PROCEEDINGS

BEEF IMPROVEMENT FEDERATION

RESEARCH SYMPOSIUM & ANNUAL MEETING

April 11 & 12, 1973

NEW TOWER HOTEL COURTS

Omaha, Nebraska

PROCEEDINGS OF BEEF IMPROVEMENT FEDERATION

RESEARCH SYMPOSIUM AND ANNUAL MEETING

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EFFECTS OF SELECTION ALTERNATIVES ON EFFICIENCY IN SIMULATED BEEF HERDS[1,2]

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Selection is an effective method of changing level of performance for many characters of economic importance in beef production. The dilemma of the seedstock producer is that of deciding upon specific selection criteria to employ in his herd. Several considerations enter into this decision. Potential response to selection is important; exerting selection pressure on an unchangeable character is not a logical course of action. Expenses associated with collecting data, analyzing records, interpreting results, disposing of cull animals and other factors should not be overlooked. Requirements and desires of potential customers are of concern; the purpose of the seedstock producer should continue to be efficient provision of cattle suited for use in commercial beef production. Of course, these and other important factors are not independent and cannot be evaluated independently. Primary attention in this discussion will be focused on the impact of certain selection alternatives in commercial beef production; other factors will be discussed when appropriate.

Much emphasis in recent years has been placed on selection programs for increasing weaning weights and yearling weights of cattle. Positive genetic and phenotypic correlations have been reported among weaning weight, yearling weight, birth weight, 18-month weight and mature weight as well as between mature weight and rate of gain during different growth periods (Brinks et al., 1964). These results imply that rank for weight in a group of cattle of the same age would tend to be similar at any point in their lives and that animals larger at maturity have a tendency to produce offspring larger at birth, weaning, 12 months, 18 months and maturity. These results also indicate that selection for fast rate of gain, which is usually considered a desirable trait, would tend to increase mature weights in a herd. Koch, Gregory and Cundiff (1973) reported that weaning weight and yearling weight were increased by selection; increased birth weight was a correlated response in both cases. Heritability estimates from these two studies and elsewhere have indicated that one may expect appreciable change when selecting for weight and growth rate in most herds of cattle. However, increases in these traits will likely be accompanied by increased birth weight and mature weight, which are not of direct economic benefit and which may actually be detrimental in effect.

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[1]The simulation study discussed in this paper was conducted at Texas A&M University and funded by the Texas Agricultural Experiment Station.

[2]Presented at the Beef Improvement Federation Research Symposium, Fourth Annual Beef Improvement Federation Meeting, April 11, 1973, Omaha.

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A character that is closely related to weaning weight in beef cattle is milk production of cows. Results of direct selection for milk yield in dairy cattle indicate that this character can be altered by selection. Because of the close association between weaning weight and milk yield, one would expect selection for heavy weaning weight to result in some correlated increase in milk yield in a beef herd.

The two characters, (1) cow size and related progeny performance and (2) milk level, are economically important components of herd performance which are changeable by selection. An examination of the direct and correlated effects of these variables on efficiency of beef production systems should increase understanding of the potential impact of alternative selection goals.

One of the problems of evaluating productive efficiency of systems is the number of considerations necessary to properly examine a system. It is virtually impossible to examine complete production systems by conventional experimental techniques. Simulation techniques provide a means of conducting comprehensive studies of systems employing several alternative levels of performance.

A simulation study was conducted at Texas A&M University to examine effects of different levels of performance for several characters on productive efficiency (Long, Cartwright and Fitzhugh, 1973). Performance data on Angus, Charolais, Hereford and Jersey cows and their progeny as well as results from other research formed the basis of the model. In order to examine productive efficiency, it was necessary to give consideration to all facets of production including cow size and progeny performance, milk level, fertility, calf survival, cow longevity, replacement requirements, nutritional needs, sale prices and fixed costs. Annual fixed costs per cow of $57 charged in this study included labor, $12; depreciation, $5; interest on cattle investment and operational expenses, $13; non-nutrient costs per replacement heifer, $6; taxes, fees and similar charges, $4; veterinary expenses, $2.50; repairs on facilities, $2; service sire, $6; transportation, $5; salt and minerals, $1.50. Two nutritional regimes, based on results of nutritional research and conventional recommendations, were employed as a basis for estimating and satisfying nutritional requirments of the breeding herd. The Drylot Regime corresponded to an intensive, drylot feeding program in which all nutrients for cows were supplied from harvested feed at relatively high cost. The Pasture Regime represented a grazing situation for cows in which quality (and cost) of pasture varied with season and supplementation was provided as required to optimally meet cow needs. For example, a small high-milking cow may require a higher quality (and more expensive) forage than a large cow producing the same amount of milk because of the higher capacity of the large cow for consumption. Feed and forage costs were based on industry estimates; nutrients for cows were cheaper in the Pasture Regime. All progeny destined for slaughter were handled similarly for the two regimes, receiving least-cost rations balanced for digestible protein, metabolizable energy and dry matter.

Three genotypes for mature size were examined: small (SS) cattle intermediate in size to the Angus and Jersey, medium (MM) cattle similar in size to the Hereford, and large (LL) cattle similar in size to the Charolais.

Weights estimated for these cows at different ages are given in table 1. Birth weights, growth rates and slaughter weights assumed for their straightbred progeny are shown in table 2. Growth rates of bulls and replacement heifers were based on data. Bulls were slaughtered at 110% of mature weight of cows of similar breeding; i.e., at a constant degree of mature weight. Slaughter heifers were assumed to gain 81% as fast as bulls treated similarly and to be slaughtered at 71% of slaughter weight of bulls of similar breeding.

Three levels of milk production were examined based on unweighted average production over age groups of approximately 6.6, 11.0 and 15.4 lb per day for a 180-day lactation. Age of cow effects were considered and level of milk production of dam above or below 8.5 lb per day was used to adjust preweaning average daily gain of a calf up to as much as 0.55 lb/day above or below genetic potential (table 3). Since the maximum increase in preweaning gain was reached at 11.4 lb of milk per day, additional milk was beneficial only as a source of nutrients.

Several levels of fertility and longevity, as well as crossbreeding systems, were included in the total study (Long, 1972). Results discussed here were based on 89% calves born of cows exposed and the oldest cows leaving the herd at 12 years of age. Discussion will be further limited to comparisons of three straightbreeding schemes, each with three milk levels as described above.

To facilitate comparisons among and across systems and regimes, the single constraint placed on a solution was a fixed expenditure ($100,000) for meeting nutritional requirements. Linear programming techniques were employed to obtain solutions in terms of cow numbers and resource use when net income was maximized. Several characteristics contribute information useful in evaluation of the systems. Trends in cow numbers, allocation of nutritional expenditures, liveweight produced, gross income and net income provide a basis for quantifying effects of the factors varied.

Increasing mature size of cow and growth rate of progeny resulted in a reduction in the number of cows maintained when nutrient resources were limited (table 4). For example, increasing cow size from SS to LL in the Drylot Regime decreased cow numbers from greater than 600 to less than 450; in the Pasture Regime, from over 800 to below 600. The effect on cow numbers of increasing milk yield was not the same for the two regimes or three types of cow; level of milk production and size of cow affected the feed cost associated with a cow and her progeny and thus affected number of cows. The costs of the least-cost nutritional program which could be formulated from the feedstuffs available in a regime varied with size of cow and milk yield.

Percentage of nutritional expenditure allocated to the breeding herd (cows, calves to weaning and replacement females) decreased (shifted to feeding slaughter cattle) as cow size increased and, except for large cows in the Pasture Regime, increased as milk yield increased (table 5). However, as in the case of cow numbers, magnitude of the changes in nutrient resource allocation was dependent upon which cow sizes and milk levels were being considered, e.g., when milk yield in the Pasture Regime was increased from 6.6 to 11.0 lb, increases in nutritional allocations to SS, MM and LL cows were 6.0, 4.7 and 4.6 percentage points, respectively. For the increase from 11.0 to 15.4 lb milk yield, these values were 1.0, 0.7 and -0.8, respectively. Similar examples may be seen in the Drylot Regime as well as in comparisons between regimes.

These results indicate that increases (decreases) in cow size and progeny growth rate and in milk production may have different effects on nutritional costs depending upon costs and sources of nutrients, performance levels and many other components of a beef production system. For example, the effect on herd requirements of a change in cow size from 948 to 1103 pounds and in milk level from 6.6 to 11.0 pounds per day was different from the effect of a change from 1103 to 1323 pounds and from 11.0 to 15.4 pounds per day. In both cases, cow size and milk yield were increased. However, in the first comparison, breeding herd requirements increased relative to fed slaughter cattle requirements; in the second, decreased.

These changes which were observed are due to the direct and indirect effects of different variables on compensating shifts and balances within a system operating within a limited set of resources. Productive efficiency is product output per unit of resource input; these shifts within a system must be made to increase efficiency.

Liveweight produced is one measure of the output of a system (table 6). Gross income is a measure of liveweight produced weighted by market value. Net income is calculated by subtracting nutrient costs and total fixed costs from gross income (table 7).

Trends in amount of liveweight produced were similar to trends in cow numbers; systems employing small cows produced the largest weights of saleable cattle. The largest differences between systems in total liveweight produced were of the magnitude of 16,000 lb (3%) in the Drylot Regime and 70,000 lb (11%) in the Pasture Regime (table 6). Because of smaller amounts and lower price, cull cow weight is less important than slaughter cattle weight as a source of income. Although larger numbers of cows result in more saleable product and, therefore, more gross income, fixed costs also increase with number of cows. Net income is a measure of the profitability of a system. Both of these measures of efficiency--liveweight produced and net income--are useful as indicators of the desirability of a system in a production situation.

Because of lower feed costs in the Pasture Regime, more saleable product and higher net incomes were produced than in the Drylot Regime. Within the Drylot Regime, although smaller cows produced more saleable product, systems using large cows realized higher net incomes (an average advantage of over $6000; table 7). In the Pasture Regime, systems employing medium sized cows were most profitable, closely followed by those using small cows. The differences in net incomes between systems in the Pasture Regime were somewhat less than in the Drylot Regime.

The intermediate milk level was most profitable in the Drylot Regime. As milk production increased up to the intermediate level, growth rate of calf tended to increase proportionately (as stated in the assumptions) above the growth rate corresponding with calf genotype. Above the intermediate level, growth rates were not appreciably increased because the assumed limits were reached; milk at the high level had benefit primarily as a source of nutrients and could be replaced by creep feed which was often less expensive. An interaction between cow size and milk level was observed in the Pasture Regime for net income. The intermediate milk level was favored in herds of small cows; high milk production was most profitable in herds of medium and large cows. The effect of cow size on capacity for low quality forage and the differences in cost of low and high quality forage and creep feed in the Pasture Regime were important factors contributing to this result.

Of course, applicability of the results of simulation to a "real life" situation hinges upon the appropriateness of the basic assumptions of the model. Nevertheless, these results indicate that identical selection goals may vary in desirability depending upon the situation in which the cattle will be expected to produce. Type of management, nutrient sources, feed and forage costs and other components determine the most desirable combination of performance levels for economically important characters. Level of performance for a single trait or a small group of traits is not sufficient knowledge for determining profitability of a herd of cattle. A very heavy weaning weight has little value in a vertically integrated system if costs of obtaining the weight are excessive and a cheaper alternative (e.g., postweaning treatment) is available to attain a similar carcass in similar time. Therefore, the total production situation should be considered in detail before selection goals are set and the type of cattle should be chosen to fit a situation just as other components of management are decided upon.

This conclusion may be extended to imply that many different types of cattle are needed to fit into the various situations in this country. Use of a single set of selection criteria for all cattle in the country is not the logical course of action. Each breed of cattle and herd of cattle has strong points. These points should be emphasized by breeders so that several types are available to commercial producers for use in different resource situations.

A problem area is that of determining the specific performance characteristics of cattle and their management that best fit the different situations. Simulation techniques have been indicated as a useful aid in studying this problem. The Management Systems Program at the U.S. Meat Animal Research Center is directed at this area of determining the specific performance characteristics of cattle and management best suited to the several production situations existing in this country. Data from multidiscipline integrated experiments involving breeding, nutrition, reproductive physiology, meats and production economics are being used in modelling studies which are directed at analyzing specific problems as well as identifying production systems which match production situations.

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TABLE 1. WEIGHTS FOR STRAIGHTBRED SS, MM AND LL COWS AT DIFFERENT AGES[a]

	Genotype		
Age	SS	MM	LL
	(lb)	(lb)	(lb)
2 years	739	822	935
3 years	820	911	1034
4 years	889	988	1122
5 years	937	1043	1186
6 years and older	948	1103	1323

[a] SS: small size mature cows (948 lb).
MM: medium size mature cows (1103 lb).
LL: large size mature cows (1323 lb).

TABLE 2. GROWTH RATES AND WEIGHTS OF STRAIGHTBRED SLAUGHTER BULLS, REPLACEMENT HEIFERS (RH) AND SLAUGHTER HEIFERS (SH)

	SS			MM			LL		
Wt or ADG, lb	Bulls	RH	SH	Bulls	RH	SH	Bulls	RH	SH
Birth weight	66	62	62	77	73	73	90	82	82
Preweaning gain	1.57	1.43	1.43	1.74	1.61	1.61	2.03	1.85	1.85
Postweaning gain	2.16	0.79	1.75	2.54	0.90	2.06	3.02	1.08	2.45
Postyearling gain	1.83	0.99	1.48	2.12	1.15	1.72	2.54	1.39	2.06
Slaughter weight	1043	....	741	1213	....	861	1455	....	1033

TABLE 3. AVERAGE DAILY MILK PRODUCTION (ADM) OF STRAIGHTBRED COWS OF DIFFERENT AGES AND HERD AVERAGES (HA) FOR ADM AND ADJUSTMENT FACTORS FOR PREWEANING ADG OF THEIR CALVES

	6.6 lb ADM HA		11.0 lb ADM HA		15.4 lb ADM HA	
Age	ADM, lb	ADG adj., lb	ADM, lb	ADG adj., lb	ADM, lb	ADG adj., lb
2 years	5.40	-0.55	9.02	0.09	12.63	0.55
3 and 4 years	6.53	-0.37	10.87	0.46	15.21	0.55
5 years and older	7.92	-0.11	13.19	0.55	18.46	0.55

TABLE 4. NUMBERS OF COWS MAINTAINED IN SYSTEMS BASED ON SS, MM, AND LL GENOTYPES FOR MATURE SIZE AND THREE MILK LEVELS IN TWO REGIMES WHEN NUTRITIONAL EXPENDITURES ARE HELD AT $100,000[a]

	Regime and milk level					
	Drylot			Pasture		
Genotype	6.6 lb	11.0 lb	15.4 lb	6.6 lb	11.0 lb	15.4 lb
SS	636	637	622	828	872	870
MM	543	543	533	690	725	726
LL	443	443	437	545	559	573

[a] Calves born per cow exposed = 89%; live cows not previously culled leave herd at 12 years of age.

TABLE 5. PERCENT OF NUTRITIONAL EXPENDITURE ALLOCATED TO THE BREEDING HERD IN SYSTEMS BASED ON SS, MM AND LL GENOTYPES AND THREE MILK LEVELS IN TWO REGIMES[a]

	Regime and milk level					
	Drylot			Pasture		
Genotype	6.6 lb	11.0 lb	15.4 lb	6.6 lb	11.0 lb	15.4 lb
	(%)	(%)	(%)	(%)	(%)	(%)
SS	54.3	60.9	62.5	40.5	46.5	47.5
MM	51.8	57.6	59.0	38.8	43.5	44.2
LL	48.7	53.6	54.8	36.9	41.5	40.7

[a] Calves born per cow exposed = 89%; live cows not previously culled leave herd at 12 years of age.

TABLE 6. LIVE WEIGHT PRODUCED FROM SYSTEMS BASED ON SS, MM AND LL GENOTYPES AND THREE MILK LEVELS IN TWO REGIMES WHEN NUTRITIONAL EXPENDITURES ARE HELD AT $100,000[a,b]

	Regime and milk level					
	Drylot			Pasture		
Item	6.6 lb	11.0 lb	15.4 lb	6.6 lb	11.0 lb	15.4 lb
SS						
Cull cows, lb	87331	87407	85312	113705	119658	119417
Slaughter cattle, lb	390668	391193	381739	508649	535526	534334
Total liveweight, lb	477999	478600	467051	622354	655184	653751
MM						
Cull cows, lb	85669	85769	84089	108903	114381	114513
Slaughter cattle, lb	387562	388099	380569	492670	517561	518267
Total liveweight, lb	473231	473868	464658	601573	631942	632780
LL						
Cull cows, lb	82767	82880	81622	101826	104499	107054
Slaughter cattle, lb	379539	380015	374240	466931	479136	490851
Total liveweight, lb	462306	462895	455862	568757	583635	597905

[a] Calves born per cow exposed = 89%; live cows not previously culled leave herd at 12 years of age.

[b] In order to calculate gross income using these liveweights, cull cows were priced at $23.95/cwt and slaughter cattle at $33.74/cwt.

TABLE 7. NET INCOME FROM SYSTEMS BASED ON SS, MM AND LL GENOTYPES AND THREE MILK LEVELS IN TWO REGIMES WHEN NUTRITIONAL EXPENDITURES ARE HELD AT $100,000[a,b]

	Regime and milk level					
	Drylot			Pasture		
Genotype	6.6 lb	11.0 lb	15.4 lb	6.6 lb	11.0 lb	15.4 lb
	($)	($)	($)	($)	($)	($)
SS	16464	16628	13806	51634	59657	59297
MM	20347	20515	18180	52986	60717	60939
LL	22651	22805	20938	50893	54835	58622

[a] Calves born per cow exposed = 89%; live cows not previously culled leave herd at 12 years of age.

[b] Net Income = Gross Income - Fixed Costs - Nutritional Expenses. Nutritional Expenses = $100,000 for all systems.

SIMUMATE: CHOOSING BREEDS AND CROSSBREEDING SYSTEMS BY COMPUTER

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Research results have developed a sound base of information relative to the amount of heterosis obtained in breed crosses in cattle. In addition, the concepts of combining the good traits of more than one breed through crossbreeding have been established. Heterosis is expected to be most important for traits low in heritability, while we would expect to be most successful in using combinatorial properties of crossbreeding when we are working with highly heritable traits. These two items along with the well established improvement that can be achieved through individual selection of bulls on their own performance leads to the conclusion that the breeding program for commercial production should include a system of crossbreeding combined with selection of breeds and selection of individual replacements.

There are several systems of crossbreeding available to the producer at the present time. The two breed rotation as the name implies involves using bulls from two different breeds in the program. The original straightbred cow herd would be bred to a different breed of bull. The replacement heifers produced by this mating would be bred to a bull of the same breed as the original cow herd. Heifers from this mating would be bred to the other breed of bull. The only records needed in this program are to know the breed of bull that sired a heifer. This could be an ear notch or some other mark on the animal. It is expected that, after a few generations of this rotation crossbreeding, the heterosis level would stabilize at 67 percent of maximum.

