Beef Cow Management: Keeping Up with the Change

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Introduction

The immediate issues facing the cow calf producer in the Northern Great Plains during the Spring of 2002 were rapid changes in the way feeder cattle are being marketed, much lower than expected cash markets with increasing costs of production and four years of drought which has resulted in reduced forage availability and caused either herd reductions and(or) alternative methods of feeding cows, calves and replacement heifers. The aim of this paper is to focus on several of these issues and attempt to provide practical options for dealing with them.

The Current Beef Industry:

Dr. Larry Corah, Vice President of Supply Development for Certified Angus Beef was asked what he thought are the challenges for the beef industry. He replied that in the future we will continue to emphasize safeguarding the quantity and quality of food produced for the consumer and the "new" agriculture of the 21st century will focus on at least five issues (Table 1).

Table 1. Challenges for the Beef Industry in the 21st Century (from Beohlje et. al., 1999 as cited by Corah, 2002)

Challenge/change	**Comment**
Global Competition	• Future price of beef will be determined by our ability to access global markets
Industrialization	• Creation of large-scale technology driven production units. Poultry industry started this trend in 1940's and has been followed by other meat species
Differentiated Products	• Transformation from a commodity product to a differentiated product. Consumer desires highly differentiated product which is safe.
Precision Production	• Formation of highly sophisticated production systems.
Formation of Food Supply Chains	• A major driver will be the need and desire to enhance food safety

Taylor Brown, President of Northern Broadcasting System was recently quoted as saying that Agriculture will not return to traditional production methods of the past; get over it.

What are the expectations between the feedlot manager and the feeder calf producer with regard to calf value?

If there is to be a successful relationship between the feedlot sector and the cow/calf sector, then the expectations between both parties must include those presented in the following table (Table 2).

Table 2. Expectations of the Feedlot Operator of the Cow/calf Producer and Expectations of the Cow/calf Producer of the Feedlot Operator (Boehlje et al., 1999 as cited by Corah, 2002)

Expectations of Feedlot Operator of the Cow/calf Producer	Expectations of the Cow/Calf Producer of the Feedlot Operator
• Meet quality expectations	• Provide equitable compensation for product or services provided
• Be reliable and committed	• Create a market opportunity for the sale of calves
• Be flexible and adaptable	• Be dependable on an annual basis
• Be cost competitive in production of calves	• Provide access to innovative products and services

Profitability. Among the factors which have influenced the profitability of the cow/calf producer are 1) the yearly feed and non-feed costs of maintaining a cow, 2) the number of cows exposed to the bull that wean a calf, 3) the weaning weight of calves and 4) the price received for calves and cull cows (Rasby and Rush, 1996). Unlike the swine and poultry industries, the beef industry in the Northern Great Plains is dynamic and ever changing because of arid environments and the effects of unpredictable precipitation on forage quantity and quality. The Northern Great Plains ranch is usually described as extensive in nature and optimal livestock production is a function of the forage resources each ranch has available and how successfully the manager can match the nutritional needs of the cowherd to the available forage (Del Curto et al., 2000). It appears that successful producers are able to demonstrate a balance between input costs for the cowherd and production of feeder calves.

Dr. R.J. Lipsey, CEO of American Simmental Association suggested that ranchers desire a cow herd with 1) low production costs (or at least controlled costs), 2) reasonable performance (minimal dystocia but explosive growth of calves), 3) cull cows with value, and 4) market demand for the calves (top of market and/or everybody wants your calves).

In 1985 the average US rancher spent $267 (USD) a year to maintain each cow in his herd. By 1995 cash costs increased to $322 per cow and could reach $357 by 2002. This expense places today's cash costs fully $90/cow higher than 15 years ago (up 34%; Brink, 2001). In 1985 the breakeven cost for a 450 lb weaned calf was estimated to be $.67/lb compared with $.90/lb for that same 450 lb weaned calf in 2001. Duane Griffith from Montana State University has tracked 60 Montana ranches for the past decade to determine costs of production and profitability. Table 3, shows the differences between the top and bottom 25% of producers from this database.

Table 3. Comparison of Total Costs Per Cow Per Year, Breakeven Calf Costs and Net Income for Montana Ranches [a]

Measure	Top 25% of Ranches	Bottom 25% of Ranches
Total cost/cow/year	$223	$550
Breakeven cost/cwt	$49.68	$112.82
Net income/cow	$135	-$223

[a]Data provided by D. Griffith, MSU Department of Ag Economics and Economics

These data indicate that the top 25% of ranches could produce a calf for approximately $.50/lb while the bottom 25% of the ranches required $1.13/lb to produce a calf. Expressed another way, the top 25% of ranches were making a profit with their calves ($135/cow) compared with a significant loss for the bottom 25% of ranches (-$223/cow).

How is the money spent in maintaining a cow? The following table presents a generalized accounting for yearly cash expenses.

