MANAGEMENT OF BEEF CATTLE FOR ECONOMIC SUSTAINABLILITY: A REVIEW OF RESEARCH

Tim DelCurto and Marty Vavra

INTRODUCTION

Beef cattle producers are faced with the never-ending dilemma of maintaining economic viability during times of low market values and, more recently, increased public criticism of beef product quality and industry compatibility with the environment. Unlike other meat animal industries, such as swine and poultry, the beef industry in the western United States is very dynamic with a great deal of diversity mostly related to arid environments and subsequent effects on forage quality, quantity, and associated relationships to beef cattle nutritional requirements. As a result, the western beef cattle industry is very extensive with optimal production being a function of the resources each ranching unit has available and matching the type of cow and/or production expectations to the available resources. Successful beef producers are not necessarily the ones that wean the heaviest calves, display 95 percent conception, or provide the most optimal winter nutrition. Instead, the successful producers are the ones who display economic viability despite the economic and public pressures that can and will continue to plague the industry.

In a real sense, there is not a right way to manage cattle in the western United States. What works for one producer, may not be appropriate for the neighboring ranch. Economic viability often relates to three general factors: 1) value of beef, 2) input costs per cow, and 3) the production per cow (Figure 1). Unfortunately, beef cow/calf producers are usually considered "price takers" in that they have very little influence on setting market value for commercial beef cattle. In addition, the beef cow/calf industry is one that typically over produces, which often leads to price scenarios that are less than desirable. Therefore, the cow/calf producer, by default, must focus on finding an optimal balance between beef cattle production and economic inputs to attain the associated level of production. In this kind of management scenario, it is not uncommon for a beef cattle manager with modest production expectations, but low input cost per cow, to have similar or better economic prospects than a producer with high beef cattle production expectations. Obviously, the producer with high levels of beef cattle performance had input costs per cow that was greater than the production advantages.

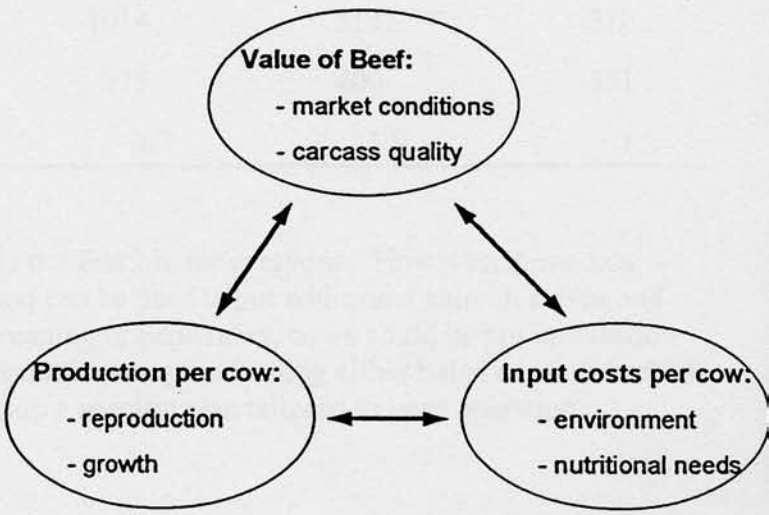

Figure 1. Economic strategies for beef cattle production focus on the following three factors: 1) value of beef, 2) production per cow, and 3) costs per cow.

What follows is a general discussion of potential management strategies that may offer economic advantages to western range livestock producers. Many scenarios or strategies may not be appropriate for your environment or production goals. Instead, most of the following information should be considered potential management alternatives that *may* offer economic advantages by decreasing input costs per cow.

When is the Best Time to Calve?

One of the most fundamental management decisions that has profound effects on beef cattle nutritional requirements is calving date. The western beef cattle industry is dominated by spring-calving beef cattle. In addition, time of calving has generally been related to the "55 days to grass" philosophy. This management strategy has gained popularity for a variety of reasons. First, the gestation length in beef cattle is approximately 284 days. Therefore, if your cow herd calves approximately 55 days before the onset of green forage, the cows will be exposed to green, highly nutritious, forage for approximately 25 days before they need to conceive and stay on a 365 day calving interval. In a sense, the 25 days of high forage quality is a natural "flushing" mechanism that usually prompts a cow to begin cycling if she had adequate body condition to begin with. Obviously, if your goal is to match the cow's nutritional requirements to the range forage quality, a producer might coincide calving with the onset of green forage (McInnis and Vavra, this publication). However, the "55 day before grass" philosophy has another advantage, the calf. A typical beef calf does not become a functioning ruminant until approximately 90 to 120 days of age. This event is usually associated with a cow that has passed its peak lactational period (day 70 to 90) and, as a result, calf performance will depend, to a greater degree, on the forage quality available to the calf. Thus, a calf born March 1, will be effectively utilizing forage available in June. In contrast, a calf born May 1, will not be effectively utilizing forage resources until August. Because of the vast difference in calf nutrition from day 90 to weaning, the earlier born calf will have weaning-weight advantages that greatly outweigh the 60 day difference in age. Obviously, if higher weaning weight is a measure of economic importance (you market calves in the fall), than the "55 day before grass" philosophy may be your best approach.

