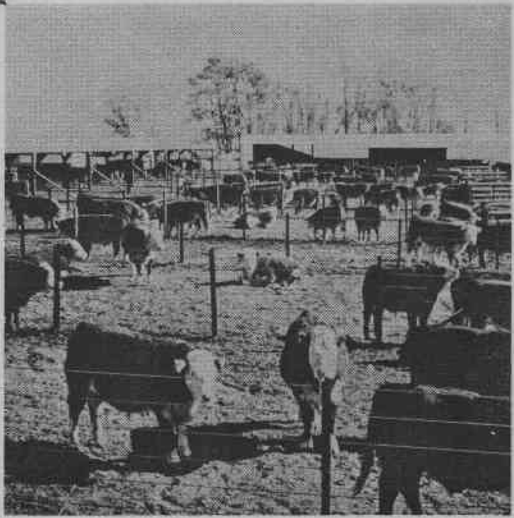
17th Annual
Beef Cattle Day Report



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HORMONAL IMPLANTS AND CASTRATION

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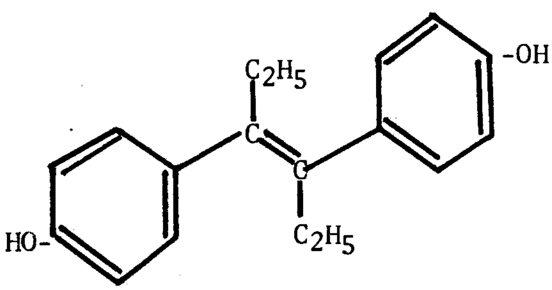
Most beef cattle text books recommend castration of male calves not later than four months of age. Reasons given for early castration include less stress to the calf, elimination of staggy carcasses and prevention of the breeding of their siblings. Since four months on a spring dropped calf comes during fly time, most calves are castrated at an earlier age. This tends to sacrifice the growth stimulation provided by testosterone, a male hormone secreted by the testes. Early castration seems to cause rather wide variations in the reduction of growth. This may be due to mature size, breed differences and the intensity of rearing. Although the average reduction due to castration was 10% (range 5-15%), several scientists have published varying results. (Naude and Armstrong, 1967 reported 8-22%; Forbes, 1968, 15-16%; Forrest, 1968, 17%; Arthaud *et al.*, 1969, 5%; Robertson *et al.*, 1970, 13%; and Witt and Andreae, 1970, 8%). Brännäng's regression of the average daily gain of steers on their identical twin intact bull brother's average daily gain was 0.78 g/g. This would mean that the greater the growth potential of an animal, the greater the percent of reduction due to castration. In other words, to take advantage of the endogenous growth stimulating hormones or exogenous growth stimulators, adequate environment must be provided.

Advantages from 15.4 to 44.0 lbs for the intact male over the castrate at weaning time have been reported by Burgess *et al.* (1954), Klosterman *et al.* (1954), Marlowe and Gaines (1958), Marlowe *et al.* (1965) and Cundiff *et al.* (1966). Tanner *et al.* (1970) suggested that much of the advantage of bulls over steers in some studies could be attributed to selection bias, especially when castration took place at three months or older. Several workers including Joubert and Dreyer (1965) have suggested that level of nutrition may partly dictate the magnitude of bull-steer growth rate differential.

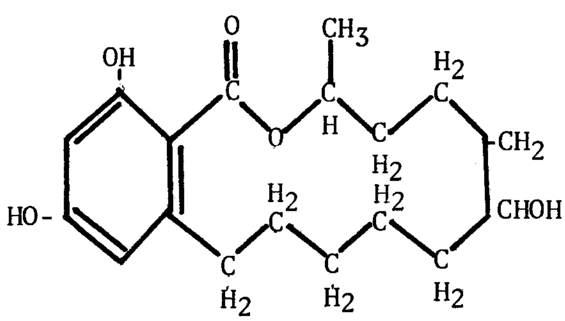
Changes in skeletal structure and chemical components of the carcasses due to castration have been well documented. Brännäng (1971) used monozygotic twins to measure the effects of castration and found steers to be taller, have a decreased number of erthrocytes but increased numbers of leucocytes, and exhibit differences in color of hide and muscular development.

Diethylstilbestrol (DES) is a synthetic estrogen prepared by Dodds et al. (1938). It is not a steroid (Figure 1) but is active both orally and whem implanted. The effect of DES in growth stimulation and retardation of sexual development has been reported by many including Ralston and Patton (1974).

FIGURE 1. CHEMICAL STRUCTURE OF DES AND RALGRO.



Diethylstilbestrol (DES)



Zeranol (Ralgro)

Zeranol prepared synthetically from Gibberella zeae, a mold of corn, was reported to have growth promoting effects on swine by Stob *et al*. (1962). It had been isolated and synthesized by Baldwin in 1961 and reported to be effective in promoting growth in beef steers by Perry *et al*. (1968). Since it was a naturally occurring substance and had little influence on sexual development, it was considered an anabolic agent.

Body heat of the animal suppresses production of viable sperm in the cryptorchid male testis but fails to inhibit hormonal synthesis. When the scrotum is shortened forcing the testicles against the body wall the animal becomes a pseudocryptorchid, a technique known as "short scrotum".

A series of trials using combinations of DES, Ralgro and short scrotum techniques were conducted in an effort to maintain some of the advantages of the intact male while reducing some of the problems involved with the untreated male.

