DELAYING CALVING

AND

REDUCING WINTER FEED COSTS

Case Studies of Wyoming Producers

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Introduction

Beef producers are always under pressure to reduce production costs and still deliver a consistent, high-quality product. Winter-feed represents a significant proportion of total operating costs for a livestock operation in the Northern Plains and the Intermountain West. Simonds (1990) determined that hay costs accounted for up to 70 percent of total costs on a large Utah ranch.

Efforts to reduce winter feeding costs have centered on extending the grazing season while reducing hay and supplemental feeding (Clark et al., 1997, Adams et al., 1994, and D'Souza et al., 1990). A low cost method of extending grazing is to shift the timing of the reproductive cycle to synchronize peak cow nutritional requirements with peak nutrient availability in range forage (Adams et al., 1996). Clark et al. (1997) measured forage intake and hay feeding on an experimental herd, separated into March and June calving in the Nebraska Sandhills, and found that June calving reduced hay feeding by 1.5 tons per cow.

Other methods of reducing winter feeding costs include alternative haying and forage systems. Simonds (1990) found that forage costs could be reduced by 48 percent when alternatives to hay were used. After comparing alternative feeding systems, D'souza et al. (1990) found that late fall grazing and early spring grazing were more profitable than harvesting and feeding hay, even though total dry matter production was lower. Adams et al. (1994) compared six combinations (three winter with two spring treatments) of grazing systems in the Nebraska Sandhills. Alternative winter treatments included grazing winter range, subirrigated meadow, and meadow hay. Spring treatments included grazing meadow hay and new growth subirrigated meadow. Grazing subirrigated meadow during the winter and spring, rather than feeding hay, increased returns by $50 to $90 per cow.

Calving season for Wyoming cow/calf operators typically runs between late February and middle April; however, the calving season providing the closest match between animal nutritional requirements and nutrient availability from standing forage starts around May or June in Wyoming (Younglove, 1998). Delaying calving season by 30 to 120 days represents a monumental shift in management philosophy and affects most aspects of livestock operations. Producers undertaking such a change will inevitably experience unexpected problems, as well as favorable results. Benefits captured by changing calving season and winter feeding programs vary depending upon forage resources, climate, and other characteristics of individual operations.

To help producers anticipate risks or potential problems associated with changing calving season, a group of agriculturists who previously converted from early to late calving were interviewed. As a result of the interviews, case studies were developed to document the production practices of these operations and identify potential benefits and problems associated with late calving. The operations featured as case studies were

selected to represent a variety of ranch sizes and management strategies.

Reduced winter feeding costs are the primary benefit of late calving. Alternative winter feeding strategies, therefore, were evaluated for each operation. Lower wintertime nutritional requirements for a cow calving in May or June increase the optional forages suitable for winter grazing. Many of the winter feeding techniques suggested to lower wintering costs, however, could be used independent of the calving season. Likewise, alternative marketing strategies could be considered independent of calving season.

Case studies were reviewed by featured producers to ensure their management practices were accurately represented. Concepts presented in these case studies are the views of the individual ranch owners or managers and do not necessarily represent opinions of the University of Wyoming or the authors of this study.

Kelley Land and Cattle Company of Wyoming

Kelley Land and Cattle Company of Wyoming (KLCC-WY) is a family owned ranching corporation and headquarters are located south of Saratoga. Three generations of the Kelley and O'Neill families have run cattle and sheep in four other states for more than 60 years. Kelley O'Neill is a shareholder in KLCC-WY and Mike Crimmins is the ranch manager. Seven full-time employees operate the ranch.

Resource Base

The ranch comprises approximately 50,000 federal, state, and private lease acres located in the North Platte River Valley south, west, and north of Saratoga. Federal lease acreage includes both Bureau of Land Management (BLM) and U.S. Forest Service (USFS) permits. The ranch has 6,000 acres of flood irrigated pasture, and most of the ranch's total carrying capacity comes from haying and grazing irrigated land. Major plant species found on irrigated land include brome, timothy, and garrison creeping foxtail. Hay is harvested on 2,000 acres, and yields range from ½ to 3 tons per acre.

The breeding herd was increased from 700 to 2,000 mother cows between 1990 and 1997. Breeds include Red Angus, Hereford, Angus, Gelbveih, and some Barzona composites. Average mature cow size is approximately 1,050 pounds.

Climate

The elevation of the ranch ranges between 6,900 and 7,800 feet. The growing season is typically 60 to 80 days. According to the National Climatic Data Center in Saratoga, long-term annual precipitation averages 10.5 inches. Precipitation is higher (15 to 19 inches) on the higher elevations of the ranch west of Saratoga and Pennock Mountain. May is normally the wettest month of the year, averaging 1.25 inches of precipitation. January is typically the coldest month of the winter, with a normal low of 10 degrees Fahrenheit and a high of 33 degrees

Fahrenheit. According to Crimmins, the first winter storm of the year usually occurs near the end of October. Significant snow accumulation does not typically take place until the end of November. Snow rarely accumulates to more than 1 foot and usually blows into drifts.

Calving Practices

Starting in the middle to late 1980s, O'Neill family members operated a ranch in Minnesota and began shifting lambing dates from January through March to April through May. The goal was to maintain production with less effort and expense. They became interested in late calving after attending the 1991 Range Beef Cow Symposium where Gregg Simonds, then manager of Deseret Land and Livestock near Woodruff, Utah, presented 12 years of cost and production data that compared March and April calving dates.

Dieter Greiner, a former KLCC-WY manager, introduced Kelley O'Neill and Mike Crimmins to Dick Diven, a consulting nutritionist and educator from Arizona in 1993. Diven convincingly suggested that winter supplemental feeding costs could be reduced if calving were delayed into the growing season when maximum nutrients could be stock harvested to meet requirements of both lactation and weight gain prior to breeding.

KLCC-WY's calving season was shifted from February and March to May and June in 1994. The purpose of late calving was to reduce winter feed expenditures by decreasing the need for substitute or "hauled out" feed per cow. When calving is delayed from

Photo 1. This mother cow watches her newborn calf.

March to June, cows are in an earlier stage of pregnancy during the cold winter months. Consequently, winter nutritional requirements are lower and cows can better afford to lose body condition than those bred to calve earlier. According to O'Neill, body condition scores should vary throughout the year. Capitalizing on the energy stored in fat reserves accumulated during the summer, rather than feeding cows enough nutrients to maintain a constant body condition throughout the winter, is more economical. Body condition is allowed to drop from an average of 5.0 in the fall after weaning to as low as 3.5, while grazing relatively low-quality standing feed residue in January and February. Body condition scores increase to 5.0 by May and June calving time, as the cows graze abundant, high-quality, and actively growing spring and early summer forage. The goal of KLCC-WY is to maintain a productive, profitable breeding herd without feeding hay during a normal winter.

Developing a cow herd that remains productive under these conditions requires selecting replacement stock with biological

Photo 2. Cows and young calves graze on summer pasture.

characteristics that fit management objectives. KLCC-WY is currently improving the late calving herd by culling cows that have difficulty or are slow to rebreed after enduring the winter on a minimal amount of feed. The breeding period is 60 days. Fourteen percent of heifer calves are selected as replacements each year, and Red Angus replacement bulls are purchased from a seed stock producer.

During the 1994-1995 winter, mature cows were fed hay for only 15 days. Many bred cows purchased during the cattle price cycle lows in 1996 were due to calve in February or March 1997. During the winter and spring, these cows were fed hay to maintain body condition and to optimize lactation and rebreeding. Crimmins expects to achieve zero hay feeding by the winter of 1999-2000. By that time, the retained breeding females should be acclimated, and those biological types that do not fit KLCC-WY's environment and management protocol will have been culled.

Crimmins admits it is unrealistic to expect cows to endure every winter without hay; therefore, hay production on the ranch will continue as insurance against unusually harsh winter weather and as a feed source for overwintering calves. KLCC-WY currently produces 2,500 to 2,800 tons of hay each year on 2,000 acres. Once the late calving system is fully established, Crimmins anticipates reducing harvested hay production to approximately 1,500 to 1,700 tons per year. Lower yielding ground will be taken out of hay production and either grazed or cut and raked into windrows for winter feeding. Harvested hay not required for winter feeding will be retained for subsequent years or sold as market conditions and management dictate.

Table 1 briefly summarizes production statistics from the records of KLCC-WY. Average calving and weaning dates were the mid-point of a 10-day period during which most calves were born or weaned.

