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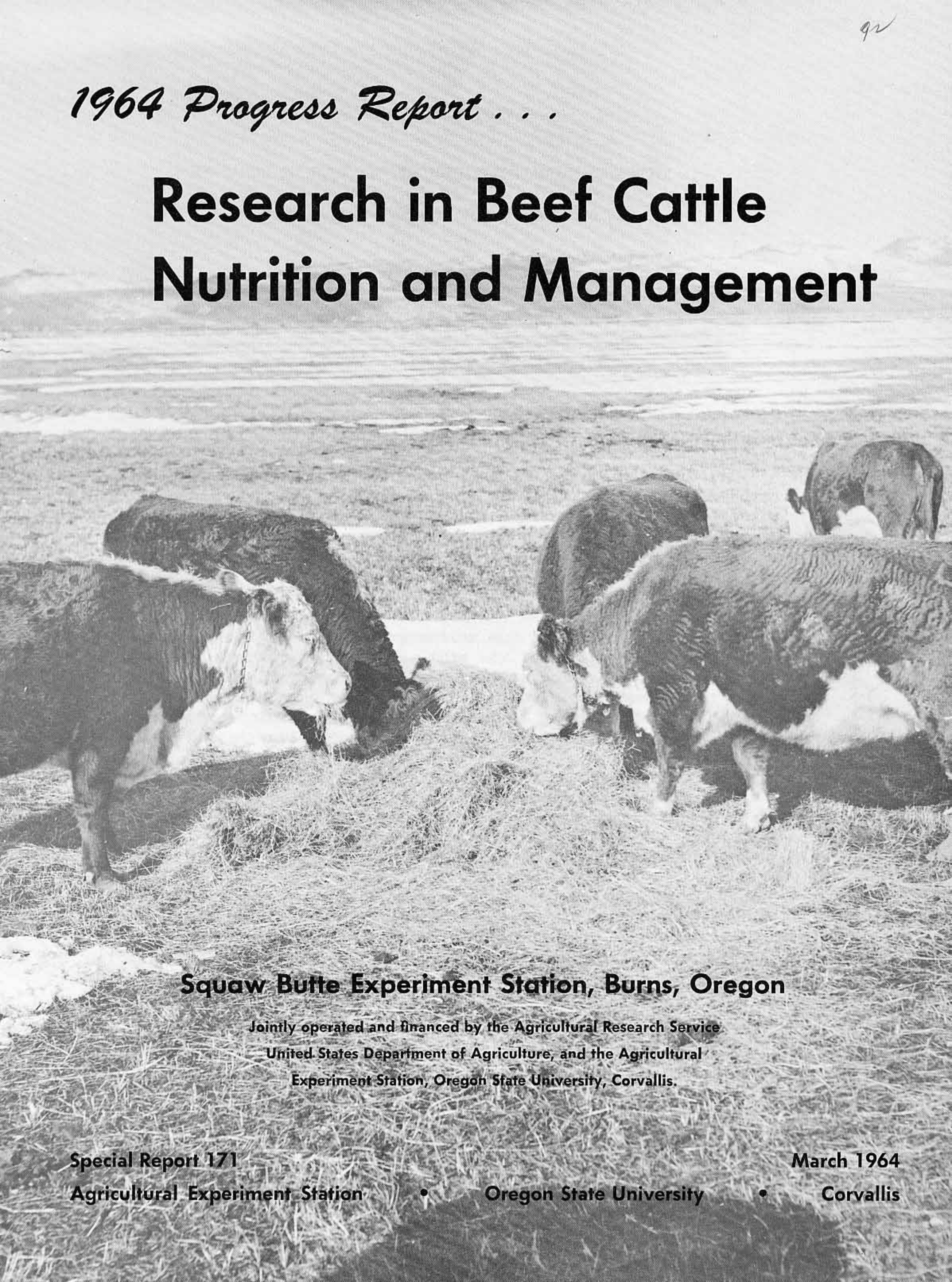
Research in Beef Cattle Nutrition and Management



Squaw Butte Experiment Station, Burns, Oregon

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- 1964 PROGRESS REPORT -

RESEARCH IN BEEF CATTLE NUTRITION AND MANAGEMENT

Robert J. Raleigh and Joe D. Wallace 1/

Supplemental Energy and Protein Requirements for Weaned Calves Fed Early and Late Cut Meadow Hay

A great portion of the livestock industry of eastern Oregon is dependent on native flood meadow hay. This hay is bulky and marginal in quality with respect to livestock production. In general older animals with the capacity for more feed can meet their requirements for performance provided adequate amounts are available. Younger animals do not fare so well since they can not consume adequate quantities. Weaner calves do little more than maintain themselves and in some cases may not do that.