Methods

During 1970, 17 and 72 implants of 12 mg of DES were compared with either 24 or 36 mg of Ralgro. In 1973, a combination of castration and implantations of Ralgro was used; castration at birth + 36 mg Ralgro at birth and at 90 days, 36 mg of Ralgro at birth and castrated at 90 days, 36 mg of Ralgro at birth and at 90 days and castrated 10 days prior to weaning, and a control of no implant castrated at 10 days prior to weaning. In 1974, implantations of 24 mg at birth and 36 mg of Ralgro at 90 days in calves castrated at birth were compared with short scrotum and intact males. In 1975, intact males were implanted with 36 mg of Ralgro at birth and again at 90 days and compared to short scrotum or intact males. All calves were stratified as to age and randomly allotted to the various treatments.

Results

Earlier work (Ralston, 1963) showed that castration at birth reduced suckling gains only slightly but significantly reduced feedlot gains as compared to castration at a later date.

Table 1 summarizes the weaning weights of intact males implanted with 12 mg of DES or 24 or 36 mg of Ralgro at birth and again at 90 days of age. Although the results are somewhat variable the 3 year averages showed no difference among treatments.

TABLE 1. WEANING WEIGHTS OF DES AND RALGRO IMPLANTED BULL CALVES.

Year	No. head/ treatment	12 mg DES	24 mg Ralgro	36 mg Ralgro
1970	18	483	477	493
1971	22	523	529	520
1972	19	511	520	503
Ave.		505	505	508

When males were castrated at birth, at 90 days or at weaning time but received 36 mg implants of Ralgro at birth and at 90 days their weaning weights were comparable to the unimplanted males castrated at weaning (505, 507, 490 and 505 lbs., respectively).

Males castrated at birth and implanted with 24 mg of Ralgro at birth and 36 mg of Ralgro at 90 days of age weaned at 463 lbs while short scrotum and intact bull calves weighed 497 and 505, respectively.

When the male calves were left intact and implanted with 24 mg of Ralgro at birth and 36 mg of Ralgro at 90 days of age they were equal in weaning weight to short scrotum and intact males without Ralgro treatments (Table 2).

TABLE 2. COMPARISON OF WEANING WEIGHTS OF SHORT SCROTUM, INTACT AND RALGRO IMPLANTED MALE CALVES.

Year	No.head/ treatment	24 + 36 mg Ralgro[1]	Short scrotum	Intact
1974	22	463	497	505
1975	20	502	502	484
1975	7		494	503
Ave.		476	499	496

[1]1974 calves castrated at birth, 1975 calves remained intact.

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THE CATTLE FEEDER OF TODAY, AND HIS ROLE IN THE FUTURE BEEF PRODUCTION

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When fed beef prices are low, when feed grains are high, when world leaders speak of feeding grains to humans, not to livestock, many a livestock producer wonders what the future holds for him. We often hear that cattle of the future will be produced on forage and not in the feedlot. Often we tend to believe what the detractors of the livestock feeding industry say without looking back at our own track record. During the 60's and early 70's, there was a tremendous growth in the cattle feeding industry. The reason for this growth was simply to fill a demand on the part of the American consumer for more beef. At first thought, we in the feeding industry think that the demand was for "fed beef" and that may be a significant part of our contribution, however while feeding may have improved the eating qualities of the product, over one half the tonage of beef consumed was "fed on" or produced in the feedlot in the period of 1968 through 1972. Had there been no feedlots and no feeding it is likely that we would, as consumers of beef, had to settle for half as much as we consumed to say nothing about quality.

Where does the beef we eat come from? On the average, the typical weanling steer calf weighes less than 400 pounds. When the cattle produced in the south are considered the average dressing percent, if all these steers calves were killed at weanling would be slightly less than 50 percent. This means that on a national average we could expect slightly less than 200 pounds of carcass beef per calf it we killed these cattle at weaning time. Some of these calves, under normal management, will continue on grass to some what heavier live and carcass weights.

If the cattle industry had to shift away from a feeding economy the only alternative would be to hold more calves on grass, this could only force a reduction in cow numbers. Table 1 shows the effect of flesh and market weight on the carcass weight and dressing percent of various weights of cattle.

Table 1. Effect of Market Weight on Supply of Carcass Beef

Live Weight	Yield	Carcass Wt.	% of 1100% Steer Carcass	
1300	63.00	819.00	119.13	fed cattle
1200	63.00	756.00	109.96	
1100	62.50	687.50	100.00	
1050	62.50	656.25	95.45	
1000	62.00	620.00	90.18	
975	62.00	604.50	87.93	
950	61.50	584.25	84.98	
925	61.00	564.25	82.07	
900	61.00	549.00	79.85	
400 [a]	46.00	184.00	26.76	
400 [b]	50.00	200.00	29.09	
400 [c]	57.00	228.00	33.16	
500 [a]	46.00	230.00	33.45	
500 [b]	50.00	250.00	36.36	
500 [c]	57.00	285.00	41.45	
600 [a]	46.00	276.00	40.15	
600 [b]	50.00	300.00	43.64	
600 [c]	57.00	342.00	49.75	
700 [a]	46.00	322.00	46.84	
700 [b]	50.00	350.00	50.91	
700 [c]	57.00	399.00	58.04	

[a] Thin feeder

[b] Average feeder

[c] Very fleshy feeder

Grains Vs Forages for Beef Production

Vast areas of the United States are adoptable only to grazing animals, for beef this means cow-calf production or possibly the stocker programs. Few, if any, changes with the exception of pressures for non livestock uses of these lands are likely to occur in the future. On the other hand many millions of acres of land which could be used for either grain production, or forage production have been taken out of grain production and put into pastures for livestock in the past 20 years. The low feed grain prices of the 60's plus the greater ease of pasture production caused the shift from crop to livestock grazing. The production potential and costs are likely to reduce the further swing of these acres from crops to pasture. The economics of crop production and in particular harvesting costs and the potential conversion of forage vs. concentrates to carcass beef will dictate the direction of the crop beef relationships.

Where Are the Efficiencies and Inefficiencies of the Beef Animal?