Difficulty maintaining conception rates has emerged as a potential problem with June calving. The conception rate for first calf heifers appears to be declining; however, Crimmins does not believe this trend is a result of late calving. The 95 percent conception rate that occurred in 1993 corresponded with the year breeding was shifted and the heifers had more time to develop before breeding. Crimmins suggested the drop in conception rates of first calf heifers from 83 to 64 percent between 1995 and 1996 resulted from a crop of heifers with poorly developed reproductive tracts. This phenomenon is likely unrelated to calving season.

Table 1. Selected cow and calf production statistics for KLCC-WY.

	1993	1994	1995	1996
Average calving date	4/1	5/15	4/26	4/20
Average weaning date	11/19	11/21	10/12	10/30
Average daily gain (suckling calves)	1.63	1.74	1.79	1.5
Pounds weaned per cow	361	355	273	349
Calves weaned per cow	80%	87%	73%	95%
Conception rate (first calf heifers)	95%	87%	83%	64%
Conception rate (second calf cows)	NA	NA	80%	90%
Conception rate (third calf heifers)	NA	NA	71%	91%
Conception rate (other cows)	NA	NA	91%	95%

Winter Feeding Practices

In December, cattle are separated into five groups: first and second calf heifers, mature cows bred to start calving May 1, mature cows bred to start calving June 1, yearling calves, and replacement heifers. Yearling calves and replacement heifers are fed hay throughout the winter, and young heifers and early-bred cows are the first to get hay when winter grazing forage is depleted. The late-bred herd generally will endure the winter without hay.

Cows primarily graze hay aftermath during winter. Herds of approximately 500 head are placed on 250- to 400-acre sections for a 10-day to two-week grazing period. Hay is not fed daily as a substitute ration except during extreme weather conditions, but it is normally fed intermittently as a standing forage supplement. Forage samples are tested frequently, and supplements are provided according to the nutrient deficiencies indicated by the forage analysis. Forage is seldom rendered inaccessible due to snow cover, which rarely accumulates to more than 12 inches and usually blows off.

Cows typically begin losing body condition in January, and start gaining it back by mid-March. Forage quality is similar during both the reconditioning and de-conditioning periods. According to Crimmins, a cow's body condition improves during the spring before green grass is available due to improved weather conditions. Currently, the same mineral supplement formulation is used year round.

Land taken out of hay production is utilized for winter grazing. Pastures grazed early in the growing season with regrowth accumulating to more than 1-foot high is cut in late summer, piled into windrows, and left for winter grazing. According to Crimmins, cutting and windrowing tall grass results in greater utilization than if the

Photo 3. These calves have recently been weaned.

forage were left standing. Pastures with less regrowth are left standing for winter grazing.

Problems Associated with Late Season Calving

One problem KLCC-WY encountered with May and June calving is conflicting labor demands between irrigating hay ground and calving. A large amount of available labor during calving season is used to identify cow/calf pairs and collect calf birth weights to monitor productivity under the modified regimen. This conflict was partially resolved by incorporating hay land irrigation in haying contracts.

Since 1993, all labor and machinery used for mowing, raking, baling, and stacking has been provided by two to three independent hay contractors. More recently, these contracts have been expanded to include harrowing, fertilizing, and irrigating. KLCC-WY kept two tractors for feeding, and the rest of the ranch-owned haying equipment was sold. Crimmins believes that in addition to diminished labor requirements, cost benefits were realized due to reduced capital investments in hay equipment and lower maintenance costs.

Providing a dry location for the cows to calve is another problem associated with the transition to a late calving season. KLCC-WY flood irrigates all pastures in May and June. The current pasture and hay field layout has been frustrating to management, as they try to avoid missing water turns on the meadow while also trying not to drown calves.

The solution to this problem appears to be building additional fencing and developing stock water on dry range. For example, KLCC-WY has a 5,000-acre Bureau of Land Management (BLM) lease that is connected with deeded pasture. The lease runs from May 15 to June 25. Although Crimmins would like to calve part of the herd on this range, 5,000 acres is too large because cows are spread out, making it difficult to monitor calving. Crimmins is negotiating with the BLM, so he can fence this range into two 2,500-acre sections.

Under the later calving system, cows are calving when they would normally be placed on the summer mountain range, up to 25 miles away from the ranch. Clearly, moving the herd at calving time imposes additional stress on dams and newborn calves. A possible solution to this problem is to move late-bred cows (those calving after June 1) to the summer range during May, one month prior to calving. Early calving cows will calve at the ranch before moving to summer range.

Crimmins acknowledges a potential for problems when calving on summer range.

He is most concerned about predators and calving difficulty. Crimmin's summer range is located in the mountains west of Saratoga, where coyotes, mountain lions, and bears could possibly prey on newborn calves. However, antelope, deer, and elk also are abundant in the area, and Crimmins believes predators will select newborn wildlife rather than calves.

As summer range is located up to 25 miles away, employees cannot frequently monitor the calving process and provide assistance in case of calving difficulty. To minimize this problem, only cows with at least a three-year history of unassisted calving will be selected to calve on the summer range.

Marketing Implications of Late Calving

Changing calving seasons did not significantly alter the marketing strategy for KLCC-WY. Under both the old and new calving system, calves are weaned in October and November and retained as yearling stockers to be grazed on rangeland their second summer. Cattle are then placed in a feedlot in October of the following year and marketed for slaughter the next March. KLCC-WY began retaining ownership through the feedlot at the same time the calving season was switched.

O'Neill believes that although reduced weaning weights may have an adverse effect on profitability, lighter calves and stockers typically receive a higher price, which softens the impact. Because calves are retained through the feedlot at KLCC-WY, however, finished weight is the production variable having the most impact on net income. According to O'Neill, calves born in May and June are reaching market weight in March and April, the seasonal peak in fed cattle prices. Before the change in calving season, calves were hitting the fed cattle market in January and February at prices well below the seasonal peak. Due to improved forage quality for lactation and decreased cold stress, warm weather calving may increase the rate of gain prior to weaning, reducing the difference in weaning weights between early and late born calves.

Weaned calves' average daily gain during the winter months is approximately 0.75 pounds. Calves are fed hay during the winter, and during the summer they are placed on rangeland where average daily gain is approximately 1.8 pounds. Yearlings enter the feedlot weighing approximately 750 pounds.

Future Projections

O'Neill has reported resistance to later calving in other operations within the company. Ranch managers and creditors have been reluctant to accept reduced weaning weights. An important factor in the success of a late calving season is the support of essential stake holders.

Crimmins is optimistic that KLCC-WY can profitably produce quality beef without feeding hay to mature cows through most winters. O'Neill envisions a cow herd that "can be run like buffalo, harvesting their own feed, with minimal intervention at calving." This will significantly contribute to reaching the ranch's production cost goal of $0.50 per pound of beef.

Deseret Land and Livestock

Deseret Land and Livestock (DL&L) operates a cow, calf, and yearling ranch near Woodruff, Utah, located 20 miles northwest of Evanston, Wyoming. DL&L is a ranching corporation owned by the Church of Jesus Christ of Latter Day Saints (LDS). The Church acquired the ranch in 1983. Ten individuals are employed full-time at the ranch, five of whom operate the cattle enterprise. Bill Hopkin succeeded Gregg Simonds as manager in 1992.

Resource Base

The Woodruff site contains 205,000 acres of deeded land and 14,000 acres of BLM leased land. Irrigated lands comprise 7,889 acres. An additional 27,000 deeded and 7,000 leased dry land acres were recently acquired near Promontory, Utah, for wintering replacement and two-year-old heifers, along with weaned calves retained as yearlings.

DL&L has nearly doubled the cow herd since the LDS church acquired the ranch. When the ranch was purchased in 1983, the heard consisted of 2,600 cows. By 1998, the herd grew to 5,150 head of mother cows, which are a composite of several unidentified breeds. Herd expansion was possible, in part, because the ranch was understocked when it was acquired.

Other improvements have been made to the ranch. DL&L holds an 1886 water right of 134-cubic-feet per second from the Bear River, among the oldest in the district. Under Wyoming water law, holders of pre-1940 water rights are allowed double their adjudicated right while the river is not under regulation. Consequently, DL&L is able to divert up to 250-cubic-feet per second to irrigate and fill their reservoir in April and May. However, when the ranch was purchased, the safe capacity of the canal diverting water from the river was only 100-cubic-feet per second. Over a period of five years, DL&L dredged the canal and filled in areas where the banks were low. Improved irrigating capacity dramatically increased annual forage production on irrigated land. The 2001 goal for forage production on the 7,889 acres of irrigated land is 18,000 tons, compared with 11,500 tons of forage produced in 1983.

