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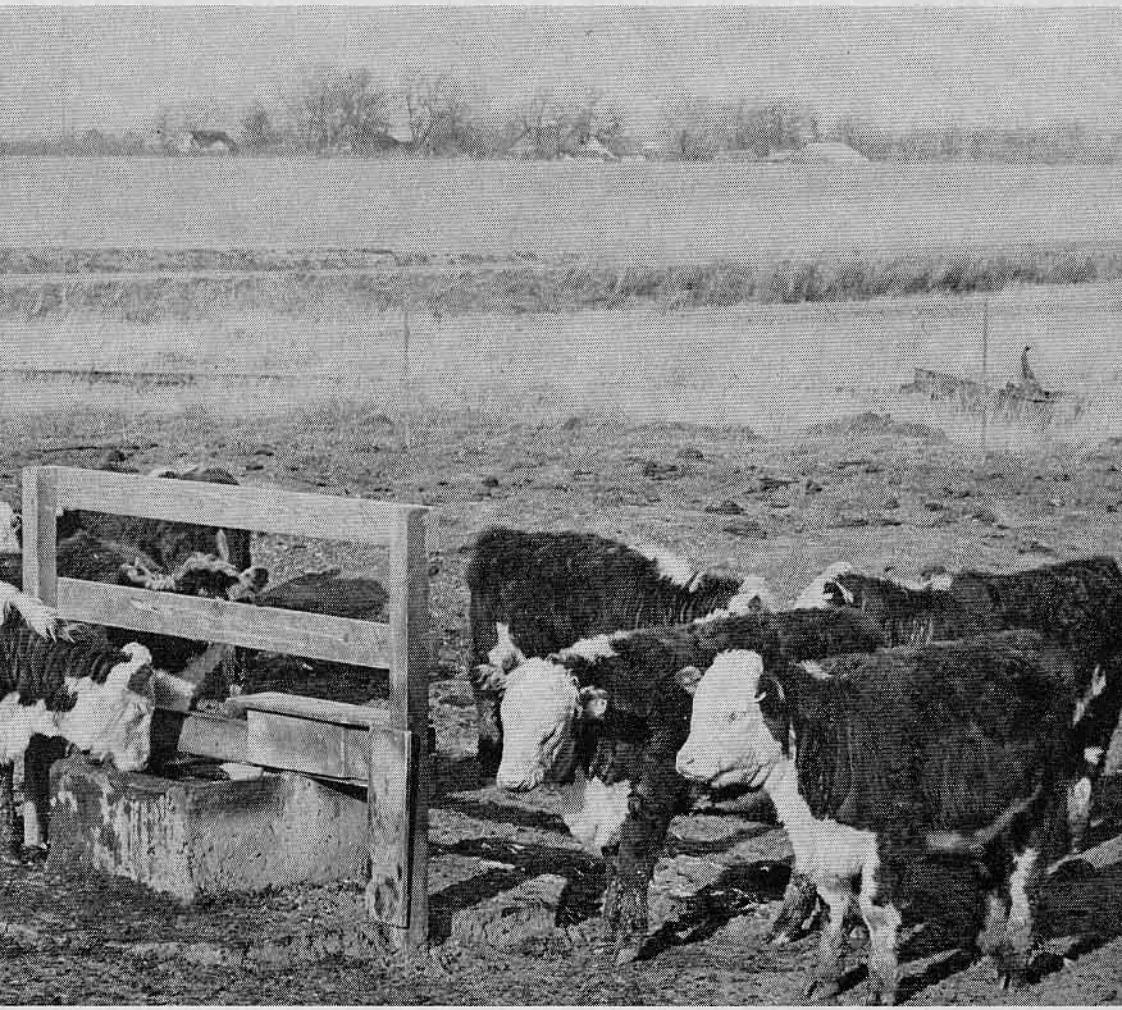
Summary of Reports . . .

Fifth Annual Beef Cattle Day



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Department of Animal Science, Oregon State University; Oregon Cattlemen's Association; Western Oregon Livestock Association; and Oregon Beef Cattle Improvement Association.

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Factors Affecting Calving Rate in Oregon Beef Herds

STANLEY GEEL and W. DEAN FRISCHKNECHT

Economic data from several sources demonstrate that an annual high rate of reproduction is the most important single factor in the financial stability of a beef-cattle production enterprise.

The purpose of the present study was to define the nature of reproductive problems, if any, among breeding herds in Oregon by collecting information in the field about the breeding performance of cows. Such information could serve as a basis for further research.

Method

The survey was conducted over the six climatological regions of the state. Each region has similarities in natural conditions that result in certain types of agricultural industries. The regions are listed below, together with their predominate types of agricultural enterprises.

1. Coastal area—specialized dairy farming and timber production.
2. Willamette Valley—dairy, poultry, vegetable, fruit, and general farming.
3. Southern Oregon—fruit and general farming.
4. Columbia Basin—wheat and other grains.
5. South-central Oregon — range livestock.
6. Blue Mountain area — livestock and general cropping.

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Each region consists of three to eight counties. To keep traveling time and expenses to a minimum, two counties within each region were selected on the basis of the concentration of beef breeders within the area. To insure a realistic estimate of each region, counties were also selected that were, in general, most representative of each region.

From a list of beef breeders provided by county agents in the two counties selected within each region, a sample of 15 to 29% was selected by the use of random numbers. The breeders were divided into purebred and commercial herds, and further subdivided according to herd size as follows: purebred herds with 10 to 50 females of breeding age; purebred herds with 51 or more females of breeding age; commercial herds with 10 to 100 females of breeding age; and commercial herds with 101 or more breeding females. Herds of less than 10 females and "hobby" herds were eliminated from the sample. The 20% sample was adjusted in order to incorporate an equal number of herds within each of the herd-size categories, thus improving the reliability of the sample on an economic level.

Data were accumulated by personal interviews, and interviewers followed a carefully prepared questionnaire.

The period under survey covered the calving years 1959 to 1961, and information was obtained for one complete cycle from exposure to calving within this period.

In this study the term 'calving rate' refers to the percentage of females giving birth to live calves.

Table 1. Stratification of sample by herd size

Herd size (No. females exposed)	No. herds	Total no. females exposed	No. bulls	Cow : bull ratio
Purebred				
10-50	17	578	24	24.1
51 or more	16	1,518	61	24.9
Commercial				
10-100	38	2,058	85	24.2
101 or more	38	10,736	492	21.8
Total	109	14,890	662	22.5

An analysis of variance was carried out on tabulated data to determine whether differences were greater than those contributed by sampling variation.

