UTILIZING RAKE-BUNCHED HAY FOR WINTERING MATURE COWS

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Many cattlemen need to improve profitability if their businesses are going to survive. Reduced demand for beef caused by declining per capita consumption without a subsequent reduction in production has weakened prices. This in conjunction with rapidly increasing production costs has put many ranches in an unfavorable financial situation. Research efforts are needed that reduce costs of production rather than simply increase productivity.

One of the most expensive practices of a cattle operation is the harvesting and feeding of meadow hay. It costs $30 per ton or more just to put this hay up and feed it in the winter. The overall goal was to investigate alternatives to conventional haying practices. The major goal of this effort was to reduce winter feed costs while maintaining adequate production levels on the meadows and reproductive and productive performance of the cow herd. The objectives of this study were to determine if mature cows can be wintered on standing or rake-bunched hay, to compare these methods to the traditional daily feed-out system on cattle production and reproductive performance, and to evaluate the relative economics of these systems.

MATERIALS AND METHODS

The trial was conducted over three winters. Treatments consisted of (1) a control group which was put on meadow aftermath or rake-bunched hay until feed became limited and then fed baled hay for the remainder of the winter, (2) a group on rake-bunched hay for the winter, and (3) a group on standing hay. Ninety-six cows were utilized the first year with an additional 33 and 51 added in the second and third years. A supplemental group of 98 head was also added to the rake-bunch and control treatments in year three. Cows were stratified into groups by age, weight, breeding date and production index, with groups randomly assigned to treatment. All cows were Hereford by Angus crosses. Only pregnant cows, three years of age and older, were assigned to the study. All cows remaining in the herd and on the study previously remained in the same treatment group in subsequent years. Treatments were run on the same field in consecutive years to allow collection of data on long-term effects on meadow composition and productivity. This work is not completed at this time.

Forage samples were taken every other week prior to cattle use throughout the trial for crude protein analyses. The rake-bunched hay and hay to be baled were cut as close to the same date as possible to help assure equal quality. Forage samples have been retained for possible future analyses, such as minerals and energy evaluation. Esophageal fistulated steers were utilized to evaluate diet quality and Chromic oxide to estimate intake. These data have not been analyzed.

Cows were gathered off range and put on flood meadows about October 1 of each year. New Zealand type electric fences were used to strip graze the standing and rake-bunched hay treatments. After estimating intake based on previous studies and clipping to determine meadow production, about one week's allowance of feed was included in each fence move. Cows were forced to clean

up an area before the fence was moved, letting them in on new feed. Baled hay was fed daily, free choice, on the control treatment with waste kept to a minimum. Cows on the standing forage received the equivalent of one pound of cottonseed meal per head per day with the supplement being fed on Monday, Wednesday, and Friday. The rake-bunched and baled-hay system cows did not receive a supplement. All cows received an injection of one million international units of vitamin A before starting the trial, however, this was discontinued in years two and three. Water, salt, and a salt-bonemeal mix was available at all times with intake recorded for the minerals.

Cows were turned out on range around March 1, prior to calving, and run as one group. Cows were bred on a two-breed cross system, artificially, to single sires of Hereford and Angus. Artificial insemination was conducted over a 42-day period with clean-up bulls raised from within the herd used for an additional 25 days. Calves were weaned about September 10. On or about October 1, cows were brought back to the meadows and the cycle repeated. Pregnancy was determined at this time by rectal palpation, with open cows culled. Cows with cancer eye, prolapses, or other maladies that made it unlikely that they could wean another calf, were also culled at this time.

Cows were restricted from feed and water overnight and weighed on October 1 and every 28 days thereafter until turnout on range March 1. Weights were also taken in May after calving and before breeding and at weaning time. Condition scores using the one-nine system, with one being emaciated and nine being extremely fat, were also assigned to cows on October 1 and at turnout.

Calf data included sex, birth weights, birth dates, dystocia scores, and weaning weights. Calving intervals were determined, with birth dates recorded the following year after completion of the trial to provide information for the final year of treatment.

RESULTS AND DISCUSSION

Average forage crude protein content over the three-year period was 7.2, 7.5, and 4.3%, respectively, for the control, rake-bunch, and standing treatments. In general, the rake-bunch fields were cut two to three days earlier than the control, which would account for the slightly higher protein values. Protein content of the rake-bunch forage did not change throughout the winter.

