

STRIP GRAZING RAKE-BUNCHED HAY AND STANDING FORAGE AS ALTERNATIVES TO WINTERING COWS ON BALED HAY

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Some cattlemen feel that more research is needed to aid in reducing costs of production rather than simply increasing productivity. The Squaw Butte Experiment Station has redirected a portion of its research program to fulfill this need.

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. A long-term project has been initiated which will look at alternatives to conventional haying practices. The major goal of this effort is to reduce winter feed costs while maintaining adequate production levels on the meadows and reproductive and productive performance of the cow herd.

The first set of experiments has involved wintering cows by grazing uncut meadow forage and rake-bunched hay as compared to feeding baled hay.

EXPERIMENTAL PROCEDURE

Cows are gathered off the range and put on the flood meadows about October 1. Treatments include (1) a control group which is put on meadow aftermath or rake-bunched hay until feed becomes limited and then is fed baled hay for the remainder of the winter, (2) a group that is put on rake-bunched hay for the winter, and (3) a group on standing hay. Cows were stratified into groups by age, weight, breeding date, breed of cow and production index, with groups randomly assigned to treatment. Only pregnant cows, three years of age and older, were assigned to the study. Each year, cows are added to the study as they become available from other studies.

New Zealand type electric fences are used to strip graze the standing and rake-bunched hay treatments. After estimating intake and clipping to determine meadow production, about one week's worth of feed is included in each fence move. Cows are forced to clean up an area before moving the fence and letting them in on new feed. The baled hay is fed daily. Cows on the standing forage receive 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 do not receive a supplement. All cows receive an injection of one million international units of vitamin A before starting the treatment. Water, salt, and a salt-bonemeal mix are available at all times.

Cows are turned out on range March 1, before calving, and run as one group. Cows are bred on a two-breed cross system, artificially, to single sires of Hereford and Angus breeding. Artificial insemination breeding is conducted over a 42-day period with clean up bulls raised from within the herd being used for an additional 25 days. Calves are weaned about September 10. On October 1, the cows are brought back to the meadows and the cycle repeated. Pregnancy is determined at this time by rectal palpation.

Cows are shrunk and weighed on October 1 and every 28 days after that until turnout on range March 1. Weights are also taken in May after calving and at weaning time. Conception, calving intervals, calving difficulty, weaning weights, etc., data are also being collected.

The rake-bunched hay and hay to be baled are cut as close to the same date as possible to help assure equal quality. Forage samples collected monthly are analyzed for protein and at times *in vitro* digestibility. Protein levels were 7.6, 8.3, and 4.6 percent on the baled, rake-bunched and standing hay the first year. Samples are retained for possible future analyses of minerals, fiber, etc. Some intake work with chromic oxide is also being conducted. Treatments are run on the same fields in consecutive years to allow collection of data on the long-term effects of these treatments on meadow productivity. One full year of the study and most of a second have been completed.

RESULTS AND DISCUSSION

Tables 1 and 2 show cow weight changes over the first two years of the study. In year 1, weight changes were almost identical between the controls and those on rake-bunched hay except during January when the controls lost 5 pounds and the rake-bunch group gained 28 pounds. Overall, the rake-bunch group came out of the winter 37 pounds heavier than the controls. Cows on the standing forage gained less or lost more weight during each month and finished the winter 88 pounds lighter than the controls and carried considerably less condition. By breeding time, the standing hay group had compensated somewhat and were 31 pounds lighter than the controls, with the rake-bunch cows maintaining their 40-pound weight advantage over the controls. By weaning time in early September, the controls and standing hay group were equal in weight, with the rake-bunch group 30 pounds heavier. By October 1, all groups were equal in weight. It is interesting to note that during part of January when the standing hay group was fed baled hay, they did not compensate but lost weight at the same rate as the controls.

During Year 2, weight changes were virtually equal to Year 1 until deep snow and ice forced feeding of the rake-bunch and standing hay groups (Table 2). It is again interesting that the standing hay group did not appreciably compensate when fed the same hay as the controls. This has important ramifications for a winter feeding program, as it points out that losses or reduced gains in early winter in many cases cannot be made up at a later date when winter conditions are severe. The rake-bunch

group lost 54 pounds more than the controls during January when they were forced to go through deep snow and ice for their feed. They ended the winter 30 pounds lighter than the controls, with the standing hay group 62 pounds lighter.

Table 1. Cow weight changes (1982-83)¹

Period ²	Treatment		
	Control	Rake-bunch	Standing
	lbs	lbs	lbs
October	+55	+53	+11
November	+32	+30	+2
December	-32	-29	-43
January	-5	+28	-7
February	-46	-41	-47
WINTER	+4	+41	-84
March-May	-157	-154	-100
BREEDING ³	-153	-113	-184
June-August	+24	+16	+56
WEANING	-129	-97	-128

¹ Mean initial weight was 1,080 pounds. Cows were in excellent to fat condition at the initiation of the trial.

² Figures represent weight changes within that period with the winter, breeding and weaning weight changes being accumulative changes up to that time.