Another crossbreeding system is the three breed rotation. This is very similar to the two breed just described but involves a third breed. In this system the original straightbred cows are bred to a bull of a different breed. The heifers produced by this mating are bred to a bull of a third breed. The heifers thus produced are then bred back to a bull from the same breed as the original cow herd. Where the two breed rotation requires two breeding pastures to accommodate the two breeds of bulls, this system will require three pastures to accommodate the three breeds involved. Again, all that is needed in the way of records is to know the breed of sire of the heifer and this will indicate the breed of bull to which she will be bred in the rotation. Heterosis in the three breed rotation will stabilize at 86 percent of maximum.

Another system available to producers is a specialized three breed crossing system. In that case the two breed rotation cross is used to initiate the program. Heifers selected for replacements would produce three calves in the two breed rotation system and then be moved to a third breeding pasture for the rest of their producing life where they would be bred to a terminal sire breed. All calves produced from these matings would go to market. This system was designed to allow major emphasis of selection on maternal traits for the breeds in the original two-way rotation and to allow major emphasis in selection of the terminal sire breed on growth rate and carcass traits. This system requires 40 percent of the herd in the two-way rotation to provide replacements and 60 percent in the terminal cross. In addition to breed of sire, the age of the cow will be needed to determine proper breeding pasture.

It has become increasingly apparent that there is not just one ideal type of beef animal, and we cannot expect one type to fit all the needs of our highly variable industry. Thus, there is an opportunity to combine breed strong points to build a producing unit for each specific situation. To be efficient in developing this program, one needs to be aware of the varying cost situations, of varying breed performance under different management systems, and of the effect of the varying management systems themselves in relation to costs and returns. For example, the breed's reproductive performance might vary considerably depending upon the level of nutrition during and just prior to the breeding season, or carcass grade might vary depending on how soon after weaning the calves of a certain breed are put on high concentrate feed. Some areas of our rangeland may have very rigid limits set on availability of forage during critical periods of the breeding season, whereas other areas perhaps with some irrigated acres available or corn belt areas may have an abundance of cheap roughage available for the cow herd. The costs of maintaining a cow may vary considerably among these situations. The optimum crossbreeding plan thus should be tailored to the individual situation and the level of management will be important in evaluating a breed in a particular crossbreeding plan. Because of the variation in management situation and its variable effect on different breeds, recommendations as to choice of breeds and crossbreeding systems for a specific farm or ranch have been difficult to make.

A computer program called Simumate has been developed to assist in making these decisions. The items listed in table 1 represent the information provided to the computer. General items applying to the entire ranch are fixed costs for the cow herd, variable costs for the cow herd, weaning weight base, postweaning feed costs and feed requirement, carcass selling price and grade spread. The latter is the difference between the selling price for average choice and average good carcasses. In addition, breed estimates based on knowledge of the individual ranch management are needed for eight preweaning traits and six postweaning traits as indicated.

The computer calculates the information presented in table 2 for each straightbred, all possible two breed rotations, three breed rotations and specialized cross systems as described earlier. In the latter case, all possible two breed rotation cows are mated to each breed of bull. For each of these crossbreeding systems and straightbreds, cow size and milk production are used in calculating carrying capacity. Male fertility, female fertility and calf livability are used in calculating percent calf crop weaned. The weaning weight base along with individual growth and maternal ability are used in calculating the weaning weight. Selling price at weaning along with carrying capacity, percent calf crop weaned and weaning weight are used to calculate return to labor at weaning.

The program separates the postweaning phase into a backgrounding system, taking the calves to 700 pounds, and a feedlot system in which the user has the option to grow the calves for 50 days and then use a finishing phase of 90 days. The program calculates days required to reach 700 pounds, feed and fixed costs for both the background and feedlot phases and return to labor for the background and feedlot phases.

The final phase considered by the computer is the carcass or packer phase. Slaughter weight, carcass weight and weight of retail cuts are calculated and from this the carcass value. Packer return is calculated and this in combination with return at weaning, backgrounding and feedlot form the basis for calculating the total industry return. Packer return is based only on the return from the carcass and does not include return from the offal.

The output from this computer program is completely determined by the information entered. The computer and the program do not add anything but simply calculate the results from the information provided. The interpretation of these results will no doubt vary with the individual using the program. That is, a cow-calf man selling at weaning may be looking for something different than a producer that feeds out his own calves. However, even the cow-calf man will need to be aware of postweaning and carcass performance if he is to maintain a suitable market for his calves. Regardless of the method of use of the results, the use of the program will allow consideration of a number of factors not presently being considered by many producers in planning their crossbreeding program. The interrelationships of some of these factors are not easily calculated without the use of a computer and when one considers the number of calculations necessary to evaluate all possible crosses among the three crossbreeding systems a computer is almost a necessity.

This program is available for use by all producers. Several universities have already obtained the program and it is available to those that have not. Producers are encouraged to utilize the computer program in planning their crossbreeding program and, if most convenient, they can be processed at South Dakota State University. A charge of $5 will be made to cover computer costs.

Table 1. Crossbreeding Simulator Input

General	
Fixed costs - cow herd	Feed costs
Variable costs - cow herd	Feed requirement
Weaning weight base	Carcass price
Grade spread	
Preweaning - breed estimates	
Cow size	Male fertility
Milk production	Calf livability
Individual growth	Female fertility
Maternal ability	Weaning price
Postweaning - breed estimates	
Daily gain	Dressing percent
Feed efficiency	Cutability
Selling prices	Percent choice

Table 2. Crossbreeding Simulator Output

Preweaning	
Carrying capacity	
Percent calf crop	
Weaning weight	
Return to labor at weaning	
Postweaning	
Days to 700 pounds	
Feed and fixed costs - background and feedlot	
Return to labor - background and feedlot	
Packer	
Slaughter weight	Carcass value
Carcass weight	Packer return
Retail cuts	Total industry return

NAME ADDRESS ZIP

NO	COST/100 COWS		WNG WT BASE	FEED COST Cents per lb of ration			FIXED COST Cents per day			BASE FEED REQUIREMENT			CARCASS PRICE	GRADE SPREAD
	Fixed	Variable		Backgrnd	Growth	Finish	Bkgnd	Grow	Fin	Bkgnd	Grow	Fin		
1	2 3 4 5	6 7 8 9	10 11 12	13 14 15	16 17 18	19 20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37 38
8	7500	6000	400	020	023	025	11	11	11	90	82	75	62	030

Breed Estimates

BREED	COW SIZE	ANNUAL MILK PROD	MALE FERTILITY	FEMALE FERTILITY	CALF LIVABILITY	INDIVIDUAL GROWTH	MATERNAL ABILITY	WEANING PRICE
1 2 3	4 5 6 7	8 9 10 11	12 13	14 15	16 17	18 19 20	21 22 23	24 25
ANG	1050	2400	92	96	95	008	005	51
CHA	1250	2800	90	92	90	022	007	50
HER	1125	2000	96	96	92	014	-05	53
HOL	1300	4500	94	90	90	018	012	49
JER	900	3600	94	96	94	-09	010	46
LIM	1160	2200	92	94	92	012	000	50

NAME ADDRESS ZIP

NO	COST/100 COWS		WNG WT BASE	FEED COST Cents per lb of ration			FIXED COST Cents per day			BASE FEED REQUIREMENT			CARCASS PRICE	GRADE SPREAD
	Fixed	Variable		Backgrnd	Growth	Finish	Bkgnd	Grow	Fin	Bkgnd	Grow	Fin		
1	2 3 4 5	6 7 8 9	10 11 12	13 14 15	16 17 18	19 20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37 38
8	7500	6000	400	020	023	025	11	11	11	90	82	75	62	030

Breed Estimates

BREED	COW SIZE	ANNUAL MILK PROD	MALE FERTILITY	FEMALE FERTILITY	CALF LIVABILITY	INDIVIDUAL GROWTH	MATERNAL ABILITY	WEANING PRICE
1 2 3	4 5 6 7	8 9 10 11	12 13	14 15	16 17	18 19 20	21 22 23	24 25
POL	1050	3000	94	95	95	008	008	50
SHO	1100	2600	96	92	94	010	006	51
SIM	1300	4000	92	94	90	022	011	50
SWI	1250	4000	94	88	90	018	011	50

Breed Estimates Continued

DAILY GAIN									BREED-FEED Efficiency			SELLING PRICE				DRESSING PERCENT		CUT-ABILITY		PERCENT CHOICE		
Background			Growing			Finishing						Background		Feedlot								
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	
2	0	0	2	7	0	2	7	0	0	0	3	4	6	4	0	6	3	6	2	9	0	ANG
2	3	0	3	4	0	3	4	0	-	0	3	4	5	3	9	6	2	6	7	4	0	CHA
2	1	0	3	0	0	3	0	0	0	0	0	4	8	4	1	6	2	6	3	7	5	HER
2	2	5	3	3	0	3	3	0	0	0	0	4	1	3	7	5	9	6	6	5	0	HOL
1	7	0	2	0	0	2	0	0	0	0	6	3	9	3	6	5	8	6	2	4	0	JER
2	1	0	3	0	0	3	0	0	-	0	3	4	5	4	0	6	2	6	8	3	0	LIM
2	0	0	2	7	0	2	7	0	0	0	3	4	2	3	8	6	0	6	5	6	0	POL
2	0	0	2	7	0	2	7	0	0	0	3	4	6	4	1	6	2	6	0	8	0	SHO
2	3	0	3	4	0	3	4	0	-	0	3	4	5	3	9	6	1	6	6	4	0	SIM
2	2	0	3	3	0	3	3	0	0	0	0	4	4	3	9	6	0	6	6	4	0	SWI

SIMUMATE II SOUTH DAKOTA STATE UNIVERSITY

THESE ESTIMATES PROVIDED BY

I M RANCHER ANYWHERE, ST 99999

WEANING COSTS			WNG	FEED COST PER LB.			FIXED COST PER DAY			BASE FEED REQUIRE.			CHOICE	GRADE
N	FIXED	VARIABLE	BASE	BACK	GROW	FINISH	BACK	GROW	FINISH	BACK	GROW	FINISH	PRICE	SPREAD
4	7500.	5000.	400.	0.020	0.023	0.025	0.11	0.11	0.11	9.0	9.2	7.5	0.62	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILTY	WNG PRICE	DAILY GAIN BACK	DAILY GAIN GROW	DAILY GAIN FINISH	FEED EFF	SELL PRICE BACK	SELL PRICE FEED	DRESS PCT	CUT ABLTY	PCT CHOICE
ANG	1050.	2400.	0.92	0.96	0.95	0.08	0.05	0.51	2.00	2.70	2.70	0.03	.46	.40	0.63	0.62	0.90
CHA	1250.	2800.	0.90	0.92	0.90	0.22	0.07	0.50	2.30	3.40	3.40	-.03	.45	.39	0.62	0.67	0.40
HER	1125.	2000.	0.96	0.96	0.92	0.14	-.05	0.53	2.10	3.00	3.00	0.0	.48	.41	0.62	0.63	0.75
SIM	1300.	4000.	0.92	0.94	0.90	0.22	0.11	0.50	2.30	3.40	3.40	-.03	.45	.39	0.61	0.66	0.40

CARRYING CAPACITY BASE IS 4756. LBS. TON PER ANIMAL PER YEAR

THESE RESULTS BASED ON ESTIMATES MADE BY

I M RANCHER ANYWHERE, ST 99999

STRAIGHTBRED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG	100.0	0.84	452.	55.	124.	14.	46.	32.	1078.	73.	15.	21.
CHA	84.3	0.75	516.	30.	80.	9.	32.	16.	1176.	87.	15.	41.
HER	96.6	0.85	436.	56.	126.	14.	48.	44.	1120.	79.	15.	29.
SIM	76.7	0.78	532.	31.	73.	8.	29.	12.	1176.	87.	15.	41.

STRAIGHTBRED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG	679.	421.	419.	418.	-12.	95.
CHA	729.	489.	439.	485.	-20.	68.
HER	694.	437.	425.	434.	-34.	95.
SIM	717.	473.	432.	470.	-27.	58.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGCHA	89.0	0.85	514.	59.	84.	9.	33.	16.	1141.	83.	15.	34.
ANGHER	95.7	0.90	473.	76.	107.	12.	42.	30.	1112.	79.	15.	27.
ANGSIM	84.3	0.86	522.	59.	80.	9.	32	14.	1141.	83.	15.	34.
CHAHER	87.6	0.85	506.	59.	85.	9.	34.	21.	1163.	86.	15.	39.
CHASIM	78.0	0.81	555.	44.	61.	7.	25.	5.	1192.	90.	15.	45.
HERSIM	83.1	0.87	514.	59.	82.	9.	33.	19.	1163.	86.	15.	39.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGCHA	713.	460.	435.	456.	-16.	93.
ANGHER	695.	435.	427.	431.	-23.	110.
ANGSIM	708.	453.	431.	449.	-20.	87.
CHAHER	721.	469.	438.	465.	-27.	91.
CHASIM	733.	487.	441.	484.	-24.	71.
HERSIM	715.	461.	434.	458.	-31.	85.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGCHAHER	69.9	0.88	506.	69.	87.	10.	35.	20.	1143.	83.	15.	34.
ANGCHASIM	82.8	0.86	540.	61.	70.	8.	29.	9.	1162.	86.	15.	38.
ANGHERSIM	86.6	0.90	512.	69.	85.	9.	34.	18.	1143.	83.	15.	34.
CHAHERSIM	82.0	0.86	534.	61.	71.	8.	29.	13.	1177.	88.	15.	42.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGCHAHER	712.	456.	435.	452.	-22.	101.
ANGCHASIM	721.	468.	437.	465.	-20.	89.
ANGHERSIM	709.	451.	433.	448.	-25.	97.
CHAHERSIM	726.	474.	439.	470.	-27.	87.

SPECIALIZED CROSS-BULL BREED FIRST_ COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	ANG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG CHAHER	87.6	0.86	498.	59.	91.	10.	36.	24.	1145.	84.	15.	38.
ANG CHASIM	78.0	0.84	542.	46.	68.	8.	28.	10.	1166.	86.	15.	43.
ANG HERSIM	83.1	0.88	506.	56.	87.	10.	35.	21.	1145.	84.	15.	38.
CHA ANGHER	95.7	0.88	491.	75.	95.	10.	38.	22.	1141.	83.	15.	29.
CHA ANGSIM	84.3	0.85	536.	62.	72.	8.	29.	9.	1161.	86.	15.	35.
CHA HERSIM	83.1	0.85	524.	55.	76.	8.	31.	15.	1176.	88.	15.	37.
HER ANGCHA	89.0	0.88	517.	68.	82.	9.	33.	16.	1143.	83.	15.	34.
HER ANGSIM	84.3	0.89	525.	67.	78.	9.	31.	14.	1143.	83.	15.	34.
HER CHASIM	78.0	0.85	550.	53.	64.	7.	26.	8.	1179.	88.	15.	44.
SIM ANGCHA	89.0	0.85	527.	64.	76.	8.	31.	11.	1161.	86.	15.	35.
SIM ANGHER	95.7	0.89	491.	77.	95.	10.	38.	22.	1141.	83.	15.	29.
SIM CHAHER	87.6	0.85	515.	61.	79.	9.	33.	17.	1176.	88.	15.	39.

SPECIALIZED CROSS-BULL BREED FIRST_ COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG CHAHER	718.	460.	438.	457.	-20.	101.
ANG CHASIM	729.	475.	442.	471.	-16.	84.
ANG HERSIM	714.	465.	436.	451.	-23.	93.
CHA ANGHER	704.	450.	430.	446.	-27.	100.
CHA ANGSIM	715.	464.	434.	460.	-23.	83.
CHA HERSIM	722.	471.	437.	467.	-30.	83.
HER ANGCHA	712.	456.	435.	458.	-22.	97.
HER ANGSIM	708.	451.	432.	448.	-24.	91.
HER CHASIM	730.	478.	442.	474.	-25.	80.
SIM ANGCHA	715.	465.	434.	461.	-22.	89.
SIM ANGHER	701.	445.	428.	442.	-29.	99.
SIM CHAHER	722.	472.	438.	468.	-29.	88.

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THESE ESTIMATES PROVIDED BY

PAARLBERG

	WEANING COSTS		WNG	FEED COST PER LB.			FIXED COST PER DAY			BASE FEED REQUIRE.			CHOICE	GRADE
N	FIXED	VARIABLE	BASE	BACK	GROW	FINISH	BACK	GROW	FINISH	BACK	GROW	FINISH	PRICE	SPREAD
4	7500.	6000.	400.	0.020	0.023	0.025	0.11	0.11	0.11	9.0	8.2	7.5	0.62	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILTY	WNG PRICE	DAILY GAIN BACK	DAILY GAIN GROW	DAILY GAIN FINISH	FEED EFF	SELL PRICE BACK	SELL PRICE FEED	DRESS PCT	CUT ABLTY	PCT CHOICE
ANG	1050.	2400.	0.92	0.96	0.95	0.08	0.05	0.55	2.30	2.75	3.00	0.03	.48	.43	0.63	0.62	0.90
HER	1125.	2000.	0.96	0.96	0.92	0.14	-.05	0.57	2.10	2.75	3.00	0.0	.50	.44	0.62	0.63	0.75
POL	1100.	4000.	0.94	0.95	0.95	0.09	0.08	0.54	2.00	2.75	3.00	0.03	.44	.42	0.61	0.65	0.70
SHO	1100.	2600.	0.96	0.92	0.94	0.10	0.06	0.54	2.00	2.75	2.80	0.03	.44	.41	0.62	0.60	0.80

CARRYING CAPACITY BASE IS 4756. LBS. TDN PER ANIMAL PER YEAR

THESE RESULTS BASED ON ESTIMATES MADE BY

PAARLBERG

STRAIGHTBRED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG	100.0	0.84	452.	70.	108.	12.	46.	30.	1108.	79.	15.	46.
HER	96.6	0.85	436.	71.	126.	14.	48.	40.	1108.	77.	15.	45.
POL	87.5	0.85	468.	57.	116.	13.	43.	-0.	1108.	79.	15.	63.
SHO	95.0	0.83	464.	62.	118.	13.	44.	1.	1089.	75.	15.	48.