Data on hay fed over the duration of the trial are presented in Table 1. The rake-bunch group only required feeding during a 49-day period in year two. During this period there was a snow cover of some 16 inches with compounding problems of melting and freezing, causing a solid crust with freezing rain falling on this. A thick ice cover was created which cattle were afraid to step on. It also covered the bunches making them very difficult to locate. This feeding period could have been avoided through management. In subsequent years, the bunches were made larger in size and low ground more prone to snow accumulation grazed early in the winter before heavy snow. Bunches on the high ground were available under the worst of conditions. This appears to have virtually eliminated the concern about hay availability under heavy snow.

Table 1. Baled hay fed over the duration of the trial[a]

Date	Control[b] (lb)	Rake-bunch[c] (lb)	Standing[c] (lb)
1982-83			
9/30 - 10/28	0	0	0
10/28 - 11/24	8	0	0
11/24 - 12/23	17	0	0
12/23 - 1/27	26	0	27 (22 days)
1/27 - 2/23	26	0	0
1983-84			
10/4 - 10/24	0	0	0
10/24 - 11/29	11	0	0
11/29 - 1/4	30	32 (11 days)	30
1/4 - 1/31	30	22 (12 days)	31
1/31 - 2/28	28	22 (26 days)	27
1984-85			
10/2 - 10/15	0	0	0
10/15 - 10/30	11	0	0
10/30 - 11/26	11	0	0
11/26 - 12/26	26	0	0
12/26 - 1/28	30	0	31 (24 days)
1/28 - 2/27	29	0	31

a Represents the average amount of hay fed per day per cow over the period indicated with numbers in ( ) denoting the number of days hay was fed during that period. When ( ) are not present hay was fed over the entire period.

b Rake-bunched hay or meadow aftermath was available to some degree during October and November.

c Hay was fed during periods when snow cover was too heavy for grazing.

The rake bunches appear to emit heat and to some extent tend to remain reasonably open or at least visible through the snow. They discolor and are not attractive, but have a sweet smell similar to haylage. During the period when feeding was required, cows would leave the feed ground and search for rake-bunches, showing a definite preference to them. Bunches were successfully grazed through periods of 24-inch snow cover and under 12 inches of water towards spring. Weekly fence movements seem to be near optimum, creating very little waste. Cows had access to previously grazed areas and when the weather warmed, cleaned up portions of the fields where snow and ice restricted

previous availability. It appeared that refusals or waste was even less on the rake-bunch treatment than the hand fed cows, particularly in the spring when hand-fed cows start bawling and following the feed wagon, tromping hay into the mud, rather than eating. Rake-bunch cows continued to graze aggressively through the warmer weather.

Feeding was required through various periods of time during the winter on the standing forage. Forage would be smashed under the snow and it was very difficult for cattle to uncover, with only very stemy, poor quality material appearing above the snow. When fed hay, these cattle did not compensate after periods of reduced intake and consume more hay than the controls. Daily intake was identical between the two groups. Many winters are open enough to allow grazing throughout, but the risk of heavy snow covering the forage is always there and quality of feed is poor enough that some supplementation is required.

Condition scores at the beginning and end of the treatment period are shown in Table 2. Cows were carrying extra flesh at the beginning of the winter and in the case of the control and rake-bunch groups still in above average condition prior to turnout on range. Standing forage cows were close to average condition at turnout, but had received supplement throughout the trial and fed hay frequently.

Table 2. Condition scores at trial initiation and before spring turnout[a]

	October	February	Number[b]
Control	5.6	5.3	165
Rake-bunch	5.6	5.4	165
Standing	5.7	4.9	102

[a] 1-9 system with 1 being emaciated and 9 extremely fat.

[b] Number of observations.

Table 3 presents weight change data averaged over the three years. Rake-bunch cows were 22 pounds heavier at the end of the winter than the control group. This difference was reduced considerably during year two when these cattle were pushed to try and find feed under the ice and snow and lost considerable weight. The rake-bunch groups ate more aggressively during February when the weather warmed. This provided the difference between the two groups at turnout on range. Standing forage cattle maintained their weight, but lost condition over the winter. These cattle were in their last trimester of gestation with a portion of their weight being fetal material and amniotic fluid. By breeding time the rake-bunch group was still 9 pounds heavier than the controls with the standing group 68 pounds lighter than the controls. By

weaning time the rake-bunch group was still heavier than the controls with the standing group substantially lighter. When the cycle was repeated in October, weights were similar between the groups.