Table 4. Generalized Cash Expenses for Maintaining a Beef Cow

Expense	Cost/year	
Forage	$125	***59% of total*** (Forage + Additional feed)
Additional feed	$86	
Veterinary/medical	$17	
Labor	$29	
Interest	$21	
Other Costs	$77	
Total cow costs	$356	

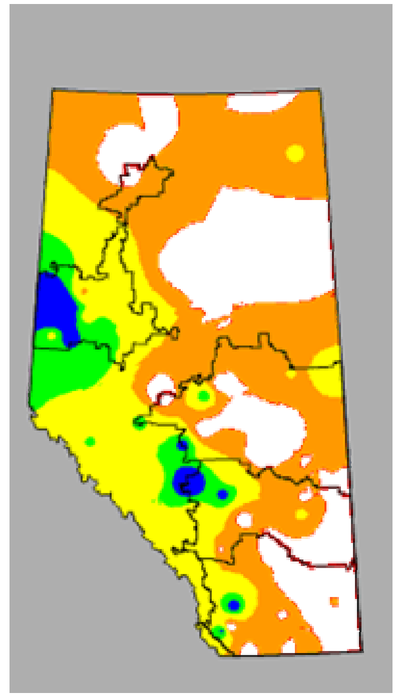
The largest expenses were for feed (59 % of total). Brink (2001) believes that operating a profitable cowherd breaks down into following three basic rules:

- Rule 1. Hold your annual cow-carrying costs to $300 per cow (cash expenses) or less,
- Rule 2. Keep your calf-crop weaned calf-crop percentage at 88% of exposed cows or higher,
- Rule 3. Wean calves that are average or above for weaning weight (at least 475 lbs).

Current (May 2002) Situation for the Alberta Cow/calf Producer:

Starting in July of 2001, cow/calf producers recognized that they were facing a full blown drought which caused many ranchers to sell herds early and dramatically alter the price and flow of feed (Reuters, September, 14, 2001). Eight months later, producers in western Canada were still continuing to trim herd size (FWN, May, 15, 2002). The number of cows being slaughtered was up approximately 14% from the same time a year ago. In addition, because of the cool wet spring of 2002, many cows lost calves and these cows were sent to slaughter. Last fall it was predicted that as much as a 25% herd liquidation in parts of Alberta would occur (Will Irvine, Strathmore, AL). Figure 1 shows the extent of the drought in Alberta as of May 2002.

Figure 1. Areas of Alberta which have received less than 50% of normal precipitation as of May 19th (Areas represented in white; from: http://www.agric.gov.ab.ca/images/climate/seasonal/02/02a1may19n.gif)



Management of the Cow Herd During Drought and (or) Limited Forage Supplies

Drought develops progressively over time. Management of the ranch during a drought depends on the balance between stocking density and the availability of feed and water. In the long run, you can help protect your interests by sound planning to make your ranch decisions less sensitive to drought. Decisions need to be based on what relief measures are potentially available on the ranch. Among the important factors are guessing the expected duration of the drought, the current water and feed inventories, the body condition of the cowherd and financial resources available. During drought, decisions may be based on emotion rather than logic. The main goal is to make objective decisions and get skilled help when necessary from your extension agent, beef specialist, range specialist or agricultural consultant (Paterson et al., 2001).

The producers who survive best during drought are those who adopt sound management and financial plans and review them regularly. They make firm decisions, and act quickly and early. Keep alert for opportunities such as leasing land instead of buying feed. Four factors which affect risk management during a drought include: 1) the total population of cattle in relation to feed availability, 2) how widespread the drought-area is, 3) the time of year and the likely hood of rain and return to adequate feed supplies in your area and, 4) evaluation of cash flow needs (borrowing your way through a drought to maintain traditional herd size may inhibit long-term profitability).

Questions a Rancher must answer when facing a drought or lack of forage:

- Are my animals losing weight or not performing adequately?
- What is the body condition score of my cows?
- Will I have to start to provide supplements?
- If the drought continues, should I cull the least productive or "at risk" animals?
- What feeds are available to the ranch?
- Assuming that I will have to purchase supplemental feeds, are they available and at what cost?
- Is one option to sell hay and buy back grain for limit feeding?
- Do I have the feed resources to allow for full feeding vs. supplementary feeding only vs. limit feeding of grain?

Progression of options a Rancher considers during drought:

- Do nothing.
- Selective reduction of the cow herd, especially the least productive cows.
- Early weaning of calves to reduce nutritional demands on cows.
- Leasing of additional grazing ground vs. purchasing of supplemental feeds.
- Purchase supplemental feedstuffs.
- Move the cow herd to a dry lot for full feeding.
- Limit feed grain to meet nutrient requirements.
- Sell all the livestock.