Date of harvest or maturity of plants at harvest probably contributes more to the quality of this hay than any other single factor. Optimum production of both dry matter and protein is reached before mid-July. However, the earlier this hay is harvested the more available the nutrients are for animals. Digestibility of all major nutrients is higher during early stages of plant growth than after the plant becomes more mature. The digestibility of some of the major nutrients of this hay at various harvest dates is presented in table 1.

These data indicate that hay harvested in this area in late June or early July should give maximum animal production. This is also the time when we approach maximum protein and dry matter production on the meadows. Earlier harvest dates are impractical from the standpoint of reduced yield as well as physically, due to flood waters.

The protein content of this meadow hay decreases at the rate of about 0.1% per day during July and August. With the decrease in digestibility, accompanied by this loss in total protein, the loss in value for animal production is further magnified. Digestibility of cellulose,dry matter, and energy also decreases, though not as markedly as protein, with advancing maturity of the grass.

A study was conducted at the station to compare early and late-cut meadow hay, when fed in rations balanced through supplementation to contain adequate protein with various levels of energy, for wintering weaner calves.

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Table 1. Apparent digestibility of dry matter, nitrogen, gross energy and cellulose.

Harvest Date	Digestibility: Dry Matter	Nitrogen	Gross Energy	Cellulose
	%	%	%	%
June 9	61.8	63.0	60.3	68.0
June 28	56.6	60.2	55.8	59.8
July 17	51.7	48.4	50.5	55.1
August 4	49.2	35.2	47.8	54.0

Experimental Procedure

Forty-eight weaner steer calves were stratified by weight into two replications and then into the four lots within each replication. Treatments were randomly assigned to each lot; with six animals in each lot. The animals were weighed initially and at 28-day intervals throughout the trial. All weights were taken after an overnight restriction from water. The experimental treatments consisted of hay harvested at an early and a late date and two levels of energy supplementation (table 2). The early-harvested hay was cut on July 5 and contained 9% crude protein. The late-harvested hay was cut on August 4 and contained 6% crude protein. The hay was coarse chopped and fed in sheltered feed bunks. Hay was weighed into the mangers each morning and refusals were weighed back weekly. Water, salt, and bonemeal were available in all lots.

Table 2. Composition of diets.

Treatment: Energy Level	Harvest Date	Hay %	Hay lb/day	Barley %	Barley lb/day	Cottonseed Meal %	Cottonseed Meal lb/day	Urea %	Urea lb/day
% TDN									
51	July 5	93.6	11.7	4.0	0.5	1.4	0.17	1.0	0.12
	August 5	89.0	12.1	---	---	10.0	1.36	1.0	0.14
56	July 5	79.5	10.5	19.1	2.5	---	----	1.0	0.13
	August 5	76.0	10.4	16.0	2.2	6.6	0.91	1.0	0.14

The diets were all calculated to contain 12% crude protein. Energy levels were set at 51 and 56% TDN; the low level was that which was provided by the hay and the necessary protein supplement to bring the diet up to 12% crude protein. Barley was used for the energy supplement and a mixture of cottonseed meal and urea for the protein supplement. Table 2 shows the components of each diet. The supplement was mixed and fed in feed troughs daily.

Observations

The steer calves receiving the higher level of energy gained significantly more than those receiving the lower level of energy, regardless of date of hay harvest (table 3). The poorest doing animals were those which received the early-cut hay with the low level of energy. One might have expected that those on the late-harvest hay with low energy should have had the poorest performance. This probably would have been the case had it not been for the additional protein supplied as cottonseed meal to the group fed the late-cut hay. The animals on the late-cut hay received about 11% of their total diet as supplement whereas the animals on the early-cut hay received about 5% of their total diet as supplement. Half of the total protein supplied the animals on the late-cut hay came from the supplements and only about one-fourth of the total protein for those on the early-cut hay was supplemental. Calves wintered on native hay alone, regardless of protein content, will not consume amounts more than adequate for maintenance. When a protein supplement is added they apparently make better use of this hay.

There were no significant differences in gain between the animals receiving early-cut or late-cut hay at the higher level of energy (table 3). However, the animals on the late-cut hay received twice as much supplemental protein as the animals on the early-cut hay.

