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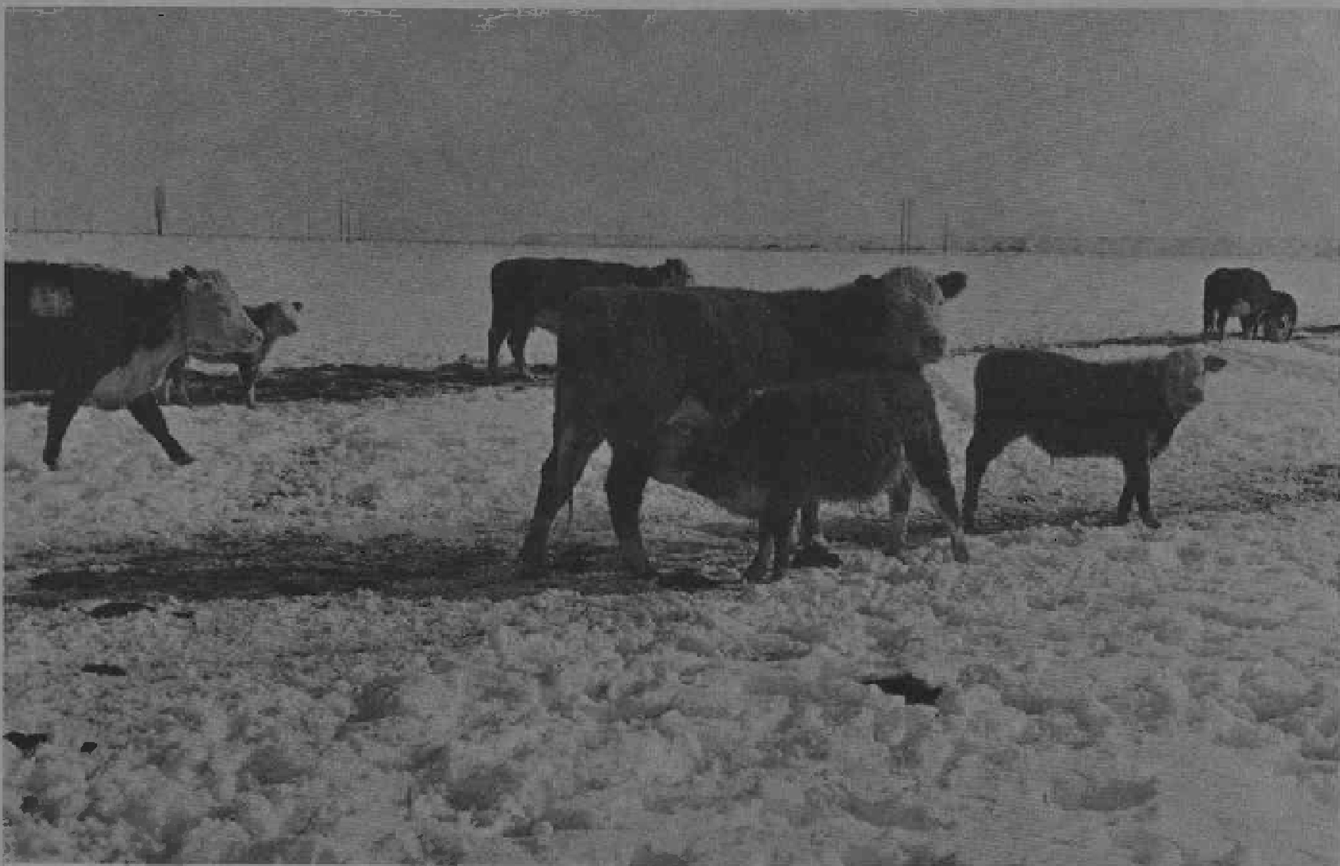

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A COMPARISON OF LONG VS CHOPPED ALFALFA OR MEADOW HAY
FOR WINTERING WEANER CALVES

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

In much of the west wintering weaner calves are generally fed a hay based ration by most ranchers. The ration is usually a native grass hay with an energy and/or protein supplement, or alfalfa which may be supplemented.

Hay quality will vary considerably depending on such factors as harvest date, plant composition, and haying conditions. Physical form and other factors may influence response of growing calves to these hays. Many ranchers feed loose hay either out of bales or directly from a loose stack; others chop the hay to better facilitate mechanical handling.

These studies were undertaken both to compare the native meadow hay to alfalfa as well as look at the effect of chopping the hay on the performance of wintering weaner calves.

EXPERIMENTAL PROCEDURE

Trial 1. Forty-eight weaner calves, averaging about 390 pounds, were stratified by sex and weight and allotted to one of four treatments with six animals per lot and two replications per treatment. Meadow and alfalfa hay were fed as long or chopped hay in a 2 x 2 factorial trial (Table 1).

Table 1. Experimental design

	Trial 1		Trial 2	
	Form fed		Form fed	
	long	chopped	long	chopped
Alfalfa	12[1/]	12	26	26
Meadow	12	12	10	10

1/ Represents numbers of animals.

The alfalfa hay fed was a 13.1% protein and the meadow hay 8.2% protein. Table 2 shows the daily dietary intakes. The hay was fed free choice since voluntary intake was one of the objectives of this study. The grain portion of the ration was fed daily in feed troughs and the hay was fed in mangers. The hay was weighed in daily with refusals weighed out weekly.

Table 2. Composition of daily ration per head - Trial 1

	Ingredient			
Form	Meadow hay	Alfalfa hay	Barley	Cottonseed meal
	(lb.)	(lb.)	(lb.)	(lb.)
Alfalfa[1/]				
long	--	12.1	2	--
chopped	--	13.2	2	--
Meadow				
long	9.6	--	2	1
chopped	9.4	--	2	1

1/ All hay was fed free choice daily with refusals weighed back weekly.

