Matching Cattle Nutrients Requirements to a Ranch's Forage Resource, or Why We Calve Late

Gregg Simonds, Deseret Land & Livestock

Our goal at Deseret Land and Livestock is to maximize long-term profit. Our profit is a function of the following factors: the prices we receive for our production, our amount of production, the costs of production, and the productive capabilities of our land and labor. Prices, production, and coat are managed on an annual basis. The long-term outcome of one's management is determined by their attention and skill in enhancing the capability of land and labor.

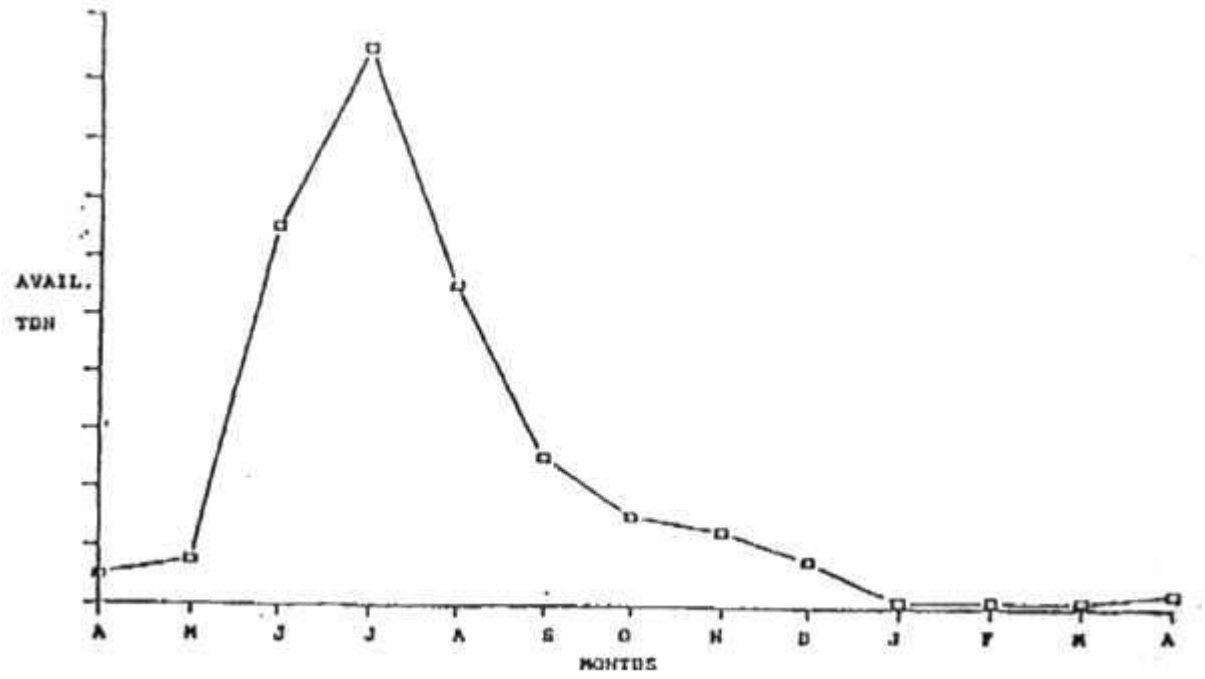
These factors of profit can vary tremendously within and between years. For example, prices for 400-500 pound steer calves from 1979-1989 varied nearly $.58/pound over the period and on average the prices varied $.17/pound within any given year during this time, with a maximum within year difference of $.26/pound (Cattle-Fax 1991). Our range forage production has varied in the same 10-year period from less than two weeks of active growth to over three months. Finally fuel and interest on borrowed money costs have oscillated dramatically over this same period with all costs tending to increase.

The tremendous variability of both the biological and financial environment in which ranchers do business make it a very high risk business. No single fixed strategy, no matter how good, will maximize long-term profitability. We believe that in this type of business environment the key to success is to have the flexibility to adapt.

We calve late because it provides us with the best fit between the cattle's nutritional requirements over their production cycle and the ranch's naturally produced forage. This match has helped us become a low-cost operation, has reduced our susceptibility to inflationary pressures on cost, has increased our production, and has broadened our marketing opportunities.

Over the last twelve years, we decreased our total cost per pound of calf produced from over $.90 to $.62. We have gone from a cow/calf operation to a cow/calf/yearling operation. Finally we now look for marketing opportunities year-round instead of having to sell the calves each fall.

