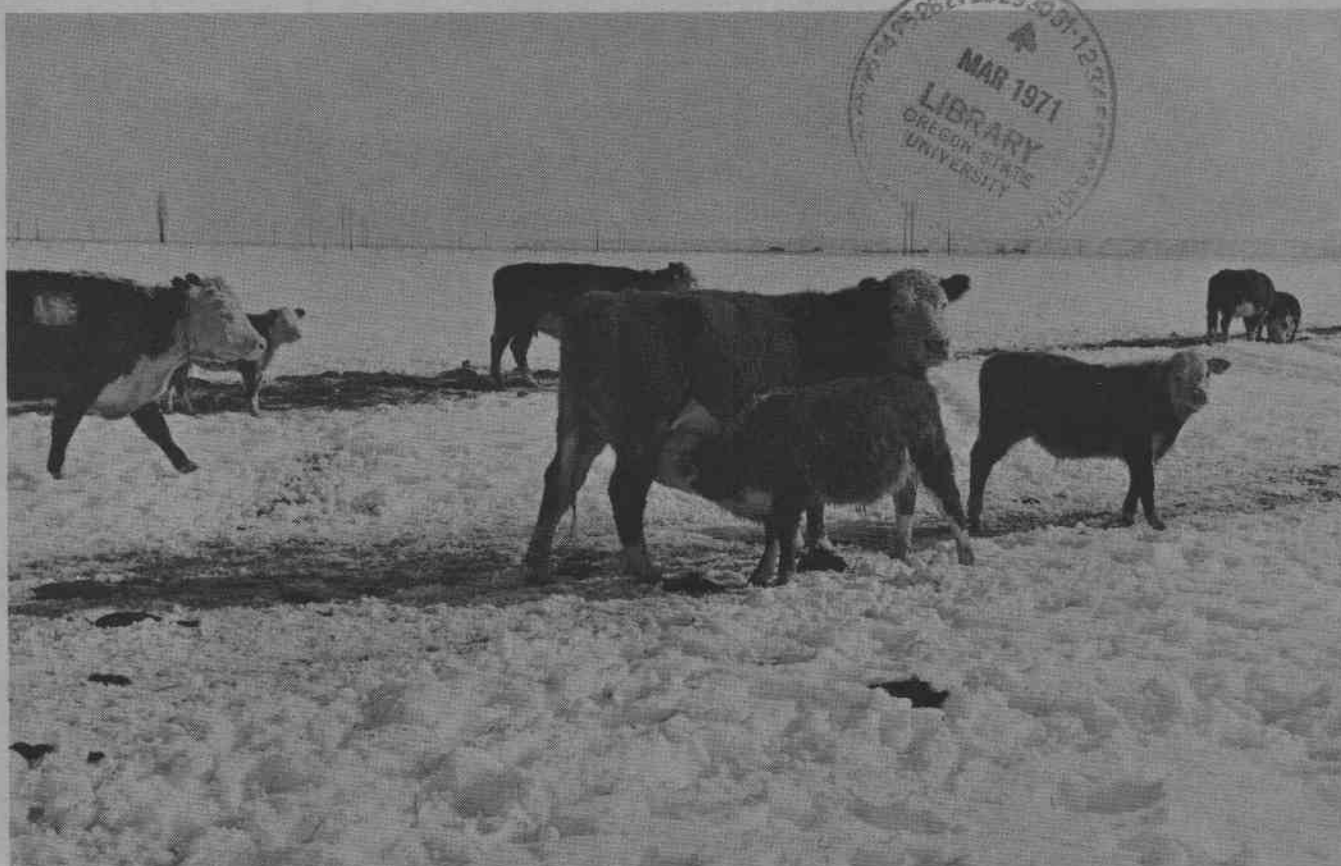
*1971 Progress Report . . .*

# Research in Beef Cattle Nutrition and Management





Special Report 322 March 1971

Agricultural Experiment Station • Oregon State University • Corvallis

In cooperation with the United States Department of Agriculture

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The Squaw Butte Experiment Station is jointly operated and financed by the Agricultural Research Service, United States Department of Agriculture, and the Agricultural Experiment Station, Oregon State University, Corvallis.

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DAILY VERSUS ALTERNATE FEEDING OF RANGE SUPPLEMENTS

Larry Foster, H. A. Turner, and R. J. Raleigh

Much work has been done on the supplementing of growing animals while grazing crested wheatgrass ranges during the summer. Supplementation of grazing yearling cattle is an economical practice provided the correct supplement program is followed. Practical methods of feeding must be developed before range supplementation will be an accepted practice by most livestock operators. Biuret 1/, a nonprotein nitrogen compound, has given good results when fed to range animals after protein content of the forage declines with plant maturity. Biuret was used in different supplement regimens to determine the feasibility of feeding these supplements in a more practical manner.

## EXPERIMENTAL PROCEDURE

Forty-two yearling steers from the Station herd were grazed on crested wheatgrass pastures on the Squaw Butte experimental range. Individual feeding pens were setup for the necessary supplementation. The experimental design was a 3 x 2 factorial with three frequencies of feeding and two starting dates with six replications (Table 1). Supplements were fed daily, every other day, or every fourth day with starting dates of May 15 and July 15. A control group of steers received no supplement. Animals were neck-chained with different color tags for easy identification to treatments. The animals grazed together on crested wheatgrass pasture with free access to water, salt, and a salt-bonemeal mixture. All animals were penned each morning starting May 25, including those which began supplements July 15, in individual feeding stalls and fed their respective diets. Control animals were penned in the same manner as those receiving supplements. The cattle were weighed after an overnight restriction from feed and water just prior to the start of the trial and each four weeks thereafter for the duration of the trial. The trial was initiated on May 25 and continued through August 19.