Fresh water, salt, and a salt-bonemeal mix were available in the lots at all times. The animals were weighed at 28-day intervals after an overnight restriction from water. Hay samples were taken daily and composited for analysis. The trial was initiated on November 6, 1968 and completed on March 12, 1969. The results given here are for this 126 day period.

Trial 2. Seventy two weaner calves were allotted on the basis of sex and weight to one of eight pens. Four pens of 8 head each were fed long or chopped first or second cutting alfalfa. Four pens of 10 each were fed either third cutting alfalfa or meadow hay in long or chopped form. Unequal numbers were used based on the amount of hay available. All alfalfa fed cattle were summarized together (chopped vs. long) for this article. A summary of differences in hay quality will be presented in a later report. Table 1 shows the design of the experiment.

The protein level in the alfalfa hay was about 18% indicating a considerably better quality hay than in Trial 1. The meadow hay was 8.0% protein which was about the same quality as the meadow hay used in Trial 1. Composition of the daily diet is shown in Table 3.

The grain supplement was fed daily in troughs with the hay fed to all cattle in sheltered bunks. The hay was weighed in daily with refusals weighed back weekly. The hay samples in this trial were taken by 3/4 inch bale core of a representative number of bales each week.

Fresh water, salt and salt-bonemeal mix were available at all times in each lot. The animals were weighed each 28 days after an overnight restriction from water.

Table 3. Composition of daily diet per head - Trail 2

Diet	Ingredient			
	Meadow hay[1/]	Alfalfa hay[1/]	Barley	Biuret
Alfalfa				
long	--	14.1	--	--
chopped	--	15.3	--	--
Meadow				
long	9.0	--	2.8	2 oz
chopped	8.8	--	2.8	2 oz

1/ All hay was weighed in daily and fed free choice with refusals weighed back weekly.

RESULTS AND DISCUSSION

Past studies at this station have shown that weaner calves consuming native meadow hay without supplement will gain about 1/2 to 2/3 of a pound per day for the winter period. Research also indicates that calves should gain 1 - 1.6 pounds per head per day for best gains on pasture the following summer. Production and cost data from Trial 1 are presented in Table 4.

Intake of meadow hay was similar whether it was chopped or long, however, the cattle on the long hay did consume a little more. The calves consuming the chopped meadow hay appeared to have more problems with sore mouths possibly due to the short stiff pieces of grass stems.

Chopping of alfalfa increased the hay intake by about 10% which was reflected in the gain made by these animals. Gain followed the intake pattern with the best gains exhibited by the calves on chopped alfalfa (1.17 lbs/day), followed by the long alfalfa (1.04 lbs/day), long meadow hay (.98 lbs/day), and chopped meadow hay (.94 lbs/day).

Efficiency of gain could not be compared across hay types since the grain portion was different. It can be noted that hay efficiency followed the gain pattern. The cost of gain was higher on the alfalfa rations mainly because of the relatively poor gains made on this poor quality hay. The net return over feed cost, however, was still best on the chopped alfalfa treatment.

Table 4. Production and cost data on weaner calves fed long and chopped meadow and alfalfa hay - Trial 1

	Meadow hay		Alfalfa hay	
	long	chopped	long	chopped
Initial wt., lb. 1/	397	381	390	395
Average daily gain lb.	.98	.94	1.04	1.17
Efficiency of gain 2/	9.8	10.0	11.6	11.3
Feed cost/head/day ¢ 3/	23.0	22.7	27.2	29.1
Feed cost/lb gain ¢ 4/	23.5	24.2	26.1	24.9
Return over feed cost ¢	16.2	14.9	14.4	17.7

1/ Initial weight was taken on November 6, 1968 and data are summarized to March 12, 1969 for a total of 126 days.

2/ Hay efficiency only - not including grain supplement.

3/ Costs of feed based on following prices (1972 estimates, $/ton).

Barley	60
Meadow hay	25
Alfalfa hay	35
Cottonseed meal	100

4/ Gain was estimated at 40¢ per pound.

Trial 2. The intakes on the second trial followed the trend of the first with the chopping of meadow hay slightly lowering intake whereas chopping of alfalfa resulted in an 8% increase in intake (Table 3).

Table 5 shows the production and cost data on Trial 2. Gains on meadow hay were similar to the first trial with the chopped hay fed cattle gaining 20% less than the long hay group. Again, the chopped alfalfa fed group gained better than the long hay fed group, 1.56 as compared to 1.38 pounds per day. This group ate 8% more and gained 13% better.

The alfalfa fed group gained considerably better in Trial 2 as compared to Trial 1, particularly considering that the animals in Trial 1 had two pounds of barley per head per day. This difference can be attributed mainly to increased quality of hay and increased intake.

The efficiency of conversion of hay to gain reflects the same trend in both trials. Cost of gain in Trial 2 followed the trend of gain with chopped alfalfa being the cheapest followed by long alfalfa, long meadow and finally the chopped meadow hay.

Table 5. Production and cost data on weaner calves fed long and chopped meadow and alfalfa hay - Trial 2

	Meadow hay		Alfalfa hay	
	long	chopped	long	chopped
Initial wt., (lb.)1/	358	373	364	366
Average daily gain	1.09	.91	1.38	1.56
Efficiency of gain2/	8.29	9.69	10.20	9.84
Feed cost/head/day ¢3/	21.7	21.4	24.6	26.7
Feed cost/lb. gain ¢4/	19.9	23.5	17.8	17.1
Return over feed cost ¢/day	21.9	15.0	30.6	35.7

1/ Trial started on December 7, 1971 and ran until March 1, 1972 for a 113 day trial.