The basis for these changes comes from an understanding of our annual forage availability curve. This curve represents the quantity and quality of the naturally produced and available forage on tho ranch (Figure 1).



The horizontal axis shows months in a year starting with April, The vertical axis is available TDN (Total Digestible Nutrients). This curve is unique to our environment thus each operator needs to identify and understand his own situation.

Deseret Land and Livestock is located in northeastern Utah near Evanston, Wyoming. Our lower elevations, where we winter the cows, are around 6,300 foot and most of the precipitation comes as snow (10 inches annual precipitation at 6,300 feet). We usually go to -30 degrees Fahrenheit and have been as low as -52 degrees Fahrenheit. The normal hay feeding season in this area is from mid-December to late April. On average we start having some growth in April. This is followed by six weeks of rapid growth in May and June. Year in and out the vast majority of our annual production occurs during this period. Maximum TDN on our lower elevation ranges occurs the third week of June. By mid-July growth has nearly ceased and the plants start to lose nutriants rapidly. The rate of decline for TDN slows and stabilizes at fairly low levels (40-50%) as the plants become dormant in the early fall. Forage becomes nearly unavailable as snow and sub-freezing temperatures tend to keep the ground covered from mid-December until mid-April.

Between years, forage availability can vary six-fold in production depending on soil moisture and minimum temperatures. Daily minimum temperatures in the spring can shift our rapid growth period plus or minus two weeks. Snow cover and past grazing practices can affect current production as well as long-term productive capability.

Present and future operating costs and cattle production are affected by how well the animal requirement curve is matched to the forage availability curve (Figures 2 & 3). In the past, we focused on trying to maximize calf weaning weights. We calved the heifers in late February and the cow herd in early March. Calving took place over 100 days. Then we would wean in early November. Figure 2 shows how this strategy led to big differences between the forage curve and the animal requirement curve (shaded area). The differences were made up by haying the surplus summer forage and purchasing other high coat feed supplements or otherwise animal performance suffered.