Table 1. Experimental design

| Feeding frequency | No supplement | Starting date | | Total number of animals |
|---|---|---|---|---|
| | | May 25 | July 15 | |
| Control | 6 | | | 6 |
| Daily | | 6 | 6 | 12 |
| Every other day | | 6 | 6 | 12 |
| Every fourth day | | 6 | 6 | 12 |
| Total number of animals | 6 | 18 | 18 | 42 |

1/ Number of animals on each treatment

1/ Biuret was provided by the Dow Chemical Company under the trade name "Kedlor". The Dow Chemical Company also provided financial assistance for this research.

The supplemental nitrogen and energy was fed daily in amounts to provide for approximately 2.25 pounds daily gain up to July 15. It was felt that the bulkiness of the diet of the every fourth day feeding would become a limiting factor after July 15 so supplementing beyond this date would probably provide for less gain than anticipated earlier. Table 2 shows the nitrogen and energy supplementation levels necessary to maintain 2.25 pounds during the grazing season from previous studies at Squaw Butte. This takes into consideration the decline in those nutrients provided from the forage as the forage matures. The nitrogen was supplemented as indicated in Table 2, with energy being fed at a constant rate after bulk became a factor on the "alternate days" feed. Composition of the supplements is included in Table 3 with sulphur supplied so that each animal received 0.03 pound of additional sulphur from the grain supplement and the supplemental sulphur combined. Since biuret does not contain sulphur as do the plant proteins, sulphur was added to insure adequate amounts for protein assimilation.

Table 2. Nitrogen and energy supplementation levels for different periods during the grazing season 1/

| Period | Nitrogen | Digestible energy |
|---|---|---|
| | (g./hd./day) | (kcal./hd./day) |
| Turnout - 5/30 | 8.7 | 1560 |
| 5/31 - 6/6 | 6.5 | 1170 |
| 6/7 - 6/13 | 4.4 | 780 |
| 6/14 - 6/20 | 9.7 | 750 |
| 6/21 - 6/27 | 17.2 | 1120 |
| 6/28 - 7/4 | 23.2 | 1420 |
| 7/5 - 7/11 | 26.5 | 1800 |
| 7/12 - 7/25 | 36.2 | 2390 |
| 7/26 - 8/8 | 46.3 | 3550 |
| 8/9 - 8/22 | 50.4 | 4620 |
| 8/23 - 9/5 | 54.2 | 5180 |
| 9/6 - 9/19 | 58.0 | 6150 |
| 9/20 - 10/4 | 62.0 | 7000 |

## RESULTS AND DISCUSSION

The animals went on feed readily and after the first week of the trial were consuming their respective supplements as shown in Table 3 with little or no refusals. The average daily gain of steers starting on supplement on May 26 was 2.38, 2.03, and 2.15 pounds on the daily, every other day, and every fourth day feeding, respectively, as compared to 2.19, 1.84, and 1.90 pounds on steers receiving supplements beginning on July 17 (Table 4). Control animals gained 1.93 pounds per day over the 96 day trial. This trial was designed to run several more weeks but forage became limited and the trial had to be discontinued.

Table 3. Supplemental feed schedule 1/

| Date | Barley | Biuret 2/ | Sulphur 3/ |
| --- | --- | --- | --- |
| | (lb.) | (lb.) | (lb.) |
| 5/26 - 5/30 | 1.00 | ---- | ---- |
| 5/31 - 6/6 | 0.75 | ---- | ---- |
| 6/7 - 6/13 | 0.50 | ---- | ---- |
| 6/14 - 6/20 | 0.48 | 0.03 | 0.03 |
| 6/21 - 6/27 | 0.70 | 0.06 | 0.03 |
| 6/28 - 7/4 | 0.91 | 0.09 | 0.03 |
| 7/5 - 7/11 | 1.13 | 0.11 | 0.03 |
| 7/12 - 7/25 | 1.50 | 0.13 | 0.03 |
| 7/26 - 8/8 | 2.23 | 0.16 | 0.03 |
| 8/9 - 8/19 4/ | 2.23 | 0.18 | 0.03 |

1/ Supplemental schedule for those fed daily, with animals being fed every other day fed twice this amount per feeding and those fed every fourth day, four times this amount per feeding.

2/ A small amount of barley was fed as ground barley to premix with the biuret.

3/ Sulphur was fed to supply each animal with 0.03 pound of additional sulphur from the grain supplement and the supplemental sulphur.

4/ Bulk was becoming a factor with the every fourth day feeding, so energy level was held constant, with nitrogen continuing to increase as scheduled.