Results

Information was obtained from 109 interviews, representing 76 commercial herds and 33 purebred herds from a total of 14,890 cows and heifers that were bred and 645 bulls used in breeding.

The average herd size of the 33 purebred herds was 64 females, with a range of 20 to 230. The 76 commercial herds averaged 168 females, with a range of 17 to 1,100.

Of the farms sampled, 86.2% owned Herefords, 7.8% owned Angus, 2.8% owned Shorthorns; the remainder had cattle of mixed breeding.

Calving rate

Of the cows and heifers bred, 94.3% of the purebreds and 91.7% of the commercials gave birth to live calves. Thirty-nine percent of the purebred herds and 28.9% of the commercial herds had calving rates of 98 to 100%.

The difference in mean calving rate between regions was not significant at the .05% level.

Herd size

The optimum herd size, although dependent on economic factors, is closely related to the number of cows per bull.

The effect of herd size on calving rate in commercial herds is not significant. The highest calving rates were obtained on commercial herds of less than 100 females (Table 2). Herds of this size generally had two herd sires.

There does not appear to be any significant effect of herd size on calving rate among purebred herds. The absence of any effect may be attributed to the division of herds into one-bull units to insure identity of calf crop and to the improved management of the purebred herds (Table 3).

Breeding system

The system of mating may materially affect calving percentages, especially where cows are put with the bulls on mountainous and tree-covered terrains.

There are no significant differences between calving percentages of cows exposed on pasture or in a confined area as opposed to those bred on the range.

In both purebred and commercial herds, the ratio of cows to bulls on the

Table 2. Calving rate by herd size, commercial herds

Herd size	No. reporting	Mean herd size	No. females bred	No. live calves born	Calving rate
					%
10-50	18	32	582	540	92.8
51-100	20	74	1,476	1,387	93.9
101-150	11	135	1,482	1,341	90.5
151-200	8	180	1,441	1,322	91.7
201-1,100 ..	19	411	7,813	7,149	91.5
Total	76	832	12,794	11,737	91.7

Table 3. Calving rate by herd size, purebred herds

Herd size	No. reporting	Mean herd size	No. females bred	No. live calves born	Calving rate
					%
10-50	17	34	578	544	94.1
51-100	11	66	728	685	94.1
101-150	3	120	360	339	94.1
151-200	1	200	200	190	95.0
201-1,100 ..	1	230	230	210	91.3
Total	33	650	2,096	1,977	94.3

range was appreciably lower than those bred on pasture. This may partly account for the absence of any effect.

Handmating, in combination with either pasture or range mating, was practiced by 18.2% of the purebred breeders, while no commercial breeders reported using handmating. No breeders reported the use of artificial insemination.

Bulls per herd and cow: bull ratio

An effort was made to determine whether the number of bulls per herd or cow unit affected the calving rate as a result of competition among bulls, particularly when old and young bulls were run together.

The number of cows per bull for a specific exposure period is an important factor for determining calving rate. The average number of cows exposed per bull for purebred and commercial herds was 24.7 and 22.2, respectively. High calving rates were found where 30 to 50 cows were exposed per bull. Further analysis revealed that the majority of the one-bull herds consisted of 30 to 50 cows.

Other factors

Increased supervision at calving time at the rate of two or more visits to the herd per day may greatly reduce calf losses.

The feeding of good quality legume hay and grain or a commercial supplement to herd bulls prior to the breeding season is important in maintaining high calving rates.

Culling of nonbreeders immediately or following a diagnostic test, will reduce production costs and improve subsequent calving rates.

While every effort was made to secure accurate and reliable information, bias due to ego-threatening questions can never be entirely eliminated. Furthermore, much of the information obtained in this survey was based on estimates and average values.

Steer Fattening Trials With Computer-Formulated Rations

D. C. Church, W. G. Brown and A. T. Ralston

Feeding trials during the past two years have been designed to evaluate the use of computer-formulated rations. This procedure is called "linear programming" by the trade, a name that is derived from the type of mathematical computations involved. This type of formulation is useful from a theoretical viewpoint, because the computer can consider all of the nutrients that a particular feedstuff contributes to a ration, and then select a combination that is least costly. In addition, these computations are done in a few minutes, whereas to do the same thing on a hand calculator would take days.

1961-62 rations

In the 1961-62 trials, rations were formulated using either digestible energy (DE) or estimated net energy (ENE).[1] Rations were formulated to have three energy levels: 1.24, 1.36, and 1.48 megcal. for DE rations and 0.58, 0.64, and 0.69 megcal. for ENE rations. (The values for the DE rations are roughly equivalent to 62, 68, and 74% TDN.) Other than for energy, these rations were formulated with the following specifications: crude protein, 11.5%; calcium, 0.75%; phosphorus, 0.50%, salt, 0.5%; crude fiber. 8 to 15%; alfalfa meal, 5 to 15%; beet pulp, 10% (minimum); molasses, 5 to 10%; and added dry vitamin A, 750 I. U. per pound of feed. In addition to these six rations, a control ration (No. 7) was used for comparative

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[1] The digestible energy of a feed is determined by feeding it to an animal and then measuring how much energy is lost in the feces. This provides a measure of the energy that is absorbed, and gives a value that is similar to TDN but more accurate. Net energy is calculated by determining the losses in the feces, but it also includes losses in urine, gases, and heat increment. Heat increment accounts for the heat of fermentation in the rumen or gut and heat produced by some chemical reactions in the body. (Heat increment is a form of energy that cannot be stored, but does serve to warm the body in cold weather.) Because of the cost of obtaining data, net energy values are not available on many feeds, but calculated data are available and are probably accurate enough for practical application. Both digestible energy and net energy are expressed in mega calories (megcal.) or therms per pound of feed. For further information, see a reference book such as *Animal Nutrition* by Maynard and Loosli.