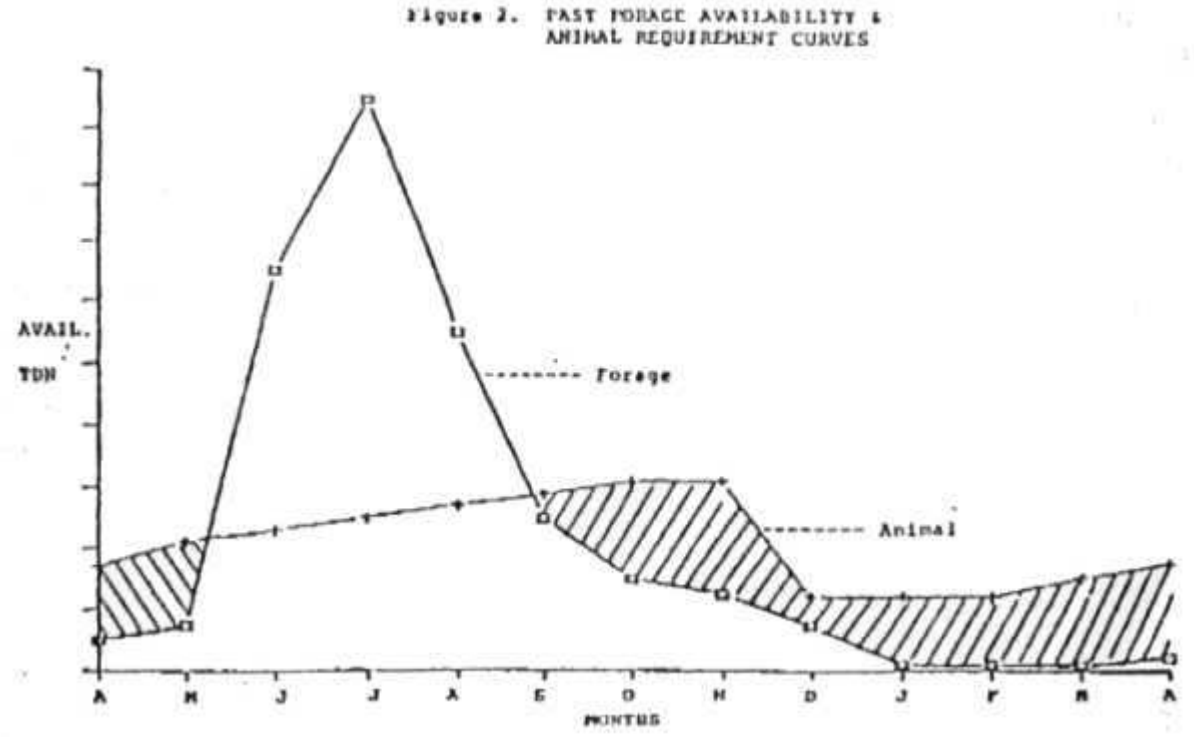


Figure 2. PAST FORAGE AVAILABILITY & ANIMAL REQUIREMENT CURVES

Cow requirements change with their physiological demands. Post calving is probably the most physiologically demanding time for a cow. She must recuperate from the rigor and trauma of calving, lactate and recover body condition to cycle, and rebreed. A rising plane o£ nutrition post calving is key to when she has her first estrus and if she conceives. We fed our best wild hay during this critical period. Our calving period was over 100 days and the conception was in the low eighty percentile. We tried to improve this performance by developing and

growing alfalfa under circular sprinklers. This was not a cost effective idea because of the high investment and operating cost in our low production environment (54 days of frost-free growing season).

Calving on a feed row led to a lot of other problems; we needed to pair off the cows with calves and separate them from the springers to reduce mis-mothering. Diseases spread easily on a feed row because of the close contact between calves. The attention of our labor was fragmented between calving and irrigating and as such, neither was done well. Finally, the cattle tired of hay and wanted to be turned out on the new green grass growth. Invariably, they chased the watery forage and lost condition.

During the summer the cows grazed out on generally abundant native forage while we were busy putting up hay for the long feeding period. As the season progressed into fall the forage quality decreased and the cows lost condition because they were unable to meet their maintenance requirement while they were nursing a calf. We would finally wean the calves when they were not gaining very well and the chances of snow were increasing. Our cows condition necessitated that we begin feeding hay as soon as we got extremely cold and/or snowy conditions. However, our cows were so accustomed to being fed hay by mid-December that they would gather around stack yards, even if winter conditions wore not extreme and natural feed was available.

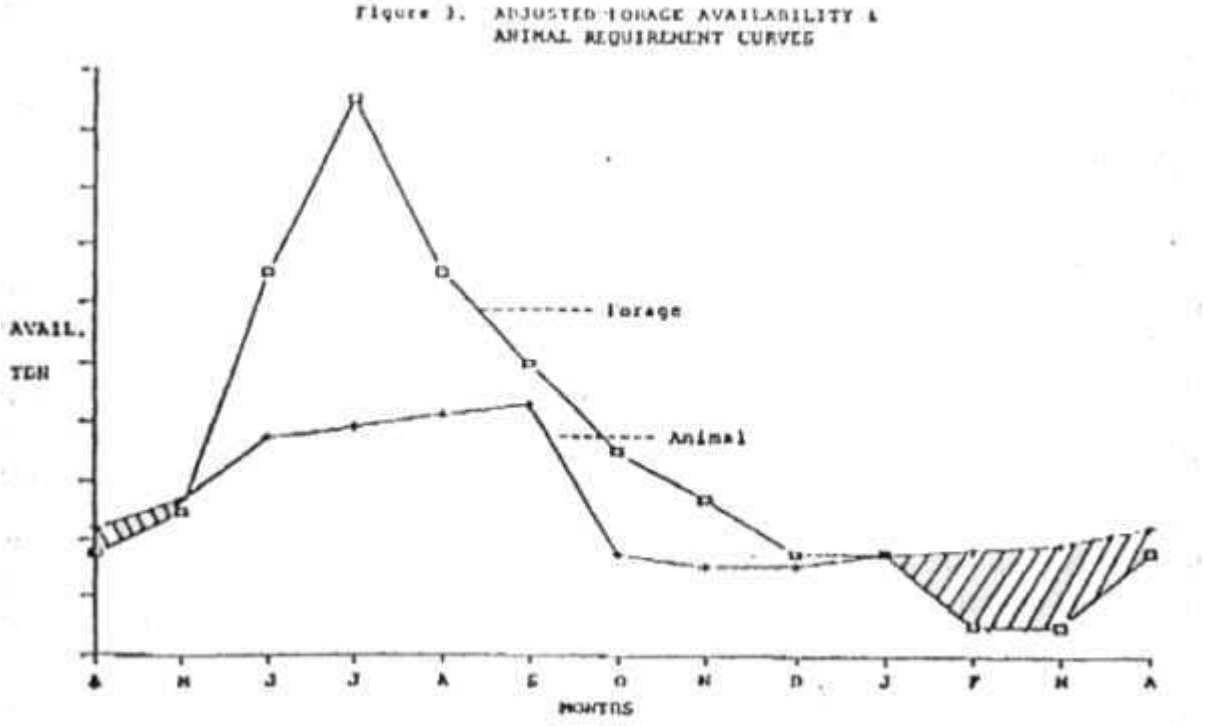
Our past strategy had problems, it required a lot of hay feeding and this represented our highest annual cow production cost. Additionally, hay production and feeding lead to our 2nd, 3rd, and 4th highest costs, namely: cow depreciation (the costs associated with developing replacements), operating interest (the difference between cash the ranch was taking in and the cash going out), and labor (Table 1). Our calf weaning weights were mediocre and costly inputs would have been required to raise them. Finally, we had a limited marketing window with November weaned calves being our only option.