STRAIGHTBRED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG	698.	433.	430.	429.	-46.	100.
HER	687.	433.	421.	429.	-67.	89.
POL	676.	439.	413.	436.	-52.	67.
SHO	675.	405.	415.	402.	-32.	79.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGHER	95.7	0.90	473.	92.	100.	11.	42.	26.	1121.	80.	15.	49.
ANGPOL	90.6	0.90	489.	85.	95.	10.	39.	6.	1121.	81.	15.	58.
ANGSHO	94.7	0.89	487.	89.	96.	11.	39.	6.	1112.	80.	15.	50.
HERPOL	89.2	0.91	481.	84.	103.	11.	40.	11.	1121.	80.	15.	57.
HERSHO	93.2	0.90	479.	87.	104.	11.	40.	11.	1112.	79.	15.	50.
POLSHO	88.4	0.90	495.	80.	99.	11.	38.	-8.	1112.	80.	15.	50.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGHER	701.	438.	431.	434.	-57.	(110.)
ANGPOL	695.	441.	427.	438.	-50.	98.
ANGSHO	695.	424.	428.	421.	-39.	106.
HERPOL	690.	441.	422.	438.	-60.	91.
HERSHO	689.	424.	423.	421.	-50.	99.
POLSHO	684.	427.	419.	424.	-43.	88.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGHERPOL	91.0	0.92	489.	93.	95.	10.	39.	11.	1125.	81.	15.	56.
ANGHERSHO	93.8	0.91	488.	96.	95.	10.	39.	12.	1119.	80.	15.	50.
ANGPOLSHO	90.4	0.91	499.	91.	92.	10.	37.	-1.	1119.	81.	15.	56.
HERPOLSHO	89.5	0.92	494.	90.	97.	11.	38.	2.	1119.	80.	15.	56.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGHERPOL	698.	442.	428.	438.	-56.	104.
ANGHERSHO	697.	430.	429.	427.	-49.	(110.)
ANGPOLSHO	694.	432.	426.	429.	-44.	102.
HERPOLSHO	690.	432.	423.	429.	-51.	97.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG HERPOL	89.2	0.90	481.	82.	99.	11.	40.	14.	1125.	81.	15.	55.
ANG HERSHO	93.2	0.89	478.	85.	100.	11.	41.	15.	1119.	80.	15.	49.
ANG POLSHO	88.4	0.89	498.	81.	93.	10.	37.	-2.	1119.	81.	15.	55.
HER ANGPOL	90.6	0.92	500.	93.	90.	10.	37.	6.	1125.	82.	15.	55.
HER ANGSHO	94.7	0.91	498.	96.	91.	10.	37.	7.	1119.	80.	15.	49.
HER POLSHO	88.4	0.90	505.	87.	92.	10.	36.	-4.	1119.	80.	15.	55.
POL ANGHER	95.7	0.91	474.	92.	101.	11.	41.	17.	1125.	81.	15.	54.
POL ANGSHO	94.7	0.90	491.	91.	95.	10.	39.	1.	1119.	81.	15.	54.
POL HERSHO	93.2	0.90	479.	86.	104.	11.	40.	7.	1119.	80.	15.	54.
SHO ANGHER	95.7	0.92	476.	94.	100.	11.	41.	17.	1120.	80.	15.	51.
SHO ANGPOL	90.6	0.93	495.	90.	93.	10.	38.	-0.	1120.	81.	15.	57.
SHO HERPOL	89.2	0.92	483.	85.	102.	11.	40.	5.	1120.	80.	15.	57.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG HERPOL	696.	441.	427.	438.	-57.	94.
ANG HERSHO	695.	429.	427.	425.	-50.	99.
ANG POLSHO	691.	431.	424.	428.	-45.	90.
HER ANGPOL	697.	441.	427.	438.	-56.	98.
HER ANGSHO	696.	429.	428.	425.	-49.	103.
HER POLSHO	688.	431.	421.	428.	-51.	87.
POL ANGHER	697.	441.	428.	437.	-57.	107.
POL ANGSHO	692.	431.	425.	427.	-45.	102.
POL HERSHO	689.	431.	422.	427.	-52.	95.
SHO ANGHER	698.	431.	429.	428.	-49.	112.
SHO ANGPOL	695.	434.	426.	430.	-44.	102.
SHO HERPOL	691.	434.	423.	430.	-52.	95.

SIMUMATE II SOUTH DAKOTA STATE UNIVERSITY

THESE ESTIMATES PROVIDED BY

RANKINS BUNCH

WEANING COSTS			WNG	FEED COST PER LB.			FIXED COST PER DAY			BASE FEED REQUIRE.			CHOICE	GRADE
N	FIXED	VARIABLE	BASE	BACK	GROW	FINISH	BACK	GROW	FINISH	BACK	GROW	FINISH	PRICE	SPREAD
4	7500.	6000.	400.	0.020	0.023	0.025	0.11	0.11	0.11	9.0	8.2	7.5	0.62	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILTY	WNG PRICE	DAILY GAIN BACK	GROW	FINISH	FEED EFF	SELL PRICE BACK	FEED	DRESS PCT	CUT ABLTY	PCT CHOICE
ANG	1050.	2400.	0.92	0.96	0.95	0.08	0.05	0.51	2.00	2.70	2.70	0.03	.46	.40	0.63	0.62	0.90
HER	1125.	2000.	0.96	0.96	0.92	0.14	-.05	0.53	2.10	3.00	3.00	0.0	.48	.41	0.62	0.63	0.75
JER	900.	3600.	0.94	0.96	0.94	-.09	0.10	0.46	1.70	2.00	2.00	0.06	.39	.36	0.58	0.62	0.40
SWI	1250.	4000.	0.94	0.88	0.90	0.18	0.11	0.50	2.20	3.30	3.30	0.0	.44	.39	0.60	0.66	0.40

CARRYING CAPACITY BASE IS 4756. LBS. TON PER ANIMAL PER YEAR

THESE RESULTS BASED ON ESTIMATES MADE BY

RANKINS BUNCH

STRAIGHTBRED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG	100.0	0.84	452.	55.	124.	14.	45.	32.	1078.	73.	15.	21.
HER	96.6	0.85	436.	56.	125.	14.	48.	44.	1120.	79.	15.	29.
JER	104.6	0.85	404.	27.	174.	19.	56.	12.	980.	56.	15.	9.
SWI	79.1	0.74	516.	23.	84.	9.	33.	8.	1162.	87.	15.	43.

STRAIGHTBRED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG	679.	421.	419.	418.	-12.	95.
HER	694.	437.	425.	434.	-34.	95.
JER	568.	352.	342.	350.	-11.	37.
SWI	697.	460.	420.	456.	-33.	41.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGHER	95.7	0.90	473.	76.	107.	12.	42.	30.	1112.	79.	15.	27.
ANGJER	99.2	0.90	456.	59.	128.	14.	46.	16.	1040.	67.	15.	16.
ANGSWI	85.8	0.85	514.	55.	86.	9.	34.	12.	1134.	83.	15.	35.
HERJER	97.6	0.91	448.	63.	128.	14.	47.	22.	1062.	70.	15.	19.
HERSWI	84.6	0.85	506.	54.	87.	10.	35.	17.	1156.	86.	15.	39.
JERSWI	87.3	0.85	489.	43.	105.	12.	39.	5.	1083.	74.	15.	26.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGHER	695.	435.	427.	431.	-23.	(10.)
ANGJER	629.	390.	384.	387.	-12.	80.
ANGSWI	697.	446.	425.	443.	-23.	78.
HERJER	637.	398.	387.	395.	-22.	81.
HERSWI	705.	455.	428.	451.	-34.	76.
JERSWI	639.	409.	385.	406.	-21.	53.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGHERJER	96.6	0.92	467.	71.	115.	13.	43.	21.	1075.	73.	15.	21.
ANGHERSWI	87.7	0.88	506.	66.	88.	10.	35.	17.	1138.	83.	15.	35.
ANGJERSWI	89.6	0.88	495.	59.	100.	11.	38.	9.	1089.	75.	15.	26.
HERJERSWI	88.7	0.89	489.	59.	101.	11.	39.	13.	1104.	77.	15.	28.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGHERJER	656.	409.	400.	405.	-19.	94.
ANGHERSWI	702.	447.	428.	443.	-27.	91.
ANGJERSWI	657.	416.	399.	413.	-19.	76.
HERJERSWI	662.	422.	401.	418.	-26.	74.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG HERJER	97.6	0.90	459.	66.	120.	13.	45.	21.	1074.	72.	15.	19.
ANG HERSWI	84.6	0.85	500.	54.	91.	10.	36.	20.	1140.	83.	15.	38.
ANG JERSWI	87.3	0.86	498.	48.	99.	11.	38.	7.	1089.	75.	15.	25.
HER ANGJER	99.2	0.92	478.	77.	111.	12.	41.	14.	1072.	72.	15.	16.
HER ANGSWI	85.8	0.87	520.	62.	82.	9.	33.	12.	1138.	83.	15.	34.
HER JERSWI	87.3	0.87	505.	55.	94.	10.	36.	6.	1103.	77.	15.	25.
JER ANGHER	95.7	0.91	452.	63.	123.	14.	46.	28.	1079.	73.	15.	27.
JER ANGSWI	85.8	0.86	491.	46.	102.	11.	39.	14.	1094.	76.	15.	33.
JER HERSWI	84.6	0.86	479.	42.	106.	12.	41.	19.	1109.	78.	15.	37.
SWI ANGHER	95.7	0.90	486.	79.	98.	11.	39.	22.	1136.	83.	15.	30.
SWI ANGJER	99.2	0.90	483.	70.	107.	12.	40.	9.	1085.	75.	15.	18.
SWI HERJER	97.6	0.90	471.	70.	111.	12.	42.	15.	1100.	77.	15.	22.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG HERJER	651.	406.	397.	403.	-21.	86.
ANG HERSWI	706.	450.	431.	447.	-25.	86.
ANG JERSWI	654.	415.	397.	412.	-20.	61.
HER ANGJER	646.	402.	394.	399.	-23.	84.
HER ANGSWI	701.	446.	428.	443.	-27.	82.
HER JERSWI	656.	418.	397.	414.	-28.	58.
JER ANGHER	668.	417.	408.	413.	-15.	104.
JER ANGSWI	671.	426.	408.	422.	-13.	79.
JER HERSWI	678.	432.	411.	429.	-20.	78.
SWI ANGHER	696.	442.	425.	439.	-30.	101.
SWI ANGJER	644.	407.	391.	404.	-25.	73.
SWI HERJER	651.	414.	394.	410.	-31.	75.

THESE ESTIMATES PROVIDED BY

BIRD CAGE CATTLE CO SOLD ON CARCASS WEIGHT

N	WEANING COSTS FIXED	WEANING COSTS VARIABLE	WNG BASE	FEED COST PER LB. BACK	FEED COST PER LB. GROW	FEED COST PER LB. FINISH	FIXED COST PER DAY BACK	FIXED COST PER DAY GROW	FIXED COST PER DAY FINISH	BASE FEED REQUIRE. BACK	BASE FEED REQUIRE. GROW	BASE FEED REQUIRE. FINISH	CHOICE GRADE PRICE	CHOICE GRADE SPREAD
4	7500.	6000.	400.	0.020	0.023	0.025	0.11	0.11	0.11	9.0	8.2	7.5	0.62	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILTY	WNG PRICE	DAILY GAIN BACK	DAILY GAIN GROW	DAILY GAIN FINISH	FEED EFF	SELL PRICE BACK	SELL PRICE FEED	DRESS PCT	CUT ADLTY	PCT CHOICE
ANG	975.	2750.	0.92	0.94	0.95	0.10	0.06	0.52	2.00	2.70	2.50	0.03	.46	.40	0.62	0.62	0.90
HER	1025.	2000.	0.92	0.94	0.92	0.12	-.03	0.53	2.10	3.00	2.70	0.0	.48	.41	0.62	0.63	0.75
LIM	1125.	2400.	0.90	0.92	0.90	0.14	0.02	0.50	2.10	3.00	3.00	-.02	.45	.40	0.62	0.66	0.50
SIM	1200.	4000.	0.93	0.93	0.90	0.18	0.10	0.50	2.30	3.40	3.40	-.03	.45	.39	0.61	0.64	0.50

CARRYING CAPACITY BASE IS 4574. LBS. TON PER ANIMAL PER YEAR

THESE RESULTS BASED ON ESTIMATES MADE BY

BIRD CAGE CATTLE CO SOLD ON CARCASS WEIGHT

STRAIGHTBRED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG	100.0	0.82	464.	59.	118.	13.	44.	24.	1060.	70.	15.	17.
HER	100.8	0.80	436.	50.	126.	14.	48.	44.	1093.	74.	15.	23.
LIM	90.7	0.75	464.	24.	112.	12.	42.	29.	1120.	77.	15.	40.
SIM	78.6	0.78	512.	28.	82.	9.	33.	17.	1176.	87.	15.	41.

STRAIGHTBRED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG	657.	407.	405.	404.	-19.	82.
HER	678.	421.	415.	424.	-33.	83.
LIM	694.	458.	420.	455.	-28.	66.
SIM	717.	459.	434.	455.	-25.	62.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGHER	97.6	0.86	479.	75.	104.	11.	40.	26.	1089.	74.	15.	22.
ANGLIM	92.5	0.84	493.	60.	98.	11.	37.	19.	1103.	76.	15.	31.
ANGSIM	85.4	0.86	519.	59.	82.	9.	33.	12.	1182.	81.	15.	32.
HERLIM	92.9	0.82	479.	54.	102.	11.	39.	28.	1120.	78.	15.	35.
HERSIM	85.8	0.84	504.	54.	86.	9.	35.	22.	1149.	83.	15.	36.
LIMSIM	81.8	0.81	518.	42.	80.	9.	32.	15.	1163.	85.	15.	44.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGHER	675.	422.	415.	419.	-26.	97.
ANGLIM	684.	438.	418.	434.	-23.	87.
ANGSIM	696.	439.	425.	435.	-22.	82.
HERLIM	694.	448.	423.	444.	-31.	86.
HERSIM	707.	449.	430.	445.	-29.	82.
LIMSIM	715.	465.	433.	461.	-27.	74.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO TCO	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGHERLIM	93.5	0.86	492.	69.	96.	11.	38.	22.	1108.	77.	15.	30.
ANGHERSIM	88.5	0.87	509.	67.	86.	9.	34.	18.	1127.	80.	15.	31.
ANGLIMSIM	85.6	0.85	519.	58.	81.	9.	32.	13.	1137.	82.	15.	37.
HERLIMSIM	85.9	0.84	509.	54.	85.	9.	34.	19.	1148.	83.	15.	39.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGHERLIM	687.	437.	420.	434.	-27.	94.
ANGHERSIM	695.	438.	425.	434.	-26.	89.
ANGLIMSIM	701.	449.	427.	445.	-24.	83.
HERLIMSIM	708.	455.	430.	452.	-29.	83.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO TCO	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG HERLIM	92.9	0.85	479.	58.	102.	11.	40.	26.	1109.	77.	15.	32.
ANG HERSIM	89.8	0.86	502.	56.	89.	10.	36.	20.	1130.	81.	15.	35.
ANG LIMSIM	81.8	0.84	515.	46.	83.	9.	33.	15.	1140.	82.	15.	41.
HER ANGLIM	92.5	0.85	498.	64.	94.	10.	37.	20.	1108.	77.	15.	30.
HER ANGSIM	85.4	0.86	520.	63.	81.	9.	32.	14.	1128.	80.	15.	32.
HER LIMSIM	81.8	0.83	518.	47.	81.	9.	32.	17.	1150.	83.	15.	42.
LIM ANGHER	97.6	0.85	487.	71.	99.	11.	39.	22.	1107.	77.	15.	27.
LIM ANGSIM	85.4	0.84	523.	58.	90.	9.	32.	17.	1137.	82.	15.	36.
LIM HERSIM	85.8	0.83	507.	52.	85.	9.	34.	20.	1149.	83.	15.	39.
SIM ANGHER	97.6	0.87	492.	75.	94.	10.	38.	21.	1124.	80.	15.	25.
SIM ANGLIM	92.5	0.85	505.	63.	88.	10.	35.	15.	1134.	81.	15.	31.
SIM HERLIM	92.9	0.84	490.	59.	94.	10.	37.	24.	1146.	82.	15.	35.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG HERLIM	691.	440.	422.	437.	-26.	91.
ANG HERSIM	701.	442.	429.	439.	-23.	87.
ANG LIMSIM	708.	454.	431.	450.	-21.	81.
HER ANGLIM	686.	437.	419.	433.	-27.	86.
HER ANGSIM	696.	439.	426.	435.	-25.	83.
HER LIMSIM	712.	459.	432.	455.	-27.	78.
LIM ANGHER	682.	423.	417.	430.	-29.	93.
LIM ANGSIM	700.	447.	426.	443.	-25.	81.
LIM HERSIM	708.	455.	430.	451.	-29.	81.
SIM ANGHER	685.	431.	419.	428.	-31.	89.
SIM ANGLIM	692.	443.	422.	439.	-29.	81.
SIM HERLIM	701.	451.	426.	447.	-33.	84.

THESE ESTIMATES PROVIDED BY

BILL DURFEY ET AL COLUMBIA MO

BREAKING COSTS			WNG	FEED COST PER LB.			FIXED COST PER DAY			BASE FEED REQUIRE.			CHOICE	GRADE
N	FIXED	VARIABLE	BASE	BACK	GROW	FINISH	BACK	GROW	FINISH	BACK	GROW	FINISH	PRICE	SPREAD
4	7500.	6000.	400.	0.020	0.023	0.025	0.11	0.11	0.11	9.0	8.2	7.5	0.62	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILITY	WNG PRICE	DAILY GAIN BACK	GROW	FINISH	FEED EFF	SELL PRICE BACK	FEED	DRESS PCT	CUT ABLTY	PCT CHOICE
ANG	1050.	2500.	0.90	0.96	0.95	0.15	0.07	0.50	2.00	2.60	2.50	0.03	.46	.42	0.64	0.60	0.99
CHA	1300.	2800.	0.90	0.85	0.85	0.25	0.10	0.49	2.30	3.50	3.50	-.05	.45	.40	0.61	0.68	0.65
HER	1100.	2000.	0.94	0.95	0.92	0.17	0.0	0.50	2.10	2.70	2.65	0.01	.46	.42	0.63	0.62	0.94
SIM	1250.	4000.	0.96	0.96	0.90	0.25	0.15	0.49	2.30	3.50	3.50	-.05	.45	.42	0.62	0.67	0.80

CARRYING CAPACITY BASE IS 4706. LBS. TON PER ANIMAL PER YEAR

THESE RESULTS BASED ON ESTIMATES MADE BY

BILL DURFEY ET AL COLUMBIA MO

STRAIGHTBRED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG	100.0	0.82	408.	61.	106.	12.	39.	27.	1055.	69.	15.	37.
CHA	82.0	0.65	540.	11.	70.	8.	27.	15.	1190.	87.	15.	58.
HER	99.2	0.82	468.	52.	110.	12.	42.	34.	1073.	71.	15.	43.
SIM	79.6	0.83	560.	47.	61.	7.	24.	10.	1190.	87.	15.	82.