Options a Rancher should keep in mind with regard to cow management:

- Fertility of cows may decline when their body condition score (BSC) drops below a 4; especially at time of calving and when they go into the breeding season in poor condition. In the absence of sufficient nutrients, particularly energy, cows lose considerable weight. When such weight losses occur, milk production decreases and reproductive activity may cease. The end result is light-weight calves and open cows. To prevent such undesirable effects, cows either must be provided sufficient nutrients to avoid weight losses and maintain production requirements or they must be relieved totally or partially from these stressors.
- Early weaning of calves is one option which allows cows to rebuild body reserves and rebreed the next year.
- Money and diminishing feed reserves are too valuable to waste on cows that are unproductive, not pregnant or are unsound. These animals are candidates for culling at any time and especially during drought conditions.
- Don't forget about development options for the replacement heifers.

Supplementation Concepts During Drought

Producers generally have two options for meeting the nutrient requirements of cattle on drought-affected pastures and ranges. The first is to provide supplemental feed to ensure the cow herd has adequate energy, protein, vitamins, and minerals. The second is to reduce the nutrient requirements of the cow to a point where they can be met with available forage. Table 5 summarizes some of the consequences of inadequate intakes of energy, protein, vitamins and minerals by beef cattle (Bearden and Fuquay, 1992). The data show that reproduction is impacted the most by these deficiencies.

Table 5. Influence of Inadequate and Excessive Dietary Nutrient Intake on Reproduction in Beef Cattle (Bearden and Fuquay, 1992)

Nutrient Consumption	Reproductive Consequence
• Inadequate Energy Intake	• Delayed puberty, suppressed estrus and ovulation, suppressed libido and spermatozoa production
• Inadequate protein intake	• Suppressed estrus, low conception, fetal resorption, premature parturition, weak offspring
• Vitamin A deficiency	• Impaired spermatogenesis, anestrus, low conception, abortion, weak offspring, retained placentae
• Phosphorus deficiency	• Anestrus, irregular estrus
• Selenium deficiency	• Retained placenta
• Copper deficiency	• Depressed reproduction, impaired immune system, impaired ovarian function
• Zinc deficiency	• Reduced spermatogenesis

Pastures which have become dormant due to drought conditions are usually deficient in protein. If these conditions occur during the breeding season, reductions in pregnancy rate can occur. Providing dry cows with approximately 0.5 - 0.75 pounds of supplemental crude protein and lactating cows with 0.9 - 1.2 pounds of supplemental crude protein per day may be necessary. Protein based supplements (soybean meal and canola meal), commercial protein blocks, liquids, and tubs would be appropriate. Alfalfa hay, sunflower meal, safflower meal, as well as other protein meals may also be used as protein supplements.

Moore et al. (1999) constructed a large data base from published articles in an effort to determine how supplementation strategies influenced both animal performance and voluntary forage intake. Their conclusion was that supplements generally, but not always increased daily gain (ADG). In many cases, small amounts of supplemental total digestible nutrients (TDN) increased daily gains; especially with native forages and straws. The least ADG response to supplemention was seen with native forages supplemented with molasses alone or with low intakes of molasses containing high levels of NPN. The greatest response was measured with improved forages, when supplemental TDN was > 60% of OM (either dry feeds or molasses plus added protein), and when supplemental CP intake was > .05% of BW.

From the data base it was concluded that the changes in voluntary feed intake due to supplement ranged from −1 to +1% of body weight (BW). Generally, supplements decreased intake with improved forages, but with native forages and straws, supplements both increased and decreased forage intake. This discrepancy was thought to be related to the ratio of TDN to CP in forages, an indicator of the amount of N relative to available energy (Table 6). When supplements increased forage intake, forage TDN:CP ratio was > 7 (deficit of N relative to available energy). Supplements decreased intake when the TDN:CP ratio was < 7 (adequate N) except for ammoniated straws, when forage intake fed alone was > 1.75% of BW, or when supplemental TDN intake was > .7% of BW. There was little difference between sources of supplemental CP or TDN relative to changes in forage intake. When forage intake was increased by supplement, liquid and dry feeds were equivalent as energy sources as long as the supplement contained added protein. As protein sources, NPN and protein meals were apparently equivalent in increasing intake.

Table 6. Requirements for Crude Protein (CP) and Total Digestible Nutrients (TDN), and the Resulting TDN:CP Ratio for Beef Cattle (from Moore and Kunkle, Univ. of FL 2000).

Age Class of Female	Requirement, % of DM		TDN:CP Ratio
	Protein	TDN	
Heifer, 800 lb body weight (BW):			
Non-Pregnant, 0 lb gain/day	7	54	7.7
Pregnant, 1.0 lb gain/day	8	55	6.9
Heifer, 600 lb BW, 1.25 lb gain/day	9	59	6.6
Lactating Cow, 1000 lb BW, 15 lb milk/day	11	62	5.6

McCollum (1997) provided one example of utilizing the TDN:CP ratio approach in selecting a supplement for animals grazing lower protein native range (Table 7).