Table 2 shows the net energy requirements of beef cattle. These tables map out the course for even more efficient production of beef.

Table 2. Net Energy Requirements for Steers & Heifers

Wt. lbs.	NEm per day Mcal	Steers # gain/day 1.0	2.0	3.0	Heifers # gain/day 1.0	2.0	3.0
		meg cal NEg/day			meg cal NEg/day		
400	3.85	1.25	2.64	4.17	1.39	3.03	4.93
500	4.55	1.48	3.12	4.93	1.64	3.58	5.82
600	5.21	1.70	3.58	5.65	1.88	4.11	6.68
700	5.85	1.91	4.02	6.35	2.11	4.61	7.50
800	6.47	2.11	4.45	7.02	2.33	5.09	8.29
900	7.06	2.30	4.86	7.67	2.55	5.57	9.05
1000	7.65	2.49	5.26	8.30	2.76	6.02	9.80
1100	8.21	2.68	5.65	8.91	----	----	----

Table 3 shows the percentage of total feed fed used for maintenance if various weights of cattle are maintained on forage of the quality of prairie hay of average quality.

Table 3. Net Energy Requirements of Cattle Maintenance

Animal Weight	Meg. Cals. per day	Pounds of Av.[1] Range Feed	Feed for Maintenance as % of estimated total intake
200	2.29	5.19	74
300	3.10	7.03	70
400	3.85	8.73	73
500	4.55	10.32	68
600	5.21	11.81	65
700	5.85	13.27	66
800	6.47	14.67	73
900	7.07	16.03	76
1000	7.65	17.35	79
1100	8.21	18.62	81
1200	8.77	19.89	83
1300	9.31	21.11	85

[1] Assuming NEm of 44.10 meg. cal per cwt. at 10% moisture. (Prairie hay average quality).

It is readily apparent that about 75% of all feed used by the animals shown in Table 3 will go to maintenance with very little feed available for true production. Possibly more important in the future than the poor conversion of feed resources is the affect of low order rates of gain on non-feed costs of owning cattle. Few areas of the United States could obtain gains on forage only of much over 1 pound per head per day "pay to pay" for extended periods of time. Table 4 shows a typical cost of ownership budget for stocker cattle.

Table 4. Cost of Ownership of a 400 Pound Steer on Pasture for 180 Days When Purchased for $40 per cwt.

Item		Daily Cost ¢/day
I	Interest at 9% on animal (7.36)	4.09
II	Interest on feed and operating expense at $0.30 day $1.23	.68
III	Cost of Death loss (3%) $5.00.	2.78
IV	Vet & Medical Expense at $3.50	1.94
V	Trucking Expense 275 miles at 1.25 (3.13)	1.74
VI	Commission at $2.00 head	1.11
VII	Labor Charge at 5¢/head/day	5.00
VIII	Special feed & salt & mineral at 4.00 head	2.20
	Non pasture costs/day	19.54
	Pasture at 1.75 per cwt/mo	23.33
	Total cost per day	42.87

Effect of Rate of Gain on Cost of Gain (assume 7% shrink from purchase and sell direct off pasture with a 3% shrink).

		Cost per lb. of gain ¢	
Gain from in wt. to pay wt.	Gain from pay wt. to pay wt.	Non feed Cost of gain	Total Cost of gain
0.50	.344	58.50	122.09
0.75	.56	34.89	76.56
1.00	.81	24.12	52.93
1.25	1.06	18.43	40.45
1.50	1.31	14.92	32.73
1.75	1.56	12.53	27.48
2.00	1.81	10.80	23.69

When using the daily non-feed cost budget shown in Table 4 caution should be exercised because the budget is based on a 6 month grazing period. If the grazing period is cut in half, all the daily costs except interest and labor will double and for 90 days the total non pasture costs per day would be about 25.5 cents per day. This form of budgeting non-feed costs is useful because it makes it easy to calculate non-feed cost per pound of gain. It should become clear that these non-feed costs will eliminate in the future cattle programs which obtain low daily gains.

The relationships between high energy feeds and roughages in the cost and efficiency gain.

In modern cattle feeding the secret of survival is to develop rations for cattle which represent the best value from the feed commodities available in the area.

The modern theory of feedlot ration formulation can be illustrated by figures 1-A through 1-C.

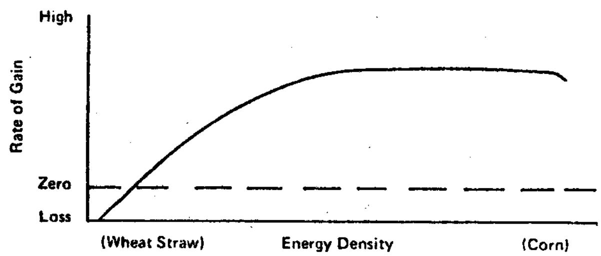

Figure 1-A Effect of Energy Density on Rate of Gain.

When nutritionally adequate rations are formulated at various energy levels ranging from very low (level of wheat straw) to very high (level of shelled corn), the relationship in Figure 1-A would become apparent.

When energy density is very low, animals simply cannot eat enough feed to make gains; as energy density increases, gain increases. Maximum gain usually occurs on rations of about 50 to 70 percent concentrate if the roughage protion of the ration is equivalent to good quality alfalfa hay. Higher or lower energy roughages will tend to move the relationship in the appropriate direction. A slight depression in gains is frequently observed on very high concentrate rations.

High rates of gain are very important because of high non feed costs on cattle. In the feedlot, gross feedlot margins of 15 to 20 cents per head per day are common. In addition to this, all of the costs shown in Table 4 with the exception of yardage would have to be added to the feedlot margin. Non feed costs in the feedlot would range from about 30 to as much as 35 cents per day. The increase in gain from 2 pounds to 3 pounds per head per day could reduce non feed cost of gain in excess of 5 cents per pound.