The feed efficiency and cost per pound of gain followed the same pattern as gains. These both reflect the cost of maintenance plus gain which is why cost for the lower levels of energy are higher than for the higher levels of energy. The cost of gains for the steers receiving the early-cut hay with the higher level of energy was significantly less than for any other treatment. Differences in cost of gain were not significant for the other three treatments. We can conclude from this that quality of this native meadow hay as related to harvest date is more important when additional energy supplement is provided than when a low level of energy is fed. This further indicates that more benefit is derived from early harvested, better quality hay when animals are fed for higher production and efficiency than at lower levels of productinn.

Table 3. Average daily gain, feed intake, feed efficiency, and cost per pound of gain for calves on each treatment.

Energy Level	Harvest Date	Average Daily Gain	Average Daily Feed Intake	Feed per Pound Gain	Cost per Pound Gain 1/
% TDN		(lb)	(lb)	(lb)	¢
51	July 5	0.74	12.5	16.9	19.4
	August 5	0.92	13.6	14.8	20.0
56	July 5	1.08	13.2	12.2	16.2
	August 5	1.14	13.7	12.0	17.8
Average of energy levels.					
51% TDN		0.84	13.0	15.8	19.7
56% TDN		1.11	13.4	12.1	17.0
Average of harvest dates.					
	July 5	0.91	12.8	14.5	17.8
	August 5	1.03	13.6	13.4	18.9
Average of all animals.		0.97	13.2	14.0	18.4

1/ Cottonseed meal was priced at $80.00, barley at $50.00, and urea at $120.00 per ton for arriving at feed costs.

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Supplementing Yearlings on Native Range

The nutritive value of native and introduced range grass species for livestock production, has been determined over several years at the Squaw Butte Station. Many of the chemical constituents of forage plants have been determined during various stages of growth. Most of the work has been concerned with the protein and energy content, which can be interpreted in terms of livestock requirement for particular levels and types of production. These are of major concern since both protein and energy decrease in most plants with growth and maturity and are also the most expensive to replace.

Evaluation of the forage indicated that protein becomes marginal for desirable livestock production about mid-June and energy about the first of July. Supplementation studies with yearling cattle grazing crested wheatgrass showed that gains could be maintained at 2 lb./day or better through most of July with an economic level of protein and energy supplementation. After this time the digestible protein and energy of the forage supplies less than a fourth of the necessary nutrients required for the 2 lbs. daily gain.

In general, supplementation is considered in terms of supplying nutrients when they become lacking or inadequate. Supplementation may be justified where maintenance and normal growth are concerned. However, with regard to saleable animals the less time required to get a desirable weight is generally more economical in terms of food nutrients since maintenance requirements use up a lot of feed. It is logical then, that if forage is adequate for maintenance and 2 lbs./day gain, any additional feed should go towards increasing this gain. This past summer yearling steers grazing native range were used to determine if economical gain increases could be obtained through the use of supplements early in the grazing season as well as later.

Experimental Procedure

Thirty-nine yearling steers were stratified by weight to three groups of thirteen each, each group was then randomly alloted to one of the three following experimental treatments; (1) range forage alone, (2) range forage plus adequate daily supplementation of protein and energy to provide for maintenance and 2.25 lbs. daily gain, and (3) same as treatment two except additional energy was supplemented commencing with the start of the trial when moisture content of the forage was high. The supplements required for maintenance and 2.25 lbs. daily gain were based on the data collected in previous years and are presented in figures 1 and 2.

Each treatment group was placed in one of three adjoining, uniform 160 acre native pastures where they were group fed their respective supplements daily. All animals were weighed just prior to the initiation of the trial on May 10 and at 28-day intervals until August 3 when the trial was terminated. All weights were taken after an over night restriction from feed and water. Cottonseed meal and rolled barley were used for the supplemental sources of protein and energy, respectively. Daily supplements fed to each experimental group are shown in table 4. The supplements were adjusted during the grazing season to account for the change in nutritive quality of the forage during the grazing season.

Observations

Average daily gains, value of gain, cost of daily supplements, and profit or loss from supplements for each treatment and grazing period are shown in table 5. Since all animals had access to an adequate supply of comparable forage no costs were assessed for the forage. Animals receiving supplementation during the entire season (treatment 3) gained at a faster rate during the first two periods than those on other treatments but those receiving supplements only in the last half of the trial (treatment 2) made the greatest gain during the last 28-day period. There were no significant difference in treatments 1 and 2 for the first and second periods. This was expected for the first period but an increase in gain was expected in treatment 2 during the second period. Apparently the supplements should have been started somewhat earlier in order to achieve this. Animals on treatment 3 gained significantly more than either of the other two groups during the first two periods. However, in the