STRAIGHTBRED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG	675.	405.	418.	402.	-25.	101.
CHA	726.	494.	442.	490.	-34.	51.
HER	676.	419.	418.	416.	-33.	96.
SIM	738.	494.	453.	490.	-47.	92.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGCHA	87.7	0.78	545.	50.	70.	8.	28.	13.	1137.	81.	15.	91.
ANGHER	96.9	0.82	508.	74.	91.	10.	35.	23.	1076.	72.	15.	43.
ANGSIM	86.1	0.88	555.	70.	65.	7.	26.	11.	1137.	81.	15.	62.
CHAHER	87.4	0.76	535.	46.	73.	8.	29.	17.	1146.	82.	15.	54.
CHASIM	78.5	0.79	582.	43.	50.	5.	20.	4.	1206.	90.	15.	74.
HERSIM	85.8	0.88	545.	70.	68.	7.	27.	14.	1146.	82.	15.	65.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGCHA	710.	455.	437.	451.	-29.	85.
ANGHER	684.	417.	423.	414.	-29.	111.
ANGSIM	716.	455.	442.	451.	-36.	107.
CHAHER	711.	462.	436.	458.	-34.	83.
CHASIM	742.	501.	454.	497.	-41.	81.
HERSIM	716.	462.	441.	458.	-40.	109.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO TCO	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANGCHAHER	89.7	0.93	538.	62.	73.	8.	29.	15.	1124.	79.	15.	50.
ANGCHASIM	82.2	0.85	570.	58.	57.	6.	23.	7.	1164.	85.	15.	63.
ANGHERSIM	88.6	0.90	545.	79.	70.	8.	28.	13.	1124.	79.	15.	58.
CHAHERSIM	83.0	0.83	563.	56.	59.	6.	24.	9.	1171.	86.	15.	65.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANGCHAHER	704.	446.	434.	442.	-31.	97.
ANGCHASIM	726.	472.	446.	460.	-35.	93.
ANGHERSIM	708.	446.	437.	442.	-35.	115.
CHAHERSIM	726.	477.	446.	473.	-38.	92.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO TCO	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
ANG CHAHER	87.4	0.80	537.	48.	75.	8.	30.	18.	1126.	80.	15.	54.
ANG CHASIM	78.5	0.80	574.	44.	55.	6.	22.	7.	1169.	86.	15.	71.
ANG HERSIM	85.8	0.87	542.	68.	71.	8.	28.	15.	1126.	80.	15.	62.
CHA ANGHER	96.9	0.85	524.	75.	80.	9.	32.	17.	1120.	79.	15.	42.
CHA ANGSIM	86.1	0.85	566.	69.	58.	6.	24.	7.	1162.	85.	15.	59.
CHA HERSIM	85.8	0.85	555.	65.	63.	7.	25.	10.	1169.	86.	15.	62.
HER ANGCHA	87.7	0.82	546.	56.	69.	8.	28.	13.	1125.	80.	15.	52.
HER ANGSIM	86.1	0.90	556.	72.	65.	7.	26.	10.	1125.	80.	15.	60.
HER CHASIM	78.5	0.81	577.	46.	53.	6.	21.	6.	1175.	86.	15.	72.
SIM ANGCHA	87.7	0.82	556.	56.	63.	7.	25.	10.	1162.	85.	15.	58.
SIM ANGHER	96.9	0.90	524.	83.	80.	9.	32.	17.	1120.	79.	15.	49.
SIM CHAHER	87.4	0.82	544.	51.	67.	7.	27.	13.	1169.	86.	15.	61.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
ANG CHAHER	710.	451.	437.	447.	-28.	91.
ANG CHASIM	737.	481.	452.	477.	-30.	91.
ANG HERSIM	714.	451.	441.	447.	-32.	112.
CHA ANGHER	692.	436.	426.	433.	-37.	98.
CHA ANGSIM	719.	466.	442.	462.	-39.	95.
CHA HERSIM	720.	472.	442.	468.	-42.	95.
HER ANGCHA	708.	449.	436.	445.	-29.	92.
HER ANGSIM	712.	449.	439.	445.	-33.	109.
HER CHASIM	735.	484.	451.	480.	-34.	90.
SIM ANGCHA	714.	466.	441.	462.	-39.	85.
SIM ANGHER	695.	436.	429.	433.	-41.	108.
SIM CHAHER	719.	472.	441.	468.	-41.	84.

SIMUMATE II SOUTH DAKOTA STATE UNIVERSITY

THESE ESTIMATES PROVIDED BY

WARWICK BRIT DAIRY EXOTIC RETAIL CUTS

	WEANING COSTS		WNG	FEED COST PER LB.			FIXED COST PER DAY			BASE FEED REQUIRE.			CHOICE	GRADE
N	FIXED	VARIABLE	BASE	BACK	GROW	FINISH	BACK	GROW	FINISH	BACK	GROW	FINISH	PRICE	SPREAD
4	7500.	6000.	400.	0.024	0.028	0.030	0.12	0.12	0.12	9.0	8.2	7.5	0.70	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILTY	WNG PRICE	DAILY GAIN BACK	GROW	FINISH	FEED EFF	SELL PRICE BACK	FEED	DRESS PCT	CUT ABLTY	PCT CHOICE
HER	1125.	2000.	0.96	0.96	0.92	0.14	-.05	0.63	1.90	3.00	3.00	0.0	.54	.45	0.62	0.63	0.75
HOL	1300.	4500.	0.94	0.88	0.90	0.20	0.12	0.59	2.10	3.30	3.30	-.03	.47	.43	0.59	0.66	0.50
JER	850.	3600.	0.96	0.96	0.92	-.09	0.10	0.56	1.50	2.00	2.00	0.06	.41	.38	0.58	0.62	0.40
LIM	1160.	2200.	0.92	0.94	0.90	0.14	0.0	0.60	1.90	3.10	3.10	-.03	.51	.43	0.63	0.68	0.30

THESE RESULTS BASED ON ESTIMATES MADE BY

WARWICK BRIT DAIRY EXOTIC RETAIL CUTS

CARCASSES SOLD ON WEIGHT OF RETAIL CUTS

STRAIGHTBRED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FIXED	FEEDLOT NET RETURN INDIVIDUAL
HER	100.0	0.85	436.	98.	139.	17.	57.	30.	1120.	95.	17.	14.
HOL	77.5	0.74	528.	52.	82.	10.	36.	-28.	1162.	102.	17.	52.
JER	113.0	0.85	404.	74.	197.	24.	68.	-31.	980.	67.	17.	1.
LIM	96.2	0.78	456.	69.	129.	15.	51.	17.	1134.	95.	17.	18.

STRAIGHTBRED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HER	694.	437.	485.	490.	-19.	122.
HOL	686.	452.	496.	507.	-4.	72.
JER	568.	352.	385.	395.	12.	57.
LIM	714.	486.	528.	544.	40.	144.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FIXED	FEEDLOT NET RETURN INDIVIDUAL
HERHOL	84.8	0.85	512.	92.	91.	11.	40.	-10.	1156.	102.	17.	36.
HERJER	103.0	0.91	448.	112.	143.	17.	56.	-7.	1062.	84.	17.	7.
HERLIM	95.5	0.87	475.	106.	115.	14.	48.	14.	1141.	99.	17.	19.
HOLJER	89.0	0.85	495.	83.	110.	13.	45.	-35.	1083.	88.	17.	26.
HOLLIM	83.3	0.81	522.	79.	86.	10.	37.	-15.	1163.	102.	17.	39.
JERLIM	100.9	0.87	458.	93.	138.	17.	53.	-13.	1069.	85.	17.	9.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HERHOL	699.	451.	497.	505.	-12.	107.
HERJER	637.	398.	438.	446.	-3.	109.
HERLIM	713.	467.	513.	523.	10.	150.
HOLJER	634.	406.	444.	454.	5.	79.
HOLLIM	709.	475.	519.	532.	19.	121.
JERLIM	647.	420.	458.	471.	25.	114.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
HERHOLJER	90.8	0.89	494.	102.	108.	13.	45.	-20.	1104.	92.	17.	23.
HERHOLLIM	86.8	0.86	512.	97.	92.	11.	40.	-7.	1158.	102.	17.	32.
HERJERLIM	98.9	0.90	469.	110.	126.	15.	50.	-4.	1094.	90.	17.	18.
HOLJERLIM	89.7	0.86	501.	89.	104.	13.	43.	-23.	1109.	93.	17.	25.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HERHOLJER	659.	419.	461.	470.	-3.	103.
HERHOLLIM	710.	466.	511.	522.	6.	129.
HERJERLIM	667.	429.	470.	481.	11.	128.
HOLJERLIM	665.	435.	474.	487.	16.	106.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
HER HOLJER	89.0	0.87	510.	97.	100.	12.	41.	-28.	1103.	92.	17.	20.
HER HOLLIM	83.3	0.84	523.	87.	86.	10.	37.	-11.	1159.	102.	17.	34.
HER JERLIM	100.9	0.89	477.	113.	122.	15.	49.	-11.	1092.	90.	17.	8.
HOL HERJER	103.0	0.90	474.	121.	120.	14.	49.	-17.	1100.	92.	17.	15.
HOL HERLIM	95.5	0.87	487.	110.	105.	13.	45.	1.	1157.	101.	17.	29.
HOL JERLIM	100.9	0.87	484.	106.	115.	14.	47.	-22.	1106.	92.	17.	17.
JER HERHOL	84.8	0.87	484.	79.	113.	14.	47.	-11.	1109.	93.	17.	33.
JER HERLIM	95.5	0.89	450.	93.	135.	16.	54.	7.	1099.	91.	17.	20.
JER HOLLIM	83.3	0.84	494.	70.	108.	13.	44.	-15.	1115.	93.	17.	34.
LIM HERHOL	84.8	0.84	513.	89.	91.	11.	40.	-7.	1158.	102.	17.	33.
LIM HERJER	103.0	0.89	466.	117.	128.	15.	51.	-8.	1092.	90.	17.	7.
LIM HOLJER	89.0	0.84	510.	89.	100.	12.	41.	-30.	1107.	92.	17.	21.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HER HOLJER	652.	415.	456.	465.	-6.	83.
HER HOLLIM	711.	468.	513.	524.	8.	118.
HER JERLIM	660.	425.	465.	476.	8.	118.
HOL HERJER	648.	412.	452.	461.	-10.	110.
HOL HERLIM	707.	464.	509.	520.	4.	143.
HOL JERLIM	655.	420.	467.	479.	10.	111.
JER HERHOL	674.	430.	472.	481.	3.	104.
JER HERLIM	683.	440.	482.	493.	18.	137.
JER HOLLIM	682.	446.	487.	500.	24.	113.
LIM HERHOL	709.	465.	510.	520.	4.	118.
LIM HERJER	658.	422.	462.	472.	4.	120.
LIM HOLJER	657.	428.	468.	480.	11.	91.

THESE ESTIMATES PROVIDED BY

WARWICK BRIT DAIRY EXOTIC SOLD ON CARCASS WEIGHT

	WEANING COSTS		WNG	FEED COST PER LB.			FIXED COST PER DAY			BASE FEED REQUIRE.			CHOICE GRADE	
N	FIXED	VARIABLE	BASE	BACK	GROW	FINISH	BACK	GROW	FINISH	BACK	GROW	FINISH	PRICE	SPREAD
4	7500.	6000.	400.	0.024	0.028	0.030	0.12	0.12	0.12	9.0	8.2	7.5	0.70	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILITY	WNG PRICE	DAILY GAIN BACK	DAILY GAIN GROW	DAILY GAIN FINISH	FEED EFF	SELL PRICE BACK	SELL PRICE FEED	DRESS PCT	CUT ABLTY	PCT CHOICE
HER	1125.	2000.	0.96	0.96	0.92	0.14	-.05	0.63	1.90	3.00	3.00	0.0	.54	.45	0.62	0.63	0.75
HOL	1300.	4500.	0.94	0.88	0.90	0.20	0.12	0.59	2.10	3.30	3.30	-.03	.47	.43	0.59	0.66	0.50
JER	850.	3600.	0.96	0.96	0.92	-.09	0.10	0.56	1.50	2.00	2.00	0.06	.41	.38	0.58	0.62	0.40
LIM	1160.	2200.	0.92	0.94	0.90	0.14	0.0	0.60	1.90	3.10	3.10	-.03	.51	.43	0.63	0.68	0.30

CARRYING CAPACITY BASE IS 4921. LBS. TDN PER ANIMAL PER YEAR

THESE RESULTS BASED ON ESTIMATES MADE BY

WARWICK BRIT DAIRY EXOTIC SOLD ON CARCASS WEIGHT

STRAIGHTBREED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
HER	100.0	0.85	436.	98.	139.	17.	57.	30.	1120.	95.	17.	14.
HOL	77.5	0.74	528.	52.	82.	10.	36.	-28.	1162.	102.	17.	52.
JER	113.0	0.85	404.	74.	197.	24.	68.	-31.	980.	67.	17.	1.
LIM	96.2	0.76	456.	69.	128.	15.	51.	17.	1134.	95.	17.	18.

STRAIGHTBREED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HER	694.	437.	481.	490.	-29.	118.
HOL	686.	452.	470.	507.	-30.	46.
JER	568.	352.	388.	395.	15.	60.
LIM	714.	486.	485.	544.	-3.	101.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
HERHOL	84.8	0.85	512.	92.	91.	11.	40.	-10.	1156.	102.	17.	36.
HERJER	103.0	0.91	448.	112.	143.	17.	56.	-7.	1062.	84.	17.	7.
HERLIM	95.5	0.87	475.	106.	115.	14.	48.	14.	1141.	99.	17.	19.
HOLJER	89.0	0.85	495.	83.	110.	13.	45.	-35.	1083.	88.	17.	26.
HOLLIM	83.3	0.81	522.	79.	86.	10.	37.	-15.	1163.	102.	17.	39.
JERLIM	100.9	0.87	458.	93.	138.	17.	53.	-13.	1069.	85.	17.	9.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HERHOL	699.	451.	482.	505.	-27.	92.
HERJER	637.	398.	438.	446.	-3.	109.
HERLIM	713.	467.	489.	523.	-13.	126.
HOLJER	634.	406.	433.	454.	-6.	69.
HOLLIM	709.	475.	484.	532.	-16.	86.
JERLIM	647.	420.	440.	471.	7.	97.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
HERHOLJER	90.8	0.89	494.	102.	108.	13.	45.	-20.	1104.	92.	17.	23.
HERHOLLIM	86.0	0.86	512.	97.	92.	11.	40.	-7.	1158.	102.	17.	32.
HERJERLIM	98.7	0.90	469.	110.	126.	15.	50.	-4.	1094.	90.	17.	12.
HOLJERLIM	89.7	0.86	501.	89.	104.	13.	43.	-23.	1109.	93.	17.	25.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HERHOLJER	659.	419.	452.	470.	-11.	94.
HERHOLLIM	710.	466.	487.	522.	-19.	104.
HERJERLIM	667.	429.	457.	481.	-3.	115.
HOLJERLIM	665.	435.	454.	487.	-5.	86.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
HER HOLJER	89.0	0.87	510.	97.	100.	12.	41.	-28.	1103.	92.	17.	20.
HER HOLLIM	83.3	0.84	523.	87.	86.	10.	37.	-11.	1159.	102.	17.	34.
HER JERLIM	100.9	0.89	477.	113.	122.	15.	49.	-11.	1092.	90.	17.	8.
HOL HERJER	103.0	0.90	474.	121.	120.	14.	49.	-17.	1100.	92.	17.	15.
HOL HERLIM	95.5	0.87	487.	110.	105.	13.	45.	1.	1157.	101.	17.	29.
HOL JERLIM	100.9	0.87	484.	106.	115.	14.	47.	-22.	1106.	92.	17.	17.
JER HERHOL	84.9	0.87	486.	79.	113.	14.	47.	-11.	1109.	93.	17.	33.
JER HERLIM	95.5	0.89	450.	93.	135.	16.	54.	7.	1099.	91.	17.	20.
JER HOLLIM	83.3	0.84	494.	70.	108.	13.	44.	-16.	1115.	93.	17.	34.
LIM HERHOL	84.8	0.84	513.	89.	91.	11.	40.	-7.	1158.	102.	17.	33.
LIM HERJER	103.0	0.89	466.	117.	128.	15.	51.	-8.	1092.	90.	17.	7.
LIM HOLJER	89.0	0.84	510.	89.	100.	12.	41.	-30.	1107.	92.	17.	21.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
HER HOLJER	652.	415.	447.	465.	-14.	75.
HER HOLLIM	711.	468.	487.	524.	-18.	93.
HER JERLIM	660.	425.	452.	476.	-6.	104.
HOL HERJER	648.	417.	445.	461.	-17.	102.
HOL HERLIM	707.	464.	485.	520.	-21.	119.
HOL JERLIM	655.	428.	447.	479.	-10.	91.
JER HERHOL	674.	430.	463.	481.	-6.	95.
JER HERLIM	683.	440.	467.	493.	3.	123.
JER HOLLIM	682.	446.	465.	500.	2.	90.
LIM HERHOL	709.	465.	486.	520.	-20.	95.
LIM HERJER	658.	422.	450.	472.	-8.	108.
LIM HOLJER	657.	428.	448.	480.	-9.	71.

SIMUMATE II SOUTH DAKOTA STATE UNIVERSITY

THESE ESTIMATES PROVIDED BY

HAMMOND CATTLE CO

WEANING COSTS			WNG	FEED COST PER LB.			FIXED COST PER DAY			BASE FEED REQUIRE.			CHOICE	GRADE
N	FIXED	VARIABLE	BASE	BACK	GROW	FINISH	BACK	GROW	FINISH	BACK	GROW	FINISH	PRICE	SPREAD
4	7500.	6000.	400.	0.020	0.023	0.025	0.11	0.11	0.11	9.0	8.2	7.5	0.62	0.030

BREED	COW SIZE	MILK PROD	MALE FERT	FEM FERT	CALF LIVA	IND GROW	MATERN ABILTY	WNG PRICE	DAILY GAIN BACK	GROW	FINISH	FEED EFF	SELL PRICE BACK	FEED	DRESS PCT	CUT ABLTY	PCT CHOICE
BRA	1050.	2900.	0.92	0.85	0.90	0.15	0.08	0.49	1.75	2.20	2.50	-.03	.45	.40	0.65	0.66	0.35
CHA	1250.	2800.	0.90	0.92	0.85	0.22	0.07	0.50	2.30	3.40	3.40	-.03	.45	.39	0.62	0.67	0.40
HER	1100.	2000.	0.96	0.96	0.92	0.10	-.05	0.53	2.10	2.75	3.00	0.0	.48	.41	0.62	0.63	0.70
SIM	1300.	4000.	0.92	0.94	0.90	0.22	0.11	0.51	2.30	3.40	3.40	-.03	.45	.39	0.61	0.65	0.50

CARRYING CAPACITY BASE IS 4908. LBS. TON PER ANIMAL PER YEAR

THESE RESULTS BASED ON ESTIMATES MADE BY

HAMMOND CATTLE CO

STRAIGHTBRED PERFORMANCE

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
BRA	100.0	0.70	492.	31.	119.	13.	36.	25.	1035.	61.	15.	23.
CHA	87.0	0.70	516.	24.	80.	9.	32.	16.	1176.	87.	15.	41.
HER	101.7	0.85	420.	56.	133.	15.	50.	48.	1108.	77.	15.	26.
SIM	79.1	0.78	532.	38.	73.	8.	29.	6.	1176.	87.	15.	41.

STRAIGHTBRED PERFORMANCE

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
BRA	673.	444.	404.	440.	-10.	68.
CHA	729.	489.	439.	485.	-20.	62.
HER	687.	433.	420.	429.	-35.	96.
SIM	717.	466.	434.	463.	-25.	61.

TWO BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
BRACHA	90.4	0.75	535.	44.	79.	9.	29.	13.	1119.	76.	15.	35.
BRAHER	98.1	0.83	485.	63.	108.	12.	38.	28.	1084.	71.	15.	27.
BRASIM	85.8	0.79	543.	51.	75.	8.	27.	8.	1119.	76.	15.	35.
CHAHER	91.3	0.83	498.	60.	89.	10.	36.	24.	1157.	84.	15.	37.
CHASIM	80.5	0.79	555.	45.	61.	7.	25.	3.	1192.	90.	15.	45.
HERSIM	86.5	0.87	506.	63.	85.	9.	34.	19.	1157.	84.	15.	37.