2/ Hay efficiency only not including grain supplement.

3/ Costs of feed based on following prices:

Meadow hay - $25/ton
Alfalfa - $35/ton
Barley - $60/ton
Biuret - 1¢/oz.

4/ Gain was evaluated at 40¢/lb. gain.

The return over feed costs indicated that the chopped alfalfa returned about $5.75 per head more than the long hay. In addition to this one must consider the added cost of grinding. In comparing the chopped alfalfa to long meadow hay, a return of $12.20/head would be realized for the 113 day trial.

From these trials one would conclude that poor alfalfa hay is not much better than average quality meadow hay, whereas good quality alfalfa is much superior to either. Also, from these data one would not recommend chopping meadow hay, while chopping alfalfa appears to be a good practice.

NITROGEN AND ENERGY RELATIONSHIPS IN WINTERING STEER CALVES

Larry Foster and R. J. Raleigh

Wintering weaner calves on native meadow hay generally requires some kind of supplementation. The two nutrients of most concern are protein and energy. Opinions vary as to which is most important and what kind is best. Trace minerals are sometimes of concern in specific areas.

Natural protein can be replaced with some nonprotein nitrogen compounds. Biuret and urea are the most common. Due to toxicity, palatability and utilization problems associated with urea, it has not been a consistently effective source of nitrogen for growing calves. Biuret has had no problems of toxicity or palatability, therefore making it an ideal source of N for supplementing low quality roughage, provided adequate energy is in the ration.

Supplemental energy, generally supplied by grains, is often necessary in obtaining economical gains from wintering calves on meadow hay. Protein has traditionally been supplied via a plant meal such as cottonseed meal. Which nutrient (nigrogen or energy) is needed first for most economical growth is not always clear cut. Supplements on the market range from high protein-no energy supplement to one of high energy low protein (straight grain).

Trace minerals are often considered important in a balanced nutritional program. Previous work at this Experiment Station has indicated that cattle eating the available forage of the area and on a relatively low plane of nutrition seldom show response to any mineral supplements other than phosphorus. Trace minerals were included in the first trial to determine if weaner steer calves would show a response to trace minerals, particularly in view of the fact that nonprotein nitrogen was being used rather than natural protein sources, and these calves would be growing at above maintenance levels.

This study was designed to determine the relative necessity of energy, nitrogen and trace minerals for supplementing weaner calves on native meadow hay. Biuret and barley were fed alone and in combination with each other to provide a comparison of these supplemental systems. Trace minerals were included the first year of the study.

EXPERIMENTAL PROCEDURE

The trials were conducted on two sets of cattle for two consecutive years at Section five winter headquarters. The cattle were fed in 12 adjacent lots. The supplement was fed in wooden bunks and long meadow hay in mangers under open sheds. The hay portion of the ration was fed as long hay free choice, weighed in daily with refusals weighed out weekly. Fresh water, salt and salt-bonemeal mix were supplied free choice at all times. Hay samples were taken with a bale core sampler and composited for analysis. The animals were weighed at 28 day intervals after overnight restriction from water. All supplements containing barley were pelleted in a 3/4 inch cube.

Trial 1. One hundred twenty weaner steer calves were stratified by weight and assigned randomly to one of 12 pens with 10 steers per pen (Table 1). Eight pens were assigned a treatment of mineral mix, feed grade biuret or energy, alone and in combination with each other. Twelve treatments were fed with six nitrogen-energy treatments and two trace mineral treatments (none or added trace minerals). Experimental design in Table 1.

Table 1. Experimental Design - Trial 1

Mineral	Nitrogen level 2/	Energy 3/	
		0	+
0	0	1 4/	2
	1	3	4
	2	-	9
	3	-	11
+	0	5	6
	1	7	8
	2		10
	3		12

1/ Mineral was either none (0) or fed at 2.27 gm/head/day (+). Table 2.

2/ Nitrogen levels calculated as follows:

0. No supplemental Biuret added.
1. All supplemental nitrogen (considering all N supplied by free choice hay intake) being supplied by biuret.
2. All supplemental N being supplied with biuret and barley.
3. All of the calculated N requirement of the animal being supplied by biuret (ignoring the N in the hay and barley).

3/ Energy was either 0 (no added barley) or + (2 lb. added barley).

All + treatments were isocaloric.

4/ Number represents treatment.

Treatment explanations were as follows: (* denotes added trace mineral)

1 and 5.* No supplemental nitrogen or energy.

2 and 6.* No supplemental nitrogen but with added energy from barley (some nitrogen was in barley).

3 and 7.* No supplemental energy. Biuret added to supply the nitrogen needed to balance the ration for N

4 and 8.* Added energy supplied by barley plus the same amount of biuret added as in number 3 and 7.* Thus, the barley would add N in excess of the animals theoretical requirement.

9 and 10.* Added energy supplied by barley, with biuret supplying the N needed to balance the ration.

11 and 12.* Added energy supplied by barley, with the entire daily requirement for N coming from biuret alone (ignoring N in the hay and barley). This treatment was in excess of the animals' theoretical requirement for N.

Table 2 shows the trace mineral mix, with 2.27 grams per head per day fed in the supplement (or in salt for the treatment number 5 group).

Table 2. Trace mineral Mix 1/

Mineral	%	Mg/hd/day as fed
Zinc	29.6	670
Iron	9.8	222
Manganese	8.0	182
Copper	3.0	68.1
Sulphur	3.0	68.1
Iodine	1.8	68.1
Cobalt	0.12	2.7

1/ Fed at a rate of 2.27 grams/head/day.