Table 1. Selected Cost/Cow/Year

	1979	1979 (Adjusted)*	1989
TOTAL	**234**	**420**	**207**
Hay	**-100**	**179**	**34**
Depreciation	**35**	**63**	**19**
Operating Interest	**28**	**50**	**2**
Labor	**17**	**30**	**25**

** These cost are adjusted to 1990 costs assuming an inflation rate of 5% per annum.*

Figure 3 shows how we have adjusted both the animal requirement curve and the available forage curve to reduce the differences between them (shaded area).



We started our adjustment by reducing the high cost of hay production. We evaluated both the production in tons/acre and the TDN of this hay by field. Fields varied tremendously in their production. The extremes were 0.6 tons/acre production with 48% TDN to nearly 3 tons/acre and yield with 54% TDN. When the farm costs were prorated over the fields, production costs ranged from $10 to $90 per ton. On a cost/ton basis, our overall average was $49. From this analysis we discovered that in 30% of the fields, it was costing more to produce hay than to purchase it. We chose not to hay 25% of the area because a lot of haying costs are not directly variable with production and thus the total amount of hay produced is very important to tho overall cost/ton. The benefits realized by eliminating haying these low production fields were a $10-15/ton drop in hay cost, more total tons of hay harvested on less land (Table 2) and a shortened haying season which increased hay quality because the plants are less mature when cut.

Table 2. Hay Production Changes at the Ranch

	Acres	Tons	Tons/Acre	$/Ton
1979	**7100**	**7300**	**1.02**	**49**

1984	**5600**	**9000**	**1.60**	**30**
1990	**1716**	**4000**	**2.32**	**35**

The uncut area (1,700 acres) was available for other uses. We eventually started using it to summer our yearlings and winter our cows. Winter grazing of these meadows helped reduce our total hay demand (eventually leading to some hay sales) and lower the cost to winter our cows. We reduced the cost of haying even more by windrowing hay and letting the cows free-choice graze it. We allocate windrowed hay by using a portable electric fence. As time went on we kept introducing new practices that reduced our hay feeding season (Table 4) while increasing beef production (Table 3) and the production capability of our land and labor.

Currently, we calve our cows starting April 5th. They generally calve out on pastures (usually crested wheat grass/sagebrush) that were rested during the active growing season the previous year. This has dramatically increased our available standing forage in the spring. This standing forage tends to melt the snow up to four weeks earlier than pastures that are grazed down the previous year and have not regrown. The vertical stalks of standing forage intercepts the radiation from the winter sun (which is low on the horizon) more efficiently than grazed down forage. Therefore, standing plant material captures more radiation and re-radiates this energy which helps melt the snow.

Cows calving in those large rested pastures can find a secluded and dry place to calve. Cows have continuous access to feed (not waiting for a tractor to come every 24 hours). The crested wheatgrass tends to meet their nutritional requirements because the old growth provides their energy requirements and it shelters the basal leaves over the winter which are green and high in protein. The range starts its active growth in May but the dry forage keeps it from being too washy. As time goes on, new growth predominates the plants and thus the cows' plane of nutrition is constantly increasing.