Big game species also have become an important source of income for DL&L. Between 25 and 75 percent of net income, depending upon the cattle price cycle, is derived from the wildlife program. According to Hopkin, any ranch with reasonably good rangeland is going to feed wildlife whether they want to or not. Accepting and managing the elk and deer population while capitalizing on their economic value, rather than trying to minimize or prevent wildlife forage consumption, has been profitable. Two full-time biologists manage the wildlife and have developed what Hopkin believes is the best elk database in the West. DL&L currently manages 2,000 head of elk in cooperation with the Utah Division of Wildlife Resources. A range of 250 to 1,200 tons of alfalfa is required, depending on the severity of the winter, to entice the elk to stay on the ranch and reduce the risk of destroying neighbors' haystacks.

Under Utah law, DL&L is considered a Cooperative Wildlife Management Unit, formerly called a Posted Hunting Unit. This arrangement allows the state of Utah to maintain ownership of big game, while granting DL&L a partnership with the Division of Wildlife Resources in regulating herd size and structure by setting hunting seasons and determining the number of permits issued each year. The Division of Wildlife Resources, as a limited entry drawing, issues 15 public bull elk permits, along with cow permits. DL&L biologists and the Division of Wildlife Resources meet annually to determine harvest numbers. DL&L retains the revenue from their allocation of permits, which amounts to nearly $8,500 for each trophy elk. In DL&L's accounting scheme, the cost of forage consumed by elk and deer is charged against revenue on a standard AUM basis, the same as the cattle enterprise. The cost of raising an elk, therefore, can be compared with the cost of raising cattle or sheep.

Climate

The elevation of the Woodruff ranch ranges from 6,300 feet to more than 8,000 feet. The frost-free growing period is typically 52 days. Average annual precipitation is 10 inches at lower, 12 inches at intermediate, and 20 inches at high elevation areas. Most precipitation is in the form of snow. Wintertime temperatures frequently reach as low as –30 degrees Fahrenheit and occasionally dip to –50 degrees Fahrenheit. Mean monthly temperatures remain below freezing from November through March in the Woodruff area. The combination of snow and sub-freezing temperatures can render standing forage inaccessible during the winter.

Deseret Land and Livestock

Photo 4. Cows graze on winter pasture.

Promontory, where 34,000 acres were recently obtained, is near the Great Salt Lake at the bottom of the Great Basin. Ranging between 4,200 and 4,600 feet, the elevation is lower and winters are less severe than those in the Woodruff area. According to Hopkin, winter temperatures are generally 20 to 30 degrees warmer in Promontory than in Woodruff. Promontory is relatively dry compared with Woodruff, averaging 6 to 10 inches of precipitation, most of which accumulates during the spring, fall, and winter.

Calving Practices

Calving season was delayed approximately 15 days, from mid-March to early April starting in 1988. After carefully examining the production and nutrient cycle of the forage resources, DL&L management was convinced that calving in April would provide a better match between cow nutritional requirements and nutrient availability. This enables the cow herd to be maintained throughout the year at lower

costs. Observing a herd of bison maintained on the ranch supported this conclusion. Bison bulls were kept with the cows year round. Calving naturally occurred in early summer and little intervention was ever required.

To determine when forage availability was at a maximum, samples were collected throughout the growing season. Forage availability, measured in pounds of total digestible nutrients per acre, increased rapidly beginning in early May and peaked at the end of June. By combining results from forage analysis and National Research Council nutritional recommendations, management determined that calving later would increase the cows' ability to meet nutritional requirements from grazing resources.

Management was nervous about delaying calving season too far, because they knew it would be difficult to shift back if profitability was adversely affected. Historical weather records for the Rich County area showed average temperatures increased slowly until around April 5, then increased rapidly until summer. In addition, calving in early April would synchronize breeding with peak nutrient availability at the end of June, maximizing conception rates.

DL&L experienced several benefits from later calving. Hopkin admits that earlier born calves are larger if scours or other infectious calf illnesses can be prevented and if all the calves can get a significant amount of colostrum immediately after birth. In reality, calves born in March were typically delivered in a concentrated situation where infections spread easily. Calf growth was impaired and feed costs were high as a result of cold weather. April born calves are currently born on prior-year crested wheatgrass or cheatgrass pastures. Because cows are grazing during parturition rather than being fed, newborn calves are widely dispersed, reducing the risk of scours and avoiding mothering problems that frequently occur in a more concentrated environment. Consequently, later born calves gain weight faster and appear to catch up with early born calves.

When calving season was switched, DL&L management determined that a low elevation area comprised mostly of BLM land was best suited for calving. The existing grazing allotment for the first pasture was approximately 200 head on 1,611 acres for 45 days beginning in middle May. Management submitted a proposal to the BLM to allow 3,000 head on this pasture for three days, beginning in early April, before new growth occurred. The cows then would be rotated to a 3,891-acre pasture for about 10 days, after which they would continue on other checker board and private range pastures for the remainder of the calving season. The range conservationist in charge of DL&L's BLM allotment was initially surprised at the proposal but eventually agreed. Hopkin noted that range conditions on the affected BLM land have improved since making changes in utilization methods.

Where calving occurs on open range and cows are widely dispersed, Hopkin noted that employees could not easily monitor the herd during calving and provide assistance when necessary. Through the breed-

ing and replacement program, DL&L reduced the assistance rate of two-year-old heifers from 45 percent in 1983 to approximately 12 percent by 1997.

The reduction in the assistance rate is primarily explained by an increase in the minimum size of the pelvic area of one-year-old heifers from 130 cm^2 in 1985 to 170 cm^2 in 1991. According to Hopkin, a heifer with a larger pelvic height is more likely to deliver a calf without difficulty. Much of the genetic pelvic size increase can be attributed to using Beef Master bulls starting in 1986. Beef Master bulls contain Bos indicus blood and have a relatively large pelvic area per pound of body weight. However, use of these bulls was terminated in the early 1990s because of characteristics incompatible with the overall management objective. Bos indicus breed types are generally later maturing and have difficulty breeding under the DL&L management scheme. In addition, management found Bos indicus breeds were relatively thin-skinned with short hair coats and carried less body condition into winter. These traits reduced their ability to satisfy winter nutritional requirements on poor-quality feed, which is an important component of the late calving objective.

Since the early 1990s, DL&L has been raising replacement bulls and moving toward English breeds, which seem to have a naturally smaller pelvic opening. Through the replacement bull and heifer selection program, DL&L maintained the large pelvic area and low assistance rate. When the replacement decision is made each spring, all potential replacement heifers are gathered and measured for pelvic area, and the largest pelvic area heifers are selected as replacements. Hopkin acknowledges that frame size creep (enlarging cow frame size with each generation) is a risk with this type of selection. Currently, average weights of mature cows with a body condition score of five are 1,050 to 1,150 pounds. Replacement bulls are selected from mothers who have raised a satisfactory calf for seven years and are nine years or older. Hopkin commented, “The only pedigree these bulls have is that their mothers are still in a herd with unforgiving management.”

Deseret Land and Livestock

Photo 5. Elk search for forage during winter.

Winter Feeding Implications of Later Calving

The economic benefit of delaying calving season is captured, in part, by lowering winter feeding costs. Gregg Simonds estimated that up to 70 percent of the costs of maintaining a cow are for winter feed. Late calving and early weaning allowed DL&L to drastically reduce the amount of hay harvested. In 1983 when the ranch was acquired, 9,000 tons of hay was the harvest goal. Currently, DL&L employees are

Deseret Land and Livestock

Photo 6. These cows are cleaning up windrowed hay.

harvesting 1,000 to 1,500 tons of hay, with the objective of feeding 1,000 tons annually to the cow herd. An inventory of 3,000 to 3,600 tons is maintained as insurance against a harsh winter occurring, on average, every five or more years. Forage produced on land taken out of hay production is used for summer yearling grazing or unharvested for winter grazing by middle-aged cows.