Table 3 shows the ration composition with the meadow hay being 6% protein.

Table 3. Ration Composition - Trial 1 1/

Treatment	Trace mineral	Biuret	Barley 2/ Dry matter	Barley 2/ Air dry
	(gm)	(lbs.)	(lbs.)	(lbs.)
1	--	--	--	--
2	--	--	2.0	2.25
3	--	.34	--	--
4	--	.34	2.0	2.25
5	2.27	--	--	--
6	2.27	--	2.0	2.25
7	2.27	.34	--	--
8	2.27	.34	2.0	2.25
9	--	.22	2.0	2.25
10	2.27	.22	2.0	2.25
11	--	.63	2.0	2.25
12	2.27	.63	2.0	2.25

1/ All animals received native meadow hay free choice. Requirements were determined from 1970 NRC requirements for 1.5 pounds daily gain.

2/ .04 pounds N.

3/ Trace mineral supplied gratis by Leslie Salt Co.

4/ Biuret supplied gratis by Dow Chemical Co.

Trial 2. Trial two was a repeat of trial one without the trace mineral treatment, using two pens of 8 head per pen on each treatment. The 96 weaner steer calves were stratified by weight and assigned randomly to one of 12 pens. Treatment number was randomly assigned to two pens each as seen in Table 4. Nitrogen and energy treatments were the same as in Trial 1 with ration composition shown in Table 5. Differences in amount fed were primarily due to different hay analysis and size of animal. The biuret only treatment was fed daily to the animals by suspending finely pulverized biuret in water and spraying the hay.

RESULTS AND DISCUSSION

Trial 1. Results from Trial 1 are presented in Table 6 and 7. Hay intake was very similar for all treatments. Trace mineral had no effect on the performance of weaner calves and therefore, was not considered in Trial 2. Nitrogen and energy consideration will be discussed in conjunction with Trial 2.

Table 4. Experimental Design - Trial 2

Nitrogen level 1/	Energy 2/	
	0	+
0	1 3/	2
1	3	4
2	-	5
3	-	6

1/ Nitrogen levels calculated as follows: (0) no supplemental N supplied. (1) All supplemental N being supplied by biuret considering only the nitrogen in the hay, ignoring N supplied in the barley. (2) All supplemental N being supplied with biuret and barley (balanced diet). *(3) All of calculated N requirement of the animal supplied by biuret (ignoring the N in the hay and the barley).

2/ Energy is either 0 (no added barley) or + (3 pounds added barley). All (+) treatments are isocaloric.

3/ Number represents treatment designation, see Table 5. All treatments contain 2 pens of 8 head each.

Table 5. Ration Composition - Trial 2 1/

Treatment	Biuret	Barley	
		Dry matter	As fed
	(lb.)	(lbs.)	(lbs.)
1	--	--	--
2	--	2.75	3.25
3	.21	--	--
4	.21	2.75	3.25
5	.08	2.75	3.25
6	.63	2.75	3.25

1/ Rations 2, 4, 5, and 6 were pelleted in 3/4 inch square pellets. All animals received native meadow hay free choice.

Table 6. Performance Results - Trial 1

Trace mineral	Nitrogen level 1/	Hay intake Barley 0	Hay intake Barley +	Average daily gain Barley 0	Average daily gain Barley +
None	0	12.7	11.6	.64	1.07
	1	12.0	11.3	.76	1.08
	2	---	12.2	---	1.09
	3	---	12.5	---	1.20
2.27 gm per day	0	12.3	11.8	.64	1.02
	1	12.4	12.0	.69	1.11
	2	---	12.2	---	1.20
	3	---	12.3	---	1.03

1/ Levels explained in footnote - Table 1.

Table 7. Trial 1 average daily gains averaged across treatments

	Barley None	Barley Added
Mineral		
None	.7	1.11
2.27 gm/day	.6	1.09
Nitrogen level 1/		
0	.64	1.05
1	.72	1.09
2		1.15
3		1.12
Barley	.68	1.10

1/ Nitrogen levels explained in footnote - Table 1.

Trials 1 and 2. Performance results and daily hay intake from Trial 2 are presented in Table 8.

Table 8. Average daily gain and hay intake - Trial 2 1/

	Energy			
	Hay intake		ADG	
Nitrogen level	0	+	0	+
0	12.5	11.4	.37	1.04
1	12.4	11.4	.59	1.03
2		12.1		.97
3		12.4		1.21

1/ Pounds per head per day.

In both trials there was a stimulation in average daily gain by the addition of N alone (12.5% and 59% in Trials 1 and 2, respectively). However, this stimulation in gain was not as great as the addition of barley alone (64.5% and 181%). This would indicate that the first limiting nutrient in these trials was the need for additional energy. There was a trend of a little added gain for additional nitrogen with barley. The apparent increase in gain for the high N level in Trial 2 may indicate a shortage of available N in the hay with a resulting shortage to the animals. This was not apparent in Trial 1 with higher added N.

In looking at this data from a more practical economic viewpoint, we will compare the N only to the barley only treatment using $60/ton barley, $312/ton biuret and 40¢ beef.

Trial 1.

Nitrogen only	Cost	5.26¢/day
	Return	3.20¢
		2.06¢ loss per head/day
Barley	Cost	6.8¢
	Return	16.8¢
		10.0¢/head/day

Dollars returned for dollars feed cost invested 2.47

Trial 2.