Table 4. Gain data over 96 day trial

| Treatment | Initial wt. 5/25 | ADG | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | | Accumulative | | | By period | |
| | | 6/24 | 7/22 | 8/19 | 5/25-7/22 | 7/22-8/19 |
| | (lb.) | (lb.) | (lb.) | (lb.) | (lb.) | (lb.) |
| Control | 604 | 3.03 | 2.40 | 1.93 | 2.40 | 0.96 |
| May 26 2/ | | | | | | |
| Daily | 587 | 3.13 | 2.76 | 2.38 | 2.76 | 1.61 |
| Every other day | 598 | 3.00 | 2.64 | 2.03 | 2.64 | 0.79 |
| Every fourth day | 623 | 3.03 | 2.62 | 2.15 | 2.62 | 1.18 |
| July 17 2/ | | | | | | |
| Daily | 572 | 3.03 | 2.40 | 2.19 | 2.40 | 1.75 |
| Every other day | 609 | 2.53 | 2.28 | 1.84 | 2.28 | 0.93 |
| Every fourth day | 589 | 2.83 | 2.36 | 1.90 | 2.36 | 0.93 |

1/ Accumulative ADG from the initial weight to the date shown.

2/ Starting date for receiving supplements.

The accumulative mean data showed that steers fed daily outgained either those fed every other day or every fourth day. Gain data between every other and every fourth day was variable with little differences between the two.

All supplemented groups of animals which were started on May 26 outgained the control group. However, of the animals which were started on supplements July 17, only the daily-fed group gained more than the control group. The data suggests that in order to achieve maximum gain, supplementation should begin early in the summer.

Table 4 shows the gain data for the first 58 days and the last 38 days. All supplemented animals, which essentially would be only the animals beginning on May 26, outgained the control animals during the first 58 days. However, this difference was not maintained throughout the final 38 days. The gains over the last 38 days were similar between the two groups with little difference between those starting on May 26 and those starting on July 17. Again in the second period, animals receiving daily supplements gained more than those supplemented either every other or every fourth day during this period. Supplementation in the first 58 days had little or no effect on gains in the last 38 days.

## CONCLUSIONS

The results of this trial would indicate that weight gains of yearling steers supplemented with energy and nitrogen daily while grazing crested wheatgrass would be higher than those receiving supplements less frequently. These data indicate that a method of feeding range supplements must be devised so that animals receive their supplements daily. This can be accomplished either through hand-feeding of the animals, a salt control mix which will limit their daily supplement intake, block feeding which also will limit their supplement intake, or some other possible mechanism.

# MANAGEMENT OF CATTLE GRAZING NATIVE FLOOD-MEADOWS

R. J. Raleigh, H. A. Turner, and Larry Foster

Previous work at the Squaw Butte Station and other range stations in the western area indicate a decline in quality of range forage from the beginning of the grazing season, in mid or late April on through the grazing season. Forage quality on the native flood-meadow, follows this same trend. Although we have little cattle gain data from these meadows the nutrient value of these forages would indicate that we would get much the same response as from range forage. Protein content of the flood-meadow forage is high in early spring dropping down to about eight percent by the early part of July, after this time the protein content drops by about one percent per week. Digestible energy values follow this same trend.

Range supplementation studies conducted at the Squaw Butte Station have indicated that we can expect an economic return from supplements starting in early spring with an energy supplement and then adding both protein and energy once both factors become limiting. The supplement needs to supply the difference between that provided by the forage and the requirement for the desired gain of the animal. Both protein and energy need to be provided beginning in late June or early July. Supplmenting with either nutrient alone after this time gives a limited gain response.

Stilbestrol implants have consistantly improved steer gains by 10 to 15 percent on any feed regimen as long as feed is adequate to support reasonable gains. Also, internal parasite control can substantially increase net income under certain conditions providing a parasite problem exists. Little research has been conducted on internal parasite control in this area.

With the above objectives in mind this study was initiated to determine the value, the type, and the method of supplementing yearlings grazing the native flood-meadows, to determine if stilbestrol implants would increase the daily gain of yearling steers grazing these meadows, and also, to determine if internal parasite control is economically feasible under these conditions.

## EXPERIMENTAL PROCEDURE

The study was conducted on the Bell A Ranch of the Bell A Grazing Association, using four fenced native flood-meadow pastures and 160 steers from the cooperators on the ranch. The pastures were selected to be as nearly uniform as possible, each one with a carrying capacity of 40 steers grazing from May 1 to September 15. The steers came from three separate owners. Ownership was stratified across all experimental treatments.

The experimental design was a 2 x 2 x 2 factorial to compare supplement versus no supplement, stilbestrol versus no stilbestrol, and internal parasite control versus no internal parasite control, with two replications (Table 1). Steers in two of the pastures were supplemented while steers in the other two pastures remained unsupplemented. One-half of the steers in each pasture received a 12 mg. stilbestrol implant at the beginning of the trial. One-half of the stilbestrol implanted steers and one-half of the steers without implants were treated for internal parasites with a thiabendazole bolus at the start of the trial.

The animals were individually identified and had free access to water, salt, and a salt-bonemeal mixture at all times. They were weighed, initially, and every four weeks thereafter during the trial. Weighing conditions were the same at each weighing with cattle gathered from all pastures and put into a common pen each morning before weighing, they were then weighed at random at which time they were cut into their respective pastures.

Supplements fed were calculated to provide for 2.25 pounds daily gain throughout the grazing season. The feed schedule is shown in Table 2. All pastures were cut and rake-bunched on July 13 and the supplement level remained constant from that date to the end of the trial.