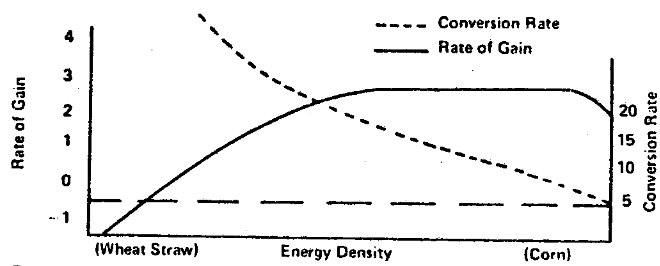

Figure 1-B Effect of Energy Densities on Rate and Efficiency of Gain.

Figure 1-B shows feed conversion (pounds of feed dry matter per pound of gain) superimposed on the diagram shown in Figure 1-A. Note that as energy density increases that the conversion ratio will similarly show an improvement in balanced rations. Feed conversions have always been important, but have become more important in recent years when the costs of harvesting, hauling and delivering feed are considered. Many feeds of low energy density now cost more to harvest and haul than they are worth if economical beef production is to be achieved.

Rate of gain and feed conversion ratio are very important factors in ration formulation because of their affect on cost of gain. However, neither maximum rate of gain nor the most efficient conversion ratio insure economical gains. Feed prices are important in determining the cost of gain.

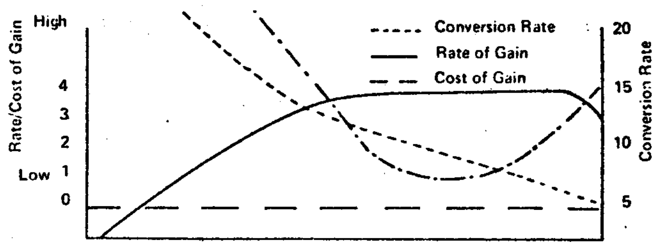

Figure 1-C Effect of Energy Density on Rate, Efficiency, and Cost of Gain.

Figure 1-C illustrates a hypothetical cost of gain curve superimposed on Figure 1-B.

The object in the formulation of beef cattle finishing rations is to feed at the low point on the cost of gain curve. IT IS PROBABLY TRUE THAT MORE FEEDERS WHO EXPERIENCE HIGH COST GAINS DO SO FROM BEING AWAY FROM OPTIMUM ON THE COST CURVE, RATHER THAN FROM RATION IMBALANCE ITSELF.

The cost of gain curve is affected by the factors shown on both the rate and efficiency curve; however, feed price and overhead costs can move this curve either to the right or left.

All cattle feeders are affected by the relationships which affect the cost of gain curve. Beef animals may be managed on either high concentrates or high roughage programs or combination in between. Because of increasing energy and fertilizer costs, the cereal grains have represented a lower total cost of gain potential in beef cattle than have harvested forages that last few years. With the exception of high energy byproducts, feeds such as molasses, hominy feed, beet pulp, etc., corn has represented the best value in terms of least cost beef gain in the corn growing areas of the United States. Sorghum grain and barley have been competitive in other areas. Feed grain prices have become very important to all in the cattle business as changes in grain prices have a large affect on the value of weanling calves and stockers.

Effect of Weight on Feed Efficiency

The greatest misconception in the cattle industry is that all gains on beef cattle should cost a given figure. Table 5 shows the effect of weight on feed conversion of feedlot steers fed a good high energy ration. Light weight young cattle can gain on much less feed than they will when they reach heavier weights. The reasons for this are apparent in the net energy requirements of beef cattle Table 2. Note how the energy for gain (feed) increases as the animal becomes heavier.

Table 5. The Effect of Weight on Feed Efficiency
Assuming a 86 meg cal NEm and 56 meg cal NEg

Weight	Feed/lb. Gain	Weight	Feed/lb. Gain
300	3.3	900	7.8
400	4.0	1000	8.9
500	4.7	1100	10.1
600	5.4	1200	11.4
700	6.2	1300	13.8
800	7.0		

Where feed costs are concerned the net energy tables clearly show that the younger and lighter the cattle can be put on feed the greater is the potential for achieving efficient use of feed. It is also obvious that if cattle can be marketed at somewhat light weights that feed efficiency and costs may be improved. The normal energetics of feed utilization dictate that feed required per pound of gain on a given ration will increase as cattle become heavier. Thus, it is impossible to achieve a single figure for cost of gain over a wide range of weights. At times, the beef cattle pricing mechanism ignores this biology and thus provides a profit opportunity for those cattlemen in a position to exploit it.

Size of Cattle Vs Feed Efficiency a Potential Conflict

The energy requirements of cattle indicate that if optimum efficiency is important then cattle should be started on feed at light weights, and at an early age. The earlier they can be marketed on the other end the better. These concepts at time conflict with:

1. A cow man who is striving for heavier weanlingweights.
2. The Packer-Breaker who has his processing costs tied to a per head basis.

In the meat trade there are significant economies on a per pound of retail product as carcass size increases. There will be compromise and changes on the part of breeders, feeders and meat processors, however in the future, conservation of feed resources will have a much more significant impact than in the past.

Can Cattle be Made More Efficient?

Beef cattle and in particular the feedlot industry has wasted a lot of feed in the past. Poor rations, failure to use proven feed additives, and growth stimulants have possibly caused us to use as much as 15% more feed than was necessary. The biggest waste of feed, however, has occurred when feeders elected to feed cattle to heavier weights than necessary. It has been standard practice to feed cattle for an extra 2-3 weeks when feeding to grade as a "safety factor". Research has never supported this concept. An additional 2 weeks feed would seldom raise the percent of choice cattle in a pen over 2 or 3%.

The new beef grades and the emphasis on leaner carcass should greatly reduce the feed required in feeding cattle.