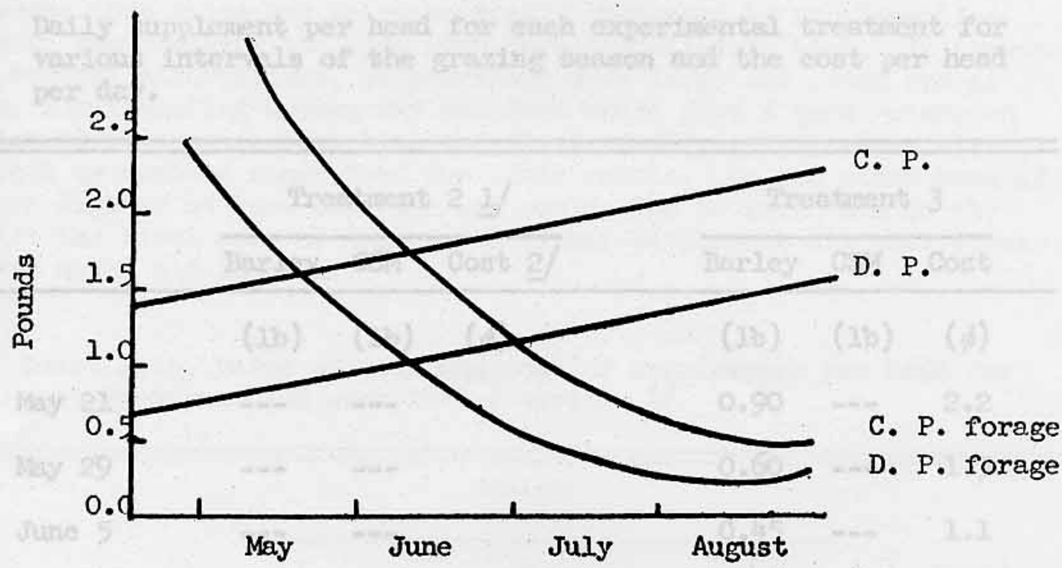

Figure 1. Pounds of crude and digestible protein required for maintenance and 2.25 pounds daily gain of yearling steers and the amount they will get from forage.

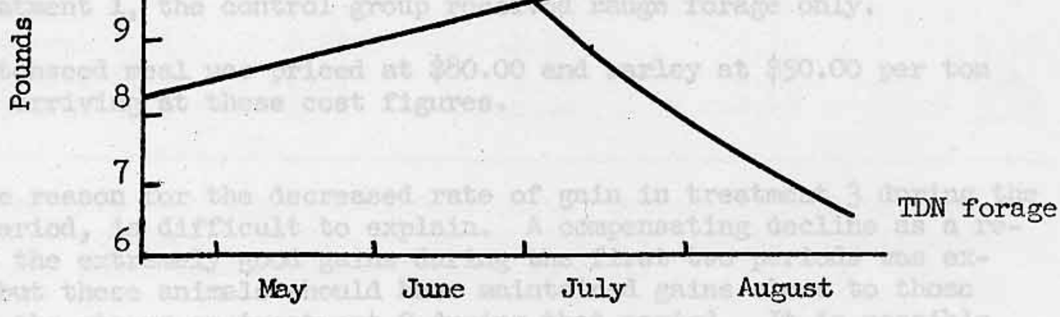

Figure 2. Pounds of TDN required for maintenance and 2.25 pounds daily gain of yearling steers and the amount they will get from the range forage.

third period the animals on treatment 2 gained significantly more than those on either treatments 1 or 3.

Table 4. Daily supplement per head for each experimental treatment for various intervals of the grazing season and the cost per head per day.

Date	Treatment 2 1/			Treatment 3		
	Barley	CSM	Cost 2/	Barley	CSM	Cost
	(lb)	(lb)	(¢)	(lb)	(lb)	(¢)
May 10 - May 21	---	---		0.90	---	2.2
May 22 - May 29	---	---		0.60	---	1.5
May 30 - June 5	---	---		0.45	---	1.1
June 6 - June 12	---	0.40	1.6	0.20	0.40	2.1
June 13 - June 19	---	0.55	2.2	0.10	0.55	2.4
June 20 - June 26	0.10	0.70	3.0	0.10	0.70	3.0
June 27 - July 3	0.20	0.80	3.7	0.20	0.80	3.7
July 4 - July 10	0.30	0.90	4.4	0.30	0.90	4.4
July 11 - July 17	0.45	1.00	5.1	0.45	1.00	5.1
July 18 - July 24	0.60	1.10	5.9	0.60	1.10	5.9
July 25 - Aug. 3	0.90	1.20	7.0	0.90	1.20	7.0

1/ Treatment 1, the control group received range forage only.

2/ Cottonseed meal was priced at $80.00 and barley at $50.00 per ton for arriving at these cost figures.