TWO BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
BRACHA	711.	473.	427.	469.	-15.	77.
BRAHER	680.	444.	417.	440.	-22.	96.
BRASIM	705.	462.	425.	458.	-17.	77.
CHAHER	717.	466.	435.	462.	-28.	93.
CHASIM	733.	484.	442.	480.	-22.	70.
HERSIM	711.	455.	432.	452.	-30.	89.

THREE BREED ROTATION

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
BRACHAHER	92.4	0.82	515.	59.	87.	10.	33.	19.	1124.	78.	15.	34.
BRACHASIM	84.6	0.79	554.	49.	66.	7.	26.	5.	1147.	82.	15.	39.
BRAHERSIM	89.0	0.85	520.	63.	84.	9.	32.	16.	1124.	78.	15.	34.
CHAHERSIM	85.1	0.84	528.	61.	74.	8.	30.	12.	1173.	87.	15.	41.

THREE BREED ROTATION

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
BRACHAHER	708.	462.	428.	459.	-22.	90.
BRACHASIM	719.	475.	433.	471.	-18.	76.
BRAHERSIM	704.	455.	426.	452.	-23.	90.
CHAHERSIM	723.	470.	438.	466.	-27.	88.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARRY CAP	CALF CROP	WNG WT	NET RETURN	DAY TO 700	BACKGRD COSTS FIXED	BACKGRD COSTS FEED	BACK NET RETURN INDIVIDUAL	SLTR WT	FEEDLOT COSTS FEED	FEEDLOT COSTS FIXED	FEEDLOT NET RETURN INDIVIDUAL
BRA CHAHER	91.3	0.83	501.	57.	93.	10.	35.	23.	1127.	79.	15.	39.
BRA CHASIM	80.5	0.81	551.	47.	67.	7.	26.	6.	1152.	82.	15.	46.
BRA HERSIM	86.5	0.86	509.	60.	89.	10.	34.	19.	1127.	79.	15.	39.
CHA BRAHER	98.1	0.80	501.	62.	94.	10.	35.	21.	1120.	77.	15.	28.
CHA BRASIM	85.8	0.78	552.	49.	68.	7.	26.	5.	1145.	81.	15.	35.
CHA HERSIM	86.5	0.84	518.	61.	78.	9.	32.	14.	1172.	87.	15.	38.
HER BRACHA	90.4	0.80	529.	52.	80.	9.	30.	16.	1124.	78.	15.	34.
HER BRASIM	85.8	0.83	537.	56.	76.	8.	29.	12.	1124.	78.	15.	34.
HER CHASIM	80.5	0.84	545.	52.	66.	7.	27.	8.	1175.	87.	15.	44.
SIM BRACHA	90.4	0.77	544.	51.	71.	8.	27.	7.	1145.	81.	15.	35.
SIM BRAHER	98.1	0.82	501.	66.	94.	10.	35.	19.	1120.	77.	15.	28.
SIM CHAHER	91.3	0.83	510.	62.	82.	9.	34.	17.	1172.	87.	15.	38.

SPECIALIZED CROSS-BULL BREED FIRST COWS TWO BREED ROTATION NEXT

BREED	CARC WT	RET CUTS	MARKET VALUE CARC	MARKET VALUE ACTUAL	PACKER NET RET INDIVIDUAL	INDUSTRY NET INDIVIDUAL
BRA CHAHER	716.	468.	433.	464.	-18.	101.
BRA CHASIM	730.	482.	440.	478.	-13.	87.
BRA HERSIM	712.	460.	431.	456.	-19.	98.
CHA BRAHER	697.	455.	421.	451.	-27.	83.
CHA BRASIM	711.	469.	429.	465.	-22.	67.
CHA HERSIM	719.	466.	436.	463.	-30.	84.
HER BRACHA	707.	463.	427.	459.	-22.	79.
HER BRASIM	703.	455.	426.	452.	-23.	78.
HER CHASIM	729.	474.	441.	471.	-24.	81.
SIM BRACHA	712.	470.	429.	467.	-22.	72.
SIM BRAHER	694.	448.	420.	445.	-29.	85.
SIM CHAHER	719.	467.	436.	464.	-29.	88.

PREDICTION OF FEEDLOT PERFORMANCE AND CARCASS MERIT BY VISUAL APPRAISAL OF LIVE-ANIMAL TRAITS[1]

John D. Crouse[2]

Accurate, reliable methods for predicting feedlot performance and carcass merit would be valuable for beef improvement programs. Visual evaluation is easily obtained, rapid, inexpensive and lends itself to widespread application. Consequently, for many years the beef cattle industry has been searching for new techniques, as well as trying to improve old techniques, of predicting feeder calf performance or carcass merit by live-animal traits.

An appraiser can, generally, find himself in one of four situations evaluating steers. The population being evaluated will either be feeder calves or slaughter steers and will be homogeneous or heterogeneous in body type and management. A homogeneous population would be typical of a single breed or breed cross produced by a seedstock producer who has minimized environmental variation, such as feeding and management practices, in order to accurately appraise genetic differences between animals. A heterogeneous population would be typical of a market population of feeders or slaughter animals consisting of animals of a wide range in breed type or maturity and produced under a broad range of environmental conditions.

The study reported here was conducted to determine the value of certain subjective and objective live-animal traits for predicting future performance and carcass merit of steers representing various breed types and management conditions.

Source of Data Studied

The data for this study were derived from the Germ Plasm Evaluation program being conducted at the U.S. Meat Animal Research Center to evaluate and characterize various genetic resources for beef production.

A total of 452 calves sired by Hereford, Angus, Jersey, South Devon, Limousin, Simmental and Charolais bulls out of Hereford and Angus cows were used.

The steers were weaned, evaluated, fed in a feedlot, weighed every 28 days and re-evaluated before slaughter in three groups after 215, 243 and 271 days on feed. Visual observations were made by three experienced appraisers from the Agricultural Marketing Service, Kansas State University and the U.S. Meat Animal Research Center. The three appraisers independently evaluated the steers at weaning for 13 live-animal traits and U.S.D.A. (1965a) feeder grades (coded Good = 7, 8, 9; Choice = 10, 11, 12; Prime = 13, 14, 15). Disposition was scored on a 3-point scale with Gentle = 1, Active = 2, and

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[1]Presented at the Beef Improvement Symposium on Animal Evaluation of Beef Cattle, Fourth Annual Beef Improvement Federation Program, April 11, 1973, Omaha, Nebraska.

[2]U.S. Meat Animal Research Center, ARS, USDA.

Wild = 3. Hair coat was scored with Long = 1, Medium = 2, and Short = 3. The remaining 11 traits were scored on a 10-point scale with one and 10 representing extremes. Overall muscling and muscling of round was scored in relation to skeletal size with extremely thick = 1. Depth of body was skeletal depth at the heart girth in relation to length with extremely deep = 1. Width between hind legs was scored extremely wide = 1 to extremely narrow = 10. Extremely heavy bone was scored one. Growth potential scores of one correspond to extrmely good. Height reflected height at maturity, extremely tall = 1. Length of rump was an evaluation of length from hooks to pins in relation to body length with extremely long = 1. Length of body was length from first rib to aitch bone with extremely long bodied calves scored one. Trimness was evaluated as the degree of fat deposition in the throat dewlap, brisket, belly, flank and twist and scored extremely thin = 1. Condition was evaluated from extremely thin = 1 to extremely fat = 10 (with extremely fat >0.4 inches of fat).

Evaluation at slaughter included the above traits with estimations of U.S.D.A. (1965b) carcass quality grade (QG), cutability grade (CG), 12th rib fat thickness (FT), ribeye area (REA) at the 12th rib, conformation and percentage of kidney, pelvic and heart fat (% K,P&H) replacing estimates of hair coat, disposition, feeder grade and growth potential.

U.S.D.A. yield grades, quality grades (coded Good = 7, 8, 9; Choice = 10, 11, 12; Prime = 13, 14, 15) and factors affecting grades were obtained 24 hours postmortem. The right side of each carcass was transported to Kansas State University and cut into semi-boneless retail cuts leaving no more than 0.3 inch fat cover.

Results

Feeder Calf Observations:

Average estimates of feeder calf traits and intraclass correlations are presented in table 1. The intraclass correlations (t) have possible values ranging to a correlation of 1.0. This would indicate perfect agreement among appraisers in their evaluation of traits. The intraclass correlation of 0.71 for feeder grade estimates indicate a high degree of agreement among appraisers estimating this trait. Similar high correlations among appraisers were found for all traits except evaluations of hair coat (t = 0.36) and length of rump (t = 0.18).

The population of feeder calves considered by the appraisers had a feeder grade of high choice with an overall condition score of 6.6, slightly to moderately fat and an average weight of 476 pounds.

Correlations of a heterogeneous group of feeder calves with carcass and growth traits - Correlations between traits of a heterogeneous group of feeder calves and selected carcass and growth characteristics are presented in table 2. These results are appropriate when drawing inference to a population of cattle consisting of a wide range in biological type and maturity, typical of offspring derived from germ plasm of domestic and new "exotic" breeds and fed for 215 to 271 days.

Correlations have a possible range of -1.0 to +1.0 with 1.0, ignoring the sign, being perfect and 0.0 being the lowest. The sign of the correlation merely reflects the direction of the scale used in scoring and the correlation coefficient is a measure of mutual association between live-animal traits with growth and carcass traits.

The correlation between feeder grade and carcass overall conformation of 0.74 indicates a high association between the variation of these two traits. As feeder grade increased carcass conformation increased. This would indicate that feeder grades of cattle, varying widely in breed type and management, would be good predictors of carcass conformation. The correlation of -.04 between feeder grade and carcass quality indicates that feeder grades would be of little value in predicting carcass quality grades.

The correlation of 0.36 between feeder grade and percentage of actual cutability indicates a moderate degree of association between variation in these two traits. Other live-animal traits which would be considered moderate indicators of cutability are trimness, muscling of round and depth. Calves that were trimmer in the dewlap, brisket, belly, flank and twist, muscular in the round, and shallower bodied, tended to have higher cutability when slaughtered after 215 to 271 days on feed.

The best live-animal indicator of feedlot gains would be growth potential scores. The association between growth potential score and feedlot gain ($r = -.47$) was higher than that between preweaning daily gain and feedlot gain ($r = 0.24$). Other low to moderate predictors of feedlot gains would be size of bone, width between legs, height and length.

Prediction of a heterogeneous group of feeder calves growth and subsequent carcass characteristics by live-animal traits - In order to determine the value of single and multiple live-animal traits as predictors of feedlot gains and subsequent carcass merit, prediction equations, presented in table 3, were developed. Like the correlation analysis, these equations are applicable to a population of a broad range in breed-type and management. The percentage of variation of carcass or growth traits accounted for by live-animal traits in the equations is given by $R^2 \times 100$.

Feeder grades accounted for 13% of the variation in percentage of actual cutability. The best predictor of carcass cutability accounted for 41% of the variation and included seven live-animal traits. Each trait in the equation improved the accuracy of the entire equation and is entered in order of its individual importance. No meaningful additional accuracy would be gained by incorporating an additional trait into the equation.

No trait nor combination of traits produced a meaningful estimator of carcass quality. This indicates that the appraisers were not able to rank feeder calves for expected carcass quality grades by traits observed.

The best predictor of feedlot gains included two traits, size of bone and growth potential, and accounted for 24% of the variation. This degree of association would be considered a low value resulting in poor estimates of animal to animal differences.

Correlations of a homogeneous group of feeder calves with carcass and growth traits - Results of the correlation analysis within breed types and management systems are presented in table 4. Results from this analysis are applicable to animals within a breed or breed cross which have been fed and managed alike. This population would be typical of that of a seedstock producer where animal differences that are due to environment have been minimized in order to more accurately measure genetic differences.

Correlations between feeder calf live-animal traits and percentage of actual cutability are generally very low to low with the exception of condition scores (r = 0.30) and average daily gain from birth to weaning (r = -.31). Within breeds, trimmer calves with slower preweaning average daily gains tend to have the highest cutability. These two traits should produce the best estimate of subsequent carcass cutability.

Again, no individual feeder calf trait appears to be associated with carcass quality grades. Feeder calf grades appear to be more highly associated with carcass conformation than other growth and carcass traits.

Prediction of a homogeneous group of feeder calves growth and subsequent carcass characteristics by live-animal traits - (table 5) On a within breed type, management system basis, a prediction equation with feeder calf grades only accounted for 1% of the variation in percentage of actual carcass cutability. The best predictor of carcass cutability applying negative emphasis to preweaning ADG, condition score and overall muscling score only accounted for 16% of the total variation. No single trait nor combination of traits produced a meaningful estimator of carcass quality grades.

The best predictor of feedlot gains accounted for 13% of the variation in feedlot gains and included four live-animal traits, growth potential, overall muscling, height and condition.

Comparison of correlations between feeder calf traits with carcass and growth characteristics of the two populations - Correlations of live-animal traits with carcass traits are presented in table 6. Generally, correlations within breed type populations are much lower than correlations with populations including all breed types studied. This is due to the fact that the "built in" correlation found in going from one breed to another is removed in the within breed type, treatment correlations. In other words, as appraisers move from Jersey crosses to Limousin crosses in estimating conformation or feeder grade, a difference that is due to breed type is detected and recorded. However, within a breed type, these differences in conformation are relatively small and not readily detected.

An example of this is the high correlation between feeder grade and carcass conformation in the overall population. This associated response of variables was reduced to less than half within a given breed type and management system. A more dramatic example of population differences affecting an appraiser's ability is the reduction in the correlation coefficient between feeder grade with cutability. On an overall basis the correlation was 0.36; however, on a within breed basis, it was reduced to -.09. This change in association would indicate that not only was feeder grade a poor predictor of cutability within breed types, but also that increases in feeder grade were associated with decreased carcass cutability within breed types.

An example of a live-animal trait which may be of more value in detecting differences within a given breed type and management system than in an overall heterogeneous population, is that of average daily gain from birth to weaning. This correlation increased from -.02 overall breed types to -.31 within breed types indicating it is more useful for predicting cutability on a within breed type basis. Apparently, within breeds, preweaning growth reflected maternal performance and calves with more rapid growth were fatter, reducing cutability.

Slaughter steer live-animal traits:

Means and intraclass correlations of scores by the three appraisers are presented in table 7. The agreement among appraisers again appears high on most linear animal measurements. Length of rump once again appeared to be the most difficult to determine. The steers were estimated to have a carcass quality grade of 10.6 (low to average choice) and a yield grade of 3.1. Feedlot gains were 2.44 lb/day and an average slaughter weight of 1059 lb. was obtained.

Correlations of live-animal slaughter steer traits of a heterogeneous population with carcass characteristics - The three appraisers had more success as determined by the correlation analysis, table 8, estimating carcass quantitative characteristics such as cutability than qualitative characteristics such as quality grade. Other investigations have indicated that trained personnel could account for more variation estimating carcass yield grade and fat thickness than estimating quality grade. It has been suggested that the difficulty in estimating quality grade was due to the appraisers inability to estimate marbling.

Live-animal estimates of yield grades were correlated highly with percentage of actual cutability ($r = -.81$). Similar high correlations were found between live-animal estimates of linear carcass measurements, fat thickness and ribeye area. This correlation indicates that appraisers should be able to reasonably estimate carcass cutability of a heterogeneous group of cattle based on live-animal evaluations.

Prediction of carcass characteristics by slaughter steer traits of a heterogeneous population - Table 9 presents prediction equations written to determine the value of slaughter steer traits in predicting carcass characteristics.

Slaughter steer grades accounted for 13% of the variation in carcass quality grades. The only live-animal trait which would make any contribution to an equation including slaughter steer grades was estimates of fat thickness; however, this improvement was small and the practical importance questionable.

Live-animal estimates of yield grade accounted for 65% of the variation in carcass cutability. This degree of success would be considered high. Live-animal estimates of yield grades should be useful in market slaughter steer populations consisting of diverse breeds or crosses and fed for different lengths of time.

Live-animal traits were used to develop an equation for predicting carcass cutability. Each trait entered was found to be important to the accuracy of the equation. However, the 4% improvement in the accuracy of the equation over estimates of yield grade alone is relatively small for field purposes.

Correlations between live-animal slaughter steer traits of a homogeneous population with carcass traits - Correlations between live-animal traits and carcass characteristics within a breed type and management system were generally low to moderate. Estimates of fat thickness and slaughter steer grades appear to be most highly correlated with quality grades (table 10). This is also true of marbling scores.

Linear estimates of fat thickness and ribeye area were moderately associated with carcass measurements. Live-animal estimates of percentage of

heart, kidney and pelvic fat were not highly correlated with carcass estimates (r = 0.26). The live-animal trait most highly associated with carcass cutability was yield grade (r = -.61).

Prediction equations of carcass characteristics by slaughter steer traits of a homogeneous population - Slaughter steer live-animal estimates of quality grades only accounted for 5% of the variation in carcass quality grades (table 11). The addition of fat thickness increased the accountable variation to 7%. This percentage of variation accounted for would be considered very low and of little value in predicting carcass quality.

Live-animal estimates of yield grade accounted for 37% of the variation in carcass cutability. Development of an equation using multiple live-animal traits increased the variation accounted for in carcass cutability to 44%. The use of yield grades in a homogeneous population, consisting of animals of the same breed, fed and managed alike, would be of low to moderate value in predicting carcass composition.

Genetic correlations and heritability were not estimated in this study. If genetic correlations are of the same magnitude as phenotypic correlations it does appear that improvement from selection based on live-animal appraisal would be as rapid as improvement from selection based on progeny testing and direct measure of carcass traits. Although progeny testing is more accurate, improvement is slow because of reduced intensity or the small proportion of bulls progeny tested and a long generation interval.

Comparisons of correlations between slaughter steer traits with carcass characteristics of the two populations - Table 12 combines the two correlation tables of the two populations for slaughter steer and carcass traits. Similar to the feeder correlations, overall correlations are greater than within breed type correlations.

The degree of association between slaughter steer traits and carcass traits on a within basis is not reduced as much as it was with feeder calf traits. This indicates that within breed type animal to animal differences are greater at slaughter and the appraisers able to detect these differences more accurately.

It is interesting to note that within subclass correlations of live weight with quantitative carcass characteristic, percentage of actual cutability, increased. This increased association would indicate that live weight or carcass weight would be more valuable as a predictor of cutability within breed types than over all breed types.

Conclusions

1. Feeder calf performance or subsequent carcass merit cannot be predicted by visual appraisal.
2. Slaughter steer quality grades cannot be determined by visual appraisal.
3. Slaughter steer cutability can be determined with useful accuracy by visual appraisal in a heterogeneous group of cattle which vary widely in breed type.
4. Appraisers have more difficulty detecting animal differences at slaughter within a breed type managed under similar conditions.
5. It appears that genetic improvement based on visually appraised selection criteria will be slow.
6. Live-animal evaluation or appraisal of carcass composition, especially yield grade, should be useful in screening prospects for more accurate evaluation with progeny test.

Literature Cited

U.S.D.A. 1965a. Official United States standards for grades of feeder cattle. Title 7, Ch. I, Pt. 53, Sections 53.201, 53.207 and 53.208. March U.S.C. & M.S.

U.S.D.A. 1965b. Official United States standards for grades of carcass beef. Title 7, Ch. 1, Pt. 53, Sections 53.102 - 53.106. June. U.S.C. & M.S.