Table 1. Experimental rations fed[1]

Item	1	2	3	4	5	6	7
	% composition						
Barley	.....	28.56	56.93	21.80	38.57	39.77	55.0[2]
Beet pulp, shredded	10.0	10.0	10.0	10.0	10.0	19.79	5.0
Molasses, cane	10.0	10.0	10.0	10.0	10.0	10.0	5.0
Milo	10.22	.....	.....	.....	.....	.....	.....
Corn	.....	.....	.....	.....	.....	2.14	.....
Wheat, mill run	34.51	32.16	3.05	33.6	18.14	.....	24.5
Cottonseed meal, solvent	4.18	.....	.....	.....	.....	.....	.....
Cull peas	1.50	0.51	15.68	1.65	6.66	21.23	.....
Alfalfa hay	5.0	15.0	7.19	15.0	15.0	5.0	10.0
Wheat straw	22.74	2.27	.....	6.46	.....	.....	.....
Dicalcium phosphate	.....	.....	0.95	.....	0.48	1.23	.....
Limestone	1.34	1.00	0.70	0.99	0.65	0.34	.....
Salt, trace mineralized	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Added vitamin A, units/lb.	750	750	750	750	750	750	750

[1] Prices on the feedstuffs in rations 1-6 were obtained in Hermiston in August 1961; they were as shown: ($/T) gr. barley, 43.50; gr. milo, 51.50; gr. corn, 52; gr. cull peas, 46; wheat, mill run, 41; shredded beet pulp, 52.00; molasses, 32.80; cottonseed meal, 75; alfalfa meal, 26; gr. wheat straw, 20; limestone, 21; dicalcium phosphate, 95; and trace mineralized salt, 46.

[2] Steam-rolled barley.

purposes. The composition of these rations is shown in Table 1.

Weanling steer calves used

Cattle used in this experiment were weanling steer calves obtained in central Oregon. After a short adjustment period, they were started on alfalfa pellets and then gradually shifted over to their respective rations. All calves were individually fed twice daily in stalls. They were inoculated with a mixed bacterin, treated for grubs, and after 4 weeks on feed, implanted with 24 mg. of diethylstilbestrol. All calves were marketed in Portland in June after being on feed for 213 days. Some of the data on animal performance are given in Table 2.

Results encouraging

In view of the results obtained, we can say that the rations formulated with the computer produced acceptable performance, particularly the rations formulated with net energy (Nos. 4, 5, and 6). It seems likely that most of the differences noted in Table 2 between the lots receiving rations 1 to 3 (DE) and 4 to 6 (ENE) are due to greater feed consumption by calves on rations

Table 2. Live animal performance and carcass data

Item	Lot means						Treatment means		
Selection of feedstuffs	Digestible energy			Estimated net energy			Control	DE	ENE
Lot number	1	2	3	4	5	6	7	1, 2, 3	4, 5 ,6
Energy level	*Low*	*Med.*	*High*	*Low*	*Med.*	*High*	*Med-High*		
Initial wt., lbs.	492	486	498	494	487	478	469	492	486
Daily wt., lbs.[1]	1.90	1.70	1.88	2.12	2.25	2.26	2.22	1.83	2.21**
Daily feed intake, lbs.	17.2	15.7	13.0	18.3	16.5	15.8	16.2	15.3	16.9*
ENE intake, megcal..	1,864	2,014	1,838	2,272	2,217	2,286	2,211	1,905	2,258**
Feed/lb. gain, lbs.	9.02	8.43	6.91	8.64	7.33	6.96	7.28	8.12	7.63
ENE/lb. gain, megcal./lb.	4.60	5.56	4.59	5.03	4.62	4.79	4.68	4.92	4.79
Hot carcass wt., lbs.	538	509	539	568	578	576	565	528	574
Carcass yield, %	57.8	57.7	58.7	57.9	59.0	59.3	60.4	58.0	58.7*
Marbling[2]	10.2	8.5	9.5	10.5	12.8	11.8	12.3	9.4	11.7
Backfat, mm.	9.5	9.0	9.0	9.8	9.2	11.8	11.3	9.2	10.2
Ribeye area, sq. in.	11.48	11.42	12.85	11.56	12.88	11.78	13.16	11.92	12.07
Ribeye area, sq. in/ cwt. of carcass	2.15	2.27	2.40	2.04	2.23	2.05	2.35	2.27	2.11
Federal grade[3]	14.5	14.0	14.2	14.2	16.0	15.2	15.7	14.2	15.2

[1] = Daily gain figured from carcass wt. which is assumed to be equal to 60% of final wt.
[2] = 15 = modest, 12 = small, 9 = slight, 6 = traces
[3] = 17 = average choice, 14 = average good
* $P<0.05$ ** $P<0.01$

4, 5, and 6. In addition to eating more, these calves gained more rapidly and were more efficient, particularly when lots 1 and 2 are compared with lots 4 and 5. Also, carcass data indicated that calves in the ENE lots had more finish.

Cost of gain tended to follow about the same trend as feed conversion data. It should be noted that our feed costs are somewhat inflated when compared to commercial costs. The actual cost per pound of gain (Table 2) is probably not very meaningful under commercial conditions, particularly since individually fed cattle will be somewhat less than cattle having free access to feed. In addition, feed conversion of individually fed catle will be somewhat greater when fed for a given period. In the future, when we have a meat laboratory available, we plan to carry all cattle to about 1,000 pounds and top out experimental cattle on a weekly basis. This procedure will give a better comparative evaluation than feeding all animals for a given period.

Current feeding trial

The current feeding trial now under way is a continuation of the use of linear-programmed rations. Having satisfied ourselves with a reasonable degree of certainty that ENE is preferable to DE as a basis of selecting feedstuffs, we also want to see if protein should be selected for as crude protein or digestible protein. Consequently, three rations were formulated: No. 1, 12% crude protein; No. 2, 8.5% digestible protein, and No. 3, 10.5% digestible protein. All rations were formulated to have the same ENE values (0.638 megcal./lb.) and the same restrictions as in the previous experiment, except that salt was included at 1%. The control ration (No. 4) is the same as last year (No. 7), except that all ingredients other than the rolled barley were pelleted (because of sorting by some calves) and, in addition, an antibiotic was added (5 mg. zinc bacitracin per pound).

The calves on feed this year are weanling Willamette Valley calves, and they have been managed in the same way as before except that stilbestrol was given in two separate 15 mg. implants after 28 and 126 days on feed.

At the time this report was written, cattle had been on experiment for about 160 days. At this time, there does not appear to be any appreciable difference in the gain or feed conversion of calves on the three experimental rations.