Cows need to be in good condition as winter approaches if they are going to winter cheaply. Calves are weaned in September, allowing cows to gain body condition to at least a condition score of five before winter. Body condition scores are monitored during the winter by randomly sampling 20 to 30 cows each week. This allows management to determine whether the current diet is meeting requirements and if additional supplementation is needed.

Hopkin believes low intensity, long duration grazing during the winter best satisfies cow requirements. Cows are better off if they are moved and herded as little as possible during the winter. For example, a typical winter rotation is 2,000 cows on a 960-acre swamp pasture for 60 days. The meadow where forage is stockpiled typically yields 2 tons of grazable forage per acre. Standing forage grazed during the winter is generally poor quality, averaging 4 to 5 percent crude protein and 50 percent TDN. Two to 5 pounds of alfalfa per head is fed daily to cows grazing on stockpiled forage; the alfalfa serves as a protein and energy supplement. According to Hopkin, this diet will not maintain a cow with a body condition score below 4.5 during bitter weather.

Quality stock water sources are an important component of a low-cost winter feeding system. When the ranch was acquired, winter stock water was provided by chopping a hole in the ice covering a canal and forcing cows to drink water at near freezing temperatures. Wells with electric pumps were installed, or springs were developed at several locations, drawing water out of the ground at 44 degrees Fahrenheit. A drinking trough is maintained at the surface of each well that allows the water to be run continuously with no ice. According to Hopkin, warmer drinking water conserves energy by allowing dietary calories to be utilized for body maintenance rather than warming water. Hopkin believes warmer drinking water considerably reduces stress placed on cows wintering on poor-quality forage and exposed to harsh weather conditions.

First and second calf heifers, along with weaned calves, are wintered at the Promontory site. Cattle generally arrive at Promontory in mid-November and are sent back to

Woodruff by May 1. The entire summer growth at Promontory, which averages 14,000 to 20,000 AUMs, is stockpiled for winter consumption. Forage species are primarily crested wheatgrass and cheatgrass. A 20 percent protein liquid molasses supplement is provided free choice.

DL&L experimented with alternative winter forage systems. For example, on part of the hay land, hay is cut and bunch raked, then left in windrows for winter grazing. Portable electric fencing is used to partition off three to seven days worth of feed to ensure proper utilization. Hay left in windrows is usually cut near Labor Day and typically yields 6.5 percent crude protein and 58 percent TDN in February.

Two important advantages of grazing windrowed hay are reduced labor and fuel costs, as the hay is left in the field and grazed, rather than baled and stacked and then unstacked and fed. According to Hopkin, feeding windrowed hay requires one-fifth of the labor needed to feed baled hay. Another advantage of windrowed hay is that it more evenly disperses the hay among the cows. Hopkin noted that when hay bales are cut and piled on the ground, fatter, more aggressive cows consistently out compete thinner, less aggressive cows for the highest quality and most palatable hay. As a result, fatter cows gain condition while thinner cows lose condition. In windrows, higher quality hay is more evenly distributed throughout the meadow, and less dominant cows are as likely to get higher quality hay as dominant cows. Cows grazing windrows maintain a "grazing mentality" and are better adapted to foraging for food after they are turned onto range in the spring.

One disadvantage to leaving the hay in windrows is that meadows containing windrowed hay cannot be irrigated during the fall. Fall soil moisture has a profound impact on vegetative growth the following spring. Hopkin believes leaving hay in windrows on meadows where fall irrigation water is available is not economical. In addition, forage losses to wildlife are difficult to prevent when hay is left in the meadows. During the winter, elk are often attracted to hay left in the meadow and can destroy the windrows. Forage not consumed by the elk is scattered, trampled into the ground, and often contaminated with urine and feces.

Another important disadvantage of windrowed hay is that it cannot be stored from year to year. DL&L's winter feeding philosophy is to feed hay only if winter grazing resources have been depleted or rendered inaccessible. Hay surplus is held in reserve for later years. As feeding becomes necessary, the oldest hay is fed first to prevent spoilage. Hay left in windrows has to be used whether it is needed or not.

Marketing Implications of Later Calving

The decision to maintain yearlings was a by-product of the calving season change. Management believed calves weaned 15 to 30 days younger would be 25 to 30 pounds lighter, and marketing these smaller calves would not be profitable. Hopkin noted, however, that calves born in April weaned at approximately the same weight as those

born in March. In addition, late calving reduced the amount of hay required for the breeding herd. This led management to evaluate alternative uses for surplus hay. At the prevailing feeder cattle prices, Hopkin estimated that allowing yearlings to graze meadows formerly used for hay production was equivalent to selling hay at $90 per ton, without a haying cost.

Retaining calves led to other benefits. For example, the yearling operation created a year-long marketing window, allowing calves to be sold at prices more favorable than those received when calves were marketed at weaning in the fall. Marketing options open to DL&L are fall-weaned calves, spring or fall yearlings, and fed cattle. In addition, since forage production on the ranch varies sharply from year to year, maintaining yearlings allows DL&L management to easily adjust stocking rates to properly use the varying amount of annual forage production.

The five-year plan developed by DL&L management sets precise production cost goals to be achieved by 2001. These goals include marketing 950-pound yearling steers by October 1 at a production cost of $0.45 per pound. Yearling heifers are to be marketed weighing 830 pounds by October 1 at a production cost of $0.57 per pound. The primary reason heifers are significantly lighter and carry a higher cost is that the heaviest heifers are selected as replacements and incorporated into the breeding herd.

Conclusion

According to Hopkin, the goal of a ranch operation should be to maximize profit rather than concentrate on a single production variable such as weaning weights. To maximize profit, a manager should understand the sources of costs as well as revenues. Keeping accurate production and financial records and continuously evaluating resources, such as the forage base and nutrient curve, help managers reach their goals. Each ranch has its own unique resource endowment; therefore, specific calving, harvesting, or utilization practices that have been profitable for DL&L may not be profitable for ranches with a different resource base. Hopkin believes the most important lesson other operators can learn from DL&L is to question every production practice to determine whether alternative methods might increase profitability.

The Stafford-Poston Ranch

The Stafford-Poston Ranch, named after the current and original owners, is a cow/calf operation located southeast of Riverton, Wyoming. Troy Stafford and his family purchased the ranch and started a herd from scratch in 1986. The ranch consists of approximately 45,000 deeded and leased acres that support 600 mother cows. Labor is contributed primarily by one full-time and one part-time family member.

The ranch has 400 acres of irrigated land, primarily containing Boziosky Russian wildrye and native western wheatgrass. Irrigated land is used for harvesting and marketing Boziosky Russian wildrye seed. The land is then grazed during winter. Dry range grasses include Bozoisky and native species such as western wheatgrass, basin wildrye, needle-and-thread, and several minor species.

Climate

Ranch elevation ranges from 5,000 to 8,000 feet. Precipitation averages 7 to 9 inches at the lower elevation and 15 inches in the higher country. Snow rarely accumulates more than 6 inches, and forage accessibility is seldom a winter grazing issue. The growing season is typically 90 days. January is the coldest month of the year with temperatures ranging from an average low of –2 degrees Fahrenheit to an average high of 28 degrees Fahrenheit. Average daily high temperatures remain below freezing during December and January.

Calving Practices

When the Stafford family took over the ranch in 1986, they adopted a spring calving and fall weaning cycle typical of other operators in the region. In 1991, Stafford decided to change calving from March to June and July. The purpose behind this change was that summer calving would allow cows to take better advantage of high-quality forage during calving and lactation, while being sustained on low-quality, grazed forage during the winter, reducing maintenance costs.

Stafford contemplated shifting calving to summer for three years before actually initiating the change. Before moving to Wyoming, Stafford operated a ranch in Oklahoma that maintained a spring and fall calving herd. Production and financial records from this operation revealed that the fall calving herd was making money while the spring calving cows consistently lost money. Stafford compared the forage nutrient cycle of grasses common to the Riverton, Wyoming, area with cow nutrient requirements imposed by the breeding-calving-lactating cycle. From this data he concluded that calving in June would place cows on green grass during lactation when nutrient requirements peak and allow dry cows to graze low-quality forage during winter, reducing the need for hay. However, he was uncertain how well calves born in early summer would perform. In Oklahoma, he observed that calves born in June gained weight poorly and commanded very little in the market. These fears were alleviated after he read results of a study

Photo 7. Russian wildrye is stockpiled for winter grazing.

conducted in Wyoming showing no significant weight difference at 205 days old between calves born in March and those born in July.