Table 3. Weight change data averaged over 3 years by period

	Control	Rake-bunch	Standing
	(lb)	(lb)	(lb)
October	76	61	10
November	7	24	0
December	2	2	-26
January	0	-6	12
February	-11	15	3
WINTER	74	96	0
March-May	-130	-143	-123
BREEDING	-57	-48	-125
June-August	-5	-1	33
WEANING	-62	-49	-92

Reproductive and productive performance data averaged over the three-year period are presented in Table 4. Conception rates were 86, 79, and 73%, respectively, for the control, rake-bunch hay, and standing forage treatments. The difference between the control and rake-bunch groups occurred primarily in year two when the snow and ice created problems with the rake-bunch group and an attempt was made to force them through without feeding. Sex-adjusted weaning weights and calving intervals were similar between groups. Despite the difference in conception rates between the rake-bunch and controls, the number of calves weaned was similar because of higher death losses from the control group. The standing forage group weaned a substantially lower percentage of calves. This is also reflected in the yearly attrition rate, which was similar between the control group and the rake-bunch group, but higher on the standing forage group.

Table 4. Cow reproductive and productive performance averaged over 3 years[a]

	Control	Rake-bunch	Standing
Conception rate (%)	86(154)	79(164)	73(95)
Weaning weight (lb)[b]	347(146)	345(149)	346(92)
Calving interval (days)	371(121)	375(117)	372(61)
Attrition rate (%)	21	22	33

[a] Numbers in () represent observations.

[b] Weaning weights were adjusted for sex based on the entire experimental herd.

Variable costs among treatments on a per head basis for each year are presented in Table 5. Variable costs included commercial rates for putting up baled hay @ $27/ton and swathing and bunching @ $11/ton. Vitamin A was valued @ $.16 per dose, salt @ $100/ton, bonemeal @ $565/ton, and cottonseed meal @ $245/ton. Actual costs of electric fences and troughs were prorated over five years. Labor was valued @ $4/hour and included labor required for fence building and moving, supplementing, feeding hay and any other labor required by various treatments.

Costs on the controls ran from $46-55 per head with variation occurring depending on availability of fall forage, severity of the winter, and date of snow cover. Rake-bunch costs were $20-28 per head with year one being highest because of the use of high tensile wire and fiberglass posts that were driven into the ground. In years two and three, polywire and step-down posts simply stuck into the ground or snow and ice were utilized which cut material cost somewhat and labor considerably. Year two costs were slightly higher than year three due to the feeding period previously discussed. With current knowledge the cost of wintering cattle on rake-bunched hay would be $30 per head less than conventional haying and feeding out system. However, emergency hay should be kept on hand for the possibility of extreme conditions that would necessitate feeding. Costs on the standing hay were $38-57, which were at times as expensive as the traditional system because of frequent periods when feeding was necessary. However, these were three of the most severe winters experienced in this area and in many years cattle could get through the winter on the standing forage without hay feeding. Cattle on this treatment may have made it through in year three, but we simply did not provide enough standing forage and ran out in early January.

Table 5. Variable costs per head per winter between treatments[a]

Year	Control ($)	Rake-bunch ($)	Standing ($)
1982-83	46	28	38
1983-84	55	23	57
1984-85	50	20	49

In summary, the rake-bunch treatment for wintering mature cows appears to be a very cost effective system. This trial was conducted over three very severe winters, which gave the system a good test. Wintering cattle on standing forage does not appear to be a viable alternative. In many years, snow cover makes forage availability poor. Reduced performance, even with supplements, as compared to the conventional haying practices without corresponding cost reductions, did not make it cost effective.

Work is continuing on the effect the bunches have on total production and composition of forages produced by the native flood meadows. Rake-bunches cover 5% or less of the total land area, so even if forage is totally denuded under the bunches, which it isn't, it would be a minimal loss. It appears the area under the bunches had totally recovered by the following year.