The key to improvements in efficiency may be in the research laboratories of this country. Following the introduction of stilbestrol and antibiotics in the 50's, we went through the 60's with out many new feed additives or growth promotives, at least nothing of the significance of Stilbestrol, which can easily reduce the cost of feeding a long fed steer by as much as $35.

The emphasis on "improving the environment" and dificulty in getting new products cleared by the Food and Drug Administration were significant causes for slow down. Time or the "energy crisis" appears to accelerated the process and cattlemen can look forward to exciting things in the 70's. Monensin sodium, Rumensin® has reduced the feed required to feed a feedlot steer on an average of 10 percent across the nation. More important is that the animal scientist for the first time has made a significant crack in improving the efficiency of energy transfer with in the rumen of cattle. The rumen of cattle is both an asset (in using low quality forages) and a liability (less efficient system than monogastrics for example in the use of concentrates). It is quite likely that following the successful introduction of monensin, that other products will follow which will improve the efficiency of nutrient utilization.

It is likely that a replacement which can be more effective and have a greater relative safety that Stilbestrol is just around the corner. Low quality feeds which in their natural state may not be conducive to economical beef production can and are being improved by mechanical and chemical process to open a vast reserve of additional feed resources. We have the technology to offer the American consumer even larger quantities of high quality beef in the future, in spite of possibly sharing a greater amount of our feed grains with the world.

The Computer and the Cattle Feeder

Todays, and the cattle feeder of the future must know where he stands in terms of animal performance and costs on cattle on feed today, and where these cattle will be at any point up to market. Most of the large feedlots in Oklahoma use the Oklahoma State University Beef Gain Simulator or a similar method of forward cattle projection.

The Beef Gain Simulator computer program is a tool for cattle feedlot managers, cattle consultants, financial investors and, generally, anyone who is interested in such items as cost of gain, feeding period length and the economy of ration selections. Basically, the Simulator does calculations that are performed every day by those in the cattle industry. However, in the industry these calculations depend on knowing the cost of rations already consumed and weight already gained. In contrast, the Simulator predicts both consumption and gain. This fact, along with the speed at which a computer can do calculations, makes the Simulator the valuable tool that it is.

Why Use The Simulator?

The main reason for using the Simulator is to predict the profit for cattle in a feedlot before an investment is made. In addition, the rise or fall of profits with different inputs (for example, ration selection) can be determined easily by using the Simulator. Such a variation in the feeding of cattle may not be feasible in a real environment since a given variation can be economically disastrous. Output from the Simulator can also be used as a base for the historical evaluation of cattle performance. By comparing actual performance to predicted performance, it is possible that both the Simulator and present feeding methods can be improved.

The output of one of these simulations is shown in Table 6. The portions of the table marked "input parameters" and the ration numbers, days, $/cwt, NEm and NEg are input information supplied by the user. The other figures are generated by the program. While information in this sample run is shown on a 14 day increment the calculations are done for each day, and could be printed out on a daily basis if desired.

Tools such as the gain simulator will become even more significant in the future as cattle feeders trend toward assuming less market risk and work more on feeding margins.

The Real Strength of the American Beef Cattle Industry

The future of the beef industry does not really lie in the cattle we have today nor the feed resources that are available today. Our strength and our future lies in our people. The cattleman of today is ambitious and well educated, he has a proven track record. The future of the industry lies in economies which will result from our people doing their present jobs with greater knowledge, skill and dedication.

Table 6 OKLAHOMA STATE UNIVERSITY BEEF GAIN SIMULATOR

DATE	DAY	FAT WT.	DAYS FEED	DAYS FEED COST	///// GAIN ///// DAYS LBS.	AVERAGE IN_W	AVERAGE PY_W	// CONVERSION // DAYS LBS.	AVERAGE IN_W	AVERAGE PY_W	/ COST OF GAIN / DAYS TOT.	AVERAGE IN_W	AVERAGE PY_W	BREAK EVEN $/CWT	PROFIT /HEAD
4/01/76	0	546	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.65	7.35
4/14/76	14	582	17.47	0.83	3.22	2.59	0.54	5.43	6.14	29.70	0.31	0.42	2.23	42.36	9.58
4/28/76	28	628	18.26	0.96	3.34	2.91	1.88	5.46	5.81	8.98	0.34	0.34	0.59	41.64	14.83
5/12/76	42	674	18.94	0.99	3.27	3.04	2.36	5.79	5.75	7.42	0.34	0.33	0.47	41.09	19.61
5/26/76	56	719	19.49	1.02	3.18	3.09	2.57	6.12	5.81	6.96	0.36	0.33	0.44	40.73	23.50
6/09/76	70	763	19.91	1.05	3.08	3.10	2.69	6.46	5.91	6.81	0.38	0.33	0.42	40.54	26.40
6/23/76	84	805	20.22	1.06	2.98	3.08	2.74	6.79	6.02	6.78	0.40	0.34	0.42	40.48	28.33
7/07/76	98	846	20.41	1.07	2.86	3.06	2.77	7.13	6.15	6.81	0.43	0.34	0.42	40.53	29.33
7/21/76	112	885	20.51	1.08	2.75	3.03	2.77	7.47	6.29	6.87	0.45	0.35	0.42	40.67	29.44
8/04/76	126	923	20.52	1.08	2.62	2.99	2.76	7.82	6.42	6.95	0.47	0.36	0.42	40.89	28.71
8/18/76	140	959	20.46	1.07	2.50	2.95	2.74	8.18	6.56	7.05	0.49	0.37	0.43	41.16	27.19
9/01/76	154	993	20.34	1.07	2.38	2.90	2.71	8.55	6.70	7.16	0.52	0.37	0.44	41.49	24.90
9/13/76	166	1021	20.19	1.06	2.27	2.86	2.69	8.88	6.82	7.26	0.54	0.38	0.44	41.81	22.38