Once the decision to shift calving season was made, the next step was confronting biological and economical issues surrounding the transition. By 1991, the ranch had a good set of cows calving in March. Stafford observed that early calving cows were worth more in the market than those born later. Rather than turn the bulls out three months later and decrease the market value of his breeding stock, Stafford decided to capitalize on the difference in value and replace the entire herd with cows already on a late calving and breeding cycle. Stafford sold his March calving cows to an operator in Colorado, and because of a drought in California, he was able to purchase late summer calving pairs at lower prices. This transaction resulted in an average net gain of $200 to $300 per cow.

The move to a later calving date was a decisive move, and the cost of failure was high. Most of the cows purchased to replace the herd had calved in August. Stafford knew that August was too late for calving in this region, because breeding would be in November when the weather is cold and the grass is in its dormant stage. He knew moving calving back two months would be difficult but decided to turn bulls in with the cows a few weeks after calving the first year. Within two years, the calving date for the rest of the herd was successfully moved to June and doubts surrounding Stafford's decision had disappeared.

Late calving reduced labor costs on Stafford's ranch considerably. In the years since changing to June calving, Stafford has not pulled a single calf and has lost only one cow from birthing complications. Calves are born on green grass where cows are widely dispersed, reducing the risk of calf illnesses. Greater dispersion also lowers the chance of mothering problems, resulting in less time sorting calves and matching pairs. Also, it is no longer necessary to monitor calving in cold winter weather.

One of the benefits Stafford realized from late calving is that replacement stock is less expensive. Rather than retaining heifers, replacement stock is purchased in the cull cow market. While acknowledging a potential for problems with this approach, Stafford believes many ranchers using a more traditional calving season systematically cull cows that work well under his system. According to Stafford, other operators often cut late breeding cows from their herd. Frequently, these cows breed late

because they produce too much milk, resulting in delayed cycling. Stafford explained, “Cows and heifers are often culled because they are too good as mothers.” These cows work well in Stafford’s system. Generally, he will purchase a cow slightly above slaughter price, harvest a calf for several years, and sell the cow with a calf in June at a higher price than what he paid for the cow.

The annual replacement rate in Stafford’s herd averages 20 percent. For Stafford, the ideal replacement is a three-year-old pregnant cow due in June. He typically buys four-to-seven-year-old, late-bred cows. Stafford prefers black cows because he believes the stocker calf market prefers them. Smaller cows work better than large cows in Stafford’s system because nutrient requirements are lower and less costly to purchase and maintain.

The late calving program is successful, in part, because higher elevation portions of the ranch maintain forage quality through breeding season during the late summer and fall months. Forage quality in other areas typically drops off considerably in late summer. Breeding on lower quality forage could reduce conception rates and, therefore, profitability. Consistent with the low input philosophy, Stafford does not attempt to limit breeding and calving to a narrow time period. He agrees a narrowly confined calving period and uniform calves are desirable; however, he believes it is often not worth the costs incurred to achieve it.

Troy Stafford

Photo 8. Mother cows and their calves consume summer pasture.

Winter Feeding

The primary benefit Stafford expected from late calving was reduced winter feeding costs, which was achieved by shifting from hay to grazed forage consumption. Under the March calving system, cows were fed 1,000 to 1,500 pounds of alfalfa hay per cow over the winter. Under the present system, each cow receives only 2 to 5 pounds of alfalfa per day as a protein and energy supplement while grazing native range. All hay is purchased rather than produced on the ranch.

Stafford credits the success of his late calving program to high-quality winter range. Late calving will not reduce feeding costs unless a sufficient quantity of standing forage is available for winter grazing. Snow is rarely an accessibility factor. Ridge tops quickly blow off and southern slopes melt off after a snowstorm. Much of the bottom land contains native basin wildrye that stands above the snow. Sections designated for winter grazing are rested over the entire growing season and the herd is kept together during the winter and rotated to different pastures often. Frequent

Troy Stafford

Photo 9. Big Horn sheep share winter feed with cows and calves.

rotation ensures the highest quality forage is rationed throughout the winter. After cows become acclimated to Stafford's system, moving cows requires little effort.

Bozoisky Russian wildrye is an important component of the winter feeding system. Approximately 700 acres of Russian wildrye is rationed to the cows between December and April. The grazing strategy is to quickly rotate the cows through the Russian wildrye in the early winter while they are lactating and consuming the highest quality portion. Cows are then returned to clean up the lower quality forage later in the winter after the cows are dry and nutritional requirements are lower. Stafford reports that Russian wildrye is highly palatable and contains crude protein levels double that of other pasture grasses during the winter. The estimated yield of Russian wildrye acreage is 1.2 AUMs per acre. Native range grasses on the ranch yield an estimated 0.2 AUMs per acre.

Stafford developed an interest in Russian wildrye after obtaining information from the Natural Resource Conservation Service (NRCS). In 1991, NRCS established 40 acres and evaluated the stand for three years to determine whether it would be viable in their program. Bozoisky Russian wildrye appeared to perform well in forage production, dormant season nutrient retention, and heartiness. During the next few years, they established 700 acres.

Weaning and Marketing Practices

Stafford's goal is to market light stockers in late winter when few calves are available and prices are higher. Calves are typically weaned and sold in early February, weighing approximately 500 pounds. Yearling operators are often looking for stock at this time and are willing to pay a premium for these relatively light calves with a high potential for growth. Stafford recounted several occasions when he received $20 less per head for his calves than other operators received for spring-born calves sold on the same day weighing 150 pounds more. Production of these larger calves often requires feeding the dam an additional ton of hay and keeping calves in a feedlot after weaning for 60 to 90 days. Stafford estimates production costs on these heavier calves to be at least $130 per head more than was invested in his calves.

Stafford recognizes that allowing the calf to suckle the mother through winter months runs contrary to conventional wisdom, which suggests it is inefficient to feed a cow in order to put weight on its calf. Stafford points out, however, that he could feed each cow 12 pounds of alfalfa per day at the cost of placing the calf in a feedlot. His experience suggests both a cow and calf will thrive on good winter range supplemented with alfalfa at a rate considerably less than 12 pounds per day.

Allowing a calf to suckle into February may cause the mother to have difficulty meeting maintenance requirements during the cold winter months because she is producing milk. However, Stafford found that his cows have had little trouble maintaining body condition through the winter. For example, he recently sold several pairs in January, and the cows averaged 1,100 pounds each. Stafford points out that by February the calves practically wean themselves, and this reduces their stress. Stafford adds that late weaning may not be possible without high-quality winter forage.

Conclusion

Summer calving, which allows cattle to harvest forage, is part of an overall philosophy of low input ranching. Stafford believes that his ranch would probably support 1,000 cows if he acquired additional hay land and produced hay for winter feeding. Pasture stockpiled for winter grazing would then be available for use in the summer or fall. He firmly believes, however, that the approach he has taken is more profitable in the end.

Deseret Ranches of Wyoming

Deseret Ranches of Wyoming is a cow, calf, and yearling ranch operated by Farm Management Company (FMC), owned by the Church of Jesus Christ of Latter Day Saints (LDS). The ranch, purchased by FMC in 1984, is a 66,000-acre operation currently supporting 1,400 mother cows and 1,500 yearlings located between Meeteetse and Cody, Wyoming. Three full-time and two part-time employees operate the ranch. Mike Meek was hired as ranch manager in 1997.

The land base of the ranch comprises two main sections. The northern section is located near Cody and primarily consists of BLM desert land. The southern section is located near Meeteetse and is primarily composed of deeded land. The elevation ranges from 5,500 to 7,000 feet. Annual precipitation averages 6 to 8 inches at the locations near Cody and 10 to 12 inches in the higher elevations near Meeteetse. May and June are normally the highest precipitation months in this region, averaging approximately 2 inches. The winter months are normally a low precipitation season. The normal diurnal range is approximately 9 to 35 degrees Fahrenheit in January and 55 to 84 degrees Fahrenheit in July. The growing season is typically 120 days.

Calving Practices

Between 1984 and 1996, Deseret Ranches ran a traditional cow/calf operation with a March calving season. Starting in 1997, calving season was moved to June. A primary purpose of moving to a later calving season was the land management objective. Summer rangeland is divided into seven grazing areas, and cows are rotated between mid-March and mid-October. March calving limited rangeland management alternatives because only one area was suitable for calving during cold weather. Logistic constraints with March calving required each section of rangeland

Photo 10. Winter forage sustains this mother cow and her calf.

to be grazed the same time of year, placing additional stress on early or late developing forage species, depending on utilization timing. Range conditions, consequently, were deteriorating. Conversely, any location was suitable for calving in June. Late calving provided greater flexibility in land management decisions by allowing the time of year each section is used to be rotated, while also resting one section each year.