Table 1. Experimental design 1/

| Treatment | No internal parasite control | Internal parasite control | Total animals |
|---|---|---|---|
| No supplement | | | |
| No stilbestrol | 10 | 10 | 20 |
| Stilbestrol | 10 | 10 | 20 |
| Supplemented | | | |
| No stilbestrol | 10 | 10 | 20 |
| Stilbestrol | 10 | 10 | 20 |
| Total animals | 40 | 40 | 80 |

Table 2. Feeding schedule showing feed per head per day

| Date | Barley | CSM | Biuret | Sulphur |
|---|---|---|---|---|
| | grams | grams | grams | grams |
| Turnout - 5/30 | 454 | --- | -- | -- |
| 5/31 - 6/6 | 341 | --- | -- | -- |
| 6/7 - 6/13 | 227 | --- | -- | -- |
| 6/14 - 6/20 | 190 | 50 | 7 | 13 |
| 6/21 - 6/27 | 227 | 115 | 14 | 13 |
| 6/28 - 7/4 | 290 | 150 | 20 | 13 |
| 7/5 - 7/11 | 370 | 180 | 25 | 12 |
| 7/12 - 8/17 1/ | 540 | 215 | 30 | 12 |

1/ The pastures were cut and rake-bunched on 7/13 with supplement levels being maintained at this level to termination date.

## RESULTS AND DISCUSSION

Supplemented steers gained 2.14 pounds per day as compared to 2.02 for the nonsupplemented steers (Table 3). This response to supplementation was not as great as expected or get from our range supplement program. The supplement levels fed were based on data obtained from our range supplementation program at Squaw Butte. However, crude protein values of the meadow forage indicated a higher quality forage than we have on our ranges and also higher than we estimated when we set up the supplementation levels (Table 4). This indicates a need for additional work describing the nutritional quality of these meadow forages at various times during the grazing season.

Gain responses from supplementation were about as expected from the beginning of the trial to June 23 and crude protein values of the Bell A forage were similar to values on which the supplement was based during this time. However, through the latter part of June and up to the cutting date of July 13 the Bell A forage ran substantially higher in quality than expected.

Table 3. Gain data over 88 day trial

| Treatment | No. of animals 1/ | Initial wt. 5/22 | ADG 2/ 6/23 | 7/21 | 8/18 |
|---|---|---|---|---|---|
| | | (lb.) | (lb.) | (lb.) | (lb.) |
| Control | 20 | 519 | 2.38 | 2.07 | 1.92 |
| Supplement | 20 | 537 | 2.84 | 2.25 | 2.15 |
| Supplement + Stilbestrol | 20 | 541 | 2.84 | 2.42 | 2.27 |
| Supplement + ThiaB. | 20 | 546 | 2.54 | 2.07 | 1.95 |
| Stilbestrol | 17 | 550 | 2.91 | 2.38 | 2.15 |
| Stilbestrol + ThiaB. | 18 | 523 | 2.63 | 2.33 | 2.17 |
| ThioB. | 19 | 530 | 2.44 | 2.07 | 1.90 |
| Suppl. + Stilb. + ThiaB. | 18 | 543 | 2.88 | 2.42 | 2.22 |
| Supplement | 78 | 542 | 2.75 | 2.28 | 2.14 |
| No supplement | 74 | 530 | 2.56 | 2.20 | 2.02 |
| Stilbestrol | 73 | 539 | 2.81 | 2.38 | 2.20 |
| No stilbestrol | 79 | 533 | 2.53 | 2.12 | 1.98 |
| Thiabendazole | 75 | 536 | 2.59 | 2.22 | 2.06 |
| No thiabendazole | 77 | 536 | 2.75 | 2.28 | 2.13 |

1/ Eight animals got out of the experimental pastures and had to be excluded from the data.

2/ Accumulative ADG from the initial weight to the date shown.

Table 4. Forage quality

| Date | Crude protein Range forage 1/ | Bell A meadow 2/ |
|---|---|---|
| | % | % |
| May 29 | 12.0 | 11.5 |
| June 5 | 11.1 | 12.1 |
| June 12 | 10.2 | 11.2 |
| June 19 | 9.4 | 9.9 |
| June 26 | 8.6 | 9.9 |
| July 3 | 8.0 | 9.3 |
| July 10 | 7.4 | 9.2 |
| July 16 | 6.9 | 9.1 |

1/ Supplement level was based on forage values over a period of 10 years on the Squaw Butte range and yearling response to various supplements.

2/ Forage was sampled weekly during the trial up to cutting and bunching of the meadows on July 13.

This resulted in higher gains from steers not receiving a supplement than would normally be expected and possibly may have effected the gains of the supplemented steers since excess protein was fed in relation to energy. These results further point out the need for a proper balance of nutrients since if either protein or energy is out of balance gains can be effected.

The stilbestrol implants boosted gains by ten percent with implanted steers gaining 2.20 pounds per day as compared to 1.98 for the steers not implanted. The combination of supplements with the implant, produced the best gain of any of the combined treatments.

Gains were depressed among the steers receiving the internal parasite control. Daily gain of steers receiving the bolus was 2.06 pounds as compared to 2.13 for the control steers. Microscopic examination of feces from steers with and without the internal parasite treatment indicated a very low infestation of either stomach or lung worms in any of the steers.