Are Weaning Weights Really Important?

The beef cattle industry in the United States has seen dramatic changes in production efficiencies over the last 30 years. In particular, weaning weights have increased from approximately 400 lbs in 1967, to greater than 600 lbs in 1997. The increase in weaning weights is related to increased use of continental breeds, greater selection on growth traits, and general improvements in management efficiency. If your goal is to market your spring calves in the fall, then this change in production efficiency has improved your economic potential.

However, the increase in weaning weights is an improvement in production efficiency that has some indirect problems. First, the target slaughter weight of market cattle has not

changed dramatically during this time period. As a result, the opportunities to put on post-weaning weight have become more limited with the higher weaning-weight cattle. For example, if a spring calving beef cow/calf producer weans his cattle in late October at 600 lbs, he/she may choose to sell in the fall market or retain calves over the winter feeding period. Because of the bigger calves his options are reduced. With only marginal gains of 1 to 1.5 lbs per head per day gains, this producer will come out of the winter feeding period (120 to 150 days) with 700 to 800 lb yearlings. The opportunities to place these animals on spring grass have become very restricted because to fit market standards the yearlings need to be placed in the feedlot (avg 90 days) with an expected gain of 300 to 350 lbs, and a target end weight of 1200 to 1300 lbs. Therefore, spring calving cow/calf production with high weaning weights have, as a result, limited opportunities as stocker cattle on grass markets.

Another change in the beef cattle industry in recent years is the trend to retain ownership and/or branded markets. These changes have indirectly led producers to reevaluate weaning weight goals because of opportunities to capture weight gains on yearlings and the need to provide cattle at finished weights over a yearly time frame. For producers who wish to retain ownership of cattle after weaning, weaning weight takes on less significance.

In fact, these producers are ones that should consider calving dates strongly if he/she wishes to decrease costs per cow. Moving the calving date to coincide range/pasture forage quality with cow nutrient demands may effectively reduce costs associated with supplementing cows during nutrient deficiencies. Weaning weight advantages are reduced, but the producer has more opportunities to capture that gain later in stocker, backgrounding, and finishing phases.

Fall Calving.

While this particular strategy does not closely match the cow's nutrient demands with range/pasture forage resources, some benefits do exists. By calving during the fall (September to October), a calf is produced that is big enough to efficiently use the early high-quality forage available in the spring; with the cow still producing some milk, to make rapid gains during this period. This program allows calves to stay on the cows longer and continue to make economical gains. In contrast, spring born calves are often not able to effectively utilize spring and early summer forages.

Likewise, fall calving may provide benefits relative to the environment that calves are exposed to at birth. Typical spring calving conditions include poor calving weather, long breeding seasons, and problems, such as infectious diarrhea and respiratory diseases, which are compounded by calving on wet muddy flood meadows. Wind is also prevalent at this time of year, and wind-chill can adversely affect calf morbidity and mortality.

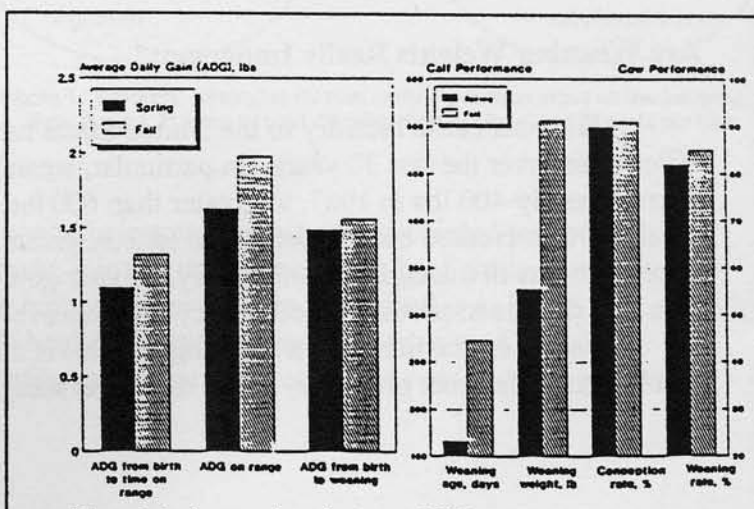

Figure 2. Performance data of spring- and fall-born calves and cows averaged ov
5 years.