Future possibilities

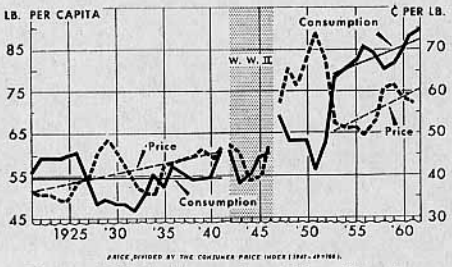
At this point we feel that linear programming has definite possibilities for a feeder who is buying a fair share of his feed. In addition to the cattle trials at Corvallis, we have some data on cattle from Hermiston and from several trials with lambs at Hermiston and Union. In every case, the programmed rations have done well, although there is no doubt that we need to make some changes in ration specifications for optimum results. Results should become more predictable as we learn more about this phase of programming and as more information becomes available on the composition and interactions that occur between feeds.

Beef—The Popular Choice

W. H. KENNICK

The current demand for beef is ample evidence that this meat is *the popular choice* of consumers. This choice, combined with a growing population, a rising consumer income, and an increasing demand for beef, has put the cattlemen in an enviable position among other meat producers. We very quickly have learned to accept as normal an annual consumption of 80 to 90 pounds of beef per person. This situation, however, has not been normal in the history of the beef industry.

Figure 1 graphically illustrates that the cyclical fluctuation in beef consumption from 1921 to 1951 was from 47 to 70 pounds per person, and that any time the supply reached toward 65 pounds there was a sharp break in beef prices. Since 1951, consumption has risen sharply and continues to follow an upward trend. Prices broke sharply with the increased supply of beef from 1951 to 1953, started to recover in 1956, and, until recently, followed an upward trend.



Source: USDA *Livestock and Meat Situation.*

Figure 1. Retail price and per capita consumption of beef.

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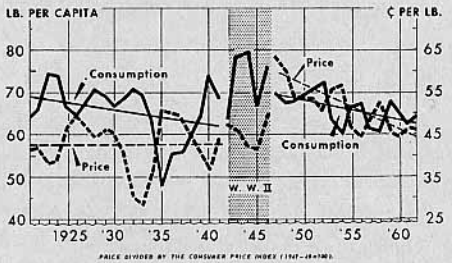
Pork situation

This same situation is not true with other classes of meat. Figure 2 illustrates the plight of the pork industry. From 1921 to 1941, per capita consumption of pork moved downward at 0.5% per year. Although the abnormal supply and demand situation during World War II, coupled with rationing and price controls, caused a sharp break in this decline, the same downward trend at an accelerated rate of 0.7% per year has prevailed from 1947 to be present. This trend toward a reduced consumption of pork has prevailed, although the retail price of pork has moved downward at an average rate of 2% per year.



Source: USDA *Livestock and Meat Situation.*

Figure 2. Retail price and per capita consumption of pork.

Poultry trend

The other major competitor for the meat dollar, poultry, has followed quite a different trend since World War II. A striking change in the structure of the poultry industry and its production and marketing efficiency since 1947 has increased the per capita use of chicken 56%, or from 18 to 30 pounds. The consumer, however, has been willing to accept this increased production only

at an almost equal reduction in price. That is, 30 pounds of chicken today has very little more retail value than 18 pounds of chicken had in 1947.

Unfortunately for the sheep industry, the consumption of lamb, on a national basis, is so low that it offers no serious competition to other meats.

To bring these data up to date and summarize them; the average consumer ate 89.1 pounds of beef last year, up 1.1 pounds from 1961 and a new record; 64.0 pounds of pork, far below the 79.5 pound record-high in 1944; 37.3 pounds of ready-to-cook poultry; about the same amount of lamb as in 1961; and a little less veal than in preceding years.

Beef consumption factors

Several factors have influenced the per capita consumption of beef, and these tend to bear out the fact that beef is the popular choice.

Level of income has very little influence on consumption of pork or chicken, indicating that even relatively low-income families are able to satisfy their desire for these meats. In contrast to this, level of income has a marked effect on per capita consumption of beef. As family annual income increases from $2,000 to $10,000, beef consumption increases approximately 10% for each $1,000 increase. This fact, coupled with changing levels of income, helps to explain the recent high level of beef consumption at relatively high prices.

In 1947, 63% of the families in the United States had incomes of less than $4,000, with an average family income of $4,126. By contrast, in 1957, just 10 years later, 64% of the families had annual incomes of *over* $4,000, and the average had gone up to $6,200. This income provides a higher discretionary spending power, which means that now a larger part of a family's income is above the basic requirements for living. Some of this discretionary spending power is being used to purchase beef.

Another way of looking at the prestige factor or popular choice of beef is to compare the changes which have taken place in the percentage of disposable income spent for food and various types of meat. Historically, about 25% of disposable income has been spent for food. This figure dropped to 19% in 1962, the lowest on record, in spite of the additional built-in "maid service" it includes. The 4.6% of disposable income spent for meat in 1962 was also well below the 40-year average of 5.3%. The distribution of the income spent for meat, however, showed a larger divergence from the past than did the total amount. The year 1962 saw 2.7% of disposable income spent for beef, the highest on record, and only 1.7% on pork, the lowest on record.

Farm families have not historically been large beef eaters. Economic and technological developments in the last 20 years, however, have had a marked effect on their consumption. Today's farm family cannot only afford to eat beef, but can also afford the refrigeration and freezer equipment which makes it possible to maintain a ready supply. As a consequence, farm family consumption of beef has gone up approximately 2.5 times since the beginning of World War II.

Most of the factors discussed here which affect the anomalous situation in beef consumption and price—and there are others—are associated with the affluence of our society. I would be remiss in my responsibility if in writing this summary I failed to point out some of the dangers of producing a prestige or popular choice item.

Competition attracted

A very desirable market attracts competition, and the American beef market is no exception. The meat equivalent of over a million head of beef was imported into the U.S.A. in 1962. This was a sharp rise from 1961, and the pressure of larger imports continues to mount.

Several other commodity sources available to the American consumer provide equal nutritional value. If their demand for or choice of beef is for any reason appreciably diminished at the current high supply situation, it will be accompanied by a disastrous break in beef prices.

Lastly, the fact that beef consumption is associated with a high income level makes it liable to severe affects from any reduction in disposable income.

In consideration of the fact that record consumption and increasing price is a result of the consumer's choice, we must nurture the public image of the product with care.

Cooperative Marketing of Feeder and Stocker Cattle

LeRoy C. Wright

Marketing is of major importance in the management and production of beef cattle. Studies of improved marketing practices are especially valuable in Baker County where agricultural industry centers around the production of range livestock.