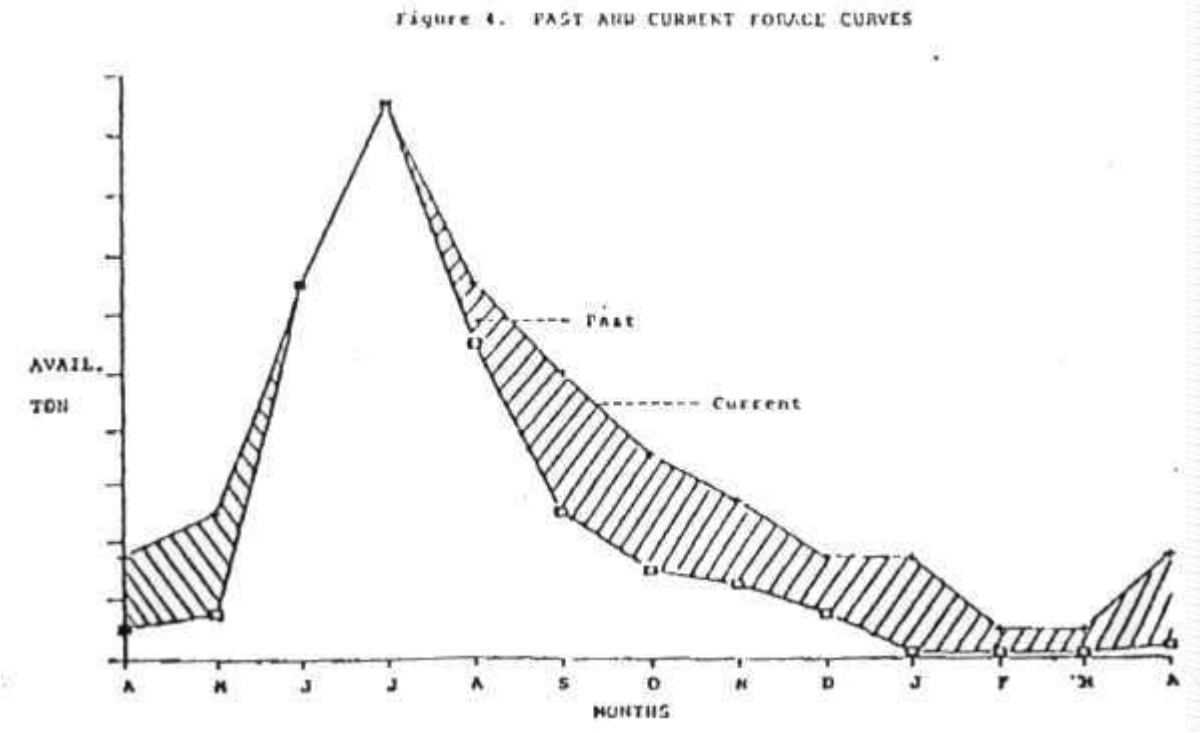
Our calves are born on the range when the plants are dormant or in slow growth and just prior to rapid growth. We minimize disturbance of the cows and calves while calving because we do not separate them as pairs and springers into different pastures. Instead, we let the cows drift onto new feed and clean up the stragglers. When rapid growth starts we move rapidly from one pasture to the next. This helps minimize re-biting of the plants and maximizes the potential that the plants will recover from grazing. Any pasture that generally has poor plant recovery will be rested the following year during rapid growth. This helps insure the health of our ranges and their production capabilities. Greater production capability reduces the

variation in annual forage production.

We put the bulls in with the cows for breeding the third week of June. This time coincides with maximum range TDN. Now over 90 percent of our calves are born in 28 days. This gives us more uniform calves. The other important aspect of concentrated calving is that we can switch the men's attention to irrigation to help insure meadow production.

During the summer, we still hay but we have decreased our total needs. This, in turn, has shortened the haying season which has allowed us to re-irrigate our meadowland, which has significantly changed our forage curve. On the cut areas, the re-watering produces highly nutritious regrowth that extends our ability to provide green (high TDN) food longer into the fall. On the uncut areas it allows the plants to stay green at the base for more nutritious fall and winter feed.

Figure 4 shows the difference (shaded area) between our past forage production curve and the current curve. The notable differences are in the spring and fall. In the spring rested crested wheatgrass and in the fall re-irrigated meadow production make up the differences between the curves.



We wean the calves in mid-September and early October. Later calving and earlier weaning has decreased the total age of the calves by 33 days, but the actual weaning weight per calf has increased from 309 pounds in 1983 to 406 pounds in 1990. This and other production changes are outlined in Table 3.