Rotating the rested section of rangeland each year offers management a chance to systematically undertake range improvement projects. In the first year, sagebrush was disked and a grass/legume mix species was established on the rested section. Similar improvement projects are anticipated in the future. Managers, consequently, anticipate a significant improvement in range conditions over the next few years.

An additional factor in the calving season change was the decision to diversify into a cow, calf, and yearling operation. Calves born in March were considered too large to profitably run through a yearling program. The breeding herd was reduced by 400 cows to support yearling calves retained from the previous year's calf crop.

Other benefits have emerged from late calving. Replacement females can be obtained from other operations within the company at a lower cost than was possible under the March calving system. For example, Rex Ranch, a sister operation located near Ashby, Nebraska, agreed to extend its breeding season from 60 to 90 days. Late-bred cows that otherwise would have been open and culled under the 60-day breeding period are shipped to the Cody ranch. This arrangement allows Rex Ranch to dispose of cull cows at a higher price while Deseret receives replacements at a lower cost than it would take to develop heifers. If inter-company operations are unable to meet future replacement stock requirements, Meek believes arrangements can be made with local ranch operations.

Lower feed costs are another advantage of late calving. Under March calving, cows were fed approximately 400 pounds of hay over an average winter. Irrigated land production also was stockpiled for winter grazing. During the winter of 1997-1998, the first winter after the calving switch, cows were fed hay only four days. Late calving allowed management to shift forage produced on irrigated land from cow to stocker calf consumption, which has a higher value use. Currently, 33,000 lower quality acres of non-irrigated BLM land in the northern section of the ranch are used for winter grazing. Cow/calf pairs are typically fed one pound of 40 percent protein cake per head daily during the

winter months. Snow in this area usually blows away, so standing forage is available throughout the year. Salt sage and browse are abundant in the winter grazing country, providing a relatively good source of protein.

Purchasing replacements from other producers reduces the importance of selecting for genetic characteristics that may better suit a cow to be successful in a late calving regimen. Bulls are a combination of Simmental, Red Angus, Charolais, and Black Angus. The cows currently in the herd are a composite of several unidentified breeds with black and gray color characteristics.

Lower conception rates have emerged as a potential adverse effect of late calving. Cows on a March calving cycle are breeding in June when forage quality is near its peak, while June calving cows are breeding in September when forage quality is considerably lower. The current breeding period is 60 days, as it was under the early calving system. Conception rates, however, declined from approximately 94 percent before the change, to 88 and 90 percent in the first two years after. Meek is not certain late calving is the root cause. A possible explanation might be in the age distribution and cow quality. When the cow herd was reduced to accommodate yearlings, replacements were not added to the herd. This skewed the age distribution toward older cows, which are declining in productivity. Also, many of these older cows originated in Florida. Meek believes conception rates will improve as these cows are replaced with stock better adapted to this environment and the later calving and breeding management system.

Photo 11. Heifers winter on alfalfa stubble.

Weaning and Marketing Practices

Calves are allowed to suckle through winter until the body condition score on the mothers declines to approximately 4.5. After the calves are weaned, cows move back to the targeted calving body condition score of 5.0. In a late calving situation, Meek believes it is cheaper to feed calves during the winter through a lactating cow. Meek expects to wean calves in February or March. The first crop of calves born under the late calving system, weighing an average of 400 pounds, was weaned in mid-February. Weaned calves are fed hay and cake until April 1. The target growth rate is 1.25 to 1.50 pounds per day over this period. Calves are then placed in desert country until irrigated ground is ready for grazing starting in mid-May.

Hay is purchased rather than produced on the ranch. The ranch contains approximately 1,700 acres of irrigated land, which is grazed by yearling calves during the summer. The management objective on irrigated land is to maintain a forage mix of

45 percent legume and 55 percent grass species by weight on a dry matter basis. Grass species include orchard grass, brome, and cheatgrass. Legume species, including alfalfa and red clover, reduce the amount of nitrate fertilizer required to maintain forage production. Forage yields on irrigated land typically average 2 to 3 tons per acre. Irrigation methods include center pivot sprinklers and gated pipe.

During the summer, calves are separated into steers and heifers and are managed under an intensive grazing system. Irrigated land is divided into 19 cells that range from 20 to 50 acres. Calves graze each cell up to three days and are rotated through the entire cycle over a 24-day period. Grazing yearling calves intensively during the growing season, rather than stockpiling forage and allowing cows to winter graze, dramatically increases total forage production on irrigated land.

Steer and heifer calves are shipped to a feedlot in September weighing 800 and 750 pounds, respectively. The spread between feeder and expected fed cattle prices dictates whether calves are retained through the feedlot or sold as yearling feeders.

Conclusion

The impact late calving has on long-term future profitability depends largely on the success of range improvements made available by late calving. Although not precisely quantified in dollar terms, late calving has already resulted in reduced labor and feed costs, according to Meek. Changing to late calving represents a major shift in management objectives for Deseret Ranches of Wyoming. According to Meek, a management change of this nature may require managers to reconsider the entire approach. He added that the paradigms and strategies best suited for early spring calving might not be optimal under a summer calving system.

The Elmer Peterson Ranch

The Elmer Peterson ranch is a cow, calf, and yearling operation located along Interstate-80, east of Rawlins, Wyoming. Elmer Peterson took over the ranch in 1953 and eventually converted it from a sheep to a cattle operation. Currently, five employees operate the ranch, including ranch manager Bob Hones.

The ranch occupies 168,000 checkerboard deeded and leased BLM acres, supporting 2,000 cows, along with yearling stockers and replacement heifers. The herd is mostly pure Black Angus, and mature cows weigh between 1,000 and 1,100 pounds. The ranch produces grass hay on 2,000 acres of irrigated land, which typically yields 2.0 to 2.5 tons per acre in one cutting. Forage species on irrigated land includes brome and garrison creeping foxtail.

Elevation ranges from 6,800 to 7,500 feet. Growing season is typically 60 to 80 days. Temperatures usually dip to –20 degrees Fahrenheit in the winter. The wind frequently blows, creating bitter winter weather conditions. Annual precipitation averages 8 to 10 inches, and April and May are the wettest months.

Calving Season

Peterson explained that his philosophy is to operate with minimal overhead and operating costs. An important component in maintaining profits on a low input operation is to evaluate weather and forage conditions and to time the reproductive cycle to maximize a cow's ability to raise a satisfactory calf without human intervention. Calving season at the Peterson Ranch takes place during a three-month period, April through June. The majority of calves, however, are born in May. First-calf heifers begin calving one week earlier than the rest of the herd. Peterson's calving season is later than what traditionally occurs in this area, as neighbors typically begin calving in February or March. Peterson adopted a later calving cycle when he started the ranch because he believed it would reduce risk and increase productivity. Peterson commented that an 80 percent calf crop and smaller calves is better than a 50 percent crop with larger calves. Also, the ranch does not have enough calving sheds to accommodate the entire herd, and building new sheds would be prohibitively expensive.

Cows migrate freely to find forage and water after they are turned onto open range. Consequently, cows are widely dispersed at calving and throughout the grazing period. Peterson's strategy is to intervene as little as possible with the cows and calves during calving and lactation. Newborn calves are not weighed, paired with the dam, or tagged. The only human interaction cows and calves receive during the summer occurs at branding. Portable corrals are moved to various locations and calves within the vicinity are rounded up and branded. Stock water facilities on rangeland include reservoirs, springs, and creeks. Most of the rangeland produces relatively little forage, requiring 40 to 60 acres to support a cow over the seven-month grazing season. Cross fencing, rotational grazing, and other intensive management practices, therefore, are not economically justified.

An important consequence of open range calving is that assistance is not available to cows and heifers experiencing calving difficulty. To minimize dystocia losses, heifers deliver their first calves in calving sheds under close supervision, and those requiring assistance are culled. Once heifers are incorporated into the breeding herd, culling decisions are based on age rather than on production. A cow that does not wean a calf is not necessarily culled, and cows are not checked for pregnancy. If a cow comes off the range in the fall without a calf, there is no way to determine whether the calf was killed by weather or predators or if the cow did not conceive. Between 85 and 90 percent of cows are weaning calves.