Twelve years ago Baker County livestock men embarked on an intensive study and evaluation of the county's livestock industry. This study included the development of a complete inventory of the county's natural resources and their application to livestock production.

Land resources inventoried

The land resources inventory of Baker County established that the county's land area is slightly less than 2 million acres; elevations vary from 1,500 to nearly 10,000 feet above sea level; and approximately half of the land area is publicly owned. Ninety percent of the total land area, including the public land, is classified as range, while the remaining 10% is classified as cropland.

In order to convert production into dollars, there is no other alternative but livestock for the agricultural use of this land area. This fact has resulted in the knowledge that Baker County's agriculture can be expanded and intensified, but will always center around the production of range livestock. Rangeland is utilized to produce forage needed in the spring, summer, and fall. Cropland is utilized to produce forage for winter feed for cattle and sheep.

Livestock economy investigated

This knowledge, therefore, created the need for taking an inventory and making a study of Baker County's livestock-production economy. The investigation revealed a pronounced trend in which there has been a reduction of range sheep numbers and an increase in beef cattle numbers. Studies also indicated a shift from the production and sale of 2- and 3-year-old steers to "she"stuff on the range.

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In 1950, the cow population of Baker County reached 36,000 head, and there were 550 ranchers. One hundred fifty of these ranchers could count on 100 brood cows or more. The remaining 400 ranchers, therefore, were facing definite problems—particularly in marketing—as they were at a distinct disadvantage in their efforts to compete with their neighbors. Buyers seemed willing to pay higher prices for cattle from the larger operations, even though smaller ranches were producing cattle of equal quality. It occurred to us this situation could be corrected. Investigations established that calving was for the most part occurring in the early spring and that owners of small ranches were weaning their calves during the month of November. The volume of livestock available from these small ranches, if organized and assembled at a central location, could be very attractive and inviting to buyers of feeder cattle. Our job was to develop and accomplish this objective.

Need recognized

Identification of the problem, recognition of the need, and a method to solve it established the goal to strengthen the price for all county cattle. We knew we had the product, and we knew that there was a market for this product. However, we were not satisfied with the results, or at least with the methods applied in the process of bringing the two together. We felt that improvements or adjustments could be made and that no one else was doing anything about it. This meant that we could no longer be satisfied with the front-gate method of selling cattle.

We needed, and fortunately found, a sufficient number of ranchers with the "pioneer spirit" to test an untried method — a producer-sponsored marketing procedure. The process selected was similar to an auction sale. This method was designed to develop competition between buyers through competitive bidding. And, since a service to prospective buyers was being provided, it should be an incentive for more people to buy Baker County cattle.

A minimum of 1,500 head of feeder and stocker cattle was established as the initial number. These cattle were to be assembled at a central location. Cooperation of the sales-yard owners was secured. The local auction yard, located on the main highway and railroad, was selected because transportation facilities are very important both for buyers and the product to be sold. The sale was scheduled for the middle of November, since our range cattle are gathered from the range area on or before November 1. At this time cows are put in hay meadows on winter feed, and calves are weaned and offered for sale. Initial selection of replacement heifer calves is made at this time, along with sorting and selection of sale cattle. Sales are now scheduled in November, December, and after the first of the year to fit the rancher's sale or marketing plans.

Sales promoted

Publicity and advertising for these sales were planned, developed, and established with care. Names of known buyers were collected, and they were notified of and invited to the sales. Advertising was placed in widely circulated livestock magazines and journals, and information on the number, size, sex, and age of the cattle to be offered was included. Ranchers who planned to sell their cattle at these sales were asked to meet a number of conditions. Consignors were urged to dehorn, wean, and vaccinate their cattle for

shipping fever and Bang's control. They were also urged to provide all possible information to assist the prospective buyer. The identity of each consignor's cattle was maintained and no integration of several consignor's cattle was followed or encouraged. Each consignor's cattle were sorted for sex, size, type, and conformation. Heifers and steers were sold separately. Consignments were sifted by a committee of ranchers and all bad eyed, lame, and poor quality cattle were removed from the sale listing.

The order of sale was established by a drawing, and heifers and steers were sold separately. All the heifers of all the consignors were sold before any steers were put up for sale.

Policies established

The offering of cattle sorted and "packaged" in this way was established as a policy and is still in force. To measure the value of this process, market authorities in Portland and other coast points are contacted following sales, and prices are compared on comparable cattle. The first sale averaged 2½¢ above the regular market on that day, and this comparable strength has continued sale after sale and year after year. We have sold more than 100,000 head of cattle through these sales. Much price-guessing has been eliminated because our ranchers use the sales to price their cattle on the ranch.

No pencil-shrinkage is applied during the sale. Cattle are sold across the scales on actual weights on sales days. To study the problem of shrinkage, several consignments were weighed at the ranches, and this weight was compared with sale weights. Sales are held Mondays, and, to permit sorting crews time to work and pen the cattle into sale lots, deliveries are made on Saturday and Sunday. Cattle delivered on Saturday have consistently equaled ranch weights, whereas Sunday deliveries generally have been below ranch weights. We believe that a good fill on consignments, particularly for weaner calves, is important. Generally 36 to 48 hours is necessary for the cattle to settle and fill. Many buyers, particularly those who ship by rail, want their cattle to have some fill.

Consignment fees are charged on a per-head basis to defray advertising and sale expense. In addition to the consignment fee, the consignor also pays brand inspection and feed charges.

As a trial, one sale was held the first year. Now there are as many as four or five sales per year, including a cow sale annually in December, in addition to feeder and stock sales. The preferred size for a sale of this type has been found to be between 2,500 and 3,000 head.

Present procedures

We are now marketing 30% to 35% of our sale cattle through this established producer-sponsored sale procedure. Our definition of a producer-sponsored sale is one in which the producer owns the cattle until the auctioneer sells them on sale day. All cattle are sold under the producer's name.

Cattle have been sold through these sales to buyers from many states. In fact, buyers from all of the western states are listed, and many of them are repeat buyers year after year. Buyers from Illinois, Iowa, Nebraska, and Colorado are becoming increasingly prominent.

This marketing program has provided the "top dollar" for Baker County cattle. If it has strengthened the country or front-gate market, the objective or goal established in our program has been reached.

Increasing Beef Production Through Range Improvement

W. A. Sawyer

Present high livestock prices and beef cattle numbers may tend to lull us into complacency concerning the need for increased beef production.