Nitrogen only	Cost	3.3¢
	Return	8.8
		5.5¢/head/day
Dollars returned for dollars feed cost invested		2.66
Barley only	Cost	9.8
	Return	26.8
		17.0¢/head/day
Dollars returned for dollars feed cost invested		2.75

It is quite apparent from these data that feeding barley alone was a better investment than feeding nitrogen alone. This does not mean that one should never feed N alone or barley alone. Probably over most conditions the most economical diet would be one of a balanced ration with both N and energy. Some feed and ranch conditions may dictate using a supplemental program which will be a little less efficient but will be made up for in practicality.

COPPER AND MOLYBDENUM NUTRITION IN PASTURE MANAGEMENT

F. B. Gomm and Larry Foster

Cattle grazing irrigated pastures in southeastern and south central Oregon may be receiving deficient amounts of copper or toxic amounts of molybdenum from the pasture forage. Recent work at Squaw Butte Experiment Station shows that animal gains can be increased by copper supplementation when forage from improved pastures is grazed.

The importance of copper as an essential element in the animal's diet has been recognized for many years. Early symptoms of the deficiency are usually observed by bleaching of the hair in colored animals, diarrhea, and lowered animal gains. Prolonged deficiencies of copper cause impaired reproduction, inability to coordinate muscular movements, skeletal abnormalities, and anemia.

Copper deficiencies occur most frequently where forage is grown on soils high in organic matter. Such conditions exist in old lake bed areas as one might find near Klamath Falls and where lands are repeatedly flooded year after year as are the meadows in Harney County near Burns. In these muck and peaty soils the copper ion is attached to the organic humus complex and may not be available to growing plants.

Drainage and repeated farming aids the breakdown of the organic matter and can help to make copper more available. In our irrigated pastures at Section 5 of the Experiment Station we have suspected such an improvement.

When highly organic soils produce forage which is only slightly deficient in copper the problem may be corrected in time as the soils decline in organic composition. Fertilizer copper can also be applied to the soil at about 5 to 10 pounds/acre of copper sulfate, but presently supplying needed copper directly to the animal appears to be more practical.

Copper deficiency may be aggravated by molybdenum. Apparently these two elements compete for the same metabolic site. When molybdenum is present in excess of the animal's requirement, copper is excreted, possibly to the extent of causing a copper deficiency. Therefore, the symptoms of molybdenum toxicity are similar to copper deficiency. Both may be corrected by providing additional copper to the animal's system. This can be done by injecting animals with copper glycinate or by feeding copper with salt or other supplements.

EXPERIMENTAL PROCEDURE

In 1968, sixty acres of native flood meadow were diked, drained by a sump pump in a 6 foot ditch around its perimeter, and irrigated with a sprinkler system with an 80 foot well water source. The primary purpose of this area is to provide a research area for obtaining cost and benefit values of differing uses under this system.

Initially 16, 2-acre pastures were seeded to combinations of fawn fescue with vernal alfalfa or ladino clover. These pastures were to determine the benefits from various combinations of grazing and haying practices from irrigated pastures.

All cattle used in the experiment have been yearling replacement heifers from the Squaw Butte herd. The cattle were weighed every 28 days after an overnight restriction from water. In 1970 and 1971 animals were weighed at scales near headquarters and were driven to the scales prior to weighing. In 1972 facilities were developed to weigh the animals at the corrals in the pasture development.

RESULTS AND DISCUSSION

In 1970 cattle grazing the pastures showed symptoms of copper deficiency and of molybdenosis, including bleached hair and diarrhea. Part of the animals which were grazing alfalfa-fescue pastures were injected with copper. In the last 14 days of the experiment (August 21 to September 4) copper treated animals gained 58 pounds per animal (4.1 lbs/head/day) compared to 47 pounds (3.4 lbs/head/day) for non treated animals. During the same period cattle which were grazing clover-fescue pastures and were not treated with copper gained only 21 pounds (1.5 lbs/head/day). Obviously the cattle did better from the alfalfa-fescue pastures.

In 1971 the clover-fescue pastures were grazed by yearling heifers, several of which were injected with copper. In a 112 day season the average gain per animal was 145 pounds with copper and 125 without copper.

Because the animals apparently didn't respond as much as expected to copper injections, it was thought that other mineral elements may be out of balance. Based on this assumption, two studies were made in 1972. Study number 1 compared the gains of animals between alfalfa-fescue pastures with clover-fescue pastures and among 4 mineral supplements. The check treatment received salt and bonemeal only. In addition to this salt-bonemeal mixture, treatment 2 received copper (1 gram/head/day), treatment 3 received copper and zinc, and treatment 4 received a complete mineral mixture. In study number 2, we collected forage samples at two-week intervals through the growing season. Samples were taken from grazed and non grazed pastures, and from alfalfa, grass, and meadow plants. These samples were analyzed for copper, molybdenum, manganese, zinc, phosphorus, calcium, magnesium, potassium, and cobalt.

The results expressed in animal gains are shown in Table 1. Animals grazing alfalfa-fescue pastures gained as much as 0.2 pounds/head/day more than those grazing clover-fescue. Those supplemented with copper gained from 0.2 to 0.3 pounds/head/day more than those not receiving copper. These gains are also reflected in higher gains per acre and gains per animal.

Table 1. Cattle gains from pastures with mineral supplements, 1972 1/

Mineral supplement	Animals per acre	Beef gain per acre	Gain per animal	Gain per head per day
	(No.)	(Lbs.)	(Lbs.)	(Lbs.)
Alfalfa-grass pasture:				
check	3.5	558	186	1.7
copper	3.5	664	221	2.0
copper-zinc	4.0	732	209	1.9
complete mineral mix	4.0	720	208	1.9
Clover-grass pasture:				
check	3.5	533	184 (125)	1.6 (1.3)
copper	4.0	603	202 (145)	1.8 (1.6)
copper-zinc	4.0	728	208	1.9
complete mineral mix	4.0	710	181	1.6

1/ Values in parentheses are 1971 data.