Supplemented steers returned $2.40 more per head than the controlled steers. Of the individual treatments, stilbestrol implants made the greatest return with these steers returning $6.00 per head over the nonimplanted steers. The most profitable of the single treatments being the stilbestrol implant. Thiabendazole, the internal parasite treatment, reduced returns by $3.00 per head over steers not receiving the parasite control. This was mainly due to the cost of the thiabendazole capsule rather than the reduced rate of gain.

## CONCLUSIONS

Results from this trial indicate that we can not afford to ignore the use of stilbestrol implants on pastures such as these. Although supplement alone and in combination with stilbestrol increased the rate of gain, the implant alone was the most profitable treatment. Supplements did not give the expected rate of gain, however, we can not conclude that supplementation will not pay on this type forage. It does point out the need, however, of learning more about the quality of these forages and tailoring a supplementation program to meet these needs.

Results from this study indicate no economic advantage from internal parasite control. However, periodic fecal sampling and worm counts should be continued as cattle numbers become more congested on these meadows to see if we have year to year variations in parasite infestation or possibly an increase with the intensification of livestock management.

# FALL CALF PRODUCTION

R. J. Raleigh, Larry Foster, and H. A. Turner

Range livestock operators in eastern Oregon and much of the western rangeland country can be classified as either cow-calf operators, or cow-calf-yearling operators. The major reason for each type of operation is the size of the calf that can be weaned. Range forage of eastern Oregon and similar dryland range areas begins to mature in early summer, resulting in a steady decline in nutritive value. As a result of this decline in forage quality, milk production of range cows and weight gains of their calves are greatly reduced in late summer and fall. Calf weaning weights are often below 350 pounds, which in most cases is not a "break even" point financially for the operator. Therefore, these calves are carried over the winter and returned to the range the next summer to balance the cost of the operation.

Calving percentages, weaning percentages, and weaning weights can be increased by improved management, selection, and breeding practices. However, little can be done to improve the quality of forage available to the calf and its mother to permit this calf to gain at its potential. Calves born in the spring will go on range usually weighing under 100 pounds and are able to make little direct use of high quality forage during the early season. When the calf is old enough to effectively use this forage, the forage quality and milk production has been reduced to a point where the calf derives little benefit from it.

A fall-calving program should provide an older, larger calf to go on the forage, so the forage at peak value, can be utilized directly by this calf. Several years ago the Squaw Butte Station initiated a fall-calving program by holding back a group of cows from the regular spring-calving herd and breeding them to calve in October and November of that year. Additional mature cows and replacement heifers were added to this fall-calving herd so that by the fall of 1968 half of the herd had been converted to fall-calving. The herds are comparable in age and productive ability. These herds will be maintained with as near a genetic uniformity as possible and will be used for comparisons, to evaluate nutritional management, and economic factors. Research data on both herds, concerning the nutritional and management requirements and other factors that may enter into the evaluation of these herds, will be recorded.

## EXPERIMENTAL PROCEDURE

Breeding of the spring calving herd, takes place in June and July on the sagebrush-bunchgrass range at the Squaw Butte Station. These breeding pastures are about 2000 acres in size with water hauled to one watering place at a time. The fall-calving herd is bred during January and February on the meadowlands of the Station where the cattle are fed during the winter. Both herds are bred with the same bulls and are multiple sired. First calf heifers in both herds are bred to calve about two weeks before the mature cows. This permits the opportunity to give special attention to these animals. Replacement for the fall herd are picked from the spring herd and vise versa to help assure genetic uniformity between the herds and it allows heifers more time for growth before breeding. Cows from each of the herds are pregnancy tested about 90 days after the breeding season ends and open cows are either switched to the other herd for a second chance or culled, depending on the history of the animal.

Salt and a salt-bonemeal supplement are available to both herds at all times. The spring calving herd receives one pound of cottonseed meal or equivalent per head daily from about February 15 to April 15 each spring. The fall calving cows are supplemented from parturition to the time of turnout on spring range. Supplemental levels are variable since part of the study is to determine the proper levels of nitrogen and energy supplementation that will give optimum return to the livestock operator. The goals are to determine the minimum level of feed necessary to maintain long term production without adversely effecting either weaning weight of the calf or reproductive performance of the cow. Creep-feeding of the calves enters into the study and calves have been fed various levels of creep-feed from shortly after birth until either going out on range or in some cases, until weaning.

Both the spring- and fall-calving herds are grazed on native or crested wheatgrass pastures from turnout in April until September 15 and November 1 for the fall- and spring-calving herds, respectively. Fall-born calves are weaned in late July and spring-born calves are weaned in early September.

## RESULTS AND DISCUSSION

Performance data of the spring and fall born calves are shown in Table 1. The average weaning weight of the fall-born calves was 502 pounds as compared to 330 pounds for the spring-born calves. The fall-born calves were weaned at 273 days of age while the spring-born calves were weaned at 166 days of age. It should be noted that carrying the spring-born calves for an additional period before weaning would not have appreciably increased their weaning weight, since little gain is made by these calves beyond the first of September, under the existing forage conditions.