Table 7 . Example of Using of the TDN:CP Ratio in Selecting a Supplement for cattle grazing dormant native range with a protein content of 5% (from McCollum, 1997)

Item	Protein Supplement	Grain-based Supplement
Forage protein, %	5	5
Forage TDN	45	45
Supplement protein, %	45	10
Supplement TDN, %	76	88
Forage TDN:CP ratio (45/5= 9)	9	9
Supplement TDN:CP ratio	1.7	8.8
TDN:CP target ratio	4-6	4-6
Best supplement choice	XXXXX	

This example demonstrates the logic in how the protein supplement was selected rather than the grain-based supplement for cattle grazing dormant native range. By providing the protein supplement the overall target TDN:CP ratio was closer to 5 compared to the grain-based supplement which would have been closer to 9.

It has been known for many years that supplemental protein can stimulate voluntary intake of low quality forages. The following table is a summary of intake responses measured by Bob Cochran from Kansas State University (cited by McCollum, 1997).

Table 8. Average forage intake response to supplements containing various concentrations of crude protein (McCollum, 1997)

Supplement crude protein content, %	Intake response, %
Less than 15	+9
15 to 20	+23
25 to 35	+60
Greater than 35	+36
Overall average	+33

Supplements containing between 25 and 35% crude protein were most effective for stimulating forage consumption.

<u>What about a high energy-low protein supplements</u>? Drought-affected pastures and native range generally do not produce adequate forage to maintain 'normal' stocking rates, so producers often provide supplemental energy to meet the needs of the cow herd. During drought conditions, energy may be the most limiting nutrient for grazing cattle. Several options are available for supplying energy to cattle on drought stressed pasture. Hay, grain, and crop processing byproducts can all be used to supply energy to grazing cattle. Low-quality forages can also be ammoniated to increase digestibility and protein content.

Grain supplementation on pasture has often resulted in a "catch 22" problem. Excess supplemental grain can reduce forage intake and digestibility, resulting in less energy available to the animal from available forage. However, this reduction in forage intake may not be undesirable during a drought. As a general rule of thumb, up to 0.2 percent of body weight of supplemental grain per head per day will not result in large decreases in forage intake and digestion. For example, a 1,200-pound cow could receive 2.4 pounds of grain per day without drastically reducing forage utilization. When starch- based supplements were fed in a Texas study (Roquette, 1995), the efficiency of supplement use and rate of gain became poorer as level of supplement increased (Figure 1).

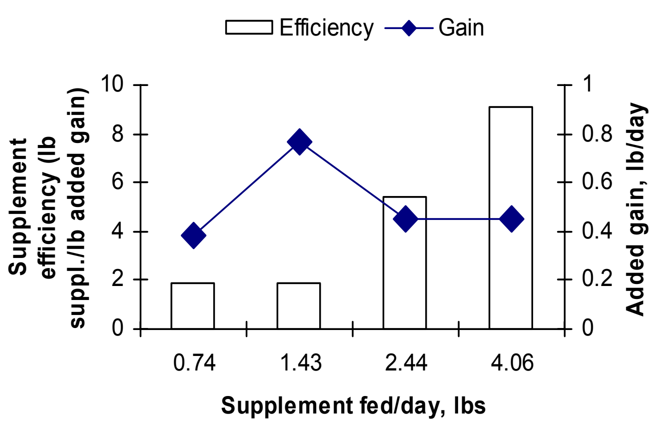
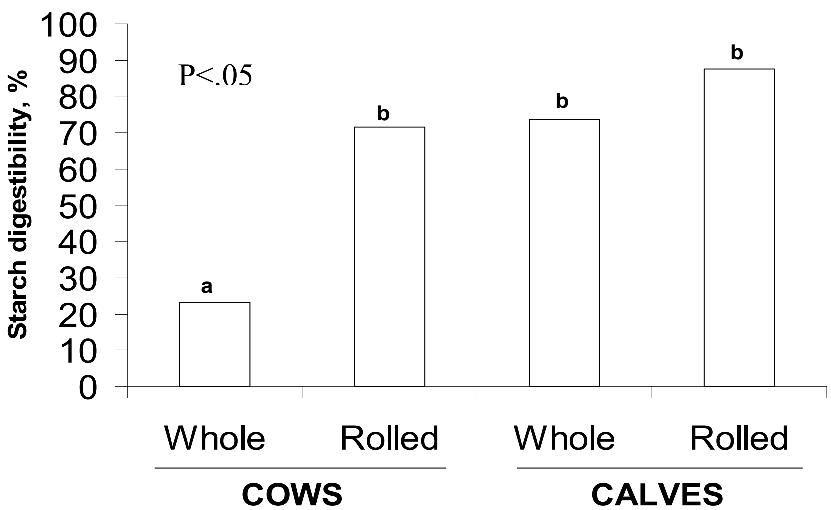


Figure 1. Effects of Corn-based Energy Supplement on Daily Gains of Stocker Steers Grazing Winter Annual Pasture (Roquette, 1995, as cited by McCollum, 1997).