The reason for the decreased rate of gain in treatment 3 during the third period, is difficult to explain. A compensating decline as a result of the extremely good gains during the first two periods was expected but these animals should have maintained gains close to those made by the steers on treatment 2 during that period. It is possible the total range forage may have been somewhat shorter in the treatment 3 pasture during the latter part of the third period, but this was not believed to be the case at the time. However, gains over the entire period were significantly greater in both supplemented groups than in the control group.

Value of gain and profit from the gain (value less feed costs) follow the same pattern as body weight gains (table 5). As stated earlier no cost of range feed was assessed and no charge was made for the labor as these would depend on the individual range operator's management. However, these data indicate that gains can be economically increased by supplementing yearlings on range during the time when forage quality is high. It appears to offer several alternatives, if yearlings were large and range was at a premium, supplementing during May and June would give a good return on the supplement and permit marketing the first of July. This would also save a month or more of range feed for other cattle. On the other hand if cattle were lighter at turn out time one could plan to keep them on the range until the first part of August and either supplement the entire season or from about mid-June on.

Table 5. Total gain, value of gain and cost of supplements per head for each treatment and each 28-day period. 1/

Treatment	Period 1	Period 2	Period 3	Total
1 (Control)				
Gain, lb.	66.60	62.70	41.20	170.50
Value, $	16.65	15.67	10.30	42.62
Cost, $	-----	-----	-----	
2 (Late Supplement)				
Gain, lb.	69.20	59.40	68.00	196.60
Value, $	17.30	14.85	17.00	49.15
Cost, $	-----	0.77	1.60	2.37
3 (All Season Supplement)				
Gain, lb.	78.10	79.50	50.10	207.70
Value, $	19.53	18.88	12.52	51.93
Cost, $	0.49	0.81	1.60	2.90
Profit or Loss				
Tr 2 over 1, $	0.65	-1.59	5.10	4.16
Tr 3 over 1, $	2.39	3.40	0.62	6.41
Tr 3 over 2, $	1.74	4.99	-4.48	2.25

1/ Value of gain was figured at $25.00 cost. Cottonseed meal was priced at $80.00 and barley at $50.00 per ton for arriving at cost figures. Labor and range feed were not figured in cost.

Mechanics and cost of supplementation would have to be determined by the individual operator, depending on what would fit best into his management program. In some cases a change in management may be meritorious and in others it may be impractical. Daily feeding of supplements is often impractical and self feeders with salt control may be desirable. Feeding of protein and energy range blocks may be practical if savings in labor offset the additional cost of the block.

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Calf Production From Aged Cows in the Squaw Butte Breeding Herd

Longevity of production has long been recognized as one of the basic factors in selectinn of breeding stock. In spite of this many culling programs being used today include the practice of culling cows at a given age such as 10 years old. Such practices are more common to ranches where adequate records are not available to accurately evaluate individual cows according to producing ability.

Longevity of production can not be overlooked in terms of efficiency of maintaining a cow-calf operation. Costs involved in raising a female from conception to first calf are the same whether she is sold at 8, 10, or 12 years of age. Cows are kept in the Squaw Butte breeding herd as long as they continue to wean a satisfactory calf each year.

Beef cows ranging in age from 6 - 8 years old are considered to be in the prime of their productive life. In production testing programs correction factors are recommended for adjusting weaning weights of calves from cows that are either less than 6 years of age or more than 8 years of age. In herds where considerable emphasis is routinely place on production records in the culling program such corrections may not always be warranted as far as older cows in the herd are concerned. With continuous selection based on production, older cows might conceivably be in the top percentage of the herd with respect to calf weaning weights.

The purpose of this study was to compare calf production data from cows 10 years of age and older with: (1) yearly herd averages over a period of 10 years; (2) calf production data from cows 4 through 9 years of age over a 10-year period; and (3) calf production data from the same animals as 6, 7, and 8 year-old cows. Observations were also made on number of animals removed from the herd for various reasons and the average age at which the animals were removed for these reasons.

Experimental Procedure

To study calf production of aged females, records from all cows born during the period extending from 1944 to 1953 that remained in the Squaw Butte herd for 10 years or longer were used. This allowed a comparison of production data from aged animals with herd averages and with younger cows in the herd over the last 10-year period (1954 - 1963).

One hundred, ninety-five replacement females were added to the herd from animals born during the period of 1944 to 1953. Eighty-six head of these animals were removed from the herd prior to reaching 10 years of age while the remaining 109 head were 10 years of age or older before removal. Calf production data from these 109 animals as aged cows were compared with their calf production as 6 to 8 year-old cows.