Winter management also is an important part of a low input livestock enterprise. Late calving reduces but does not eliminate hay requirements. Peterson's cows typically require 1.25 tons per head each winter. Neighboring producers on an earlier calving cycle typically feed 2 tons per cow. After the calves are weaned in November, the herd is separated into two groups. One group is put on the meadow and fed hay. The other group winters in McFadden, Wyoming, with another ranch operator. Cows are placed in each group based on

proximity to summer range. Replacement heifers are selected after weaning and shipped to a feeding facility near Alcova where they are fed a ration of hay and grain. By the end of winter, these heifers weigh 700 pounds and are ready for breeding.

Mature cows are sent to range a few weeks before calving, around March 20. Salt sage, yielding 16 percent crude protein, is abundant in this area and provides good forage until grass greens up in early May. Winter storms are common through April, potentially exposing cows and newborn calves to adverse weather conditions. Most of the rangeland in this region, however, contains bluffs and breaks that provide protection from the elements.

The breeding period takes 90 days. Bulls are turned out in mid-June and gathered in September. Heifers not selected as breeding stock but retained as stockers are spayed before moving to summer range. This ensures that loose bulls from neighboring operations do not breed them.

Marketing Strategy

Peterson retains ownership of the calves through the feedlot. Overwintering calves are confined in an on-site feeding facility and fed hay. By the end of winter, these calves weigh approximately 600 pounds and are placed on grass in the spring. Stocker calves are sent to irrigated pasture leased near Elk Mountain for summer grazing. They are then shipped to a commercial feedlot in the fall, weighing 750 pounds on average. Late born calves appear to gain weight faster than earlier born calves. Calves born two months apart reach a slaughter weight of 1,250 pounds just one month apart.

The primary objective of the breeding program is to develop genetic characteristics in the calves to produce high-quality meat, a product for which packers are willing to pay a premium price. Bulls are purchased from a Black Angus seed stock producer or retained from the calf crop. Peterson sells his finished cattle on Monfort's formula pricing system. The proportion of Peterson's finished cattle grading "choice" or better each year is normally more than 90 percent. Peterson credits the high-quality meat to genetics and not pushing weight gain on the calves too quickly. The average price Peterson receives for his fat cattle typically is $3 to $5 per hundred weight higher than the reported live cattle price.

Conclusion

The Elmer Peterson Ranch demonstrates that a low input operation can maintain long-term profitability. Calving under favorable weather conditions is important to the success of this program. Peterson cautions, however, that there is no single "best" method of raising cattle. The success of his ranch can be largely credited to adapting production practices to fit the resources and the environment.

Cutting Winter Feeding Costs by Grazing Windrowed Hay—S & S Ranch Company

S&S Ranch is a third-generation cow/calf operation in McFadden, Wyoming, located six miles north of Interstate-80, halfway between Laramie and Rawlins, Wyoming. The ranch was founded in 1942 by Roy and Opal Sims. Currently, S & S Ranch Company is a partnership between Don Sims, his sons, Scott and Olin, and their respective families.

The ranch consists of 22,000 total deeded and leased acres with approximately 1,800 acres of hay meadow. Currently, 3,200 tons of loose-stacked and windrowed hay is produced annually. Approximately 1,200 tons of hay are sold each year, as cows owned by other producers feed on site. Hay yields range from 1.25 to 2.25 tons per acre.

Elevation of the McFadden area is 7,300 feet. Annual precipitation averages approximately 12 inches, with more than one-third of the precipitation coming in the form of snow. The frost-free period is normally 80 days. Winds are constant and range from 10 to 30 miles per hour.

The breeding herd comprises 700 head of Gelbveih and Angus crossbred cows. The breeding program includes synchronized artificial insemination, followed by clean-up bulls, all over a 63-day breeding period. Heifers are bred beginning June 1 and start calving February 25. Mature cows are bred starting June 13 and begin calving on March 17. The replacement rate averages 17 percent per year.

S&S Ranch Company retains ownership of the calves through the feedlot. The marketing objective is to wean calves in early October and send them directly to the feedlot weighing approximately 550 pounds. Finished calves will hit the April and May fed cattle market, which is typically the seasonal price peak.

The Sims family have continuously developed forage resources and examined alternatives to cut production costs on their ranch. In the early 1960s, they determined that part of the rangeland operated by the ranch should be developed to increase forage for grazing and control erosion. Over the next 20 years, more than 1,100 acres of rangeland were seeded into Fairway crested wheatgrass. Corresponding fencing and stock water improvements also were made.

These improvements made the artificial insemination program designed to improve genetics possible. Growing seeded wheatgrass allowed large numbers of cattle to be placed in small pastures, making it easier to handle the cows and detect estrus. By 1987, Don Sims estimated that increased annual income, resulting from improved genetics made possible by wheatgrass improvements, was $10.65 per acre of improved pasture.

In 1983, test plots were established with the cooperation of the Soil Conservation Service (SCS) to determine the best grass species for the ranch. Several varieties of wheatgrass, Russian wildrye, basin wildrye, bluegrass, and other grasses were established and monitored for dry matter yield

Photo 12. Producers have found that windrowing hay and leaving it on the pasture is more economical that stacking hay.

per acre, utilization, and other productivity characteristics. No single species appeared to dominate the others.

In 1992, S&S Ranch Company leased approximately 700 acres of marginal hay land. With rough terrain and low yields relative to other hay meadows operated by the ranch, the economics of producing hay on this land was questionable. During this same period, Scott Sims noticed the hay in one of the neighbor's meadows was cut and raked, but frequent rain prevented the hay from drying enough to stack into hay cribs. After turning the windrows several times in an unsuccessful attempt to dry the hay, the neighbor left the hay in windrows until fall and turned the cows onto them. Scott Sims was surprised at how well the cows spread out and utilized the forage. Shortly after this incident, Scott heard a presentation by Gregg Simonds, then manager of Deseret Land and Livestock near Woodruff, Utah. Simmonds explained the DL&L operation's winter feeding program, which included grazing windrowed hay. This led to the decision to cut and rake the hay on marginal lands and, rather than stacking the hay into cribs, it was left in windrows for winter grazing.

Benefits of Winter Grazing Windrowed Hay

Hay raked into large windrows and left in the field for winter grazing has become an important part of the forage management program at the S&S ranch. The obvious advantage to grazing windrowed hay is the labor and machinery savings, as the forage is left in the field and grazed, rather than mechanically harvested, stacked, then unstacked and fed.

Table 1 is a budget compiled by Scott and Olin Sims estimating the relative cost of loose stacking hay in hay cribs, versus leaving hay in windrows. Each item in the budget includes a charge for labor, machinery, and purchased inputs where applicable. The machinery expense includes a charge for hourly depreciation, an average maintenance cost, and fuel. Assuming a forage yield of 1.25 tons per acre under both situations, estimated savings in direct production costs resulting from not stacking and feeding hay is $7 per ton or $2.80 per AUM.

Table 2. Cost Comparison of Stacked versus Windrowed Hay.

	Windrowed hay		Stacked hay	
	$ Per Acre	$ Per Ton	$ Per Acre	$ Per Ton
Fertilizer	12.00	9.60	12.00	9.60
Dragging	0.68	0.54	0.68	0.54
Irrigation	0.85	0.68	0.85	0.68
Fencing	1.00	0.80	0	0
Mowing	4.62	3.70	4.62	3.70
Dump rake	2.32	1.86	2.32	1.86
V rake			1.53	.77
Sweep			3.22	1.61
Stacker			4.60	2.30
Feeding				3.21
Total	21.47	17.18	29.82	24.27
Savings	8.35	7.09		

Forage grazing records kept at the ranch show that a typical winter forage yield on windrowed hay land is 90 animal days, or three AUM's per acre, which is equivalent to approximately 2,400 pounds of usable forage. S&S Ranch has not produced stacked hay on this land since acquiring the lease; therefore, no record of potential yields if the hay were stacked rather than windrowed exists. Although he does not have the data to verify it, Don Sims believes they are getting more forage per acre from this land by leaving hay in windrows than they would if they tried to stack it. After the cows eat the hay, the grass underneath the windrows is still green and provides nutritious, palatable forage. Only part of the forage raised on this land is mowed and raked. Grass in hard to reach areas or grass not tall enough to mow is left standing.