³ These losses include those connected with calving.

Table 2. Cow weight changes (1983-84)¹

Period ²	Treatment		
	Control	Rake-bunch	Standing
	lbs	lbs	lbs
October	+66	+61	+11
November	+28	+33	-5
December	-6	-1	-4
January	-7	-61	+5
February	+2	+21	+14
WINTER	+83	+53	+21

¹ Mean initial weight was 1,032 pounds. Cows were in thrifty to excellent condition at the initiation of Year 2.

² Figures represent weight changes within that period with the winter weight change being accumulative.

The amount of hay fed per cow per day over the various periods is presented in Tables 3 and 4. Only small amounts were fed early to the control group because considerable aftermath was left on the fields that they were utilizing. An effort was made to make all groups clean up their hay reasonably well on all treatments and keep the waste equal between groups when they were fed hay. The intake of the rake-bunch or standing groups did not appear to be appreciably higher when coming off limited feed than the controls. In Year 2, the intake of the rake-bunched group when fed baled hay was considerably less than both the control and standing group. They would leave the feedground early and try to uncover more hay from under the snow. It was interesting to note that they seemed to prefer the discolored, molding, rotten looking hay under the snow to the hand fed baled hay. However, it had a sweet smell similar to haylage or silage.

Table 3. Hay fed per cow per day (1982-83)¹

Treatment	November	December	January	February
	lbs	lbs	lbs	lbs
Control ²	8	17	26	26
Rake-bunch	0	0	0	0
Standing ³	0	0	27	0

¹ Represents the amount of hay fed on days hay was required.

² Aftermath and/or rake-bunched hay was available to the control group during October, most of November, and a portion of December.

³ The standing hay group was fed hay for a 21-day period in late December and early January.

Table 4. Hay fed per cow per day (1983-84)¹

Treatment	November	December	January	February
	lbs	lbs	lbs	lbs
Control ²	11	30	30	28
Rake-bunch ³	0	32	22	22
Standing ⁴	0	30	31	27

¹ Represents the amount of hay fed on days hay was required.

² Aftermath and/or rake-bunched hay was available to the control group during October, most of November, and a portion of December.

³ The rake-bunch group was fed hay for 49 days during the winter.

⁴ The standing hay group received hay for 80 days during the winter.

Table 5 presents the weaning and reproductive data from Year 1. Conception rates on the control and rake-bunch groups were 90 and 94 percent, respectively, but only 71 percent for the standing forage group. Weaning weights were not appreciably different between groups. Primarily because of the conception rates, calf production per cow was 356 pounds from the rake-bunch hay group and 345 pounds from the controls, but 266 pounds from the standing hay group. This dramatically points out the importance of condition of cows coming out of the winter on overall production. Calving interval data also are being collected.

Table 5. Weaning weight and conception rate data (1982-83)

Treatment	Number ¹	Pregnant	Conception rate	Weaning weight ²	Calf production per cow
			%	lbs	lbs
Control	31	28	90	383	345
Rake-bunch	32	30	94	379	356
Standing	31	22	71	375	266

¹ One cow from the control and standing treatment died.

² Adjusted for sex of calf with heifers adjusted upwards 5 percent.

Tables 6 and 7 present the costs of haying and feeding of the various treatments. These tables do not include value of the hay, interest on the investment, taxes, etc. This is simply an attempt to present the differences between the treatments for handling the winter feeding program. The total cost per cow was considerably less (\$18 to \$22) on the rake-bunch treatment

as compared to the controls, with productivity being as good or better after the first year. The standing hay group cost \$8 less per cow in Year 1, but as pointed out in Table 5, the conception rates were reduced by 19 percent. The cost per cow was actually higher for the standing group during the second winter because of having to feed them hay most of the winter. Also, ungrazed hay is left on the ground.

Table 6. Costs of haying and feeding per cow (1982-83)¹

Treatment	Baling hay	Labor	Salt- bonemeal	Rake- bunching	Cottonseed meal	Troughs	Electric fence	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Control	32.06	8.69	.68	4.15	0	0	0	46
Rake-bunch	0	7.31	.68	17.68	0	0	2.66	28
Standing	7.59	7.53	1.35	0	16.06	3.06	2.66	38

¹ Values used were \$27 per ton for baling hay, \$11 per acre for rake-bunching, \$4 per hour for labor, \$100 per ton for trace mineral salt, \$565 per ton for bonemeal, and \$245 per ton for cottonseed meal. Electric fence and troughs were prorated over 5 years at 1982 prices. Vitamin A injections were also used at 16¢ per cow.