The 1972 gains from the clover-fescue pastures were better than in 1971 which could indicate that the pastures might outgrow part of their copper deficiency as the soils become less organic.

A summary of chemical analyses from the herbage samples can be seen in Table 2.

Table 2. Range in chemical composition of different forages through the growing season 5/1 to 8/25/72

Element		Vernal alfalfa	Ladino clover	Fawn fescue	Sainfoin	Manchar brome	Oahe wheatgrass
Manganese	(ppm)	8-38	21-29	10-37	14-31	20-30	21-41
Zinc	(ppm)	13-38	18-25	12-35	23-37	18-21	23-24
Phosphorus	(%)	.14-.39	.24-.28	.09-.28	.27-.29	.20-.25	.23-.25
Potassium	(%)	1.2-3.5	2.3-2.6	1.6-2.4	2.2-2.6	2.4-2.9	2.9-3.0
Calcium	(%)	1.3-2.8	1.3-1.7	.07-.40	1.1-1.2	.30-.32	.34-.45
Magnesium	(%)	.22-.38	.37-.37	.09-.25	.30-.36	.13-.18	.09-.15
Cobalt	(ppm)	.12-1.62	.42-.46	.10-.26	----	.10-.18	.16-.20
Copper	(ppm)	3.0-11.4	5.0-10.4	.2-6.6	5.4-14.4	3.6-7.0	1.6-8.0
Molybdenum	(ppm)	3.9-13.4	22.1-37.5	.4-9.2	----	.8-1.4	.5-3.0

Analyses of the forage would indicate no major mineral problem other than copper and molybdenum. All forages appear to be borderline or slightly deficient in copper from an animal standpoint, while molybdenum is not too far out of line in the grasses but it is rather high in the legumes. Copper in the forage should be at 10-12 ppm with the molybdenum 10 ppm or lower. The ratio of these elements to each other, however, is probably more important than the amounts in these borderline cases. When the molybdenum concentration becomes greater than the copper, problems may begin to appear, and is probably the case in these studies.

Nutritive requirements appear to be about .05 grams of copper per day for cattle or about 10 parts per million in the dry forage. Usually 1/2 to 1 pound of copper sulfate added to 100 pounds of salt should be effective in preventing trouble where forage is deficient in copper and where molybdenum doesn't exceed 15 to 20 parts per million in the forage. When molybdenum composition in the forage is high, diets should be adjusted by copper supplementation to balance copper to molybdenum in a 1 to 1 ratio.

CONCLUSION

Based on recommended levels of mineral elements in the diet, manganese, potassium, calcium, magnesium, zinc, and cobalt are all within the optimum range for cattle grazing our irrigated pastures.

Phosphorus is generally adequate early in the season but may become deficient later in the season especially in grasses. Copper often appears to be borderline deficient in mature alfalfa and in clover but probably not low enough to cause serious deficiency symptoms in itself. Most of the time however, the grasses are deficient in copper . Fawn fescue especially appears too low to meet the animals requirement.

At times during the growing season, molybdenum may be near the toxic level in alfalfa especially in early May. Since it is high and copper low, molybdenum toxicity may result from an unbalanced ratio. Clovers appear especially high and well into the toxic range for molybdenum. The grasses are not high in molybdenum but because of their low copper composition deficiency symptoms can be expected in animals grazing any of the grasses in pure stand or clover-grass mixtures.

Alfalfa in pure stands should meet the animal requirements for copper but because of approaching a 1:2 ratio of copper to molybdenum a copper deficiency could appear. Alfalfa-grass mixtures are quite likely to be deficient in copper especially late in the season.

Supplementing with copper sulfate in the salt mix should alleviate the symptoms and increase animal production from the pastures.

PROFIT FROM A SHORT BREEDING SEASON

R. J. Raleigh and Larry Foster

The estrus or heat cycle of the cow is about 21 days. Theoretically, if the cow is in an adequate plane of nutrition, free of disease and other stress factors, she should conceive with one exposure to the bull. Why then, should the breeding season be extended for long periods of time? This paper will explore some of the advantages of a short breeding season and nutritional and management manipulations necessary to reach the goal of a shortened breeding season.

Advantages of the shorter breeding season are increased weaning weights, more uniform calves that bring higher prices, ability to identify cows of low production, and the opportunities for achieving greater efficiency from feed resources through more intensive management. Weaning weights of calves born at different dates from this experiment station and other records are presented in Table 1.

Table 1. Weaning weights of calves born at various dates

Average birth date	Average weaning weight	
	September 1	November 1
	(lb.)	(lb.)
February 21	390	405
March 7	390	405
March 21	375	390
April 4	355	370
April 18	335	350
May 2	310	325
May 16	280	295
May 30	255	270
June 13	225	240
June 27	195	210

Average daily gain that can be expected of spring born calves on the high desert country is projected in Figure 1. These are based on data from the Squaw Butte herd. Where high elevation forest range with higher forage quality is available, gains could be expected to be higher, but the general trend with relation to birth date would be similar.

Calves that are randomly born during March through June (120 days) would have an average weaning weight of 300 pounds with a range from 200 to 400 pounds whereas calves born during March and April (60 days) would have an average weaning weight of 365 pounds with a range from 325 to 400 pounds. The time of calving should be adjusted so the calves will be available to make maximum use of the forage when it is at peak quality as shown in Figure 2. Bunching the calves through a shortened breeding season will be even more effective in increasing weaning weights of calves where the period of high quality forage is longer such as we find on the higher forest ranges.