These data show that an intermediate level of corn supplementation (1.43 lb/day) stimulated rate of gain of steers with out a depression in feed efficiency compared to feeding higher levels of grain which actually reduced gain and caused poorer feed conversions. For some grains, processing may be necessary for optimum use by cattle. Corn and oats can be fed whole but may be utilized better if coarsely rolled before feeding. However, barley and wheat should be coarsely rolled. Avoid fine grinding and rolling, which results in excess fines and dust. These can result in increased incidence of acidosis and founder. Extremely dusty supplements are unpalatable. The producer must weigh the additional costs of processing vs. the value of the grain. Recent data from Montana (Rainey et al., 2002) compared starch utilization from barley-based supplements fed to either calves or three year old cows. The lightweight barley grain (42 lb/bu) was supplemented at .5% of BW and animals were consuming an 11% protein grass hay. Barley was fed either whole or dry rolled. Processing the barley did not change OM, N or NDF digestibilities. However, starch digestibility was greatly improved when barley was first rolled and then fed to cows (Figure 2). This response was not measured when rolled barley was fed to calves.

Figure 2. Effects Barley Processing and Cattle Age on Diet Starch Digestibility (Rainey et al., 2002)



Because hay frequently costs 50 to 100% more than corn, limit feeding concentrate during periods of short hay supplies makes economic sense (Loerch, 1996). The following table shows winter performance of beef cows from Ohio fed limited amounts of corn vs. ad libitum hay feeding.

Table 9. Effects of limit-feeding corn grain on wintering performance and subsequent conception rates of beef cows in Ohio (Loerch, 1996).

	------- Trial 1 -----------		-------- Trial 2 -----------	
Item	Limit-fed corn	Hay	Limit-fed corn	Hay
No. of cows	29	41	30	41
Initial wt., lbs	1367	1347	1360	1358
Final wt., lbs	1250	1296	1311	1221
Wt. change, lbs	-117[a]	-51[b]	-49[c]	-137[d]
DM intake, lbs				
Hay	1.8	28.1	2.2	29.5
Corn	10.8	-	12.6	-
Protein/Mineral supplement	2.6	-	2.2	-
Conception rate,%	93.1	85.4	90.0[e]	73.2[f]
Feed costs, $/day[g]	.75	1.36	.81	1.37

[a,b] Trial 1 (Means differ, P<.05).
[c,d] Trial 2 (Means differ, P<.05).
[e,f] Trial 2 (Means differ, P<.08).
[g] Feed costs: corn, $2.00/bu; hay, $80/ton and supplement, $150/ton.

Results of these two studies showed that feed costs could be reduced by up to 50% when corn was used as an energy source rather than hay (avg $.78 vs. $1.38/day). Subsequent conception rates were not affected in the first year and were improved in the second year with the limit-fed corn ration. One caution however, even though energy intakes were calculated to be similar between treatments, it was suspected that cold temperatures may have been responsible for greater (P<.05) weight loss in Trial 1 for cows limit fed corn. Loerch suggested that when starting the program, take 3-4 days adjusting the concentrate and decreasing the forage levels. Make sure that bunk space is adequate so all cows get their share and that cows are in a securely fenced area.

Beef specialists from Alberta Agriculture, Food and Rural Development (AAFRD) have developed various rations for beef cows fed in dry lot (Yurchak et al., 2001). Their aim was to develop potential rations for a cow and determine associated costs. The following summarizes some of the options. For these examples, the feed prices used were:

Example Rations Using Available Feedstuffs

Ingredient	Cost
Barley Silage	$35/ton
Mixed Hay	$80/ton
30% Supp	$230/tonne
Straw	$40/ton
Wheat	3.25/bu
16% Pellets	$140/tonne
Peas	$4.00/bu
Barley	$3.00/bu
Canola Meal	$170/tonne

Mixed Hay 30 lbs Straw 8 lbs Cost/Cow $1.42/day	Straw 26 lbs 16% Pellets 12 lbs Cost/Cow $1.34/day	Straw 26 lbs Peas 11 lbs Cost/Cow $1.31/day
Mixed Hay 10 lbs Straw 20 lbs Barley Grain 8 lbs 30% Supp 1 lb Cost/Cow $1.42/day	Barley Silage 24 lbs Straw 20 lbs Peas 6 lbs Cost/Cow $1.30/day	Mixed Hay 10 lbs Straw 20 lbs Wheat 7 lbs Cost/Cow $1.24/day

All Rations are based on a 1400 lb. Cow, 9 Months Pregnant, at -15 degrees Celsius. Adjustments for Replacements, 1st and 2nd Calves Will Have to Be Made (Yurchak et al. 2001

These rations show a variation of 20 cents/cow/day from the highest to the lowest. For 100 cows, this would equate to $20/day saving, or $4,400 over a 220 day winter feeding season. Available crop residues such as small grain straws, and other byproducts of crop production represent important methods of stretching tight feed supplies during drought conditions. Grain processing co-products such as wheat midds, soybean hulls, and corn gluten feed contain highly digestible fiber which provides energy while alleviating much of the negative impact that grain supplementation may have on fiber digestibility. In addition, these byproducts provide protein which may also be limiting in drought stressed forages. When using by-product feedstuffs, make sure that the mineral program is balanced. These feeds are typically high in phosphorous and potentially high in sulfur, which may lead to some mineral imbalances. The trace mineral levels may be somewhat low as well.