Disadvantages of Grazing Windrowed Hay

Leaving hay in the field causes nutrient loss. Protein, vitamins, and minerals are leached out as the hay is exposed to late summer, fall, and winter precipitation. According to past forage samples, the crude protein content of windrowed hay averaged 2 to 3 percentage points lower than stacked hay. Stacked hay averaged 7 to 9 percent crude protein and 56 percent TDN, while windrowed hay averaged 5 to 7 percent crude protein and 50 percent TDN.

Forage accessibility is a common winter grazing issue in Wyoming. According to Don Sims, snow tends to drift against the windrows in some areas, making accessibility difficult. However, Sims concedes that, overall, windrowed hay has rarely been

Photo 14. Cows feed on windrowed hay.

completely inaccessible because of snow cover. Cows have rooted through up to 8 inches of snow to get to the hay.

Another possible disadvantage of leaving hay in windrows is that hay lands cannot be irrigated during the fall and winter. According to Don Sims, spring vegetation growth largely depends upon soil moisture content from the previous fall. Flooding hay meadows in the fall could enhance the hay crop the following year. At the Sims ranch, irrigation water is only available between May 20 and July 10; therefore, fall irrigating is not an alternative.

Hay Land Management Practices

Before harvesting, windrowed and stacked hay lands receive the same management practices. All hay land is flood irrigated as long as irrigation water is available. Fertilizer (32-5-0) is applied to all stacked hay land and half of the windrowed hay land at a rate of 256 pounds per acre (80 pounds of nitrogen per acre).

Harvest timing is an important component of a successful windrowing program. If the hay is cut and raked too early, the grass growing beneath the windrows could be damaged. If the hay is cut too late, the grass gets too dry and can blow away as it is cut and raked. On the Sims ranch, grass is cut between July 20 and August 10.

Hay is cut with a 9-foot sickle bar mower, allowed to dry for two to three days, and raked into windrows with an 18-foot side-delivery rake. If the hay is allowed to dry longer than two or three days, it becomes too dry and will blow out of the windrows. The windrows should be as large as possible, because large windrows minimize the amount of forage exposed to the elements and better preserve nutritional quality. In addition, Sims found that larger windrows reduce the amount of forage blown away.

Utilization Techniques

Windrowed hay normally is grazed between November and February. The Sims recommend grazing during late fall and winter because spoilage is likely to occur if grazing is delayed into the spring, as the ground beneath the wet windrow warms and stimulates microbial activity.

After calves are weaned in October, the cow herd is separated into “thin” and “fleshy” groups. The thin group consists of two-year-old heifers, unusually thin, and older cows. Middle-aged, fleshier cows comprise the other group. Each group is kept separate for the entire winter feeding season and managed according to specific needs. The thin herd generally is fed a higher quality ration during the winter, which normally leads to less time on windrowed hay to maintain productivity. Both groups

generally are off the windrowed hay fields and fed stacked hay by February 1 to ensure the cows are in proper condition going into calving.

The windrowed hay land is divided into 12 pastures, ranging from 100 to 150 acres each. Pastures are divided by permanent solar powered electric fencing. An entire group, typically 300 to 400 head, is rotated together. The duration of each rotation varies, depending on the amount of forage available, and the number of animal days of forage available in each plot is estimated from past records and by periodic visual observation.

Depending on yearly forage conditions, utilization methods vary. In 1996, conditions were dry after the hay harvest, resulting in relatively little aftermath available for winter grazing. The "thin" herd was quickly rotated through the windrowed hay fields, using only the most accessible forage, then taken off the windrows and fed hay for the rest of the feeding season. The fleshier herd was rotated through afterward to clean up the forage that was left. In 1997, southeastern Wyoming experienced a large amount of post-harvest precipitation, providing abundant regrowth. The Sims wintered the thin herd on plentiful aftermath and stacked hay. Only the fleshier herd was rotated through the windrowed hay.

Cows are not allowed to lose body condition while grazing windrowed hay. A 24 percent protein, molasses-based liquid supplement is provided to ensure energy and protein requirements are met. Cows grazing windrows are fed 1.5 pounds of supplement per day.

One of the challenges with the windrow grazing system is getting the cows to utilize less accessible forage. According to the Sims, maximum forage utilization occurs if cows are adequately dispersed. Maximum dispersion occurs if drinking water and supplements are available 24 hours a day and do not require daily delivery. Cows need to be trained to graze the forage in the field. If the cows see a truck frequently deliver a relatively palatable supplement, they begin to anticipate each arrival and crowd around the truck as it drives up. Simply driving through to monitor the cows too frequently also can train them to watch and wait to be fed or rotated into another field. This behavior reduces the tendency to spread out and clean up less-accessible forage.

Like supplements, if drinking water is continuously available, cows are able to more efficiently satisfy water intake requirements, improving distribution and forage utilization. Scott Sims commented, "If we have to cut a hole in the ice each day, the entire herd gathers around and tries to drink." Clearly, this makes it difficult for all the cows to satisfy their needs. At the Sims ranch, a stream that remains partially open year-round bisects the windrowed hay land and provides a reliable source of drinking water.

Conclusion

The economic viability of windrowing hay to be grazed during the winter depends upon the resource endowment of the operation. Important factors are the amount of quality hay land available, stock water sources, accessible irrigation water,

and terrain and layout of the land. Forage can be utilized several different ways. The success of this program depends on constant monitoring and recognizing the needs of the cattle by observing their condition and behavior. Weather changes each year and influences the success of winter grazing.

Summary

Each operation interviewed for this study faced unique circumstances and, therefore, used different management approaches. However, several common and important facts emerged.

Benefits of late calving include reduced winter feed and labor costs. Producers interested in changing calving season need to know:

- Late calving requires a reassessment of the entire grazing program.
- A breeding herd that is suited to management objectives is important.
- Late calving requires a reassessment of the marketing program.
- Alternatives to stacking hay for winter feeding must be found.

Benefits experienced from late calving were categorically similar among operations making the conversion. Primarily, late calving reduced winter nutritional requirements and allowed producers to substitute relatively expensive hay and supplement with grazed forage. In addition, calving under more favorable weather conditions reduced the risk of distocia and calf disease, thereby lowering labor requirements.

Late spring calving places cows in an open grazing situation at parturition. Also, capturing the winter feeding benefit of late calving may require setting aside sections of pasture or range formerly grazed in the summer for winter grazing. Increasing the amount of forage harvested by cows may require reducing cattle numbers, converting irrigated land from haying to grazing, acquiring additional grazing land, or some combination of these possibilities. The entire grazing plan, therefore, would likely be affected by a calving season change.

These interviews revealed that a successful late calving program may require selecting breeding stock genetically suited to maintain satisfactory production, while exposed to adverse conditions. This means that producers must find cows that can deliver a calf with minimal intervention and successfully raise a calf and rebreed after enduring a winter on minimal feed. While replacement strategies varied among producers interviewed, there was a consensus that relatively small breed types work best.

Calves born in late spring are significantly younger in the fall when they are traditionally weaned. Calving season may have a profound impact on fall calf weight and, therefore, on revenue. Moving calving later into the spring would probably force producers to seek an alternative to selling weaned calves in the fall. The typical strategy among late calving producers was to retain yearling calves through summer and send them to the feedlot in the fall. Retaining yearlings minimizes the impact of weaning weights on net income. Converting to a yearling operation, however,

opens additional grazing management and financial issues that must be considered.

Late calving is part of a low input management philosophy that enables forage to be harvested with livestock rather than machinery, thereby, shifting toward more renewable resource consumption. This approach is consistent with the sustainable agriculture philosophy of increasing profitability while reducing risk and improving the resources that support the operation.

Windrowing meadow hay for wintering cattle is an alternative to stacking then unstacking. A substantial cost advantage occurs because it eliminates several procedures during harvest, as well as the cost of unstacking and feeding. Windrowing does have some limitations that may affect success. This process eliminates any fall irrigation of the meadows. Hay nutrient levels may be reduced, snow cover may interfere with consumption, and wintering wildlife may cause substantial damage.

A management philosophy common to the producers examined in this study is that maximizing profits is more important than maximizing production. Many of these producers maintain that large calves are desirable but are often not worth the cost.

Each producer interviewed was quick to acknowledge that production practices that work well for one operation may not work for another. They suggest it is important for each operation to carefully evaluate its own resources and adopt production practices that fit its particular environment.

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