The data used in these studies were from cows bred in multiple sire groups and to bulls of the same line of breeding each year. Only in a few isolated cases did older cows receive any preferential treatment over the remainder of the cows in the breeding herd. In establishing herd averages during recent years, the data on crossbred offsprings were not included.

Observations

Reasons for Leaving the Breeding Herd

The reason and age of removal from the herd is noted on individual cow records kept at this station. These are summarized in table 6 for all cows added to the herd which were born during the period of 1944 to 1953, inclusive. Prior to 1958 mouth condition was one of the factors considered in the culling program. The mouth of each animal was checked each year and when animals had lost 4 or more permanent teeth they were sold. Since 1958 this practice has been discontinued as it was concluded that under the existing conditions teeth records showed no relation to producing ability.

Cows born during years 1944 to 1949 were not culled heavily because of producing ability until they were about 10 years old while those born after this period were subjected to a yearly culling program with considerable emphasis on production records. The primary reason for this was that during the earlier years, an attempt was being made to increase cow numbers whereas during later years of the study cow numbers were maintained at a more constant rate. Cows removed from the herd because of producing ability as shown in table 6 included those which were dry two years in succession, those consistently weaning light weight calves and older animals diagnosed as open cows on the basis of pregnancy tests.

Cancer eye and big jaw accounted for a considerable number of animals removed from the herd. Big jaw was more prevalent in younger animals while cancer eye occurred more frequently in older animals. Total death losses caused by various factors amounted to 14% of the total animals involved in the study. Other causes of removal from the herd were of less significance and probably approach normal expectations.

Table 6. Number, percent, and average age of cows removed from the breeding herd for various reasons.

Cause of Removal	Total No. Removed	Percent of Total	Avg. Age at Removal	No. Removed Under 10 Years Old	No. Removed Over 10 Years Old
		(%)	(yrs.)		
Mouth Condition	37	19.0	11	6	31
Producing Ability	54	27.5	10	27	27
Condition	11	5.6	12	3	8
Cancer Eye	22	11.3	9	10	12
Big Jaw 1/	16	8.2	5	15	1
Death at Calving	8	4.1	3	8	0
Miscellaneous Death	9	4.6	8	5	4
Unknown Death	11	5.6	9	6	5
Crippled	4	2.0	10	1	3
Bad Udder	4	2.0	10	2	2
Other Abnormalities	5	2.6	8	3	2
Still in Herd	14	7.2	---	---	---

1/ Actinomycosis

The numbers of cows reaching 10 years of age that were removed each subsequent year is shown in table 7. The average additional life expectancy for animals still in the herd at 10 years of age in this study was about 2 years. However, this could not be determined exactly since some of the animals are still in the herd.

Calf Production by Cows of Different Ages

Comparisons showing average weaning weights of calves from aged cows with herd averages are presented in table 8. The data shown in this table represent averages of comparisons made between like sexes and within the same year. These comparisons point out the value of retaining a selected group of aged cows in a herd. They not only provide an excellent source from which to select replacement stock but also may increase weaning weights in the herd. Calves from aged cows in this study averaged about 20 pounds heavier than calves from all cows, were comparable to those from cows 4 through 9 years of age, and averaged 54 pounds heavier than calves from 2 and 3 year-old cows. Averages shown for calves from young cows (2 and 3 years old) were established primarily on calves from 3 year-old cows since the station did not breed animals until 2 years of age for several years. Cows 4 through 9 years of age produced calves which averaged 24 pounds heavier while those less than 4 years of age produced calves averaging 35 pounds lighter than calves from all cows.

Table 7. Number and percent of aged cows removed at different age classifications.

	Year of Age at Time of Removal								Still in Herd
	10	11	12	13	14	15	16	17	
Number	19	25	22	14	8	6	0	1	14
% of Total	17	23	20	13	7	5	0	0.9	13

The proportionate number of cows from various age groups has considerable influence on the average weaning weight in a given herd. In this study, however, it was calves from 2 and 3 year-old cows that had the most effect in decreasing average weaning weights. It would appear that calves from cows of this age group are most deserving of age of dam corrections.

The number of calves from older cows (10 - 14 years old) decreased with advancing cow age because animals continued to leave the herd for natural reasons and also because of continued culling based on production in aged cows. With continued stress on productive ability in the culling program there appears to be only slight reductions in weaning weights of calves from cows advancing in age beyond 10 years (table 8). Average weaning weights of calves from all cows, cows 4 through 9 years old, and cows 2 and 3 years old shown in table 8 vary slightly among the different comparisons as only years corresponding to those establishing different aged cow averages were used in these determinations.