Summary Options: When ***pasture is lacking in amount as well as quality***, the following suggestions are offered: If only slightly limited, the feeding of range cubes (minimum 20% crude protein) or mixtures of grain and protein meal at rates of 3 - 5 pounds per cow daily may work for a while. Cubes with a large amount of natural protein and a low crude fiber level (less than 10%) would be preferred.

When ***pasture becomes extremely short***, purchase of hay or a replacement feed for the pasture must be considered as well as selling of stock. Remember that most grass hay has only 50 - 65% the energy content of grain so that one pound of grain can replace 1.5 - 2.0 pounds of hay. A pound of grain will replace 1.2 - 1.4 pounds of alfalfa hay. It doesn't make sense to pay $105 per ton for poor quality grass hay when grain would cost very little more. It is necessary to start cows on grain slowly and feed so that all cows have opportunity for their share of the feed. It is possible to feed up to 80% grain in a maintenance diet for British bred cows. Grain-based supplements should be fed daily to reduce the risk of acidosis. All cattle need some forage in the diet to minimize digestive problems.

Minerals. Provide the same salt and mineral mixture during drought as you would during normal conditions. However, during drought phosphorus supplementation may be more critical. A complete mineral supplement containing 12% calcium, 12% phosphorus, 5% magnesium, 0.4% zinc (4000 ppm), 0.2% copper (2000 ppm) and 25 ppm Se has worked well under MT conditions.. Be aware of several antagonistic minerals in both forages and water which may be elevated during a drought. Connie Swenson's PhD dissertation (2000) from Montana State Universityshowed that with high levels of dietary antagonists (Mo, SO_4, Fe), the inclusion of complexed Cu, Zn, Mn and Co in the mineral supplement helped reduce negative effects of the antagonists on reproductive efficiency. As an example, the following table provides recommended levels of minerals for livestock water vs. a recent water analyses from the central part of Montana which has experienced three years of drought.

Table 10. Livestock Water Quality Guidelines and an Example of a Water Sample from Central Montana (Hager, 2002, unpublished data)

Item	Recommendation of desired upper limit (NRC, 1980)	Water Sample from Central Montana	Comment
Nitrate (NO3), ppm	0-44	0	Safe
Calcium, ppm	100	353	Interferes with absorption of other minerals
Magnesium, ppm	50	157	May cause diarrhea
Sulfate (SO4), ppm	50	4049	May interfere with Cu, Can cause polio
Total dissolved solids, ppm	960	3991	May influence milk production

National Research Council. 1980. Mineral tolerance of domestic animals. National Academy of Sciences

Vitamin A. Lack of vitamin A may become a problem during the fall and winter for cows that grazed drought-affected pastures during the summer. Vitamin A is lacking in forages grown under drought conditions and hay produced from drought-affected forages. Cows should receive vitamin A and D booster shots approximately 30 days prior to calving if they have not been previously supplemented with vitamins. The following table demonstrates the positive impact that Vitamin A had on reproduction of cows and replacement heifers.

Table 11. Effect of Vitamin A Supplementation on Reproduction of Cows and Replacement Heifers. (Bradfield and Brehens. 1968. Proc. West. Sect. ASAS 19:1)

Age Group	Control Group		Vitamin A Treatment* Group	
	No. Animals	% Pregnant	No. Animals	% Pregnant
Mature Cows	582	70.1	1097	84.5
First-calf heifers	129	74.9	241	83
Replacement Heifers	107	64.5	261	79.3

