate calves 2-3 weeks prior to weaning in order for the calf to be immunologically prepared for the stress of the weaning process. Accordingly, the Superior Livestock Vaccination Program, with the objective of promoting value addition to the calf crop, recommends two pre-weaning protocols (VAC 24 and VAC 34). Please see appendix 1 for more information. All calves should also be castrated, dehorned and branded prior to weaning to alleviate

1. This document is part of the Oregon State University – Beef Cattle Library. Published in November 2011. Prior to acceptance, this document was anonymously reviewed by two experts in the area. For further information, please visit the Beef Cattle Sciences website at http://beefcattle.ans.oregonstate.edu.

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as much as possible the stress associated with the weaning process.

Weaning Strategies

Calf stress can also be minimized by implementing strategies that modulate the degree of separation from the dam, incorporate slow changes in diet, and capitalize on the familiarity of the environment. There are several different weaning strategies or combinations of strategies that can be used, and examples are described in Table 1.

Fenceline Weaning: Studies demonstrated that fenceline weaning alleviates calf stress while improving weight gain over other strategies. As example, Pierce et al. (2003) reported that fenceline weaned calves have decreased signs of stress, spent less time bawling and walking and more time eating and lying down than calves assigned to traditional weaning (Figure 1). Total weight gain was greater for fenceline weaned calves as early as 2 weeks following weaning compared to traditionally-weaned calves. Furthermore, fenceline weaned calves were heavier 10 weeks post weaning (up to 30 lb) compared to calves that underwent total separation (Figure 2).

Two-Stage Weaning: The two-stage weaning method uses a device to prevent the calf from suckling the cow, such as rings attached to the calf's nose. This method has been shown to reduce behavioral signs of calf stress after weaning compared to traditional weaning methods; however, subsequent beneficial effects on calf performance are still questionable. As an example, Haley et al. (2005) reported that calves assigned to the two-stage weaning strategy vocalized 96.6% less and spent 78.9% less time walking, 23.0% more time eating, and 24.1% more time resting after complete separation from the dams compared to calves assigned to traditional weaning. While wearing the nose ring, two-stage calves walked 15% more than the calves that were allowed to nurse, however, after separation, the traditional weaned calves walked twice as much and bawled 20 times more often that two-stage calves. In terms of performance, Haley et al. (2005) also reported that pre-weaning average daily gain (ADG) was often reduced in calves wearing nose rings compared to calves allowed to nurse. After weaning and consequent nose ring removal and total separation from the dam, ADG was either greater or similar for two-stage weaned calves compared to traditionally weaned calves. However, overall calf ADG (pre- and post-weaning) was not improved by the two-stage weaning method. These inconsistent benefits of the two-stage weaning method on calf performance were attributed by the authors to the poor quality of the forages available for calf consumption, which greatly affected the calves not allowed to nurse. Therefore, the nutritional value of diets offered during the period in which calves receive the nose clips should be taken into consideration before implementing the two-stage weaning method.

Timing of Weaning

Weaning calves reduces the nutrient requirements of the cow. It will allow the cow to transfer nutrients previously going to milk production to her own body function, improving her own condition and preparing for the next calving. Cows that calve in moderate BCS (5 or 6) are able to recover, cycle and become pregnant sooner than cows that come through the winter in poor condition (less than 4). This is particularly important in young cows that have additional requirements of growth. Weaning calves also reduces the amount of forage the herd will consume. For example, a nursing calf that is 4 months old or older normally consumes 1.4 to 2 % of his body weight (BW) in forage; the lactating cow can consume 2.5 % of her BW or more. A dry cow often will consume only 1.8 to 2.0 % of her BW of forage. Considering a 1200 lb cow and a 350 lb calf, forage consumed prior to weaning is around 37 lbs of total forage per cow-calf pair, compared to 24 lbs of total forage consumed by the weaned cow (assuming calves are sold or managed in a drylot). As consequence, profit generated by the ranch system as it relates to the weaning strategy adopted must include breeding efficiency, feed utilization (including grazed pasture/rangeland and winter harvested forage), calf performance, and marketability.

Early Weaning: Beef calves are traditionally weaned between 6-8 months of age. However, cattle can be reared on forages and concentrates as early as 90 days of age. In fact, weaning at 90-120 days of age can be accomplished with proper nutritional management of the calf. Early weaning (EW) calves can be a tool to increase breeding efficiency of the cow herd by improving BCS, particularly during a time of forage shortage and/or poor condition of the cowherd. Research conducted at the Eastern Oregon Agriculture Research Center in Burns demonstrated that cows assigned to EW (calves were 130 d old) maintained BCS from time of EW until traditional weaning (TW; calves were 207 d old), whereas cows

assigned to TW lost almost a full BCS (Merrill et al., 2008; Figure 3). In fact, the EW cows gained 18 lbs whereas the TW cows lost 88 lbs during this period. This weight difference resulted in a subsequent reduction in winter feeding costs of roughly $29.00/hd in EW cows compared to that of TW cows.