Two things which will make this attitude of complacency shortlived, if it does exist, are (1) every cattle producer must increase the efficiency and/or quantity of production to counter ever increasing costs; and (2) experts predict that, because of increases in population, we will need about 50% more beef in the United States by 1975 if we are to maintain our present standard of nutrition.

The year 1975 is only 12 years away. This is a very important fact for cattlemen to consider, especially since the number of acres of cultivated land per person is decreasing rapidly. There are now about 2 acres of cropland per person, but it is estimated that in 20 years there will be only 1.5 acres per person. As population increases, more demand is placed on our land to produce crops consumed directly as food and fiber rather than as meat through animals.

With these things in mind, let us look at the future of beef production. Increased production in the United States will come from three major sources:

1. Intensification of beef production in the southern states through land clearing, pasture improvement, and the introduction of livestock on one-crop farms.

2. Beef production in the south, during the last 20 years, has increased more than 3 times faster than in the rest of the United States.

2. Increasing production efficiency through better nutrition, management, and breeding.

3. Increasing livestock numbers by the widespread use of present knowledge of range and pasture improvement methods.

Increasing production by improved nutrition, management, and breeding is like climbing a hill. The closer we get to the summit, the slower our progress is likely to be. A livestock producer can progress from a 60% calf crop and a 300 pound weaning weight to an 80% calf crop and a 350 pound weaning weight quite easily. Moving on up to a 90% crop and a 400 pound weight, however, is more difficult. From this point on, further progress becomes increasingly difficult and slow.

If beef cow production-efficiency in all of eastern Oregon could be improved so the present estimated calf crop of 80% and a 350 pound weaning weight would increase to 90% and 400 pounds, we could increase production by 22%. This is close to the limit of attainable increase under range conditions. If we go beyond this point, increases in production must come from increases in size of cow herds.

The range improvement opportunity

The rest of this paper will be confined to the eastern Oregon range livestock production opportunity. The area east of the Cascades contains 38 million acres of land on which the forage

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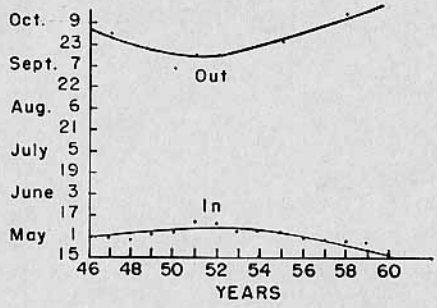

Figure 1. Dates of turning cattle in and out on the Squaw Butte range.

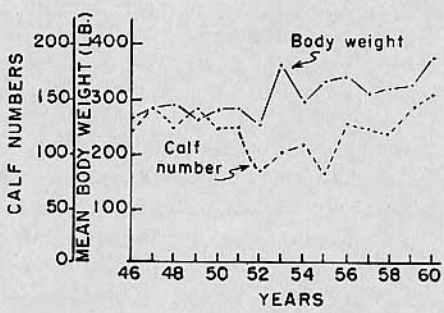

Figure 4. Number and average calf weight off summer range.

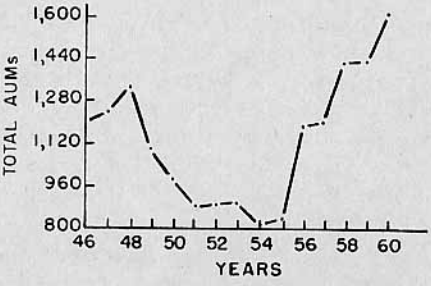

Figure 2. Summer range use in animal unit months (AUM's) at Squaw Butte.

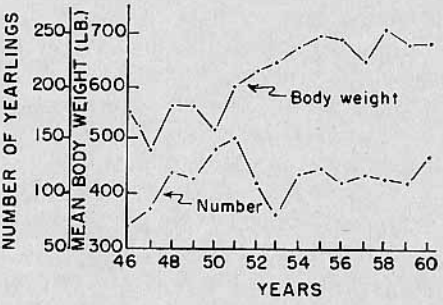

Figure 5. Number and average yearling weight off summer range.

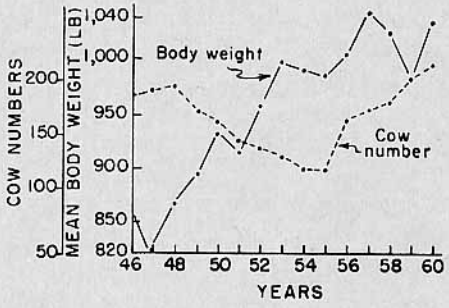

Figure 3. Number and average cow weight off summer range.

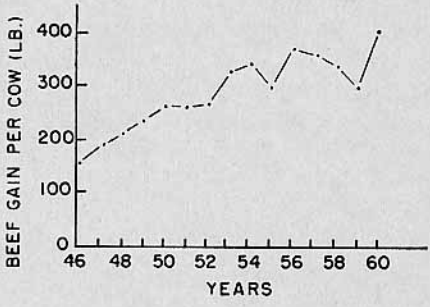

Figure 6. Pounds of beef (yearling and calf) produced per cow while on summer range.

crop can be harvested only by wildlife and domestic animals.

Eleven and one-half million acres of this area are covered with commercial timber and 26.5 million acres are open grassland, sagebrush-bunchgrass, and desert salt shrub; 66% of the 38 million-acre area is publicly owned.

Of the total area, about 10 million acres could be improved by spraying sagebrush, and another 3.5 million acres could be seeded to crested wheatgrass. Forage production on nearly all of the area could be substantially increased by better management.

Accomplishment at Squaw Butte

Work at the Squaw Butte Experiment Station is primarily of use and interest to ranchers in southeastern Oregon. Many things learned there, however, apply wherever beef cattle are produced and native or wild lands are pastured. The Squaw Butte station contains 16,000 acres of sagebrush-bunchgrass range, similar to the 20 million acres in eastern Oregon.

Squaw Butte had been grazed for 11 years under stocking at the calculated carrying capacity before 1949 when a close look was taken of what was being accomplished. It was evident that it would require a great deal of time to make substantial improvements in the range by management alone. A more aggressive and positive approach was necessary.

Six areas of attack were decided upon:

1. To haul water to obtain a more nearly ideal distribution of cattle and get a more uniform and controlled utilization of the land.

2. To ride more to keep the cattle scattered, and, in the breeding season, to see that there was a bull with every group of cows.