*Treatment group received injection of 2,000,000 IU of vitamin A

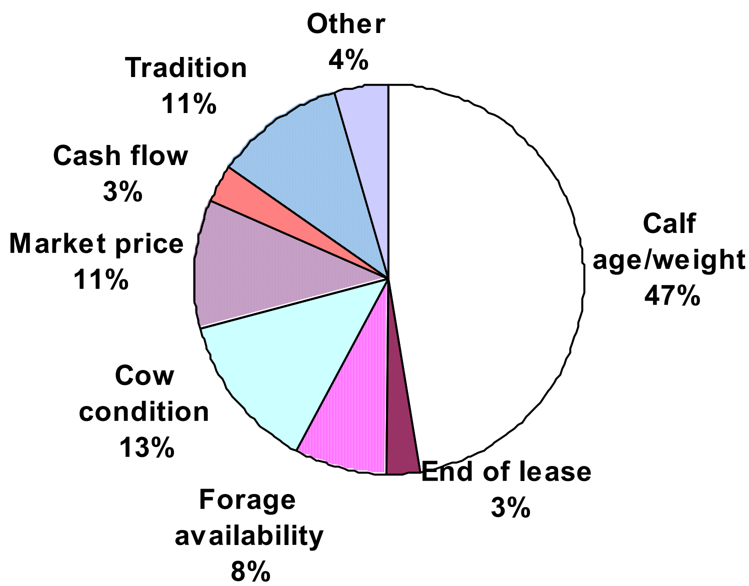
Vitamin E. Relying first on the passive immunity acquired from colostrum and then on its own still-developing immune system, a young calf is exceptionally vulnerable to disease--scours and respiratory infections in particular. Research suggests that supplemental vitamin E can permit the newborn or young calf to mount an optimum immune response. Perhaps the most dramatic results to date have occurred in a Canadian study (Zobel *et al.,* 1995) in which beef cows received 1,000 IU of supplemental vitamin E per head daily for the last 60 to 100 days of pregnancy. Incidence of scours in the calves was 62 percent less than in calves from the unsupplemented controls.

Fennewald (2002) evaluated approximately 15,000 calves from six states and fed in a Colorado feedlot to determine if drought influenced morbidity of freshly received animals. These data did not show that calves raised in a drought environment had higher morbidities than calves from states which had adequate moisture.

Early Weaning to Save Cow Body Condition and Replacement Heifer Growth

Results of a survey conducted with 2700 producers from 23 states showed that calf age/weight was the most important factor in determining when to wean calves (47%), followed by cow body condition and forage availability (21%; NAHMS, 1997; Figure 3). Interestingly, tradition had one of the highest rankings (11%) in determining when to wean calves.

Figure 3. Factors Considered Important in Determining When to Wean Calves (NAHMS, 1997)



Danielson (1997) summarized several important factors to consider in early weaning calves. Early weaning lowered the nutrient requirements of the cow and increased the carrying capacity of stressed pasture. Weaning calves prior to the traditional age of 6-7 months can increase stress and reduce calf performance if proper health, nutrition and management practices are not followed. Conversely, weaning after pastures have severely deteriorated will also result in poor calf performance. From the standpoint of the cow, the advantage of early weaning during drought periods is usually reflected in less body condition loss and improved conception rates. Overgrazing drought stressed pastures will have long term effects on forage production by reducing plant vigor and increasing less desirable plant populations.

How Early Can Calves Be Weaned? Calves have been weaned successfully at less than 2 months of age, but this is younger than is practical under most conditions. (Bagley et al, 1997). The rumens of calves are normally functioning sufficiently at 120 days of age to provide satisfactory gains without the benefit of milk or milk replacers. Therefore, weaning March and April born calves in late July-early August may be preferred to an earlier weaning date. Utah workers (Bagley et al., 1997) concluded that early weaning of calves did not result in an increased rate of illness or in a lack of gain.

Are There Special Health Considerations? The stress of early weaning directly influences the health and well being of the calf after weaning. Castration, dehorning and branding should be completed at least 10-14 days prior to weaning. Protection from clostridial and viral infection should be provided by vaccinating calves prior to weaning with a seven-way clostridial injection, IBR-BVD vaccines, and other veterinarian recommended protection. If a "booster" or re-vaccination is required for any vaccine, it is essential that label recommendations are followed. Calves should always have access to clean water and a complete mineral package should be offered in loose form. Monitor calves regularly for signs of respiratory problems, digestive disturbances, scours, coccidiosis and sorting of feed.

The palatability and acceptance of offered feed is critical to ensuring adequate feed intake by early weaned calves. Calves need to consume 2.5-3.0 percent of body weight in dry feed daily to have satisfactory performance. Offering high quality, easily digested feeds and roughages in a form that calves will consume is important bunk management. Calves should be creep fed starting three weeks before weaning to minimize stress and insure adequate feed intake following weaning. Initially, newly weaned calves should be offered long stem grass hay, the form they are most familiar with. Once weaned and on feed, calves will prefer chopped forage to long stem hay. Alfalfa should be added gradually over a 14 day period as calves start on feed. Mix the grain portion with the forage to encourage consumption of the concentrate. If the calves sort and consume the grain leaving the forage, adjust the type of forage to make the total ration more palatable. Over consumption of grain can lead to bloat and/or acidosis in the calves. Dust in the ration should be minimized and can be controlled by adding 3-5 percent molasses. Calves weighing 300 pounds should consume 8-9 pounds of dry feed daily. A 50:50 roughage-grain mix containing 13-15 percent protein generally will provide satisfactory calf performance provided the feeds are high quality and not stale or rancid. A minimum average daily gain of 2 pounds is required to compete with calves weaned at 6-7 months of age. Hand feeding whole oats or a commercial starter ration with free choice grass hay is an excellent way to start calves on feed. Once through the weaning process and on feed, calves may be switched to a balanced mixed ration offered in a self feeder.