Early-weaned calves fed concentrate diets beginning at time of weaning have comparable weight gains compared that of nursing cohorts. Feedlot performance of EW calves, however, has been variable and highly dependent on the age at weaning, as well as nutritional and management background of the calf prior to and after EW. Consequently, the effects of EW on overall calf performance will be discussed in depth in a separate manuscript within the OSU - Beef Cattle Library. Nevertheless, profit of a cow-calf operation is highly influenced by management and marketing of the calf crop. The EW calves must be fed a nutrient dense diet which almost always includes some sort of concentrate and increased labor. Typically, if EW calves are not retained for a period of time, EW reduces the gross income of the ranch. However, in situations where reproductive performance of the cowherd is enhanced, and/or feed utilization and costs are improved, the cost of EW may be justified.

Post-Weaning Management

Management of the post-weaned calf will vary depending on the marketing program adopted by the cow-calf producer. Regardless of marketing option, there are a couple of management aspects that must be evaluated to ensure maximal return on investment. Again, the Superior Livestock Vaccination Program also recommends specific vaccination protocols for calves that are weaned and then maintained at the cow-calf ranch for a preconditioning period before shipping to the feedlot (VAC 45 and VAC Precon; see appendix 1). More information about specific preconditioning strategies will be discussed in a separate article. However, basic nutritional management should be followed to ensure that calves are in adequate nutrition and will respond efficiently if a preconditioning approach is adopted.

Depending on the weaning strategy incorporated, the level of stress should dictate the type of nutritional management. Typically, a higher level of stress increases the need for energy, protein, and minerals. Unfortunately, stress causes a depression in intake; therefore a highly palatable and digestible feed source is preferred. Use of high starch feedstuffs (i.e. corn, barley, etc.) provide highly digestible energy, but can also result in rumen disorders (i.e. bloat, acidosis) if calves are not properly acclimated to these feedstuffs. Forages (i.e. grass hays, alfalfa, etc.) can provide adequate levels of protein, but can be marginal in quantity of digestible energy (especially in highly stressed calves). Calves typically prefer digestible forages over grains, so palatability and intake are usually not a major issue with these feedstuffs. Also, high levels of dietary roughages will typically help maintain stable rumen fermentation, thus reducing the chances for digestive disorders. The third feedstuff source would be non-forage fiber sources, such as soybean hulls, distillers grains, or beet pulp. These sources are typically rich in digestible energy and contain decent quantities of digestible protein. Most non-forage fiber sources are highly palatable and complement forage and grain sources that may also be fed. Recently-weaned calves also need to have unrestricted access to a clean, abundant water source at all times. From a mineral status point-of-view, calves that are highly stressed (and may show signs of dehydration or scours) may require specific macro- and micromineral nutrition to ensure water retention and proper immune function, depending on the mineral content of forages and feedstuffs being offered.

Conclusions

Weaning is one of the most stressful periods in the productive life of a beef calf, and directly impacts the calf's short-term and long-term health, gain performance, and economic viability. Management alternatives to alleviate stress and ensure that the calf's immune system is prepared to cope with the challenges associated with weaning benefit welfare and productivity of the calf crop. Currently, there are several options for pre-weaning, weaning, and post-weaning management of calves, each one with its specific advantages and disadvantages. Therefore, cow-calf producers should examine carefully the available options, and determine which one to use, if any, based on the needs and particularities of their production systems.

References

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Table 1. Different weaning strategies for beef calves.