Table 1. Performance data of spring- and fall-born calves averaged over 5 years

| Item | Spring calves | Fall calves |
|---|---|---|
| Number of calves | 619 | 494 |
| Date of birth | March 30 | October 26 |
| Weight when put on range, lb. | 92 | 301 |
| Average daily gain from birth to time on range, lb. | 1.10 | 1.32 |
| Average daily gain on range, lb. | 1.63 | 1.98 |
| Average daily gain from birth to weaning, lb. | 1.49 | 1.56 |
| Weaning age, days | 166 | 273 |
| Weaning weight, lb. | 328 | 506 |

Conception rates were good in both herds with averages of 90 and 91 percent for the spring- and fall-calving cows, respectively. However, as was pointed out earlier, on the Squaw Butte Station spring-calving cows are bred on relatively small range pastures, this combined with good stockwater conditions means animals are concentrated and higher conception rates are to be expected. Most range livestock are bred in larger pastures with rougher terrain and poorer water distribution and even with extending the breeding season to 90 or 120 days we can not expect to get the conception rate attained under the Station conditions.

The percent of calves weaned, during the five year period, was 82 and 85 respectively for the spring- and fall-born calves. These figures represent the percent of calves weaned from the total cows that were exposed to breeding. Cows that were culled on pregnancy test, age, cancer eye, or other reasons, before weaning were considered as not weaning a calf.

Fall calves were creep-fed with about 90 percent of them on feed after a week of exposure to the creep. Observations would show that all calves in the study were eating from the creeps after about two weeks. The creep-feed consisted, basically, of 40 percent barley, 40 percent alfalfa, and 20 percent cottonseed meal. This was varied during the years as to the amounts fed since part of the study was to determine the proper level of creep feeding. However, for the results of this paper all creep feeding is averaged.

Clinical cases of calfhood diseases, such as scours and pneumonia, were minimal in the fall-born calves requiring less than one percent treatment, whereas, upward of ten percent required treatment in the spring-born calves. This same ratio occurred at weaning time with the spring-born calves requiring considerably more treatment at weaning than the fall-born. There was no evidence that any of the cows had weaned their calves prior to weaning time.

Economics averaged over the five years of the study favored the fall-calving herd. Feed costs for wintering the lactating fall-calving cows ranged from $10 to $18 per animal over that for the spring-calving cows. This range in cost is due to the various treatments these animals were subjected to. Creep-feed for the fall calves ranged from $3.75 to $5.50 per calf, with this range in cost reflecting the various levels of creep-feeding. Combining the additional cost of wintering the cow and creep-feeding the calf makes a total cost for the cow-calf pair ranging from $13.75 to $23.50 for an average of $18.12 more for the fall calf than for the spring calf.

The average increase in weaning weight of the fall calf over the spring calf for the five years data was 178 pounds. Using the average five-year price of $29.60 per hundredweight for spring-born steer and heifer calves weighing 300-400 pounds at weaning time, the 328 pound spring-born calf was worth $97.08 per head. The average five-year price of fall-born calves weighing 475-550 pounds at weaning in late July was $28.75 per hundredweight making the 506 pound fall-born calf worth $144.48 per head when weaned. This gives a return of $47.40 more per head for the fall-born calf than for the spring-born calf.

Subtracting the additional cost of wintering the fall cow-calf pair over that of wintering the pregnant cow to calve in the spring leaves a net return of $28.78 per head more for the fall-born calf than for the spring-born calf. It should be pointed out that differences in death loss as reflected by percent of calves weaned as well as additional costs of medicinal supplies and veterinary services were not considered. These costs were greater in the spring-born herd and therefore would make the profit picture better with regard to the fall-calving herd.

Another way to look at the eonomics is to consider the feed, labor, possible death loss, etc. involved in bringing the 328 pound spring-born weaner calves up to the 506 pound weaning weight of the fall calves. Using an average cost figure of 24¢ per pound of gain it would cost $42.72 to provide 178 pound gain that would bring the spring-born calf weight up to the weight of the fall-born calf. This results in a net increase in feed cost of $22.68 for the spring-born calf over that of the fall-born calf at comparable weights.

## CONCLUSIONS

Fall calving offers an opportunity for some ranchers to increase their net return per cow-unit over that of spring calving. This is especially so when weaning weights of spring-born calves are light due to type of forage and other necessary management that is limited as a result of summer feed. Fall-born calves going on range in the spring at 200 pounds more weight than spring-born calves are able to better utilize the forage during the time when it is of peak quality and thereby give a better return to the livestock producer.

It should be pointed out that in order for a person to switch from spring to fall calving he should be prepared to feed somewhat better in the wintertime and have adequate feed supply available at a reasonable cost. The opportunities provided for more intensive management to increase total production and efficiency are considerably greater with fall calving than with spring calving. Fall calving offers an opportunity for breeding in smaller pastures, better use of bulls and even the possibility of using artificial insemination since cattle are gathered and bred on small pastures. It also offers an opportunity for more intensive feeding of this calf through creep-feeding and thereby permitting the calf to gain more nearly at its production potential than calves born in spring with mothers ranging on poor range feed.

For the average rancher fall-calving should increase the rate of conception and the number of calves weaned per unit of cows. This can be brought about because usually the average rancher breeding on large range areas is not able to manage his cattle or confine them so that bull distribution is not a problem. Calfhood disease problems were generally lower with the fall-calving herd than in the spring-calving herd, resulting in a lower cost for medicinal and veterinary charges as well as the possibility of weaning a larger percent of the calves born.