TABLE 1. MEANS AND INTRACLASS CORRELATIONS FOR ESTIMATES OF FEEDER CALF TRAITS BY APPRAISER MEANS

Trait	Mean[a]		Intraclass correlation
Feeder grade[b]	11.7	(Good$^-$=7 to Prime$^+$=15)	0.71
Disposition	1.9	(Gentle=1 to Wild=3)	0.55
Condition	6.6	(Thin=1 to Wasty=10)	0.51
Overall muscling	3.5	(Thick=1 to Thin=10)	0.74
Length of rump	5.0	(Long=1 to Short=10)	0.18
Size of bone	5.1	(Heavy=1 to Fine=10)	0.71
Width between legs	5.7	(Wide=1 to Narrow=10)	0.79
Growth potential	4.7	(Good=1 to Poor=10)	0.70
Hair coat	2.4	(Long=1 to Short=3)	0.36
Muscling of round	3.4	(Thick=1 to Thin=10)	0.76
Length of body	4.9	(Long=1 to Short=10)	0.59
Depth of body	4.9	(Deep=1 to Shallow=10)	0.63
Height	5.1	(Tall=1 to Short=10)	0.62
Trimness	5.0	(Trim=1 to Wasty=10)	0.62
Avg. daily gain birth to weaning, lb.	1.86		----
Weaning weight, lb.	476.3		----

[a]The mean of 3 judges evaluating 449 animals.

[b]Good = 7, 8, 9; Choice = 10, 11, 12; Prime = 13, 14, 15.

TABLE 2. CORRELATIONS OF A HETEROGENEOUS GROUP OF FEEDER CALF TRAITS WITH SELECTED GROWTH AND CARCASS CHARACTERISTICS

Carcass characteristics	Feeder Calf Traits												
	Feeder grade	Condition	Trim-ness	Muscle	Muscle round	Size bone	Daily[a] gain	Growth potent.	Length rump	Length	Depth	Height	Width legs
Cutability actual, %	0.36	-.30	-.45	-.29	-.35	-.22	-.02	-.31	-.34	-.33	0.50	-.24	-.19
Quality grade, U.S.D.A.	-.04	0.15	0.22	0.03	0.02	0.08	0.05	0.16	0.18	0.20	-.23	0.16	0.13
Carcass overall conformation	0.74	0.24	-.13	-.70	-.75	-.41	0.23	-.18	-.30	-.13	0.27	-.04	-.06
Feedlot gain	0.27	-.07	-.19	-.16	-.21	-.38	0.24	-.47	-.16	-.33	0.21	-.35	-.38

[a]Average daily gain from birth to weaning.

TABLE 3. PREDICTION EQUATIONS OF A HETEROGENEOUS GROUP OF FEEDER CALVES GROWTH AND CARCASS CHARACTERISTICS BY FEEDER CALF TRAITS

Dependent variable	R^2	Inter-cept	Regression coefficients[a] and trait
Cutability	0.13	44.43	+0.65 (Feeder grade)
actual, %	0.41	71.91	-0.88 (Rump length) -0.86 (Finish) -0.86 (Round muscling) -2.44 (Avg., B-W)[b] -0.70 (Growth potential) +0.76 (Height) -0.58 (Trimness)
Quality	0.00	10.64	-0.03 (Feeder grade)
grade	0.08	9.08	-0.30 (Depth) +0.33 (Rump length) +0.09 (Feeder grade)
Feedlot gain	0.24	3.13	-0.08 (Size of bone) -0.08 (Growth potential)

[a]Coefficients entered in order of importance to equation.

[b]Average daily gain from birth to weaning.

TABLE 4. CORRELATIONS OF A HOMOGENEOUS GROUP OF FEEDER CALF TRAITS WITH SELECTED GROWTH AND CARCASS CHARACTERISTICS[a]

Carcass characteristics	Feeder Calf Traits												
	Feeder grade	Condition	Trim-ness	Muscle	Muscle round	Size bone	Daily[b] gain	Growth potent.	Length rump	Length	Depth	Height	Width legs
Cutability actual, %	-.09	-.30	-.10	0.00	0.04	0.12	-.31	0.14	-.09	0.04	0.16	0.14	0.19
Quality grade, U.S.D.A.	0.03	0.11	0.11	0.00	-.05	0.03	0.10	0.04	0.07	0.06	-.09	0.04	0.02
Carcass overall conformation	0.36	0.26	0.08	-.43	-.42	-.03	0.10	0.07	-.08	0.05	-.08	0.14	0.08
Feedlot gain	0.04	-.04	-.05	0.04	0.02	-.09	0.19	-.30	0.00	-.24	0.02	-.28	-.29

[a]Within analysis is applicable in a population of cattle similar in management and biological type.

[b]Average daily gain from birth to weaning.

TABLE 5. PREDICTION EQUATIONS OF A HOMOGENEOUS GROUP OF FEEDER CALF GROWTH AND CARCASS CHARACTERISTICS BY FEEDER CALF TRAITS

Dependent variable	R^2	Inter-cept	Regression coefficients[a] and trait
Cutability	0.01	54.25	-0.19 (Feeder grade)
actual, %	0.16	62.77	-2.11 (Avg., B-W)[b] -0.74 (Condition) -0.54 (Overall muscling)
Quality	0.00	9.87	-0.04 (Feeder grade)
grade	0.01	9.27	+0.16 (Condition)
Feedlot	0.13	3.70	-0.04 (Growth potential) -0.09 (Overall muscling) -0.06 (Height)
gain			-0.04 (Condition)

[a]Coefficients entered in order of importance to equation.

[b]Average daily gain from birth to weaning.

TABLE 6. CORRELATIONS OF FEEDER CALF TRAITS WITH SELECTED GROWTH AND CARCASS CHARACTERISTICS

Carcass characteristics	Sub-class	Feeder Calf Traits												
		Feeder grade	Finish	Trim-ness	Muscle	Muscle round	Size bone	Daily[a] gain	Growth potent.	Length rump	Length	Depth	Height	Width legs
Cutability actual, %	Overall[b]	0.36	-.30	-.45	-.29	-.35	-.22	-.02	-.31	-.34	-.33	0.50	-.24	-.19
	Within[c]	-.09	-.30	-.10	0.00	0.04	0.12	-.31	0.14	-.09	0.04	0.16	0.14	0.19
Quality grade, U.S.D.A.	Overall	-.04	0.15	0.22	0.03	0.02	0.08	0.05	0.16	0.18	0.20	-.23	0.16	0.13
	Within	0.03	0.11	0.11	0.00	-.05	0.03	0.10	0.04	0.07	0.06	-.09	0.04	0.02
Carcass overall conformation	Overall	0.74	0.24	-.13	-.70	-.75	-.41	0.23	-.18	-.30	-.13	0.27	-.04	-.06
	Within	0.36	0.26	0.08	-.43	-.42	-.03	0.10	0.07	-.08	0.05	-.08	0.14	0.08
Feedlot gain	Overall	0.27	-.07	-.19	-.16	-.21	-.38	0.24	-.47	-.16	-.33	0.21	-.35	-.38
	Within	0.04	-.04	-.05	0.04	0.02	-.09	0.19	-.30	0.00	-.24	0.02	-.28	-.29

[a]Average daily gain from birth to weaning.

[b]Overall analysis is applicable in a population of cattle varying greatly in management and biological type.

[c]Within analysis is applicable in a population of cattle similar in management and biological type.

TABLE 7. MEANS AND INTRACLASS CORRELATIONS FOR ESTIMATES OF SLAUGHTER STEER TRAITS BY APPRAISER MEANS

Trait	Mean[a]		Intraclass correlation
Steer grade[b]	10.6	(Good$^-$=7 to Prime$^+$=15)	0.45
Yield grade	3.1		0.69
Fat thickness, in	0.5		0.70
REA, in^2	11.8		0.82
K, H & P fat, %	3.5		0.46
Conformation	12.2	(Good$^-$=7 to Prime$^+$=15)	0.66
Muscling score	3.3	(Thick=1 to Thin=10)	0.73
Size of bone	5.4	(Heavy=1 to Fine=10)	0.75
Length of rump	5.1	(Long=1 to Short=10)	0.03
Length of body	4.7	(Long=1 to Short=10)	0.57
Depth of body	4.6	(Deep=1 to Shallow=10)	0.47
Height	4.7	(Tall=1 to Short=10)	0.66
Width between legs	3.7	(Wide=1 to Narrow=10)	0.41
Trimness	4.6	(Trim=1 to Wasty=10)	0.54
Feedlot gain, lb/day	2.44		----
Live weight, lb	1059.5		----

[a]The mean of three judges evaluating 452 animals.

[b]Good = 7, 8, 9; Choice = 10, 11, 12; Prime = 13, 14, 15.

TABLE 8. CORRELATIONS OF A HETEROGENEOUS GROUP OF SLAUGHTER STEER TRAITS WITH SELECTED GROWTH AND CARCASS CHARACTERISTICS[a]

Carcass characteristics	Steer grade	Yield grade	Fat thick	REA	% K,H&P fat	Confor-mation	Muscle score	Bone size	Rump length	Body length	Body depth	Height	Width	Trim-ness	Live weight	Feedlot gain
Quality grade U.S.D.A.	0.35	0.32	0.32	-.08	0.25	-.02	0.06	0.02	0.11	0.24	-.28	0.19	-.11	0.30	0.06	-.03
Marbling	0.27	0.35	0.25	-.21	0.37	-.22	0.26	0.20	0.11	0.29	-.32	0.23	0.09	0.31	-.01	-.08
Cutability actual, %	-.57	-.81	-.69	0.40	-.70	0.40	-.51	-.29	-.17	-.48	0.61	-.39	-.16	-.74	-.06	0.13
Fat thickness, adj.	0.60	0.70	0.76	-.19	0.47	-.08	0.18	0.12	0.11	0.40	-.49	0.34	-.11	0.67	0.15	-.04
REA	0.00	-.33	-.12	0.67	-.27	0.42	-.44	-.36	-.12	-.43	-.03	-.44	-.44	-.22	0.57	0.34
K, H & P fat, %	0.15	0.35	0.13	-.19	0.58	-.48	0.52	0.39	0.08	0.09	-.41	0.01	0.30	0.30	0.12	-.18

[a]Overall analysis is applicable in a population of cattle varying greatly in management and biological type.

TABLE 9. PREDICTION EQUATIONS OF CARCASS CHARACTERISTICS BY SLAUGHTER STEER TRAITS OF A HETEROGENEOUS GROUP

Dependent variable	R^2	Inter-cept	Regression coefficients[a] and traits
Quality grade	0.13	5.50	+0.46 (Slaughter steer grade)
	0.14	6.16	+0.33 (Slaughter steer grade) +0.14 (Fat thickness)
% Actual cutability	0.65	65.56	-4.42 (Yield grade)
	0.69	63.77	-0.50 (Trimness) -1.24 (% K,H&P) -0.76 (Muscling score) -0.79 (Fat thickness) +0.22 (Size of bone)

[a]Coefficients entered in order of importance to equation.

TABLE 10. CORRELATIONS OF A HOMOGENEOUS GROUP OF SLAUGHTER STEER TRAITS WITH SELECTED GROWTH AND CARCASS CHARACTERISTICS[a]

Carcass characteristics	Steer grade	Yield grade	Fat thick	% REA	K,H&P fat	Confor-mation	Muscle score	Bone size	Rump length	Body length	Body depth	Height	Width	Trim-ness	Live weight	Feedlot gain
Quality grade U.S.D.A.	0.23	0.22	0.25	0.01	0.18	0.09	-.01	0.01	0.06	0.12	-.14	0.09	-.13	0.22	0.07	0.02
Marbling	0.18	0.17	0.18	-.03	0.14	0.04	0.02	0.03	0.04	0.15	-.12	0.10	-.04	0.14	0.04	0.05
Cutability actual, %	-.42	-.61	-.58	-.04	-.56	0.00	-.24	-.05	-.13	-.07	0.47	0.02	0.04	-.53	-.33	-.21
Fat thickness, adj.	0.41	0.57	0.59	0.10	0.51	0.12	0.08	0.02	0.00	0.06	-.35	-.03	-.14	0.51	0.33	0.24
REA	0.20	-.02	0.11	0.51	0.08	0.32	-.31	-.18	-.06	-.22	-.22	-.21	-.31	0.05	0.47	0.29
K, H & P fat, %	0.15	0.28	0.19	0.11	0.26	-.07	0.15	0.02	0.15	-.12	-.25	-.12	0.02	0.21	0.29	0.07

[a]Within analysis is applicable in a population of cattle similar in management and biological type.

TABLE 11. PREDICTION EQUATIONS OF CARCASS CHARACTERISTICS BY SLAUGHTER STEER TRAITS OF A HOMOGENEOUS GROUP

Dependent variable	R^2	Inter-cept	Regression coefficients[a] and traits
Quality grade	0.05	6.31	+0.38 (Slaughter steer grade)
	0.07	7.03	+0.21 (Fat thickness) +0.21 (Slaughter steer grade)
% Actual cutability	0.37	62.67	-3.48 (Yield grade)
	0.44	65.92	-0.56 (Fat thickness) -0.81 (Muscling score) -0.44 (Trimness) -0.0024 (Live weight) -1.15 (% K,H&P)

[a]Coefficients entered in order of importance to equation.

TABLE 12. CORRELATIONS OF SLAUGHTER STEER TRAITS WITH SELECTED GROWTH AND CARCASS CHARACTERISTICS

Carcass characteristics	Sub-class	Steer grade	Yield grade	Fat thick	% REA	K,H&P fat	Confor-mation	Muscle score	Bone size	Rump length	Body length	Body depth	Height	Width	Trim-ness	Live weight	Fdlt gain
Quality grade U.S.D.A.	Overall[a]	0.35	0.32	0.32	-.08	0.25	-.02	0.06	0.02	0.11	0.24	-.28	0.19	-.11	0.30	0.06	-.03
	Within[b]	0.23	0.22	0.25	0.01	0.18	0.09	-.01	0.01	0.06	0.12	-.14	0.09	-.13	0.22	0.07	0.02
Marbling	Overall	0.27	0.35	0.25	-.21	0.37	-.22	0.26	0.20	0.11	0.29	-.32	0.23	0.09	0.31	-.01	-.08
	Within	0.18	0.17	0.18	-.03	0.14	0.04	0.02	0.03	0.04	0.15	-.12	0.10	-.04	0.14	0.04	0.05
Cutability actual, %	Overall	-.57	-.81	-.69	0.40	-.70	0.40	-.51	-.29	-.17	-.48	0.61	-.39	-.16	-.74	-.06	0.13
	Within	-.42	-.61	-.58	-.04	-.56	0.00	-.24	-.05	-.13	-.07	0.47	0.02	0.04	-.53	-.33	-.21
Fat thickness, adj.	Overall	0.60	0.70	0.76	-.19	0.47	-.08	0.18	0.12	0.11	0.40	-.49	0.34	-.11	0.67	0.15	-.04
	Within	0.41	0.57	0.59	0.10	0.51	0.12	0.08	0.02	0.00	0.06	-.35	-.03	-.14	0.51	0.33	0.24
REA	Overall	0.00	-.33	-.12	0.67	-.27	0.42	-.44	-.36	-.12	-.43	-.03	-.44	-.44	-.22	0.57	0.34
	Within	0.20	-.02	0.11	0.51	0.08	0.32	-.31	-.18	-.06	-.22	-.22	-.21	-.31	0.05	0.47	0.29
K, H & P fat, %	Overall	0.15	0.35	0.13	-.19	0.58	-.48	0.52	0.39	0.08	0.09	-.41	0.01	0.30	0.30	0.12	-.18
	Within	0.15	0.28	0.19	0.11	0.26	-.07	0.15	0.02	0.15	-.12	-.25	-.12	0.02	0.21	0.29	0.07

[a]Overall analysis is applicable in a population of cattle varying greatly in management and biological type.

[b]Within analysis is applicable in a population of cattle similar in management and biological type.

THE VIRGINIA MODIFIED GRADING SYSTEM

A. L. Eller, Jr.
Extension Livestock Specialist
Virginia Polytechnic Institute & State University
Blacksburg, Virginia

It is indeed a pleasure and honor for me to be asked to appear on this panel dealing with the subject of Visual Evaluation of Cattle in Performance Programs. This has, perhaps, been the most cussed and discussed subject over the years since performance testing became accepted as a tool to beef cattle improvement. The subject of visual appraisal and performance records has a long and fiery history and we might say it has a real historical background and at times, people have become more than historical, they have become hysterical over the subject.

It does appear that visual appraisal has a very definite role to play in performance programs and I believe we are closer than we ever have been to coming up with a workable system that will be meaningful and useful to cattle breeders.

Any system that we work toward should meet the following criteria:

(1) Be descriptive and not comparative.
(2) Be tied closely to the commercial industry in the classifying of breeding cattle in such a way that it will tie into a meaningful classification system for feeder cattle, which should be based on categorizing cattle into homogenous outcome groups. The commercial industry right now is in need of leadership in arriving at a system for sorting and trading feeder cattle.

It appears to me that there are three measurable traits in beef cattle which have a basic relationship and all three may be used to describe the kind and potential breed value of the animal. These are:

(1) Weight
(2) Fatness
(3) Skeletal size

In analyses of data in which all three of these measures are available, it would appear that if we know two of these, we could quite accurately predict the third. In any event, two of these measures can be and must be in many instances assessed visually. They are fatness and skeletal size. We could actually assess muscling or fatness and in essence do the same job because they are basically inversed to one another if we hold weight constant.

The system of grading or scoring that we are presently using with our Virginia Beef Cattle Improvement Association Performance Testing Program, and have used for the past year, is as follows:

I. Conformation Score (type score or grade)
This is the conformation score that has been recommended by BIF and used widely throughout the industry, but it should be called a preference score rather than a conformation score because as our ideas change, cattle fitting the various scores are not the same. For instance, the cattle that were scored 15, 16, and 17 ten and fifteen years ago are quite different than those scored 15, 16, and 17 today. They will probably be different in the future. Thus, this system does not meet the criteria of being descriptive. It is a comparative system, but we still use it. We apply these scores as follows:

17, 16, and 15 - In general the cattle scoring in this range are the larger framed, thicker muscled, very correct cattle that have ideal composition of weight.

14, 13, and 12 - The cattle that fit this description as we apply it are the larger framed and/or thicker muscled cattle that are basically correct but are not quite as outstanding as the top group.

11, 10, and 9 - This category as we apply it are the average or below average framed cattle and/or the average or below average muscled cattle that may not be as correct but are basically sound. Cattle in this category generally do not have as desirable a composition of weight.

8, 7, and 6 - In this category we fit the smaller framed and/or thinner muscled cattle that are not generally as correct and may not be sound. Cattle in this category may have poor composition of weight.

5 - This score is reserved for very non-descript, common kinds of cattle.

4 - This score is reserved for double-muscled cattle.

3 - This score is for dwarfs.

This system is truly a preference score and tends to evaluate the whole animal and again it shifts with preference and industry demands as they change.