Table 3. Production Changes Between 1983 and 1990

	1983	1990
Avg. age at weaning	200	167
Avg. calf weaning weight	389	406
Gain/day of age at weaning	1.55	1.95
Total pounds at weaning	822,000	1,141,000
Jan. 1 cow inventory	2590	3012
% weaned from Jan. 1 inventory	82	93
% fertility	84	92
Winter supplement cost $/head	96	47
Cost/# of calf before G/A	.74	.54

Weaning earlier in the Fall and putting the cows on more nutritious forage allows the cows to gain and improve in body condition before the long arduous winter. This added condition has improved their ability to rustle for feed (even in snowy conditions). Normally the cows spend the early winter months in uncut meadow pastures. Later, some go onto windrowed hay and others are fed hay as necessary. In late March, the cows go to fields that have standing forage and protection to have their calves. Whenever the cows qraze out and are not being fed hay we save over $1,500/day. Table 4 contrasts past and current program to winter our cows.

Table 4. Hay Feeding/Grazing Before & After Program Changes

**BEFORE <----------Hay fed (@ 2.0 tons/cow/year)----------> **
**AFTER <-------Graze uncut meadows-------> <----------Graze windrows or feed hay (.75 tons/cow/year)----------> <--------Graze rested crested wheatgrass--------> **
|----------|----------|----------|----------|----------| Dec Jan Feb Mar Apr May

Because we had available meadow feed we had an opportunity to stock it with

yearlings during the summer. Over time we started retaining our own yearlings. This yearling program is now very advantageous to the ranch because it provides additional flexibility. We can adjust their number to match our expected forage availability without adjusting cow numbers. This class of animal is very easy to handle and move and they have a great potential to gain. In 1990, the yearlings have increased our total ranch beef production by 487,460 pounds. This production increased without us increasing our cow herd, labor, fencing, housing, equipment, or working facilities.

Yearlings have added marketing flexibilities to the ranch. We know what the value of them as calves are, what it will cost to winter them off the ranch and through experience and genetic control are able to predict their production ability. We use partial budgets, varying the prices to identify whether it would be more feasible to keep them as short yearlings, long yearlings, sale as calves, or a combination of these options. Partial budgets are done before the calves are weaned. After weaning, the calves go to the aftermath crop residue and a feedlot to keep them growing at about 1.5 pounds/head/day. This is done off the ranch in a much milder environment and has cost us around $110/head/season (October-April) or around $.40/pound of gain. Summer forage on the ranch costs us (with opportunity costs) $.20/pound/head until the yearlings are shipped in the fall.

We try to contract the calves at budgeted prices before weaning them. However, this is not critical because we have a low cost gain opportunity over a long period of time (Oct.-Oct.). This provides a broad marketing window in which to contract the calves/yearlings at prices favourable to our budget. Our experience is that at some time during this marketing period we can outperform our budgeted prices.

To summarize, we have based our operation on matching our animal requirement to our natural forage production ability. This match has dramatically increased our beef production without increases in costs. Most operators are currently doing a lot better job than we were twelve years ago and should not expect as dramatic of a change. However, one should go through the exercise of defining their forage curve and see how well it's matched to their annual requirement curve. The amount of difference will determine the cost of production. Cost control is the best hedge against the high risks inherent in our business.

By matching our curves, we have enhanced our overall flexibility. Our opportunities have increased geometrically with added flexibility. Before, we had little flexibility (high costs, few marketing options), we were like a football team that would get two or three yards on the first play from the line of scrimmage. Now we are a team that frequently gets eight yards. Our likelihood of getting a first down is greatly increased because we have numerous options to attack the defences that stand in the way of profitability.

The Case for Adapted Cows

Gregg Simonds, March 14, 1996

Ranchers are fixed cost operators with the cost of their land, labor and equipment not changing much if they run 100 head or 120 head. Ranchers in recent history have tried to produce more pounds from their ranches by increasing weaning weight. They have used bigger, exotic bulls from bread or individuals that have greater milk and started calving earlier in the year. They have been very successful in their efforts to increase weaning weight. The nation's cow herd was about the same in 1990 as 1960 while 65% more beef was produced largely due to framer cattle.