Weaning weights of fall-born calves at the Northern Great Basin Experimental Range have exceeded that of spring-born calves by 150 to 200 lbs, with over 1100 calves over 5 years (Figure 2; Turner and DelCurto, 1991). Most of the fall-born calves were creep fed 20 to 100 pounds of feed. Due to confinement on winter feed grounds, creep feeding the fall-born calf is more practical than on ranges with spring-born calves. Most of the weight advantage is due to higher gains early in the spring on range, creep feeding, and the additional length of time on the cow. Conception and weaning rates were also slightly higher in fall-calving cows.

Obviously, winter nutritional management needs to be increased dramatically with fall-calving cows with the highest nutritional demands associated with lactation and, unfortunately, the winter feeding period. However, this is a time period when cows are on base property and the manager has easy access to animals and facilities. In addition, reproductive management becomes more conducive to intensive breeding systems accommodating artificial insemination programs and/or fewer bulls needed for natural mating. Confinement breeding may, in turn, result in shortened breeding seasons.

In addition to higher nutritional input costs per cow, fall calving has another major deterrent. Public land managers currently view an animal over 6 months of age as an animal unit. This halves the cow herd in respect to public land grazing making this strategy nearly impossible to implement where public lands are the source of summer forage resources. These policies exist despite data showing that the fall-calving cow/calf pair consumes only 25 percent more forage than the spring-calving cow/calf pair (Kartchner et al., 1979). A potential strategy may be to wean fall calves before turnout on public land permits. Regardless, dry cows and cows with older calves spread out over the range better, improving distribution, and reducing overgrazing associated with poor distribution.

Early Weaning as A Management Tool

Traditionally, beef producers in the Great Basin have weaned calves at approximately 7 months, which usually coincides to late October or November for spring calving herds. However, gains of calves and cows are often poor by late August, particularly during years of poor forage quality/ quantity. By removing these calves early, they can be put on better feed with the cows remaining on range. Dry cows do well on range forage during the fall, and without suckling calves will come into winter in better condition. Improved body condition translates into a cow that will be easier to feed during the winter period and have a higher chance of breeding back in a 365 day calving interval.

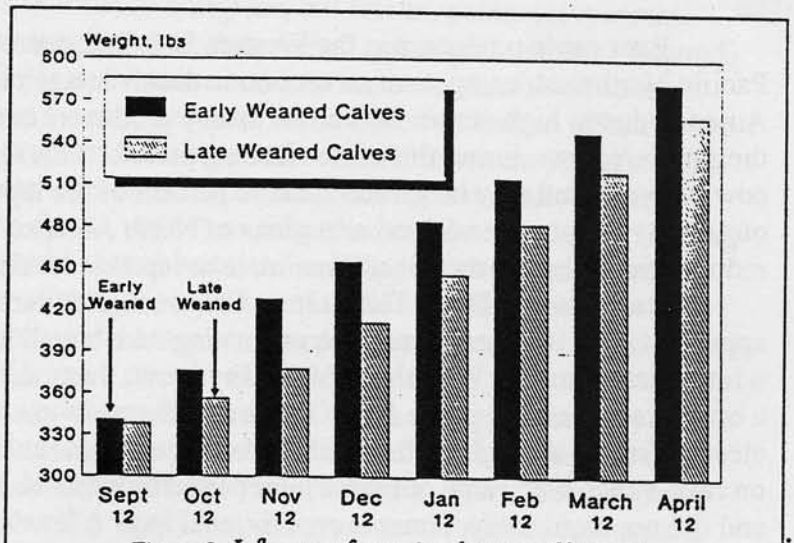

Figure 3. Influence of weaning date on calf weight.

Figure 3 presents some early weaning data from the Eastern Oregon Agricultural Research Center herd (Turner and DelCurto, 1991). Early-weaned calves were removed from their dams on September 12, and put on meadow aftermath and regrowth, plus supplemented with 2 pounds of barley and 1 pound of cottonseed meal. Late-weaned calves remained on range with their dams until October 12, and then were managed with the early-weaned calves. On November 12, all calves were fed meadow hay and received 2 pounds of barley and 1 pound of cottonseed meal throughout the winter.