3. To seed favorable sites to crested wheatgrass.

4. To control sagebrush in order to reduce its competition with grass.

5. To use crested wheatgrass to reduce the spring grazing load on native range.

6. To maintain enough reserve hay to permit flexibility in the length of the range-grazing season.

These points and what was done about them on the station are summarized below.

Water hauling. It was observed that regardless of the stocking rate, overuse of land generally occurred in an area increasing in size by concentric circles radiating out from a water hole. Overuse occurred closest to water, moderate use occurred some distance from water, and light use occurred beyond that area. Lighter stocking only slowed up the increase in the size of the overused area. The solution to this problem was to haul water to portable troughs that could be moved to keep cattle on feed. The cost—less than $1 per AUM. The result—almost no overused and underused range. It is estimated that this action increased the size of the station range by more than 35% as far as available feed for cattle was concerned. This did not increase AUM's immediately, but did increase cattle performance.

Riding to keep the cattle scattered. This practice gives the operator a chance to observe the condition of the feed and cattle and move cattle, water, and salt to new areas when needed. It permits grouping cows during the breeding season in one- or two-sire groups and seeing to it that the one or two bulls are with the cows. It also lets the operator know whether or not each bull is working. Close observation gives him the opportunity to locate new

trails, roads, cross fences, salt grounds, watering locations, etc. in order to obtain more effective range use.

Seed favorable sites to crested wheatgrass. Basic studies on the physiology of major species of native grass and crested wheatgrass told us that crested wheatgrass would stand early spring grazing far better than native grasses. These studies revealed that grazing should not begin on native range until big bunchgrasses are 6 to 8 inches high. Studies also showed that about one half of the total growth should still be present when the grasses begin to cure in order to assure adequate root food storage for the next year's new growth. It was determined that with moderate stocking about 5% of our total range area should be planted to crested wheatgrass. This would make it possible to stay off the native range until about the first of June. By June 1, native grasses were well enough developed so that they could take the grazing load and maintain their vigor.

As a result of this study, nearly 800 acres of crested wheatgrass were seeded between 1951 and 1954. The need for crested wheatgrass in a range improvement program led to extensive and intensive work on species, seeding rates, and seeding methods. This work led to the development of the Oregon Press Seeder now being used in many western states. Crested wheatgrass increased production by about 15 times on the area seeded, and added at least 20% to the forage supply of the entire station area. It is conservative to say that the seeding added 250 AUM's. Cattle make gains on crested wheatgrass in spring, summer, or fall. Tests have shown that crested wheatgrass is either equal or superior to our native range in every comparison made.

Sagebrush control. In the semiarid portion of the west where big sagebrush dominates the landscape, it was logical to assume that forage production was greatly reduced due to competition with sagebrush.

Early work on brush control revealed that a three-fold increase in forage yield would result from killing the brush. Controlled burning of sage at Squaw Butte, however, is almost impossible because of the lack of ground cover to carry a fire. Brush beating and railing were considered but were found to be either ineffective, too costly, or both, and immature brush was not killed by these methods.

We concentrated, therefore, on herbicidal control of brush and other range weeds. The widely used recommendations for aerial spraying with 2,4-D to control big sagebrush, rabbitbrush, and poison larkspur were developed as a result of this work. On the station about 4,000 acres have been sprayed, and this area is producing about three times more forage than it did before spraying. Spraying has added about 650 AUM's of forage to the station feed supply.

Use of crested wheatgrass to reduce the spring grazing load on native range. This point has been discussed quite thoroughly above. Because of crested wheatgrass plantings, station cow herds have not had to be put on the native range until as late as June 1 to 15. This late turnout, plus water hauling to obtain uniform use, has resulted in substantial improvement on the 11,000 acres of the station not sprayed or seeded.

This marked improvement probably exceeds 20% of the 1938 capacity. On the basis of this estimate, improved management has added about 240 AUM's.

Maintenance of enough reserve hay to permit flexibility in the length of the range grazing season. For more than 10 years now we have had a 2- to 3-year hay requirement in the stack when hay harvest was completed in the fall. This permitted turning out cattle on the range as late as May 10 in the spring of 1951 and bringing them in as early as September 11 in the fall of 1961. This flexibility permits us to adjust stocking rates to range-forage supply on an annual basis without changes in livestock numbers. This is almost a must in a cow-calf operation.

Summary and conclusion

Physical improvements and changes in practices on the Squaw Butte range have almost doubled the AUM's of feed produced. Let us summarize this increase:

1938 AUM's at 13 acres per AUM	1,230
Added by crested wheatgrass	250
Added by spraying brush	650
Added by delaying turnout and water hauling	240
Total increase	1,140
Estimated present AUM's	2,370

Now let us take a look at the effect of this additional food on the station's livestock production. It should be kept in mind that not all of the increased beef production is attributable to range improvement. Without range improvement, however, such things as better winter nutrition, improved cattle quality and efficiency, etc. could not have paid off.

The following graphs summarize the effect of applying the research results to the station's cattle operation. The figures present total effects from improved beef cattle nutrition, management, and breeding; and from meadow and range improvement.

In conclusion it should be pointed out that a combination of the range practices outlined above, in addition to improved winter nutrition, breeding, and management can increase beef production in eastern Oregon by more than 60% by the year 1975. This year about 225,000 acres of sagebrush will be sprayed, and about 75,000 acres of range will be seeded. These two practices will directly add about 50,000 animal unit months of feed and about 3 million pounds of beef per year. Indirectly another 3 million pounds will be added because of better nutrition, management, and breeding of livestock. Thus range improvement is an important link in the chain of increased range beef production in eastern Oregon.

The Adair Herd—Breeds, Breeding, and Management

A. T. Ralston

Although the Adair herd of cattle has been in existence for a long time, it has been used as a research tool only since the fall of 1957. This herd originated from animals discarded from research projects here and at our branch experiment stations. They are, consequently, of very ordinary quality and production potential. Since 1957, this herd has been culled for fertility, weaning weight, and conformation. With the exception of two Beefmaster bulls, all the sires used have been production tested and above average for these characteristics.

Eight head of pregnant Beefmaster cows and one Beefmaster bull were added to the Adair herd in October 1957. Although this breed originated in Texas, its apparent adaptability to Colorado's environment made people in western Oregon curious as to how well advertising claims would stand up under our environment.