II. Condition Scores:

We are using a 17 high system to score condition as follows:

17, 16, and 15 - Extremely fat
14, 13, and 12 - Above average
11, 10, and 9 - Average
8, 7, and 6 - Below average
5, 4, and 3 - Extremely thin

Visually appraising condition score helps evaluate weight and size (composition). This is an eyeball measure and does not measure fatness per se, but is confounded with general conformation. It does help evaluate size and composition. On yearlings we prefer ultrasonically measured fat thickness which tends to evaluate fatness more accurately. We think that some form of visual appraisal as to condition or fatness is highly desirable in a set of performance records.

III. Frame Scores (body type):

We have found that we can be quite repeatable in visually appraising frame size or body type. The alternate to doing this by eye would be to measure height and/or length. The scoring system we are using is as follows:

1 - small, short in every dimension, and extremely early maturing.
2 - below average size and above average in maturity rate for the breed compared to the average of the breed.
3 - average for the breed
4 - above average in frame size and later maturing than average
5 - Very large and long in every dimension and the latest maturing category compared to the breed average.

This measure seems to be quite useful in characterizing kind and size and helps considerably in the description of the animal. The only question I have is regarding whether or not the 1 to 5 scale is sufficient. The real question is whether these scores should be based on the breed average or whether they should categorize cattle regardless of breed.

IV. Muscle Scores:

We have found muscle scores to be confounded with general conformation and fatness and we have not been as repeatable in scoring muscle thickness as we would like to be. We are scoring it as follows based on the breed average:

1 - Extremely thin muscled
2 - Below average of the breed
3 - Average for the breed
4 - Above average
5 - Extremely thick muscled but not double muscled

I think the usefulness in scoring muscling is simply to pick out the extremes.

V. Soundness Score:

We feel that this can be done and should be done in a simple manner and we are using a 1 to 3 scale where 1 is complete unsound for any reason; 2 is sound but has some fault or faults insofar as correctness is concerned which might be crooked leggedness, humpbacked or many other deviations from ideal; 3 is sound. We think soundness score on a simple basis such as what we are using is all that is necessary and is helpful in a set of records as far as determining the value of animals.

Again I would stress that we need to use visual evaluation to describe animals not to compare them. The system we use should tend to evaluate or classify animals insofar as kind and not compare kinds of animals.

The same kind of animal is not right for all segments of the industry as has been brought up many times in this meeting already. High producing animals come in several different kinds of packages, so we want to be careful

not to stereotype one particular kind and call it ideal at the expense of all others. We have made this mistake many times before in the beef cattle industry. We really need to be able to, through our testing procedures and visual and other evaluations, predict weight at a common physiological or fatness end point. This would be particularly useful in testing bulls. We need also to pick out differences in composition by properly scoring fatness and/or muscling.

Again I stress that whatever system we elect to use should be quite simple and should be correlated to the needs and usefulness in the commercial industry.

We need to measure as many traits objectively as we possibly can. We should learn from these objective measurements how to more accurately score cattle visually since visual evaluation will be used to a large extent.

The system that BIF recommends ultimately should be one that can be easily taught to the cattle breeder and will need to be very simple and tied to traits which are measurable and which we can score with a high degree of repeatability.

I am not making the claim that our Virginia system is ideal at all. I will say this, however, that our breeders for the first time since we started with performance testing have found these descriptive scores quite useful and we find that we can communicate together very readily about these scores whereas the old conformation score was extremely difficult to communicate about because it was not at all descriptive but simply reflected someone's preference.

Thank you very much.

BEEF CATTLE EVALUATION SYSTEMS - A CALIFORNIA STUDY

Kenneth W. Ellis, Extension Animal Scientist
University of California

Evaluating beef cattle for conformation and for certain physical traits has occupied and continues to require considerable time and effort as well as generate much discussion. Many have come to question the desirability of attempting to evaluate live animals by using a composite score. Some feel that utilization of an evaluation system based on certain physical traits would be more beneficial and useful.

In California three types of scoring systems are used. Many people still use the old University of California scores based on the broad 1-, 2+, 2 and 2- categories. Others rely on the more recent numerical ranking based on 100 as perfect--many cattle fall into the 85-95 range. The BIF system is practically the same but substitutes a different number range, 12, 13, 14, etc.

The third system we are beginning to use is the physical traits method of evaluation. Many feel this is a more meaningful way to look at beef cattle.

We are faced with a number of questions about the real value of what we are doing in using any of the above evaluation systems in providing real and useful analyses of how a beef animal will develop and what relationship such grading has on the traits that are economically important.

The first question is whether two or more people can use the physical traits system with any degree of correlation between individuals.

The second question concerns correlation of physical traits score between weaning and yearling.

The third question is - when is the best time to score for physical traits--weaning or yearling age.

For this study a livestock specialist and three farm advisors evaluated more than 100 bulls at weaning and again at yearling age. Data collected with this group of "graders" indicate fairly good correlations between the individuals when using the UC number grades or the BIF scores. A different picture emerged when using the physical traits system. This indicated that the system is useable but training of the graders and probably experience is needed.

All correlations between physical traits were positive and significant. The correlations between the same physical traits at weaning and yearling age were positive but low. This indicates that scoring for physical traits at weaning time may not be justified and the system could best be used at yearling age.

The data in this study show also that the 205-day weight is the most useful weaning statistic in predicting what the animal will be like at yearling age. It was more highly correlated to the BIF yearling score than was the weaning BIF score.

Postweaning average daily gain was not significantly correlated with any weaning trait in this study except the weaning size of frame (.33).

The physical trait most useful at weaning appeared to be the size of frame score. This trait was more closely correlated to all yearling growth traits than any other subjective measure.

CONCLUSIONS - Physical Traits System

The Physical Traits System can be used. Training of graders and probably experience will be necessary.

1. Correlations between different physical traits were positive and significant - but they were low.

2. Coefficients of determination ranged from .03 to .49.

3. We conclude that there is fairly good independence of traits.

4. Correlations between the same physical traits at weaning and yearling are too low to justify physical traits grading at weaning.

5. The system can be used at yearling age.

6. 205-day weight is the most useful weaning statistic to tell us what the animal will be like at yearling age. It is more highly correlated with yearling BIF score than is the weaning BIF score.

7. Postweaning ADG is not significantly correlated with any weaning trait.

8. Necessary to see both 205-day weight and postweaning ADG data in records.

Table 1. CORRELATIONS BETWEEN GRADERS FOR:

CONFORMATION SCORES - WEANING

Grader	van Riet	Helphinstine	Moore	Consensus
Elings	.84	.87	.90	.97
van Riet		.85	.82	.92
Helphinstine			.88	.95
Moore				.96

CONFORMATION SCORES - YEARLING

Grader	van Riet	Helphinstine	Consensus
Elings	.88	.93	.93
van Riet		.87	.91
Helphinstine			.97

Table 2. PHYSICAL TRAIT CORRELATIONS - WEANING

TRAIT	C.S.	Waste	Muscle	Size	Soundness	Sex Ch.
205-day weight	.42*	-.06	.33*	.34*	.23*	.32*
Conf. scores		.29*	.74*	.58*	.62*	.74*
Waste scores			.19*	.37*	.23*	.29*
Muscling scores				.42*	.56*	.70*
Size scores					.49*	.57*
Soundness scores						.59*

*P<.05 165 observations; consensus scores

Table 3. PHYSICAL TRAIT CORRELATIONS - YEARLING

TRAIT	C.S.	Waste	Muscle	Size	Soundness	Sex Ch.
550-day weight	.59*	.11	.44*	.57*	.26*	.44*
Conf. scores		.47*	.70*	.74*	.58*	.65*
Waste scores			.26*	.49*	.44*	.29*
Muscling scores				.44*	.51*	.62*
Size scores					.29*	.45*
Soundness scores						.52*

*P<.05 111 observations; consensus scores

Table 4. CORRELATIONS BETWEEN GRADERS

TRAIT	RANGE
Conformation - Weaning	.82 - .97
Conformation - Yearling	.87 - .97
Waste - Weaning	.38 - .83
Waste - Yearling	.29 - .87
Muscling - Weaning	.60 - .92
Muscling - Yearling	.56 - .86
Size of Frame - Weaning	.73 - .93
Size of Frame - Yearling	.62 - .92
Structural Soundness - Weaning	.45 - .91
Structural Soundness - Yearling	.33 - .85
Breed & Sex Character - Weaning	.59 - .89
Breed & Sex Character - Yearling	.34 - .85

Table 5. CORRELATIONS BETWEEN WEANING & YEARLING

TRAIT	r	r^2
Waste	.44*	.19
Muscling	.23*	.05
Size of Frame	.45*	.20
Structural Soundness	.21	.04
Sex Character	.35*	.12
Conformation (BIF)	.32*	.10
Weaning weight & Yearling weight	.68*	.46
Weaning WDA & Yearling WDA	.71*	.50
205-day WDA & 550 WDA	.80*	.64
205-day weight & 550-day weight	.72*	.52
205-day weight & 550-day WDA	.82*	.67
205-day weight & Yearling Conf. score	.35*	.12

* $P<.05$

PROPOSED LIVE ANIMAL SCORING SYSTEM

by
A. C. Linton, Chairman
BIF Subcommittee on Live Animal Evaluation

One of the principle objectives of BIF has been to investigate and to encourage implementation of those techniques of beef cattle evaluation which when correctly applied will result in maximum progress for those traits of direct importance to profitable beef production.

Progress in beef cattle breeding can only result from a logical, scientifically sound selection program. In designing such a selection program three important facts must be taken into consideration.

1. Selection must be accurate.

2. Selection must be for heritable traits.

3. Selection must be for traits that are of economic value.

Let's consider each of these facts in relation to the current system of live animal evaluation recommended by BIF.

1. Selection must be accurate.

This can be interpreted to mean that selection must be based upon traits that can be objectively evaluated. Obviously, weight is a perfect example of an objective measure, but this can also be applied to live visual evaluation if, indeed, the appraisal is based upon some distinct anatomical features of the beast. When evaluation is performed with this basis we find that we are dealing with a reasonably repeatable trait within and between observers, so the accuracy of selection is considerably enhanced.

In that light I would like to read to you a section from the current Guidelines for Uniform Beef Improvement Programs. This is the description of breeding cattle in the conformation scores of 12, 13 and 14.

"Cattle eligible to receive these scores have no more than moderate faults in their muscular and skeletal structure. Their muscular development is usually less than outstanding but is average to superior. Skeletal structure is basically sound. Cattle in this category should include a relatively high percentage of the animals in the better purebred herds.

The top end of this series represents the lowest end of herd bull prospects and the top end of commercial bulls from a conformation standpoint. The top end of this series describes superior female replacements for purebred herds, the middle of this series describes good female replacements, while the bottom end describes the females that are no more than satisfactory as replacements in purebred herds. The score of 14 describes superior commercial bulls; 13 describes good commercial bulls; and 12 describes satisfactory commercial bulls from a conformation standpoint. The top end of this series represents the practical top of commercial cattle. The lower end of this series includes a reasonably high percentage of the better commercial replacements."

I think you will agree that this description is very general and rather vague. It is certainly no surprise that a subjective method such as this suffers from the problem of low repeatabilities. Another problem facing this type of a system is that what is defined as "beef character" or "basically ideal conformation" has been altered rather dramatically over the past ten or fifteen years. Who is to say how these terms will be defined in another decade as the demands of our industry continue to evolve?

2. Selection must be for heritable traits.

As we have already heard on this afternoon's program, the heritability value for the traditional conformation score is considered moderate at best. Most estimates of the heritability of conformation score will run in the neighborhood of twenty-five percent.

Again this problem can be attributed to the subjectivity of the conformation score. When one considers the variability of the cattle within a specific conformation score, it is hardly surprising that this heritability is low.

3. The selection must be for traits that are of economic value.

The importance, economically, of the conformation score is quite different for registered and commercial cattle. For commercial cattle the correlation between conformation score and net return is very low. While it is slightly higher for purebred cattle, it is only moderately related to net profit.

The problem with the conventional scoring system is that each overall grade assigned to a calf must be a combination of all traits considered and therefore, no real description or evaluation of the calf is possible. One calf may score 15 because of excellence in one trait while another receives a 15 because he excells in another area. Obviously, if these two calves are grouped together, they are not alike, so our conventional composite grading system has failed in it's task of evaluation.

A COMPONENT SYSTEM

An alternative system which eliminates many of the afore mentioned problems is a component system based upon the major tissues of the animals body. This system is designed to describe individuals rather than to score them for total merit. This gives it a distinct advantage in communication either from one individual to another or from the human to a computer memory and back.

Specifically, this committee recommends that the component scoring system include evaluation for the following four traits:

1. Trimness or freedom from waste
2. Muscling
3. Size of frame
4. Structural soundness

Because specific reference points are used in evaluating cattle for these four traits, the evaluation is much more objective. Consequently the repeatability and heritability estimates are considerably more favorable.

This system requires a basic understanding of bovine anatomy. Cattle are composed of essentially three major tissures - bone, muscle and fat. The shape of the skeleton and the percent of the carcass comprised by bone varies little (12 to 14%). While the proportion of fat and muscle in the carcass do vary considerably, the location of each tissue in the animal is very systematic and predictable. Muscles are

attached to the skeleton at the same points and in the same relation to each other in all cattle. Similarly, fat is deposited on the skeleton and musculartur in certain definite areas.

With this in mind and before discussing the advantages of the system in general, let's describe each of the traits in the component system.

1. Trimness or freedom from waste

Freedom from waste, particularly in weanling age cattle, does not necessarily measure how fat the cattle are at the time of scoring but rather how fat they will be after a normal feeding period or if fed to normal slaughter weights.

Handling cattle over the point of the shoulder, over the ribs and along the top of the backbone gives a good measure of fatness as the animals have no muscle in these areas. Obviously it is not often possible to handle cattle, so scoring must be done by visually appraising those areas where only fat is deposited.

Scoring this trait visually can be done by viewing the area of the brisket and dewlap, the fore and rear flanks and the twist. Cattle with loose hide in these areas and in the navel and sheath are predisposed to waste and should be scored lower for this trait.

2. Muscling

Scoring of cattle for muscle is based upon the same principle as that used for waste. Simply look at a place on the skeleton where there is only muscle on the skeleton. This is possible because the correlation between the weight of a single muscle or group of muscles with the total muscle in a carcass is on the order of .95 to .98.

Scoring for muscle can be done by looking over the arm, forarm, gaskin and stifle from a side view. From the rear, muscle is evidenced by a wide stance and by thickness through the stifle region. Watch the animal walk - muscles work as the animal moves, fat doesn't.

3. Size of frame

This trait simply involves a visual appraisal of the length of the long bones. In cattle, length and heighth vary proportionately, so one should examine the readily visual skeletal parts such as the cannon bones. Another location which can be observed for this purpose is the length of the neck.

4. Structural Soundness

Longevity is important in commercial production as it affects the number of replacements which must be kept to maintain herd size. Correct structure is a must if cows and bulls are to have a long, productive life.

Structural soundness generally refers to the structure of the feet and legs. Size and shape of the hoof should be evaluated as should the joints in the limbs. Set to the leg and angle of the hock are also important in evaluating soundness.

How does such a scoring system measure up on the three previously mentioned criteria of accuracy of measurement, high heritability and economic importance? First, because the component system is based upon skeletal reference points, it is a more objective means of evaluation leading to a greater agreement among scores and greater accuracy.

The heritability estimates of weaning scores based upon a half sib analysis of nearly 1,000 records are as follows:

Freedom from waste	.85
Muscling	.48
Frame	.69
Soundness	.14

In general, these are twice as high as the heritability of composite scores.

While a detailed correlation study has yet to be completed between these scores and those traits of economic importance to production, there appears to be a relationship between the trimness and muscle scores and the cutability of the carcass produced. Likewise, frame is associated with subsequent growth.

It is the recommendation of this subcommittee that a composit scoring system be adapted as the approved method of live animal evaluation by Beef Improvement Federation. We further recommend that the four traits evaluated in this system be:

1. trimness or freedom from waste
2. muscle
3. frame
4. structural soundness

and that they be recorded in that order. Each trait is to be recorded on a numerical score of at least 1-5 and not to exceed 1-9, with the high number representing greater desirability or a greater degree of expression for the trait. This nine point range provides flexibility in scoring, yet still requires only one digit for reporting and computer storage.

WHY WORK TOGETHER?

Bernard Jones
Curtiss Breeding Service

The Beef Improvement Federation has made tremendous progress in establishing uniform procedures for measuring and recording performance data on beef cattle. New programs have been developed for use by member organizations such as the National Sire Evaluation Program and the USDA's Carcass Evaluation Service. The BIF leadership has helped develop cooperation among all segments of the beef industry in standardizing performance records. During the past two years, BIF's educational programs have been very effective and have helped develop increased confidence in performance testing programs.

The utilization of uniform programs as recommended by BIF has been very good in most areas, but definitely needs more cooperation from member organizations in a few areas. The Farm and Ranch Pre-weaning and Post-weaning Testing Programs, Beef Carcass Evaluation Programs and National Sire Evaluation Programs have been well accepted by practically all member organizations. These programs are being utilized by individual organizations with amazing uniformity. A breeder in one state can now evaluate performance records from almost any other state. The use of standard terminology such as 205 day adjusted weaning weight, weaning weight ratio, 365 day adjusted weight, yearling weight ratio and most probable producing ability (MPPA) has made this possible. Breed associations have helped make these terms known to all breeders by adopting and implementing BIF programs. Most breed associations have adopted BIF's National Sire Evaluation Program and many beef breeders are already familiar with such terms as reference sires and expected progeny differences. This is very encouraging since the National Sire Evaluation Program was only adopted in April, 1971.

One of the BIF programs which has not been widely accepted is the measurements recommended by BIF for all Central Test Stations. There are approximately 80 Central Test Stations in the U.S. with only 10% of these stations measuring the traits recommended by BIF. One of the traits most frequently omitted is the 365 day adjusted weight and the 365 day adjusted weight ratio. This information is very important to breeders purchasing beef bulls as future herd sires and Central Test Stations is one of the best sources for selecting a herd sire. (Of the bulls Curtiss has purchased at Central Test Stations during the past four years, 86% were purchased from Central Test Stations reporting 365 day adjusted weight and ratio. The purchase price on these bulls was three times as much as the price paid for bulls purchased at Central Test Stations not reporting this information.)

Another BIF program which needs more support is advertising performance and progeny data. One of the keys to the success in the Dairy Industry has been uniformity in Dairy records. The Beef Improvement Federation needs to improve their format for advertising performance and progeny data. This format should be simple and concise.

Performance programs must be utilized by beef breeders before the beef industry can make the desired genetic change. Organizations within BIF must adopt the BIF programs and encourage their breeders to utilize the benefits of these programs. Uniformity in our current programs has been largely responsible for the progress made to date. Working together as member organizations, the current programs can be utilized more effectively and new programs adopted. Only through cooperation can we achieve maximum utilization of performance programs which will result in genetic improvement for individual beef breeders and the beef industry.

A BANKER LOOKS AT PERFORMANCE PROGRAMS

Frank J. Sibert, Vice President
Northwestern National Bank, Omaha

I want to thank you for inviting me to appear on your program and develop the assigned topic "A Banker Takes a Look at Performance Programs."

As you can imagine, we in the banking business are extremely interested in the success and prosperity of our customers.

The ability of a borrower to take capital, put it to use in his business and reap a higher percentage of return on the capital than he is paying is the way that we in the lending business build customer relationships, deposits and those many other things that go for the making of a successful bank and a successful banker.