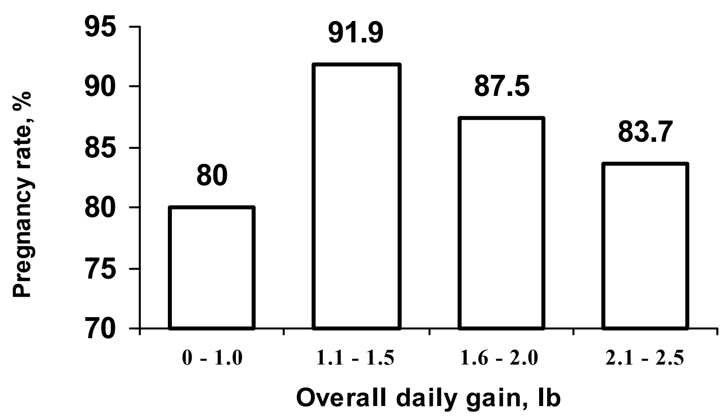
Aside from drought issues, there are other reasons to early wean calves. Kansas workers (Marston and Blasi, 2001) summarized the following advantages of early weaning programs.

- Early weaned cow-calf pairs consumed approximately 25 percent less feed than normally weaned pairs.
- Calf performance was not compromised.
- Dry, early gestation beef cows required only 60 percent of the energy and 50 percent of the protein of lactating cows.
- Dry cows consumed 30 percent less forage than lactating cows.
- It wasmore efficient to feed calves directly than to feed cows to sustain milk production.
- It wasmuch cheaper to maintain or regain cow body condition during the summer and fall months than to attempt to increase cow weights during the winter and spring months. By avoiding thin cows, suboptimal reproductive rates will be avoided.
- Dry cows required 60 percent less water than lactating cows.

- Young cows (first and second lactation) were the ideal candidates for early weaning. This is because of their additional requirements for growth besides maintenance and lactation.

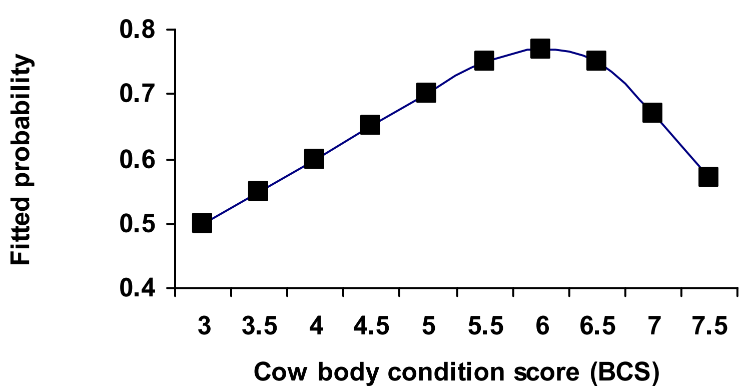
The replacement heifer represents the future genetics of the cowherd and drought may impact her first year development and hence lifetime productivity. Houghton (2002, unpublished data) showed the importance of proper nutrition and body score on pregnancy rates of the replacement heifer. Data were collected from several thousand heifers professionally developed at Heartland Cattle Company in McCook, NE (Figures 4 and 5).

Figure 4. Influence of Replacement Heifer Daily Gain on Pregnancy Rates (Houghton, 2002 unpublished)



Observations suggest that the highest pregnancy rates occurred when heifers (primarily British breeds) were grown at approximately 1 to 1.5 lbs/day. Similarly, the highest conception rates were when the heifers reached a BCS of approximately 6. If gains were less than or more than 1.5 lbs/day, and body condition score more than 6.5, pregnancy rates apparently declined.

Figure 5. Influence of Body Condition Score on Heifer First Service Conception Rates (Houghton, 2002, unpublished)



The importance of these observations is that if forage quantity and quality are such that rate of gain by developing heifers is unacceptable, pregnancy rates will suffer. These data also strongly suggest that professional heifer development may be one option for saving limited forage on the ranch while maintaining desired cowherd reproductive efficiency.

Summary

The constant challenge for the cow calf producer is to match forage nutrients with animal requirements. Often, because there is not synchrony between these two as well as conditions of drought, supplemental feedstuffs are required to maintain productivity (lactation, body condition, growth of the calf). It has been shown that diets low in protein have resulted in weak calves at parturition. After three years of drought in many parts of the Northern Great Plains, a forage and water analysis is critical in determining how well the forage resource meets the nutrient requirements of the gestating cow and replacement heifer. Failure to meet nutrient requirements has been shown to decrease pregnancy rates of replacement heifers and the postpartum interval of the lactating cow.

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