BEEF GAIN SIMULATOR CLOSE-OUT

INPUT PARAMETERS

SEX (1=S, 0=H)	1
PURCHASE WEIGHT	575
PURCHASE COST/CWT	40.00
STARTING FACTOR	0.9
FEEDER GRADE	3.5
MEDICAL COST/HEAD	3.00
SHRINKAGE%	5.00
SELLING WEIGHT	1020
SELLING PRICE/CWT	44.00
EQUITY/HEAD	0.00
INTEREST RATE%	9.00
OVERHEAD/HEADDAY	0.05
FRT+COMM/HEAD	0.00
IN DATE	40176
DEATH1	0.75
DAY1	30
DEATH2	0.50
DAY2	150
PRINT INCREMENT	14

NO FACTORS(%) J 100 F 100
M 100 A 100 M 100 J 100 J 100
A 100 S 100 O 100 N 100 D 100

RECAP AT SALE WEIGHT (9/13/76)

IN WEIGHT	546
OUT WEIGHT	1021
DAYS FED	166
GAIN/HEAD	446
FEEDLOT GAIN/HEAD	474
AVG DAILY GAIN	2.69
FEEDLOT AVG DAILY GAIN	2.86
CONVERSION	7.26
FEEDLOT CONVERSION	6.82
TOTAL COST OF GAIN/CWT	44.14
FEEDLOT COST OF GAIN/CWT	37.90
BREAK EVEN/CWT	41.81
TOTAL INTEREST	13.52
TOTAL OVERHEAD	8.30
DEATH LOSS COST	3.41
PROFIT	22.38

RATION	DAYS	$/CWT	NEM	NEG	DAYS FED	POUNDS	COST
1	10	5.25	75	46	10	153	8.04
2	15	4.75	82	53	15	265	12.60
3	500	5.25	86	55	141	2816	147.87
TOTALS		5.21			166	3235	168.53

OKLAHOMA STATE UNIVERSITY BEEF GAIN SIMULATOR

DATE	DAY	FAT WT.	DAYS FEED	DAYS FEED COST	///// GAIN ///// DAYS LBS.	AVERAGE IN_W	AVERAGE PY_W	// CONVERSION // DAYS LBS.	AVERAGE IN_W	AVERAGE PY_W	/ COST OF GAIN / DAYS TOT.	AVERAGE IN_W	AVERAGE PY_W	BREAK EVEN $/CWT	PROFIT /HEAD
4/01/76	0	546	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.65	7.35
4/14/76	14	582	17.47	0.83	3.22	2.59	0.54	5.43	6.14	29.70	0.31	0.42	2.23	42.36	9.58
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6/09/76	70	763	[illegible]	1.05	3.08	3.10	2.69	6.46	5.91	6.81	0.38	0.33	0.42	40.54	26.40
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NT FACTORS(%) J 100 F 100
M 100 A 100 M 100 J 100 J 100
A 100 S 100 O 100 N 100 D 100

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3	500	5.25	86	55		141	2816	147.87
TOTALS		5.21				166	3235	168.53

NOTE: SAMPLE RUN

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THE FIGURES AND CALCULATIONS INCLUDED HEREIN ARE BASED ON THE HISTORICAL PERFORMANCE OF AVERAGE CATTLE UNDER AVERAGE WEATHER CONDITIONS AND THE ASSUMPTIONS LISTED IN THE INPUT PARAMETERS. THEY ARE IN NO WAY A GUARANTEE OF THE PERFORMANCE OF ANY PARTICULAR GROUP OF CATTLE AT ANY GIVEN TIME.

DEVELOPED AT OKLAHOMA STATE UNIVERSITY BY

DR. DONALD R. GILL, EXTENSION ANIMAL NUTRITIONIST
AND JOSEPH L. GRAY, UNIVERSITY COMPUTER CENTER

POTENTIALS FOR RANGE BEEF PRODUCTION

William C. Krueger
Program Leader
Rangeland Resources Program

Rangeland has historically been of great importance for beef production in Oregon and most of the world. Over the last twenty years substantial increases in beef production have been brought about by integration of feed resources from range, irrigated pasture, hay, and grain. Most of this increase in red meat has come from increased yields of hay and especially grain crops. However, in recent years, production costs of hay, irrigated pasture, and grains have shown substantial increases. This coupled with changing markets and political and social factors, will probably increase demand for range forages since costs of range beef production have not been as substantially influenced by recent events. Beef producers need production alternatives that can reduce or offset the ever increasing expenses of ranching. This is where intensification of range management can be of real economic importance, since much of the cost of range management is the managerial input rather than land tillage, planting, and harvest that continually increase in cost. Developing an understanding of range and managing it to meet its potential represent an opportunity for increasing profits that may exceed those of other production alternatives.

Range Management

Range, which consists of grasslands, shrublands, and open forest make up 54 percent of the land area of the 48 states. This is over 1 billion acres that because of environmental constraints cannot grow cultivated crops year after year. Their only promise for helping to meet our food production needs is through harvest by grazing animals.

While red meat is an important product of range, other uses such as watershed, wildlife, wood products, and various forms of recreation canbe incorporated with livestock grazing to yield multiple products from rangeland that have marketable or aesthetic values. Management can be developed to favor any of these specific outputs or to accommodate various mixes of outputs. Each land owner or manager can determine the output or mix of outputs he desires and then develop specific management programs to meet these production goals. It is difficult to separate livestock grazing from other uses of the range, as grazing programs can both direct and be directed by other demands on the same land. However, with this understanding, I will concentrate on potentials for range beef production.