Table 7. Costs of haying and feeding per cow (1983-84)¹

Treatment	Baling hay	Labor	Salt- bonemeal	Rake- bunching	Cottonseed meal	Troughs	Electric fence	Total
	\$	\$	\$	\$	\$	\$	\$	\$
Control	41.33	8.69	1.11	3.33	0	0	0	55
Rake-bunch	8.17	6.49	1.58	14.15	0	0	2.07	33
Standing	31.48	8.88	2.55	0	8.29	2.97	2.58	57

¹ Values used were \$27 per ton for baling hay, \$11 per acre for rake-bunching, \$4 per hour for labor, \$100 per ton for trace mineral salt, \$565 per ton for bonemeal, and \$245 per ton for cottonseed meal. Electric fence and troughs were prorated over 5 years at 1982 prices. Vitamin A injections were also used at 16¢ per cow.

In general, the rake-bunch hay treatment looks very promising as an alternative to harvesting hay at this time. During the first year, despite an abnormally heavy snow cover these animals made it through the winter without having to be fed hay or supplement. In addition, they actually outperformed the hand-fed controls. During the second winter, they were fed for 49 days. However, even most or all of this may be eliminated with better planning. Because of the location of the water, cattle grazed

the high and heavy producing areas of the meadow first. By the time the deep snow and ice crust occurred they were in the low areas. It was observed that the larger bunches on the high ground remained open and could be grazed during the worst conditions, but the smaller bunches lying in the low areas were not accessible. Part of the reason for this is that snow blew off the high ground and accumulated on the low. Saving the high ground for deep snow and ice grazing and making some larger bunches for these periods may eliminate the need for feeding or at least reduce it considerably. However, hay for emergency feeding during severe conditions probably would be a necessary insurance policy. The standing hay treatment does not look feasible at this time. Performance has been poor on it, even with some supplement, and if supplement were provided to bring performance up to the control group, the cost probably would exceed that of the conventional haying system.

Strip grazing with the New Zealand type electric fence is certainly a key to the success of the rake-bunch system and a necessity on the standing forage. It is reasonably priced, does not require a great deal of labor to put up and move, and it is very effective. Even when these cows are hungry and there is feed on the other side of the fence, they will not touch it. Also, if cows were turned out in these fields to graze the entire area, they would waste a great deal of hay and probably starve to death by mid-winter. They would eat the best feed first and lie, defecate, and urinate on the remaining hay. By the time their feed requirements are highest during the coldest part of the winter, and when they are entering the last trimester of gestation, there would be very little quality feed available for them to eat. Waste has been very minimal on the strip grazed areas.

The early turnout on range before calving also looks promising. It requires that old feed be carried over on the ranges from the previous summer. Very little new growth is available until about May 1 or later. The early turn out date was an attempt to alleviate some of the problems connected with calving on the muddy-wet meadows in the spring. Also, in some years the standing and rake-bunch hay would be under considerable water by that time. Only mature cows are on this study, so calving difficulty is minimal. Scour problems appear to be considerably less than we are experiencing with cows left to calve on the meadows. However, we have had some coyote losses on range and this may develop into a greater problem.

In summary, the rake-bunched hay treatment for wintering cows looks very promising at this time, but the standing hay treatment does not look good compared with the conventional haying and feeding out systems. We will continue to collect data in subsequent years and present further progress reports.

USE OF SLOPES BY CATTLE IN RUGGED TERRAIN

David Ganskopp and Martin Vavra

Returns from rangelands and livestock are greatest when animals uniformly utilize forage resources. On rangelands, however, cattle often concentrate on some areas and completely avoid others. Dispersal of cattle about the landscape is influenced by several interacting environmental, managerial, and animal related factors. Environmental factors include seasonal weather conditions as well as the distribution patterns of food, water, and topography specific to an area. Managerial aspects include fencing, salting, water development, herding, and the enhancement of forage quantity or quality. Some of the animal factors influencing cattle distribution are breed of livestock, class of animal, previous experience of the animal, formation of social groups, and, in large pastures, a demonstrated home range behavior.

Consensus among most researchers is that environmental factors (primarily rugged topography and limited water) have the greatest influence on livestock dispersal on western ranges. Short of fencing and water development, management efforts aimed at enhancing cattle distribution under such conditions are usually only marginally successful.

Realizing that cattle avoid rugged topography, range managers occasionally select a slope gradient and assume in forage allocation procedures that herbage on steeper slopes is unavailable to the grazing animal. Our work with cattle in relatively rugged terrain illustrates, however, that such limits should not be arbitrarily applied to livestock or grazing allotments.

RESEARCH LOCATION AND PROCEDURES

This research was conducted in three pastures on the east bank of the Owyhee Reservoir in southeast Oregon. The area is administered by the Bureau of Land Management and is grazed by cow-calf pairs with a deferred rotation system from April 1 through October 31. Data were recorded during the 1979 and 1980 grazing seasons. The percent slope, or average slope if more than one animal was sighted, was recorded whenever undisturbed livestock were observed. Each recording was treated as a single observation regardless of the number of animals involved. To evaluate animal preferences for slope it was necessary to determine what proportions of the area occurred on the various grades. These data were derived by sampling 1,300 random points on topographic maps of the pastures. Cattle data and pasture composition were compiled in 10 percent slope categories ranging from 0 to 50+ percent. Statistical analyses were used to evaluate livestock preference or avoidance of the various slope categories.