# ENERGY LEVEL AND NITROGEN SOURCE FOR FALL CALVING COWS

Larry Foster, R. J. Raleigh, and H. A. Turner

Fall calving looks promising and profitable for many ranch operators on high desert ranges. Light weaning weights, poor calving weather, and long breeding seasons have plagued ranchers with a spring calving problem. Calving in the fall does much toward eliminating these problems. However, due to the calving in the fall, this means lactating cows must be carried through the winter which is a change in practice from most ranching operations. Energy requirements for wintering lactating cows are critical. The energy level must provide for lactation and conception requirements. However, excess energy is inefficient from the standpoint of economics as well as animal utilization. This excess energy can more efficiently be fed directly to the calf.

The major objective of this study was to determine the minimal energy level necessary for wintering lactating cows to provide for optimum production, and secondly, to evaluate biuret, urea, and cottonseed meal for protein supplements.

## EXPERIMENTAL PROCEDURE

This report includes three years data with a total of 282 cow-calf pairs. The pairs were stratified by age and production index of the cows, and age and sex of the calf for allotment to treatments. Treatments consisted of two energy levels, 85 and 100 percent of that recommended by the National Research Council on beef cattle nutrition (NRC) for this class of cattle. Supplemental N sources were urea, biuret, and cottonseed meal during the first year with urea discontinued in the second and third years. The daily ration is given in Table 1. Water, salt, and a salt-bonemeal mixture were available at all times.

The cows were moved off range about mid-September each year and were fed rake-bunched meadow hay until starting on the study. The calves were dropped in October and November each year. After calving, the cows received two pounds of barley and one pound of cottonseed meal until the start of the study.

The animals were started on the study on January 8, December 5, and December 8 during the first, second, and third years respectively. The winter program ended about mid-April each year when the cattle were turned on to the range. The cows were weighed at the start of the winter feeding period, when turned on range, and in late July when the calves were weaned. Calves were weighed at birth, at the start of the winter feed period, midway through the winter period, when turned on range, and at weaning time in late July.

The cows were penned daily about 8:00 a.m. and fed their respective supplements, then turned out on the meadows for their daily hay ration. The calves were creep-fed at various levels within each cow treatment and all creep-fed at the same level while on range.

Table 1. Daily rations for cows 1/

| | Low energy | | | High energy | | |
|---|---|---|---|---|---|---|
| Ingredient | Amount fed | D.E. | C.P. | Amount fed | D.E. | C.P. |
| | (lb.) | (kcal.) | (lb.) | (lb.) | (kcal.) | (lb.) |
| Hay 2/ | 25.96 | 28080 | 2.09 | 25.96 | 28080 | 2.09 |
| CSM | 1.5 | 1927 | 0.59 | 0.75 | 990 | 0.31 |
| Barley | ----- | ----- | ---- | 2.51 | 3900 | 0.31 |
| Fat | ----- | ----- | ---- | 0.15 | 526 | ---- |
| Total | 27.46 | 30007 | 2.68 | 29.37 | 33496 | 2.71 |
| Hay | 25.96 | 28080 | 2.09 | 25.96 | 28080 | 2.09 |
| Biuret | 0.20 | ----- | 0.44 | 0.11 | ----- | 0.22 |
| Barley | 1.23 | 1927 | 0.15 | 3.12 | 4890 | 0.37 |
| Fat | ----- | ----- | ---- | 0.15 | 526 | ---- |
| Total | 27.39 | 30007 | 2.68 | 29.34 | 33496 | 2.68 |
| Hay | 25.96 | 28080 | 2.09 | 25.96 | 28080 | 2.09 |
| Urea 3/ | 0.18 | ----- | 0.44 | 0.09 | ----- | 0.22 |
| Barley | 1.23 | 1927 | 0.15 | 3.12 | 4890 | 0.37 |
| Fat | ----- | ----- | ---- | 0.15 | 526 | ---- |
| Total | 27.37 | 30007 | 2.68 | 29.32 | 33496 | 2.68 |

1/ Diets were as nearly isocaloric within energy levels as possible and isonitrogenous for all cows at a level recommended by NRC (1963).

2/ Hay was fed free choice and the figures presented are estimates based on past studies for average hay intake of mature cows.

3/ This ration, containing urea, was only used the first year.

## RESULTS AND DISCUSSION

The cows readily consumed their daily grain rations with the exception of the ration containing urea. For this reason, along with toxicity and poor utilization of urea with relatively low energy levels, urea was excluded from the treatments in the last two years.

Average daily gain of calves during the winter or summer period was not significantly effected by energy level during the three-year study, calves from cows receiving the lower level of energy gained 1.46 and those from cows receiving the higher level gained 1.42 pounds per day in the winter period (Table 2). Summer gains were 1.97 and 1.92 pounds per day for the respective treatments with average daily gains from birth to weaning of 1.69 and 1.67 pounds.

Table 2. Calf gain data averaged over three years 1/

| Cow treatment | No. of animals | Calf weights Dec. | April | Aug. | Average daily gain Winter | Summer | Total |
|---|---|---|---|---|---|---|---|
| | | (lb.) | (lb.) | (lb.) | (lb.) | (lb.) | (lb.) |
| High energy | 106 | 127 | 307 | 508 | 1.42 | 1.92 | 1.67 |
| Biuret | 54 | 125 | 302 | 497 | 1.41 | 1.89 | 1.63 |
| CSM | 52 | 128 | 312 | 518 | 1.43 | 1.95 | 1.70 |
| Low energy | 108 | 128 | 307 | 514 | 1.46 | 1.97 | 1.69 |
| Biuret | 55 | 128 | 302 | 505 | 1.43 | 1.93 | 1.65 |
| CSM | 53 | 128 | 312 | 522 | 1.48 | 2.00 | 1.72 |
| Nitrogen sources | | | | | | | |
| Biuret | 109 | 127 | 302 | 501 | 1.41 | 1.91 | 1.64 |
| CSM | 108 | 128 | 313 | 519 | 1.49 | 1.95 | 1.71 |

1/ Only those treatments that were used each year are included.