In 1974, the U.S. Department of Agriculture brought together a work group to examine the U.S. range and its relation to red meat production. This effort resulted in a book entitled, "Opportunities to Increase Red Meat Production from Ranges of the United States". Most of the statistics and some of the ideas in this report were drawn from their publication.

Demand for Range

On a nationwide basis the demand for beef is expected to rise steadily over the next ten years. This will result in a nationwide demand for a 25-50 percent increase in range forage use. The projection is based on the lowest and highest reasonable estimates of demand. For the low estimate to be valid, beef production systems for the next ten years would need to return to pre-1970 methods of operation. For the high estimate to be valid, continued increase in per capita beef consumption and less total grain feeding per head would need to occur. In any event, the demand for range forage will increase and this means levels of stocking and areas grazed will increase to accommodate the demand if the supply of forage is adequate.

Analysis of the range situation suggests that projected demands can be met for the foreseeable future. At the present time, livestock graze on about 835 million of the 1,200 million acres of forest and rangeland in the 48 states. In 1970 it was estimated that 28% of rangeland in the West was in good or better condition. So, most of the U.S. rangeland has potential for improvement of productivity. Forest range is generally in better condition so the opportunities for improvement there are relatively lower than for other rangeland. In 1970, 213 million animal unit months (AUM's) of grazing were produced from U.S. ranges. National forests provided 5% of the grazing, other federal lands provided 9% of the grazing and 86% of the AUM's came from non-federal land.

If no major scientific breakthroughs occur over the next 25 years in either range, agronomy, or animal science, then range grazing could vary from 184 to 1,700 million AUM's annually. If no attempt is made to tap the potential of the land only the 184 million AUM output would be expected to occur. If livestock output is maximized on forest and rangeland, the 1700 million AUM level could be achieved. However, 1,700 million AUM's is 4-5 times the quantity of range forage needed and would represent severe environmental impact with a sacrifice of important multiple use values. Within the context of multiple use, 566 million AUM's of grazing could be achieved at an estimated annual investment cost of $4.74/AUM. A doubling of total range livestock production will result in a 15% increase in cost/AUM. Thus, it appears cost of meeting demands for range forage are realistic on a nationwide basis. Clearly the production opportunities from range exceed the demand for the near future and beyond the year 2000.

How can the Potential of the Range be Met?

In Oregon we have significant amounts of both public and private range. Ranchers have little opportunity to develop public ranges and thereby increase livestock numbers. It is difficult to predict the long term public land grazing policies. However, in the short run, the numbers of permitted cattle on public lands in eastern Oregon will probably remain near the present level. The Bureau of Land Management will be doing little to improve range livestock grazing until their legal problems are solved. The Forest Service has been authorized for a range validation (improvement) program that should result in increased livestock numbers in the Central Blue Mountains. The primary impact of this program will be in Grant County. Other Forest Service lands in eastern Oregon will probably show little change in permitted cattle during the next few years. On public lands in western Oregon the situation could be different, especially on Forest Service land. Douglas fir forests can be highly productive forage areas following logging. As long as grazing programs can be developed that are compatible with forestry goals, there seems to be opportunity for stocking cattle on these cut over areas and on vacant allotments. For the most part, grazing programs on public land will be rigidly structured as to time, place, and numbers of cattle grazing.

Each rancher should study his federal grazing allotment. For example: He knows the forage in each pasture and has a good idea of how it changes during the season. He also knows when each pasture will be grazed. Does the forage have the potential to meet the production goals set for the ranch? If not, how can one make the most of the grazing program in terms of profit? Is there an opportunity to wean the calves when a pasture change is made in the summer and put them on better pasture? While this may mean grazing less on public land, if the calves keep gaining and sell at a heavier weight, more profit may be realized even though costs of production are higher. A variety of animal manipulations may be developed to make the most profit from a known, fixed grazing program.

Opportunities for improvement and management of private lands remain. These opportunities are as varied as the ranches themselves but should not go unnoticed. Livestock forage production in the state can be improved by brush control, seeding, water development, timber thinning and sales, fertilization, and grazing management. The needs and values of each practice vary from site to site and ranch to ranch. However, much of the rangeland in the state is capable of producing 2 to 10 times as much grazing as it is currently. Even if specific range improvements are not needed or desired, managerial inputs could be highly rewarding.

Grass is wealth. Cattle are an effective means for marketing that yearly grass crop. To pay on the long term, range management programs must meet the nutritional needs of the plants to maintain desirable levels of production. Developing the skill to harvest maximum sustained yield of the grass crop is the key to range livestock management. An efficient matching of livestock class to the forage resources can pay well in excess of management costs.

Nutritional needs of different classes of livestock (dry cows, lactating cows, calves, steers) are as varied and important as nutritional needs of different classes of plants. However, the needs of both the plants and animals must be met every year to maintain desirable levels of production. This is where the greatest opportunity lies, in converting present forage resources to the most profitable classes of cattle while maintaining the most profitable stand of forage.

BEEF CATTLE PRODUCTION POTENTIAL OF WESTERN OREGON

Wayne Mosher - Douglas County Extension Agent
and
Ken Bare - Douglas County Rancher

Beef production in Western Oregon has increased greatly over the last 20 years but only a small portion of the total potential is being realized at the present time. In the native state much of the range is very poor for livestock production of any kind. The pasture species involved are mostly annual grasses with a very short season of growth in the spring time and a very very short season when quality feed is available. This season may be as short as a month and a half to two months on some of the dry south slopes. The introduction of subterranean clover into Western Oregon and the development of a fertilizer program to make it produce has resulted in very productive pastures being developed in the western part of the state. We have changed from a very short season with a low quality feed to a long season of productive use with a high quality feed. Subterranean clover is an annual clover that starts with the fall rains, grows some through the winter, makes a big burst of production in the spring and dies. At the time when it is growing rapidly it may have a protein content as high as 20% and tapering off to cutting hay at around 12 - 15%. In the dry state in the middle of summer it can have a protein content of 6 - 10%.