More uniform calves, as a result of a short breeding season, provide a more attractive package for the buyer and more money to the producer. A look at market records shows that calves uniformly grouped according to size, weight, and grade will bring about $10 per head more than these same animals sold in a mixture. Larger pen lots made possible by a shortened breeding season will usually increase the price. Market records indicate that small pen lots will bring about $2 per 100 pounds more than single animals and larger pen lots about $2 per 100 pounds more than smaller pen lots. This represents a $4 per hundred weight increase in price through uniform grouping of calves.

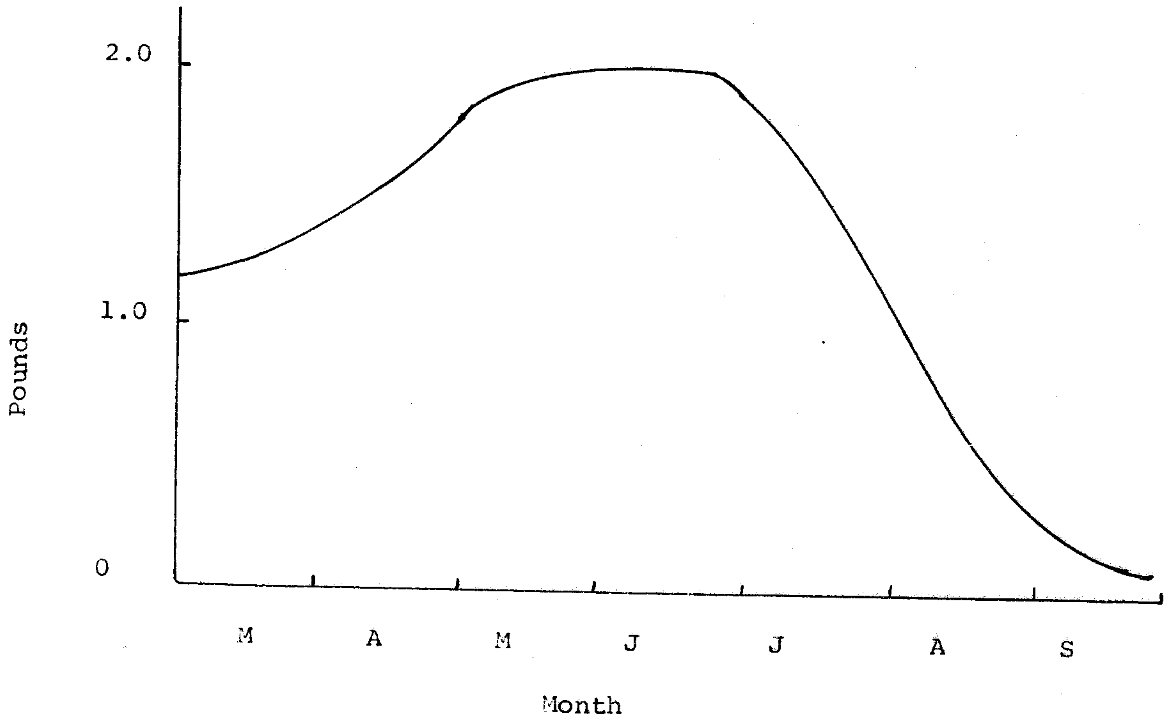

Figure 1. Average daily gain of spring-born calves on the high desert ranges of eastern Oregon.

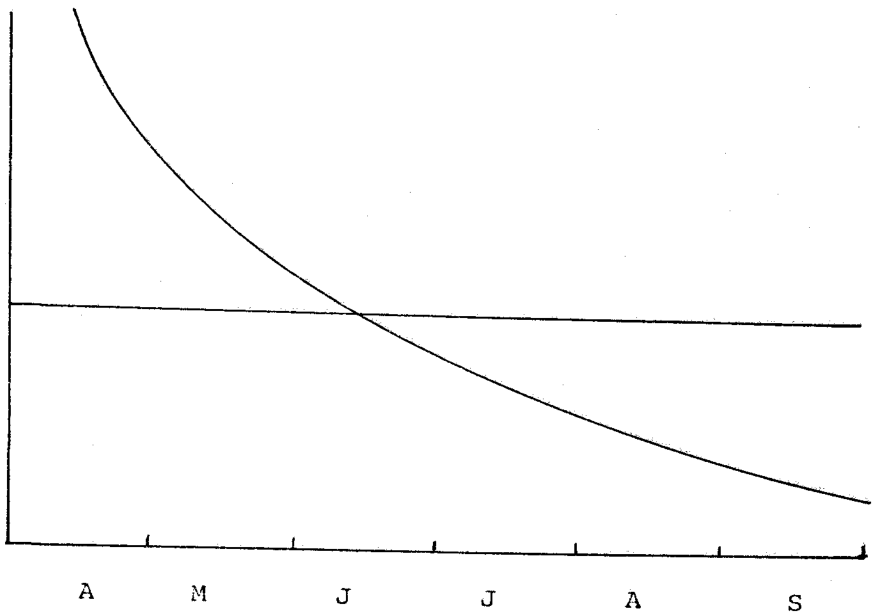

Figure 2. Curved line represents decline in forage quality during the grazing season. Straight line represents level of nutrient quality necessary to provide for 2 pounds daily gain on suckling calf.

Calves produced from a short breeding season are more easily adapted to intensive management and feeding programs after weaning. This permits the manager to put all his calves under a similar regime rather than having to handle different weights and age groups separately. Calves can be weaned at the same time eliminating the usual practice of keeping the "tail enders" on the cows and managing them separately.