Early-weaned calves outgained late-weaned calves by 20 pounds from September 12 to October 12, despite going through the stress of weaning and adjusting to new feed. During the next period of time, from October 12 to November 12, the early-weaned calves out-gained late-weaned calves by an additional 31 pounds and were now 51 pounds heavier. Late-weaned calves compensated somewhat over the remainder of the winter, but were still 24 pounds lighter on April 12.

A number of factors need to be considered when deciding if early weaning is appropriate. First, forage quality must be limiting to the point that calves will not do well and cows will likely lose body condition from late-August to the October or November weaning date. If forage quality and quantity is not limiting, then there is really no advantage to early weaning. The real advantage of early weaning is to improve the weight and body condition of the cows from late-summer to the beginning of the winter feeding period. In addition, the producer must provide adequate forage/nutrition to the early-weaned calf. For producers that frequently have limited nutritional options during the late-summer and fall period, early weaning may provide an alternative that allows for more efficient management of the mature cow body condition relative to a dynamic arid rangeland environment.

Alternative Winter Nutritional Management Strategies

Beef cattle producers in the Western U.S. and, more specifically, intermountain and Pacific Northwest, compete at an economic disadvantage relative to other regions in North America due to high winter feed costs. Many producers currently feed 1.5 to 2.5 tons of hay to their mature cows during the winter feeding period. This represents a costs of $75 to $150 per cow per year, and may be greater than 50 percent of the input costs per cow per year. Obviously, our ability to compete with other regions of North America may relate to how effective we can reduce winter feed costs, yet still maintain acceptable levels of beef cattle production.

Rake Bunch Hay. The Eastern Oregon Agricultural Research Center conducted approximately 10 years of research evaluating rake bunch hay as an alternative to traditional winter management. With this system, hay is cut, then raked into small piles, 80 to 120 lbs with a bunch rake, and left in the field. Cows are then strip-grazed, by using New Zealand type electric fences, throughout the winter. As a general summary of 10 years of data, cows wintered on rake-bunch hay, came out the winter period in better condition than traditionally fed cows, and did not require supplements or additional hay. Likewise, conception rates, calving interval, weaning weights, and attrition rates have been equal between control and treatment groups. In addition, the costs of winter feeding rake-bunch hay has been $30 to $40 less per head than the traditional feeding of harvested hay. For additional information relative to rake-bunch hay feeding, please refer to Turner (1987), and Turner and DelCurto, 1991.

Winter Grazing. Another alternative to traditional winter feeding may by winter grazing "stockpiled" forage. To effectively use this alternative, the producer must defer grazing of irrigated pasture or native range to the fall or winter months. The range forage-base will be dormant and, as a result, will likely need some supplementation, depending on quality of selected diets, body condition status of mature cows, and stage of gestation. More thorough discussions of winter grazing (Brandyberry et al., 1994) and supplementation of low-quality roughages (DelCurto et al., 1991) are provided.

Like rake-bunch hay, winter grazing may decrease winter feed cost by $20 to $30 per cow during mild to average years. To effectively utilize winter grazing in a management program, the producer must have access to the animals to accomodate supplementation programs. Water must be available throughout the fall or winter grazing period, although snow can be effectively utilized by the cow. In addition, the grazing area must be relatively free of snow accumulation during most years.

Indirect benefits of winter grazing relates to the increased management opportunities of traditional hay meadows for spring and early summer grazing. In addition, fall and winter grazing is an alternative use of native rangelands that may provide some significant advantages. First, grazing dormant forage will have minimal impact on the plant as compared to traditional spring and summer grazing. Second, grazing dry-gestating cows will be marked by better distribution over the grazing area with greater distance traveled from water, better use of slopes, and more uniform use of the grazed area.

Grass Seed Residues. Yet another alternative to traditional winter management would be the use of grass seed residues produced as a bi-product of Oregon's Grass Seed Industry. Currently, Oregon's Grass Seed Industry produces over 1 million tons of crop residues. While only 50 percent of these residues appear to be viable as a livestock feed resource, there are a number of reasons producers should consider these feeds as a winter alternative. First, many of these grass species are perennial forages (Kentucky bluegrass, tall fescue, perennial ryegrass, bentgrass, etc.) and, as a result, are substantially better than annual cereal grain straws. Second, the use of burning as a tool to sanitize fields and remove residues has been eliminated as a primary tool for grass seed producers. As a result, there is a critical need to find an effective use for these residues. Third, the Japanese export market has became "soft" in recent years, making delivery of grass seed residues to the eastern portions of Oregon more economically viable.