These bigger higher milking cows have become less adapted to the land they are produced on. The short-term gains in weaning weights are being followed by increasing costs. Thus their cost per pound is rising rapidly on these cows that rely on non-ranch inputs. These non-ranch inputs are non-renewable and thus inflationary. So the short-term gain in production in the long-term won't keep up with the rising costs of production. Calf weaning weights can't increase much anymore because they are near their biological maximum, while the cost of this strategy is increasing each year with the inflation connected to non-renewable resources, i.e. hay, tractor, fuel, etc.

Environmentally adapted cows are cows that are of the right frame size and milk so that they are highly fertile with very little supplement. A frame size 4 cow (@ BCS 5) will have a mature weight around 1,100 pounds and if she is of moderate milking ability (1.2#/day) her TDN requirements are about 13.1 lbs. per day. Contrast this with a frame size 6 cow (@ BCS 5) will have a mature weight around 1,250 lbs. if she is high milking (18#/day) her TDN requirements are 15.7 lbs. per day. The low forage production western ranch running the smaller moderate milking animals could run 20% more cows. Plus the smaller lower milking cows only need 54% TDN in their forage to meet their production requirement. While their larger, higher milking cousins need 64% TDN in their forage. This is very significant because the western native range will only produce 64% TDN forage for 2 or 3 months and in a drought year may never produce this. So the high producing cows will need to be supplemented or else show reduced fertility.

These high production cows' dependence on high quality feed make poor range cattle. They will tend to hang in the bottoms where more green feed is likely and not use as much of the range - this has environmental consequences besides economic.

The small cattle will return much more back to the land even though they may wean 10-15% less weight per calf. Because they cost $60-$70 per head less to run (20% less), their costs increase at a much lower rate (because they depend mostly on the ranch renewable resource) and over 20% more can be run with a greater chance that they will improve the land.

Wealth is long-term profit. Cattle wealth is generated when their production helps the land in which they are produced and the people they produce for. Unadapted cows milk the land and eventually everyone. Adapted cows add manna to the land and the land to them.

Wealth Production and the Beef Business

Gregg Simonds, Abstract for a Paper, October, 1996

True wealth in the beef production business relies on taking care of the lands that help produce beef and the customers for whom the beef is being produced. Our fragmented and poorly focused industry leaves much room for improvement in wealth production.

Currently the beef industry is divided into four competing groups, namely ranches, feedlots, packers and retailers. These groups all have high fixed costs and compete financially amongst each other. Who is profitable is largely determined by the price they receive for their commodity. The total supply of beef in the system determines which segment has leverage and the price received. When beef supply is low, the rancher/feedlot operators are in the driver's scat while when supplies are high, the packers and retailers take control. Overall, the business is nearly a zero-sum

economic venture that survives on low margins, high volume and ranchers who have off-ranch incomes to subsidize their cows.

This volume based system has little if any focus on what brings value to the people purchasing the product to eat. The product is very inconsistent in its eating qualities and consumers have a hard time knowing what they are getting. Thus, it is nearly impossible for consumers to make an informed decision as to whether to purchase the product and at what price. This causes dissatisfaction with consumers who will respond by reducing demand for the product.

The land suffers when the beef production process or the animals are not adapted to it. Cattle have become more productive by being bigger and heavier milkers. Volume incentives have led producers to select for bigger cattle and the mass introduction of exotic breeds in the 1970's facilitated these efforts. The constant increases in both weaning and carcass weight are a reflection of this trend.

These bigger and more productive cattle have had negative impacts on the land, ranchers and consumers. These cattle require more and higher quality feeds in order to be productive, they are less adapted to natural forages and they have a harder time sustaining themselves on low quality forage. In the West, these types of cattle can often only meet their nutritional requirements by grazing near the stream which tends to remain green. Their over use of these areas can have deleterious environmental effects in which wildlife and water quality can suffer.

These types of cattle are not adapted to low quality forage of the upland range and are unable to winter out without being fed hay. Hay feeding is the single biggest cost of ranching and becomes more and more costly because it relies on tractors and fossil fuel to power them. This contrasts with low quality range forage that only relies on sun and water and nobody has a meter on them.

These new bigger, faster growing cattle have added much inconsistency to beef production. The product is more frequently tough, has less marbling for taste and thus provides poorer eating quality. These problems have spawned branded beef companies that try to differentiate themselves from commodity beef. However, little of the premium gets to the producer.

This system based on bigger is better has gone too far and is not supportable either by the land or the customer, threatening the long term health of the industry. However, problems provide opportunities for

improvement making this a very exciting time for our industry.