Close supervision at calving can be practiced more economically during a short calving season than when the calving season is extended, resulting in a significant reduction in calf losses at birth. Record keeping is more convenient making it possible to do a better job of culling and selecting replacement heifers. Because replacement heifers are of the same age and size, a more effective program for growing them can be established than when they are of various ages and sizes.

The time of calving must be considered. There is no advantage to moving the breeding season back so the interval between calving and available range forage is excessive, unless the manager is prepared to provide additional feed for both the cow and calf. It would seem that the optimum time to drop spring calves for a range readiness date of April 15 or May 1 would be from mid-February to mid-April in order for the calves to get maximum advantage from the forage.

Achieving a short breeding season, especially for the operator that practices year-round calving, will require some manipulation and positive thinking and planning. Our goal should be one calf per cow each year which means the cow should breed within about 90 days after calving or while she is lactating. This puts a nutritional stress on the animal. A cow in lactation will meet her lactation requirements first, followed by her requirement for maintenance and finally reproduction. This means the cow must be on a plane of nutrition which allows for weight gain, either before calving or immediately after calving, so that she will cycle soon after calving and go into the breeding season with enough condition to breed. Once conceived, maintaining pregnancy does not put a lot of strain on the animal.

Late breeders will generally continue to be late breeders and a close look at a year-round calving program will show that many of these cows will be later this year than last. If this cycle continues throughout the lifetime of the animal this can mean a lifetime reduction of one or two calves from each of these particular cows, a costly item.

There are several nutritional and management devices that can help in getting a high percentage calf-crop from a shorter breeding season. Additional energy fed prior to calving will shorten the interval from calf drop to estrus and put the animal in better condition to breed.

Breeding in small open pastures with gentle terrain will step up breeding rate. Using improved range areas (sprayed and/or seeded) for breeding pastures can pay for the improvement. Fertilization of a particular seeded pasture to provide additional feed to complete the breeding in one pasture could be considered.

Semen testing bulls and observing to make sure all will breed will increase the chances for a high percentage calf crop in a short breeding season. Bulls should be maintained so they will go into the breeding season in good condition and the practice of "resting" a portion of the bulls on an alternating basis has been shown to have merit.

Selecting and culling is the most effective method of shortening the breeding season. This cannot be done overnight. The operator using a long breeding season can shorten it a month or more per year with minimum culling, until he reaches the goal desired. Once he has reached this goal (about 60 days), animals that don't meet this requirement should be culled, with the end result being a group of cows that will produce uniform calves capable of making optimum use of the forage resourc

The livestock operator who is currently calving on a year-round basis may want to look at going to a two-calf crop system, spring and fall, and reduce each breeding season to about 60 days to assure him of uniform age and weight in his calves for sale or feed lot.

Proper culling program, geared to about a 60-day breeding season, timed to fit utilization of high quality forage, should increase weaning weights by 15 to 20% and calving percentage by a similar amount. This coupled with the other associated benefits discussed makes it imperative that we take a long hard look at our present programs.

RESEARCH IN PROGRESS

TITLE Nitrogen and energy requirements for wintering cows and calves on a fall calving program using cottonseed meal and biuret for nitrogen sources.

OBJECTIVES

1. To determine the minimal energy level necessary for wintering the fall calving cows nursing a calf.
2. To evaluate biuret and cottonseed meal as nitrogen sources with different energy levels.
3. To determine as accurately as possible the free choice hay intake of the fall calving cow-calf pair.
4. To determine whether or not there is an advantage to creep feeding fall born suckling calves during the winter.

TITLE Finishing yearling steers with different implant times.

OBJECTIVES

1. To determine the time interval for implanting Ralgro.
2. To determine if Ralgro gives consistent performance over negative controls throughout the finishing phase.

TITLE Growing and finishing fall calves on whole or rolled barley with different implant times.

OBJECTIVES

1. To determine the time interval for implanting Ralgro.
2. To determine if Ralgro gives consistent performance over negative controls throughout growing and finishing phase.
3. To determine if rolling barley during the finishing phase is economical.

TITLE Effect of salt (NaCl) level and nitrogen source on performance of wintering weaner calves.

OBJECTIVES

1. To compare performance of wintering weaner calves fed different levels of salt with 3 different nitrogen sources.

TITLE Methods of supplementing grazing yearling steers.

OBJECTIVES

1. To compare different methods of supplementing on range.
2. To examine the economics of supplementing on range.
3. To compare practicability of the different methods examined.
4. To observe daily intake of liquid supplement, self fed on range.
5. To compare different liquid supplement formulations on range.
6. To compare liquid supplements on native range versus crested wheatgrass pastures.
7. To attempt to regulate daily intakes of animals on self fed liquid and dry supplements.

TITLE The effect of salt on utilization of biuret.

OBJECTIVES

1. To compare nitrogen sources in summer supplementation program with yearling steers.
2. To see if salt (NaCl) affects utilization of biuret in range or pasture supplements.

TITLE The effect of implants on suckling spring-born calves.

OBJECTIVES

1. To study the effect of implanting baby calves from 0 to 3 months and from 3 months to weaning.
2. To compare a no implant control to a Ralgro implant or Stilbestrol implant.

TITLE The Comparative feed requirements and milk production of fall and spring calved cow-calf pairs on summer range.

OBJECTIVES

1. To measure and compare forage intake of the fall and spring-calved cow-calf pair.
2. To determine milk production of cows under spring and fall calving management.
3. To partition the energy requirements and sources of energy for different phases of production of fall and spring-calved pairs.

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.