Strategy	Description	Pro	Con
Total Separation	**Abrupt separation of cow and calf without physical contact.** 1) Removal of calf to a new environment (i.e. sold, pasture or drylot). Or 2) Removal of cow to a new area thus leaving the calf in the pasture or rangeland.	**Will allow a ranch the option to sell the calf right off the cow.** Decreases the need to reserve forage or purchase feed for calves. Can also eliminate the need to have special facilities to handle bawling calves.	**High Stress** Calves are typically transported, exposed to a new environment, new diet and not allowed adaption period to separation from dam.
Fenceline Weaning	Cow and calf have nose to nose contact through a fenceline for a period of time. Preferred method allows both cow and calf access to forage. However, a drylot can be incorporated.	**Decreased Stress** Calf remains in a familiar environment and diet and allow adaptation to separation.	**Unique fenceline may need to be constructed to adequately contain calves and/or cows. Grazing management will need to be carefully thought out to accommodate cows and calves.**
Two-Stage Weaning	**A device is used to prevent the calf from suckling the cow, such as a specially designed nose ring.** Stage 1: Calf is fitted with nose ring for 4-14 days. Calf remains with the cow. Stage 2: Nose ring removed and cow and calf are physically separated.	**Less stress than abrupt separation.** Calf is allowed a period of adaptation to restricted suckling prior to total separation. During this time they remain in a familiar environment and diet.	**Cost and Labor. Low risk of lesions or abscess from nose ring.** Calves must be run through a chute 2 times during the weaning phase; 1) insertion of ring 2) removal of ring. However, calves can be processed during one of these times. Devices cost $2.00 (reusable). Retention rate reported 64-98%. May not be suitable for calves less than 425 lbs.

	Non-weaned	Fenceline Weaned (Pasture)	Total Separation: (Pasture)	Total Separation: (Drylot with hay adaptation)	Total Separation: (Drylot without hay adaptation)
Eating	41.1	37.3	23.7	28.9	21.5
Walking	8.6	10.1	28.1	9.6	14.8
Lying Down	22.9	23.3	16	21.9	20.6
Vocalization (s/hr/10 calf group)	0.1	216.7	434.6	371.2	518.2

Figure 1. Relationship between weaning strategy and observed calf behavior. Adapted from Price et al. 2003.

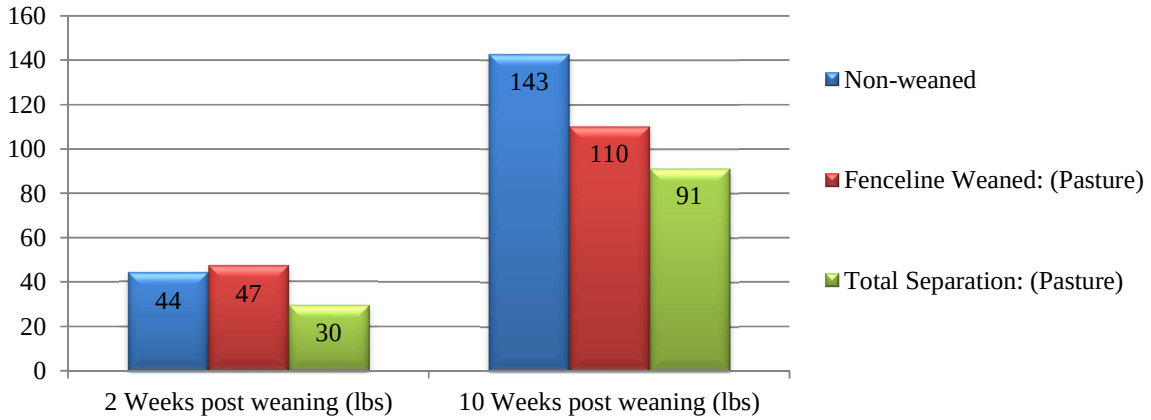

Figure 2. Effect of weaning strategy on total weight gain of calves 2 weeks and 10 weeks after weaning. Adapted from Price et al. 2003.

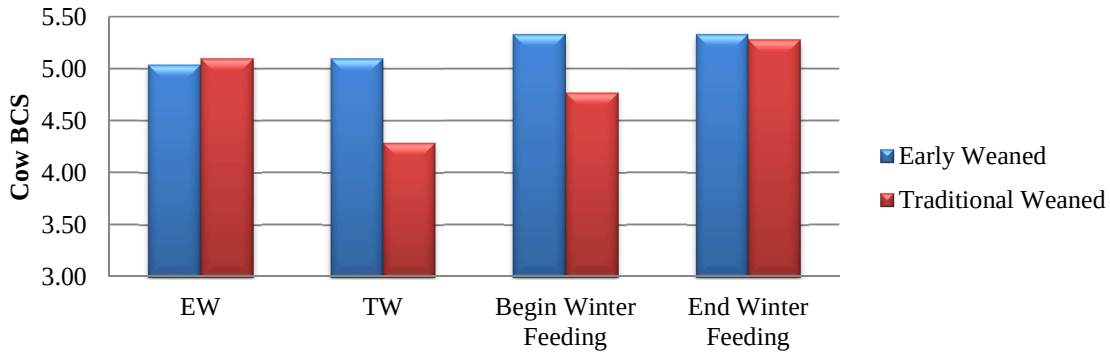

Figure 3. Effect of weaning strategy on cow BCS during different phases; at early weaning, traditional weaning, and winter feeding. Adapted from Merril et al. (2008).