Average weaning weights were compared between calves from the same cows as 6, 7, and 8 year-old animals and as cows 10 through 14 years old (table 9). Since these comparisons were between calves weaned in different years all weights were corrected for year effect. Calf production from this group of animals as 6, 7, and 8 year-old cows was relatively constant and was consistently above herd averages on the particular years involved. In this study weaning weights of calves from aged cows averaged about 15 pounds less than calves produced by the same cows during their 6th to 8th year of age. It should be pointed out that only those animals producing calves beyond 10 years of age were included in the 6 to 8 year-old group. Had this comparison been made between calves from aged cows and calves from all 6 to 8 year-old cows in the herd the association would have been different. The data in table 9 indicates that where cows of higher productive ability are concerned the decline in calf weaning weight with advancing age is of relatively small magnitude.

Table 8. Average 205-day weaning weights of calves from aged cows compared with average of calves from all cows, cows 4 through 9 years of age and cows 2 and 3 years of age.

Age Class	Average Weaning Weights 1/			
	Aged Cows	All Cows 2/	4 - 9 Yr. Cows 2/	2 and 3 Yr. Cows 2/
(yrs)	(lb)	(lb)	(lb)	(lb)
10	396	371	398	338
11	383	361	384	322
12	383	363	387	326
13	376	359	385	331
14 and over	380	371	390	335

1/ Weaning weights shown are averages of steer and heifer calves.

2/ These averages change because only those years corresponding to years of available data on cows of different age classifications were used in each determination.

Table 9. Comparison of 205-day weaning weights from the same animals as 6, 7, and 8 year-old cows and as aged cows. 1/

Sex of Calf	Age of Cow			
	6	7	8	10 to 14 (inclusive)
	(lb)	(lb)	(lb)	(lb)
Steer	394	378	392	382
Heifer	378	378	380	355
Average	386	378	386	368

1/ Since data for these comparisons came from different years all weights were corrected for year effect.

Comparison of Hereford and Charolais x Hereford Cattle

One of the most controversial subjects among cattle producers is that of crossbreeding. Answers to many questions regarding this topic are still unknown. The many different matings which are possible and their relationship to various environmental influences have hindered the progress of research in this field.

Currently the beef industry is pressed by consumer demand to produce cattle which yield leaner carcasses and still maintain the desired tenderness and flavor. To produce such animals cattlemen are searching for animals with superior muscling that yield a high percentage of retail cuts with a minimum of trim fat. Opinions on whether crossbreeding in beef cattle will lead to the development of more desirable carcass characteristics are quite diverse. The main concern among all cattle producers is that beef continue in its position of popularity among the different protein foods.

The purpose of this study was to compare weaning traits, winter performance on a growing ration as calves, feedlot performance on a fattening ration, and yearling performance on summer range with Hereford and Charolais x Hereford crossbred cattle. Detailed studies comparing carcass characteristics of the animals finished for slaughter in this study are being conducted at Oregon State University and are not summarized in this report.

Experimental Procedure

Fifty-six uniform Hereford cows from the Squaw Butte breeding herd were stratified according to age and randomly alloted to two groups in the spring of 1960. During the breeding season of 1960, cows in group one were bred to a Charolais bull while those in group two were bred to Hereford bulls with the regular breeding herd. During the 1961 breeding season the mating scheme of the two groups was reversed. Offsprings from these matings were compared in pre-weaning and weaning traits, post weaning performance on growing rations, feedlot performance, and performance on summer range.

Observations

Results showing comparisons through the pre-weaning and weaning period for both years of the study are shown in table 10. Crossbred calves averaged about 8 pounds heavier at birth and about 48 pounds heavier at weaning than Hereford calves. Hereford calves graded slightly higher than crossbreds at weaning time each year. Average daily gains during the suckling period and post-weaning period were higher in crossbred calves by 0.2 lb. and 0.3 lb. per day, respectively, when the 2 years data were averaged. The data on post-weaning performance represents a 224-day period with heifer calves in 1961 and a 60-day period with steer calves in 1962.

Steer calves obtained from the two breeding groups were placed on a fattening ration about 60 days after weaning each year. Comparitive feedlot performance, slaughter data, and financial return are summarized in table 11. The number of steer calves received in the first year's (1961) calf crop was limited and was further decreased by death loss due to bloat. Three Hereford steers and one crossbred steer died of bloat prior to the start of the trial. Due to the limited numbers of Hereford and crossbred steers remaining the two groups were fed together in one lot during the fattening period. During the second trial, one Hereford steer was removed from the study because of chronic bloat. During this trial the Hereford and crossbred steers were fed in separate lots.