Beefmaster performance

The original eight head of cows produced seven late calves in 1958 that averaged weight gains of 2.33 pounds per day of age at 153 days. This is about average for weight gains per day of age for most cattle.

From 1958 to 1962, Beefmaster calving percentage was 88, 63, 57, 75, and 50%. This lack of fertility cannot be attributed to the sires used. This fertility problem in the female has appeared in other breeds carrying Brahman blood.

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The calves produced by crossing a Beefmaster sire with Hereford and Angus cows have weaned somewhat heavier than the average of our herd (see Table 1).

The index value which favors Herefords and Angus is probably a more accurate evaluation of the calves, since it includes weaning weight and conformation score and should be highly correlated to their value. Selected Hereford sires have produced calves equal to the Beefmaster X in weaning weight and excelled them in conformation.

Most of the Beefmaster X have gained faster and more efficiently in the feedlot, but in all cases their carcasses have graded lower due to a lack of marbling. Lack of marbling in Braham crosses has been reported by several other stations.

The behavior of animals is something on which it is hard to put a monetary value, although ease of handling is extremely valuable to a rancher. The Beefmaster X is generally much less tractable than other breeds, and, in many cases, they are extremely wild and vicious.

Their disposition is also reflected in the way in which they mix with other breeds. The female is not aggressive and is not prone to battle for feed; consequently, it has been necessary to give many females extra feed during the winter months. Although they appear to be large-bodied, the cows actually are lighter than Herefords under the same environment.

The two-year old Beefmaster X females, when mated to a third breed

Table 1. Calf performance

	Wean. wt.	Index*	Feedlot gain	Carcass grade**
	Lbs.		*Lbs./day*	
1960 Adair	420	4.4		16.0
Beefmaster X	433	4.9		15.0
1961 Adair	434	4.5	2.01	15.9
Beefmaster X	470	6.0	2.35	15.0
1962 Adair	442	4.4	2.08	
Beefmaster X	458	5.2	2.00	

* Index = fancy calf in heavy 10% = 1; good calf in heavy 10% = 5.
** 14 Av. Good; 17 Av. Choice.

sire, have produced calves comparable to straight Angus and Herefords when handled under similar conditions. The mature equivalent production of all the heifers was 500 pounds of calf at 205 days of age.

Time of castration studies

Most beef cattle textbooks state that male calves should be castrated before they are four months of age. This is based on two premises: (1) that the shock of the operation is less at this age; and (2) that staggy appearance distracts from the price paid for individuals left intact too long. It has long been our observation, although not tested here scientifically, that bulls gain faster than steers or heifers. Pilkington et al. (1959) and Koger et al. (1960) reported that their research showed this to be true under feedlot conditions. Although the Oklahoma workers reported a reduction in carcass grade for the intact male, the yield was 0.6% in their favor. The work at Texas found nonsignificant differences in performance, carcass traits, and desirability of the meat (juiciness, tenderness, and flavor).

In 1961, we started the time-of-castration study reported here. The first year every second male born was castrated at birth. One-half of those remaining intact were castrated on July 7, and the rest were castrated after the animals had recovered from weaning on December 1. The intact males maintained a 0.27 pound extra gain per day over those castrated at birth for the entire suckling period, whereas, those castrated on July 7 made gains comparable to the bull calves. This is shown in Table 2.

Table 2. Performance of 1961 male calves

Gains	Castrated at birth	Castrated* July 7	Castrated at weaning
Suckling gain, lbs. 1 day	1.83	2.07	2.00
Feedlot gain, lbs. 1 day	1.95	2.13	2.02
Total advantage, lbs.		86	53

* Average age 90 days.

Feedlot gains followed the trend established by suckling gain. At the end of the feeding period, therefore, the calves castrated in July and at weaning had an 86 and 53 pound greater lifetime gain, respectively.

Results for 1962 have not been so conclusive. The average suckling gain was approximately the same for steers castrated at birth and for the intact calves (Table 3).

Feedlot gains for calves and bulls castrated at weaning so far have excelled those castrated at birth. This gives them a total advantage of 47 and 69 pounds, respectively.

Complete carcass data will be secured on the animals now being fed, and roasts containing the 10th, 11th, and 12th rib will be subjected to trained taste panels and organoleptic tests to further evaluate the meat.

This work is not conclusive and will be continued at this and other stations.

Table 3. Performance of 1962 male calves

Gains	Castrated at birth	Castrated at weaning	Bulls
Suckling gain, lbs. 1 day	1.98	2.01	2.01
Feedlot gain*, lbs. 1 day	1.83	2.1	2.24
Total advantage, lbs.		47	69

* 154-day gain.

Controlled estrus in heifers

The simultaneous ovulation of entire groups of animals would simplify large-scale artificial insemination, which in turn would provide more uniform groups of offspring. It has been shown that 6α-methyl-17α acetoxyprogesterone (Repromix) is effective in the control of estrus and ovulation in sexually mature heifers.

The purpose of this trial was to study the effectiveness of controlling estrus and ovulation in sexually mature heifers under practical conditions.

Twenty head of yearling heifers of known genetic and nutritional background were randomly allotted to two groups. Each group received 2 pounds of concentrate mix per head daily. The concentrate fed to one group had been treated with 2.25 grams of Repromix per pound of feed (90 mg. of active 6α-methyl-17α acetoxyprogesterone), while the other served as a control. This concentrate was fed for 18 days; during this time none of the treated group showed visible signs of estrus.

Sixty hours after the Repromix treatment had stopped, four treated heifers showed estrus and were bred artificially with frozen semen of known quality. During the next 12 hours, four other treated heifers showed estrus and were bred artificially. The remaining two treated heifers were bred 84 hours after treatment ceased, although they failed to exhibit estrus.

Two of the control heifers were bred 14 days after concentrate feeding stopped, but the remainder failed to exhibit estrus. At the end of 21 days, the heifers were put in a common pasture and pasture bred to a Beefmaster bull.

Results of the controlled estrus trial

Heifers whose cycles had been interrupted were much more active in their expression of estrus than the control group. Each group of heifers produced a 70% calf crop. A 60% conception occurred from artificial insemination immediately following the Repromix treatment. The calves from the control group will be born over a 42-day period, while the birth of calves from the treated females will be confined to 26 days.

Artificial insemination could be used quite advantageously for the first heat following the oral progesterone treatment. The heifers could then be pasture bred for a 42-day breeding season. This would mean a more uniform age in the calf crop and supply some replacement heifers from superior sires at a reduced cost.

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