In most cases, grass seed residues should not be considered a complete feed for wintering mature beef cows. Instead, grass-seed straws should be tested and supplements formulated to meet the cow's nutritional requirements yet maximize the use of the low-quality roughage. For more thorough reviews of grass seed residues and associated supplementation, refer to DelCurto (1991), Chamberlain and DelCurto (1991), and Turner et al., 1995.

Currently, grass-seed straw is being delivered to eastern Oregon for approximately $40 to $50 per ton. The economic viability of this feed resource should not only be compared to costs associated with meadow-hay production, but also other potential benefits. First, feeding grass straw frees up meadows for grazing and/or other uses. Second, grass-seed residues represent a clean feed with limited weeds, with the exception of the seeds from the residue itself. In many cases, seeds from bluegrass, tall fescue, and perennial ryegrass germinating on disturbed winter feed grounds should not be considered a problem. Third, feeding residues on winter feed grounds or traditional hay meadows represents an increase in nutrients added to the site.

Decreased fertilizer costs and improved organic matter of the soil may result from long-term feeding of grass seed residues.

Other Considerations. Research at the Eastern Oregon Agricultural Research Center has shown that ionophores, specifically rumensin, can improve winter beef cow performance or reduce winter feed needs (Turner et al., 1977; Turner et al., 1980). Cows fed a full feed of meadow hay plus 200 mg of monensin had daily gains of .2 pounds higher than cows fed meadow hay alone. In studies where cow weights were kept equal between control cows receiving meadow hay and cows receiving meadow hay plus monensin, hay savings of up to 13 percent were realized. Monensin represents another management tool for improving cow condition or reducing feed needs, while maintaining cow condition through the winter feeding period.

There are several other potential tools or management strategies that may help reduce winter feed costs. Obviously, if you are using low-quality roughages such as stockpiled forage and crop residues, your supplementation strategy must emphasize minimizing supplemental costs while maintaining acceptable beef cattle performance.

SUMMARY

The ability of western beef cattle producers to effectively compete with other regions of North America may depend on management strategies that emphasize profit margins rather than weaning weights. The above information only "scratches the surface" of potential alternative management strategies that may offer economic advantages. Keep in mind that western beef cattle producers and resources are dynamic and incorporation of some of these strategies has to fit your production philosophy, production goals, and holistic ranch management plan.

Readers are encouraged to request information described in the selected references. In addition, feel free to contact the Eastern Oregon Agricultural Research Center if you need additional information relative to any of the alternatives discussed in this paper.

LITERATURE CITED

Brandyberry, S. D., T. DelCurto and R. A. Angell. 1994. Physical form and frequency of alfalfa supplementation for beef cattle winter grazing northern Great Basin rangelands. Oregon Agric. Exp. Sta. Special Rep. 935.

Chamberlain, D. and T. DelCurto. 1991. Use of grass seed residues as a winter feed resource for beef cattle. Eastern Oregon Agric. Res. Center Circ. of Info. No. 2.

DelCurto, T., R. A. Angell, R. K. Barton, J. A. Rose and S. C. Bennett. 1991. Alfalfa supplementation of beef cattle grazing winter sagebrush-steppe range forage. Oregon Agric. Exp. Sta. Special Rep. 880.

Kartchner, R. J., L. R. Rittenhouse, and R. J. Raleigh. 1979. Forage and animal management implications of spring and fall calving. J. Anim. Sci. 48:425.

Turner, B., F. Conklin, T. Cross, T. DelCurto and D. Carrol. 1995. Feeding Oregon's grass straw to livestock: Economic and nutritional considerations. Oregon Agric. Exp. Sta. Special Rep. 952.

Turner, H. A. 1987. Utilizing rake-bunch hay for wintering mature cows. Research in Beef Cattle Management. Agric. Exp. Sta. Spec. Rep. 801 pp 1-7.

Turner, H. A., and T. DelCurto. 1991. Nutritional and managerial considerations for range beef cattle production. In: Veterinary Clinics of North America. John Maas (Ed.). W.B. Saunders, Co. pp 95-126.

Turner, H. A., R. J. Raleigh, D. C. Young. 1977. Effect of monensin on feed efficiency for maintaining gestating mature cows wintered on meadow hay. J. Anim. Sci 44:338.

Turner, H. A., R. J. Raleigh, and D. C. Young. 1980. Effect of various levels of monensin on efficiency and production of beef cows. J. Anim. Sci. 50:385.