Table 10. Comparison of Hereford and Charolais x Hereford calves 1/

Trait	1961 Hereford	1961 x-Bred	1962 Hereford	1962 x-Bred
Avg. Birth Weight, lb.	76.4	83.9	80.3	89.1
Avg. Da. Suckling Gain, lb.	1.64	1.72	1.56	1.87
Avg. Weaning Wt., 2/ lb.	412.6	436.5	400.1	472.5
Avg. Weaning Grade 3/ (feeder)	14.0	13.6	13.8	13.4
Avg. Da. Post Weaning Gain, lb. (Growing ration)	0.99	1.27	0.58	0.91

1/ Average of steer and heifer calves.

2/ Adjusted to 205 days of age.

3/ Medium 10 - 12; Good 13 - 15; Choice 16 - 18.

Crossbred steers gained at a faster rate and consumed more feed but were slightly less efficient than Hereford steers. Feed cost per 100 lbs. of gain was essentially the same for the two groups. Efficiency of gain and feed cost data could not be compared in the first year since the animals were fed together.

Dressing percent favored crossbred steers the first year and Hereford steers the second year, but carcass grades were higher in Hereford steers both years. When total feed costs and transportation costs were deducted from gross returns, the Hereford steers averaged $2.21 more net return per head.

Yearling heifer gains on summer range and market data off range as long yearlings are presented in table 12. When the 2 years data were averaged, crossbred heifers gained 0.36 lb. more per day and grossed

Table 11. Feedlot performance, slaughter data, and financial return on Hereford and Charolais x Hereford steers.

	First Year		Second Year	
	Hereford	x-Bred	Hereford	x-Bred
Number of Steers	5	6	11	12
Days on Feed	207	207	228	228
Avg. Performance, lb.				
Initial Wt.	480	496	447	503
Final Wt.	974	1079	934	1058
Daily Gain	2.38	2.82	2.13	2.43
Gain/Day of Age (out of feedlot)	1.93	2.20	1.79	2.06
	(Steers Fed in Same Lot)			
Avg. Daily Ration, lb.				
Meadow Hay	7.60		4.34	5.79
Rolled Barley	12.20		11.22	12.88
Cottonseed Meal	1.00		1.00	1.00
Pelleted Alfalfa Meal	1.00		1.00	1.00
Feed Efficiency and Costs				
Feed/100 lb. Gain, lb.	83.21		82.44	85.06
TDN/100 lb. Gain, lb.	55.42		57.28	58.23
Feed Cost/100 lb. Gain 2/ $	16.83		18.02	18.10
Slaughter Records				
Avg. Dressing Percent	61.4	62.8	62.2	60.8
Carcass Grades (USDA)				
Choice	0	0	1	0
Good	3	2	8	5
Standard	2	4	2	7
Avg. Return ($/hd)				
Gross Return 3/	239.90	265.95	226.29	237.93
Feed Cost 2/	------	------	87.66	100.45
Transportation Cost	------	------	7.92	8.98
Net Return	------	------	130.71	128.50

1/ All steers were given stilbestrol implants (12 mg. at start of trial and 24 mg. after 90 days) and received 20,000 I.U. of vitamin A per head daily each year.

2/ Feed costs used were meadow hay $20 per ton, barley $50 per ton, cottonseed meal $80 per ton, and alfalfa pellets $40 per ton. Costs of vitamin A and stilbestrol were not included.

3/ Steers were sold to Swift & Co., Portland, on carcass grade and yield basis each year. Prices received the first year were: Good $0.42/lb; Standard $0.39/lb. and the second year were: Choice $0.43/lb.; Good $0.40/lb. and Standard $0.36/lb.

$14.12 more per head than Hereford heifers. It should be pointed out that a part of the difference in price per cwt. received in 1963 was undoubtedly due to the heavy weights on the crossbred heifers. Part of the Hereford and crossbred heifers from each year of this study have been retained in the breeding herd. Both groups are being mated to the same Hereford bull and subsequent production data will be compared.

Table 12. Average yearling gains on native range and gross returns from Hereford and Charolais x Hereford heifers marketed off range at approximately 16 months of age.

	1962		1963	
	Hereford	x-Bred	Hereford	x-Bred
Daily Gain, lb.	1.12	1.58	0.98	1.24
Selling Wt., lb.	637	738	685	826
Price cwt., $ 1/	24.25	23.60	22.75	19.90
Gross Return/hd., $	154.47	174.17	155.84	164.37

1/ Prices received when animals were sold through Ontario Livestock Commission Company.