Nitrogen source in the cow ration did not effect calf gains, with calves on biuret-fed cows gaining 1.64 pounds per day and those from CSM-fed cows gaining 1.71 pounds per day when averaged over the three-year study. Calves from the urea-fed cows, during the first year, had daily gains of 1.63 pounds.

Cow weight changes were not different with respect to energy level or nitrogen source. During the first year of the study cows on each level of energy lost 79 pounds per head during the winter, the high-energy group gained 13 and the low-energy group lost 13 pounds per head in the second winter, and lost 112 and 125 pounds per head, respectively for the high and low energy levels in the third winter. Weather conditions were considerably more severe during the third winter which may account for the higher loss of weight in both groups that winter. Averaged over the three years there was no difference in weight changes of the cows with respect to source of nitrogen in the supplement.

Conception rates were not affected by any of the treatments imposed on the cows. Conception rates over a 60-day breeding season in January and February were 95, 69, and 96% for the first, second, and third year of the study, respectively, for an average of 87%. The low conception rate in the second year can probably be partially attributed to the drouth conditions of that year as conception rate of the spring calving herd on the Station was low also. No other explanation is offered.

Health or disease problems among the calves could not be specifically correlated with any of the treatments imposed on the cows. However, more calves from cows on the higher energy rations required treatment for scours and respiratory diseases than those from cows on low energy. Numbers treated were not large enough to be significant and an attempt to explain this would be purely speculative.

## CONCLUSIONS

These data indicate that fall-calving cows can be wintered on 85 percent of NRC requirements without effecting weaning weight of the calf or reproduction of the cow. The average daily gain of calves from cows on the higher level of energy was 1.67 pounds compared to 1.69 for the calves from cows on the lower level. Conception rate, calving percent, calving date, or weaning percent were not affected by the treatments.

Of the criteria measured there were no differences with regard to using either biuret or cottonseed meal as sources of N in the supplement. Urea cannot be recommended as a source of N for cattle with the levels of energy used in these studies primarily due to palatability factors associated with toxicity and utilization.

Results of these studies indicate that the most economical level to winter fall-calving cows is the lower level using either cottonseed meal or biuret depending on cost. It should also be brought out that animals on these studies came off range and went on winter feed in a good thrifty condition. Cattle coming in with a loss of weight and condition will have a greater winter feed requirement to replace this weight and still meet their requirement for conception and milk production.

## RESEARCH IN PROGRESS

TITLE Utilization of Feed-Grade Biuret with Mineral and Energy

OBJECTIVES

1. To study feed-grade biuret as a supplemental nitrogen source for wintering steer calves with and without additional mineral and/or energy.

2. To study the effect on mineral additions to rations for wintering steer calves.

3. To study the effect of energy on wintering steer calves.

TITLE Gain Response to Different Hay Qualities in Different Years and Effect of Winter Gain on Subsequent Performance

OBJECTIVES

1. To compare different types and quality of hay in the wintering of yearlings.

2. To determine the effect of winter gains on subsequent gains in summer and in the feedlot.

3. Compare supplementing on pasture summer to no supplement (stratified across winter treatment).

4. To study the feasibility of finishing cattle on pasture versus finishing in the traditional feedlot fashion.

5. To study economics from weaning time to packing plant of the various methods outlined here.

TITLE Nitrogen and Energy Requirement for Wintering Cows and Calves on Fall-Calving Program

OBJECTIVES

1. To determine the balance of nutrients for creep ration that will give optimum economic production with suckling calves.

2. To determine the minimal energy level necessary for wintering the fall-calving cows nursing a calf.

3. To determine the effect of creep-feeding on fall calves.

TITLE Cattle Production on Alfalfa, Alfalfa-Grass, and Clover-Grass

OBJECTIVES

1. To evaluate grazing and management methods on irrigated pastures.

2. To compare economics of beef production from grazing with that from feeding the harvested forage.

TITLE Management and Nutrition of Cattle Grazing Native Meadows

OBJECTIVES

1. Nutritive evaluation of forage grazed by the animal during the grazing season.

2. Supplementation criteria for cattle grazing native meadows.

3. Water requirements for grazing animals.

TITLE Nutritive Requirement of Various Classes of Cattle as Related to AUM Values

OBJECTIVE

1. To determine relative forage intake of different classes of range livestock during the grazing season.

TITLE Range Supplementation Methods

OBJECTIVE

1. To develop practical methods of supplementing cattle on range.

# INDEX

## PREVIOUS LIVESTOCK FIELD DAY REPORTS
## SQUAW BUTTE EXPERIMENT STATION

These reports are available upon request from the Squaw Butte Experiment Station, P.O. Box 833, Burns, Oregon 97720.

Special Report 171. 1964



Special Report 189. 1965



Special Report 210. 1966



Special Report 232. 1967



Special Report 251. 1968