Sub clover is well adapted to Western Oregon growing conditions, a winter rainy season when moisture is available, a good spring when moisture and temperature are good for growth and when the rains cease the first of July, subterranean clover dies and no longer is in need of moisture which the soils at that point are not capable of supplying. Sub clover also has one other very outstanding feature and that is its ability to stand heavy grazing. Heavy grazing tends to increase the amount of subterranean clover in the pasture as compared to associated grasses. The clover comes back stronger if it is grazed at a relatively high rate. Over grazing of sub clover while not impossible is highly improbable. Weight loss on the livestock would prohibit it.

Improved subterranean clover pastures have increased production over the native pastures several times. Native pastures produce perhaps a thousand pounds of dry weight per acre per year. Subterranean clover-ryegrass pastures properly fertilized are capable of producing 4-6 thousand pounds of dry weight production per acre per year. With good management and continued use over a period of time many of them will produce 5 - 7 thousand pounds of dry weight per acre per year of a very high quality feed. Western Oregon ranchers are improving pastures by working them up, seeding them to subterranean clover and ryegrass or subterranean clover and tall fescue. In Douglas County and several other areas of the west, the clearing of brush from hill lands and seeding these to improved pasture is proving to be quite a profitable undertaking. The improvements, though costly, can be made for considerably less than buying more land, and the economics of return are greatly enhanced with this program. When you can take an acre of hill land and spend $100.00 to improve it from a poor producing pasture the associated costs don't go up very much. Taxes are slightly increased, the cost of operation is increased because of a fertilizer program to keep the pasture growing and expenses are greater because of additional fencing and water development, but the returns far outstrip the additional cost involved.

The fertilizer program in most of Western Oregon includes phosphorous and sulfur to make the subterranean clover grow. This helps to make the clover productive. The clover also provides nitrogen for the associated grasses making them more producitive. Research workers in New Zealand and Australia have determined that nitrogen production of a good subterranean clover pasture probably exceeds 100 pounds of actual nitrogen produced per acre per year. Running more stock on the pasture is cycling more of the nitrogen back onto the soil in the form of dung and urine and consequently is making the pasture more productive. Increasing the stocking rate is beneficial to the pasture in most cases, up to the point that by excess stock particularly in the winter reduces pasture preformance. So long as we avoid excess trampling particularly in the winter time and so long as we keep the stock doing reasonably well the pasture should continue to be more productive.

Fencing is very necessary to get optimum use of the pasture that is produced. Rotation is beneficial at various times of the year and for various reasons. In the spring of the year when most of our production occurs we are in many instances shutting up pastures that we can get over with the mower and cutting these for hay to supplement the cattle through the winter months. Shutting cattle off some pastures so the pasture can grow and saving it for late summer use have also been quite successful as far as beef cows are concerned. The feed left on the pasture is adequate to summer a beef cow and to carry her into the early part of the winter although not very good calf feed at this time. Pastures need to be eaten down by the fall rains. Leaving an excess of debris on the pasture can reduce the amount of subterranean clover that comes back the next year. Keeping pastures adequate but short in the spring reduces further the low bloat possibilities with subclover.

Many of our operations in the Douglas County area and we think through a lot of Western Oregon have gone to fall calving simply because this fits our pasture production curve better. We calve in the early part of the fall when the weather is a lot nicer than it is in the early spring of the year. This makes it easier to look after the cattle during the calving period. Then as the cows go into the winter a little bit more supplemental feed than if you were carrying dry cows through the winter leads to these cows producing adequate milk for the calves. It gives us an opportunity to creep feed the calves to keep them out of the mud when we are feeding the cows. When the grass really starts growing in the spring the cows going out on grass seem to almost "freshen again" and start to produce a lot of milk and the calf is big enough to use it and also will use the pasture available. This pasture being of extremely high quality does an excellent job of putting weight on calves and keeps the cow milking well. Selling these fall calves about the first of July when the pasture dries up leaves us with only the dry cows to carry over through the summer. This fits the low summer pasture production pretty well.

We are also finding our pasture curve lends itself very well to growing out feeder calves. Many of our growers are buying calves in the late winter and early spring of the year and putting them on the green grass in the spring (about the 15th of March to the 1st of April). At this point the pastures are producing extremely well with a very high quality of feed and we find that we are able to get excellent gains on the calves. Weight gains vary from 200 to 300 pounds per calf depending on sex and wintering. We sell again about July first when the pastures dry.

We know the pastures are able to produce 4500 - 6000 pounds of dry weight per acre per year. With 4500 pounds of feed produced by the pasture during this period at 15 pounds per day average for a feeder steer would mean 300 feeder days per acre produced annually. Thats 3 feeder calves per acre for 100 days during the spring of the year, with possibilities of going to four or perhaps as high as five calves per acre for the spring flush period. We get most of the feed eaten while it is lush green and of high quality making perhaps the most efficient use of that feed that we have.

On a cow-calf operation if we produce 4500 - 5000 pounds of dry matter per acre per year that theoretically could carry about 6/10 of a cow per acre per year. So far we haven't been able to do that and part of this is because we have to conserve some of the feed as hay or other means for supplementing during the winter months. We also run into some mud problems but we think that there are some possibilities of approaching this and we definitely feel that there is a possibility of running at least a cow to 2 acres on a 12 months basis and cut our own hay on much of this Western Oregon hill country.

The potential for livestock meat production on Western Oregon hill lands is almost unbelievable. Estimates have been made that somewhere in the vicinity of 2 million acres of Western Oregon hill land should be in the proudction of pasture and harvested with livestock. It would seem that there are great possibilities of more than doubling the livestock produced in Western Oregon.