How goes our customer's business - so goes the bank, is pretty much true in all aspects of banking.

This is the reason that we in the banking business are so interested in what is happening in all fields of endeavor.

Those of us who are involved in financing agriculture, and particularly the livestock industry, are especially interested in what's happening in all phases of the livestock business.

As I am sure you are all aware, there are many changes taking place in all segments of the livestock industry from the retailer right down to the rancher.

Today I'm going to limit most of my remarks to the cattle breeder.

I'm sure that you are all aware of the many unanswered questions in the field of cattle breeding.

We do not have all the answers and we do not have the answers to some very important questions which may have long lasting affects on the total industry. The affects on the total industry, of course, will filter down to individual ranchers, some of them of which are my customers.

This is why I think it might be of interest to you to have an outsider such as myself stand back and take a look at performance programs from the overall view point rather than look at it piece meal as I am afraid so many people in the industry are doing today.

We at our bank have an opportunity to visit with customers who are supermarket operators, wholesalers, packers, feeders and ranchers. This is why I think that we can take an objective look at the total picture. In my way of thinking, those of you who are involved in beef improvement have to keep in mind the ultimate goal of the industry. The ultimate goal of the beef cattle industry, of course, is providing a product for the consumers of this country and other countries throughout the world. How to get the job done and how effectively we get the job done in my estimation is what beef improvement is all about.

Well, let's take a look at some specific things that everyone is talking about in the beef improvement field.

To some people beef improvement means weaning heavier calves. This is being done through the use of production testing, through the use of superior sires, through the use of crossbreeding, through the use of creep feeding, through the use of scale juggling and other ways.

Heavier calves are important and, particularly, they are important to the rancher who is in the business of producing and selling calves.

What about the rancher though that thinks that weaning heavier calves is the only thing that there is to beef improvement. He then goes out and buys a big bull who throws large calves, too big for his heifers and he loses half of the calves plus a number of the heifers. From the banker's viewpoint, he has entered into the wrong performance program. This type of performance is not the type of performance that will pay off the loan.

Total pounds of calves weaned out of a given cow herd is what a rancher should be looking for in my estimation and not just looking at one thing - heavier calves. Heavier calves at weaning are desirable, no doubt about it, but it certainly isn't the only thing that a rancher can look at as far as improved performance in his total breeding program is concerned.

Let's take a look at crossbreeding. To some cattlemen crossbreeding is his thing. He feels that if he is crossing this is the only performance program he needs. I'll have to admit that I am a strong advocate of crossbreeding and in most instances, crossbreds in the feedlot do an extremely good job.

I have known, however, some crosses under certain management conditions that do not get the job done in the feedlot and apparently do not get the job done over the block. These are the things that we have to be aware of in our breeding programs if we are to succeed.

We must keep in mind that the rancher's customer is the cattle feeder, we must keep in mind that the cattle feeder's customer is the packer and that ultimately the customer for the product is the consumer.

If the animals we're producing do not measure up, some place along the line we are going to be in trouble.

Case In Point - I had a customer who bought some exotic cross, rough, heavy yearling steers. He put them on feed in his feed and when they were finished they didn't yield and they didn't grade.

The result was that he had to take a considerable discount and the sale price and the overall profit picture was not good. The profitability of some straightbred cattle that he had in the same lot handled the same way was much better than the crossbreds.

This bears out to me at least that the producer of those steers was using the wrong performance program.

Another thing that I think we should think about in regard to cross-breeding is that I'm not sure that anyone fully understands the exact program and procedure that we need to follow in a crossbreeding program to get the maximum production.

We need additional information and better guidelines on how to get the job done.

A rancher who has spent his lifetime developing a quality outstanding reputation herd should move cautiously.

One wrong move could set his life's work back many years. This could be disasterous for him and for his banker.

We need more information as to the direction to take in getting the ultimate production and performance in our crossbreeding programs.

It is my opinion that crossing a small elephant on a jersey cow is not the proper performance program to follow.

You'd be surprised, however, the number of people, many of whom who have not had a great deal of experience in the cow business, think that this is the way to go.

From the standpoint of a banker, if you are using a crossbreeding program you've got to handle it in a way that you are producing cattle that will gain, will sell and will return the maximum in dollars and profits for your efforts.

You need these profits to pay off your loan at the bank, to pay for the day-to-day operation of the ranch, to pay off the mortgage on the land, to buy mom some new curtains and keep shoes on the kids.

Let's take a look for a minute at artificial insemination - to some ranchers this is the ultimate in introducing a performance program into the herd.

Through AI you have access to the best bulls money can buy and I'll have to agree that it is an extremely useful practice in herd improvement.

However, if I have a customer in the cattle business who is not a good cow man, who I know will have difficulty in detecting cows when they come into heat that has not or cannot develop his techniques to the point where he can get the cows settled and I know he's going to wind up with a short calf crop, then I know that artificial insemination is not going to get the job done for him.

I guess what I'm trying to say is that some things will work for some people, some things will not work for them, and it is very important that a cattleman who is a little skinny financially, one who is not knowledge-able in all facets of performance production, one that just cannot afford to make a big mistake, it is very important that he move with caution and that he does things within the scope of his ability and knowledge.

He should not get involved in practices that he cannot handle and that will be detrimental to the profit picture of his ranching operation.

Some ranchers have the idea that a good performance program is the production testing of their cows.

I'm not opposed to production testing and I do think it will improve the performance of a given cow herd if it's handled properly.

The problem is if this particular rancher isn't willing to go out and find top production tested bulls and pay for them, bulls that will work improvements as the years go by, then he is just spinning his wheels.

I kinda feel that a commercial cow man might do better to put his emphasis on the selection of performance tested bulls and work improvement in his cow herd through the sires rather than spending the time, the money, the energy and the expense in carrying on a complete production testing program on his females.

When you weigh calves at birth, weigh them again at weaning and keep a complete set of records on a cow herd and their offspring, it takes considerable time and effort.

Some ranches are not cut out to put forth this time and effort and do the book work involved.

For these individuals that are not willing or not able for some reason to do a top notch job in their production testing program, it would be my suggestion that their performance program be through the selection of their bull batteries and that they place their emphasis in this direction.

The big problem, of course, is to find breeding stock with an adequate set of records in order that the commercial cattleman can in fact select bulls that will work an improvement his herd.

This is the area where we need more cooperation and a lot harder work on the part of registered cattle breeders.

I really think that before we can get large scale improvement in the total cow herd in the United States, it will be necessary for this improvement to come from the bulls that are produced by the breeders.

If they can't or won't do the things that it takes to improve the performance of the cattle that they are breeding and selling to commercial cattlemen, then I don't think we will see the performance improvements that we're going to need to keep pace with the competitive foods.

There are many things that are important in the performance of beef cattle other than their ability to gain so many pounds a day, their birth weight, their weaning weight, their color, etc.

We should keep in mind as I stated at the beginning of my presentation, that ultimately we are producing a product for the consumer.

Before this product gets to the consumer it has to go through numerous channels.

All of the things that we talk about in performance in cattle are important but no one single thing is the most important or is there any single one thing that a cattle breeder can think about in his performance program to get the total job done and still pay the debts.

It's necessary that we be profit oriented in our ranching enterprises and that we devote our time and energy to getting the maximum profits out of what we are doing.

Let's concentrate a few moments on some things that are extremely important to the banker when he is financing a cattle operation.

If a man is in the cow business it is important that the cows have calves.

To me the percentage calf crop weaned is of significant importance and may be of more importance than the weaning weight of the calves.

The total pounds of calves produced in a given herd times the price received is the thing that most bankers are interested in.

This is the thing that pays the mortgage, pays the interest, pays the bills and keeps the enterprise on a solid financial footing year after year.

If you are operating a feedlot the efficiency of gain is important, the pounds per day that the cattle gain is important, the feed conversion is important, but really the most important thing is this -

If you buy a pen of cattle, put them on feed in your feedlot and sell them to the packer-buyer the most important thing is the last figure that you see in a closeout sheet on a pen of cattle and that is the dollars in profit that the cattle have made.

This is what you buy new equipment with -
Take vacations on -
Build new houses with -
Buy colored TV sets with -

And all those other things that even people in the cattle business are interested in doing.

When the packer buys a pen of cattle from a feedlot operator he is interested in how the cattle yield and how the cattle grade. He is interested in buying a steer that will hang up a carcass that is not too wasty. He is interested in that steer producing a carcass that he can sell to the wholesaler or retailer at the highest possible price.

The retailer is interested in buying a carcass that will cut out a high percentage of red meat that he can sell to the consumer at the highest possible price.

The consumer is interested in buying beef that is tender, juicy, beef that has a good flavor, beef that she can feed to her hungry family with a minimum amount of work and expense.

A total performance program should take into consideration all facets of the cattle business.

One segment of the industry is directly dependent on the other segment in reaching the optimum goal of providing good nutritious beef for a growing beef hungry nation.

We in the banking business look at performance programs as they affect the total picture and as they affect the profitability of each of the various segments of the industry.

Loans are paid from profits -
Interest is paid from profits -
Bank deposits are built from profits -

And long-time satisfied loyal bank customers are made over the years by enterprises that are profitable.

The profit motive has long been the backbone of the free enterprise system.

We in America have been and still are and will always, I hope, be profit motivated.

Whether you're breeding exotics, whether you're production testing, whether you're crossing, producing straightbreds, whether you use high priced bulls, performance tested bulls or no bulls, if in the final analysis you're making a satisfactory return on your investment and are running a profitable business, then the performance program that you are using is working for you. If your business is making money and you are keeping in mind all segments of the industry then the performance program that you are using in your herd is working.

The result will be a happy wife -

A happy banker -

And the realization that you are doing a good job in your chosen field. After all, what more is there?

Thank you for your attention. You have been a very attentive audience. I have enjoyed being here and I want to thank you for being such a fine group to talk to.

1972 BIF COMMITTEES

Record Utilization	SUBCOMMITTEE: Commercial Performance Testing Pgms	Farm & Ranch Post and Preweaning Testing Pgms	Performance Pedigree	Merchandising Performance Testing	Carcass Evaluation	SUBCOMMITTEE: Carcass Data Service	Central Test Stations	Reproduction	Sire Evaluation
Willham Chmn	Maddox Chmn	Meyer Chmn	C. Burch Chmn	Patton Chmn	Chesnut Chmn	B. Eller Chmn	Rankin Chmn	Bennett Chmn	Warwick Chmn
Gosey Secy	Cook Secy	Cundiff Secy	Zoellner Secy	deBaca Secy	Schoonover Secy	Frischknecht Secy	Christians Secy	A. Eller Secy	G. Butts
Anderson	W. Butts	R. Arthaud	Acord	Bassford	V. Arthaud	F. Baker	Chapman	Barten-slager	F. Francis
Ascherman	Herman	T. Burch	Farham	Cooper	F. Baker	French	Corbin	Brinks	B. Jones
W. Butts	Maples	G. Butts	Francis	Flint	Bradford	Keating	Delaney	R. Koch	Miller
Cook	Richey	Crandall	Gray	Graham	B. Eller	Leverete	Gillooly	Dickerson	Tom
Ellis		Durfey	Ludwig	Hammond	Epley	Maddux	Glenn	Felts	Willham
Gibbs		Fitzhugh	Matthiessen	Iverson	Forrest	Swaffar	Hatch	Laster	Vaniman
H. Gregory		W. Forbes	D. Nichols	C. Koch	French	Wharton	Hemming-sen	Riu	Ludwig
Haugse		Harmon	Patterson	Lamont	Frisch-knecht	Cross	Morgan	Singleton	
Herman		Heeney	Severin	Lilley	Johnson		C.Nichols	Sullivan	
Maddox		Jorgensen	Vaniman	Nixon	Keating		Nordhouse	Woodward	
Maples		Kirkeide	Vantrease	Noller	Kimble				
Nelson		Lindblom	APHA Rep.	Ricklefs	Leverete		Schmidt		
Nolan		Linton	(Allen)	Ross	Maddux		Sierks		
B. Pope		Massey		Spader	Mohler				
Reese		McReynolds		Vanderkolk	Orts		Sumption		
Richey		Messersmith		Westmeyer	Sutton		Wallace		
Todd		Mitteness		Wolf	Swaffar		Yarbro		
AICA Rep. (Northcutt)		Rhodes			Tuma				
		Stuart			VanStavern				
		Ricketts			Wharton				

REPORT OF RECORD UTILIZATION COMMITTEE

R. L. Willham, Chairman

The charge is to develop utilization of performance records in the beef industry. Records must be used to return value. The steps chosen to accomplish the charge are as follows:

1. Develop guidelines for performance programs offered to the beef industry by BIF member organizations.
2. Develop means to promote the enrollment and participation of cattlemen in performance programs.
3. Develop pamphlets and brochures on performance record use for all segments of the beef industry.
4. Promote record utilization throughout the beef industry using educational material and the news media.

All steps have been worked on by the Committee. This report, the third for the Committee, will deal first with development to date and then consider new development.

Development to Date

Guidelines for a complete breeding stock performance program are now a part of the second edition of GUIDELINES FOR UNIFORM BEEF IMPROVEMENT PROGRAMS. Numerous national performance programs have undergone extensive revision in the last year. The general trend has been to introduce breeding reports into the programs. This includes provisions to accumulate data on cow weights and calving scores. The AHIR, AHA, and APHA programs now include such reports. CHIP and ASA initially had these as does PRI. Several national programs have incorporated the estimation of breeding values into their programs. The AHIR program is operational while the AHA, RA, APHA, and several others are developing the procedure.

Several pieces of literature have been developed over the past year. The guidelines for commercial beef cattle producers have been written by L. A. Maddox, Jr. These will be discussed for inclusion in the next BIF guidelines edition. After completing the guidelines, a simple program for production and quality controls for large ranches was written by L. A. Maddox, Jr. Plans are to develop this program in Texas. This program was written up in the Proceedings of the Beef Improvement Federation Eastern Regional Conference.

In the same proceedings, the topic of estimated breeding values is discussed. The paper includes in appendix A the necessary formulations for a BIF member organization to include breeding value analysis in their performance program. Thus, the technical knowledge is available to make performance programs more valuable to the participant. Also included in the mid-year proceedings is a paper titled, The Bull Selection Problem. This paper deals with the genetic aspects of sire selection and it is available for BIF members to use any or all of it in their promotional material. A paper on the same topic appears in the current beef sire directory.

A condensed version of the Bull Selection Problem is slated to appear as a BIF brochure. As such it will be available to BIF member organizations for their promotion.

New Developments

The following is a listing of new ventures for the record utilization committee to consider and to develop if the need and value can be established.

1. Guidelines for Commercial Beef Cattle Producers: Copies of the guidelines were sent to members asking for comments. Final revisions have been made and the guidelines are ready for inclusion in the next revision of the BIF guidelines as a part of the record utilization report. A copy is attached.

2. Guidelines for feeder calf sampling programs: Such guidelines, especially concerning the sampling and reporting procedures, need to be developed for eventual inclusion in the BIF guidelines. A subcommittee is to be appointed composed of men where ongoing programs exist (Montana, Kansas, Nebraska, Oklahoma and Missouri).

3. The Place of Records of Performance in the Beef Industry: A brochure giving the possible extent that records can be used in the entire beef industry needs to be written and a start of such was discussed. Wide distribution of such a brochure could develop the use of records in normal buying and selling of beef cattle from the purchase of breeding stock to the retail merchandising of beef. It could aid in the sound development of a specification industry. A committee is to be appointed to study how best to get the information to the industry. After discussion question 4 was included in the operation of this committee, the general consensus was to get the help of the press to help publicize this, rather than BIF to publish documents.

4. Performance Program For You: Using the guidelines, a brochure comparing the different kinds of performance programs could be written. Cattlemen just starting would have a basis for selecting the program that can do the most for their particular operation.

5. Guidelines for Reporting Sire Evaluation Data: The NAAB is in the process of developing such guidelines for reporting sire data in catalogs. To make reporting of sire evaluation uniform over the beef industry would be of real significance. This is being done in the sire evaluation committee.

6. A Banker's Guide to Beef Performance Records: A brochure of this type needs to be written. Banker organizations would help in distribution. This could produce real impetus to keep basic performance records in the industry. A committee is to be appointed.

7. Performance and the Show Ring: A lot of the established performance herds are being skyrocketed into popularity by their stock winning at the major shows of the nation. This was discussed and no action was taken.

8. Aids in Planning and Cataloging of Performance Information: Simple herd record calendars need to be developed. Means of keeping the most meaningful records on a herd, cataloged need defining. This aspect is the responsibility of the member organizations.

The following is a list of topics that were discussed by the record utilization committee:

1. Inability of too many computer facilities to produce an "on-time" performance program as promised. This was discussed and a committee needs to be established to consider more centralized processing.

2. One of the most important decisions of the commercial producer is that of breed or breed combinations. Breed evaluation cannot be done by each producer so this decision must be based on available data. Is it possible to set up the mechanism to supplement the work at USMARC and the stations with breed comparisons from field data? This would be record utilization helping to answer the question of breed choice. South Dakota is doing this. Probably the Regional Beef Cattle Breeding Research groups should be doing this rather than BIF.

3. Mention has been made of possibly requiring performance data on all animals registered with a breed. This would increase the number of cattle enrolled in performance programs. Should such a practice be recommended by BIF. Can adequate sire evaluations be made with the data? This was discussed and no action taken.

Guidelines for Record Programs for Large Commercial Beef Cattle Producers

Large commercial beef producers do not use performance record programs because people that normally develop suggested programs have not been able to come up with meaningful programs that can be conducted within the costs they can afford. Generally, all that has been offered to him is a slight revision of programs for registered breeders which with today's costs will not make him a reasonable return on his added expense.

By combining records on performance, quality of product and cost into a management control system, a more modern and scientific approach can be developed for these ranches. The controlled program-production, quality and cost-should measure in some degree the biological processes that are typical in todays beef production. To direct those biological processes, management must have measurements taken periodically which indicate if the processes are operating in normal manner or deviating sufficiently to justify corrective action. Then a study should be made to determine the cost of correcting the situation.

What follows is a listing of the specific points in the BIF Commercial Guidelines:

1. THE RANCH-PRESENT AND FUTURE. Before any rancher embarks upon a continuing record of production and quality characteristics, his first step should document his present production and quality level and set goals for periods of 5 or 10 years in the future. These goals should include record of production characteristics such as number of (and percentage when applicable) cows bred, calves born, calves weaned, average weaning weight, and average cow weight. To document the quality level of young cattle produced on the ranch, there is a need to record such traits as age and weight in the feedlot. Also, the weight, quality and yield grade of the finished cattle.

Goals should reflect what appears to the rancher to be the necessary changes in production and quality to establish the most profitable ranch operation within his own personal preferences.

2. HERD BULLS. Information on young bulls such as an average 205-day weaning weight and an average weaning weight ratio of all bulls purchased within a given year. A registered breeder on a reasonable production testing program would also be able to furnish yearling weights and ratios if young bulls are purchased at 12 or more months of age. A few of the most progressive registered breeders will be able to furnish you with feedlot and carcass data on half sibs (calves sired by the same bull). Performance information on the individual bulls plus feedlot and carcass data on half brothers would be ideal. A 205-day weaning weight and a yearling weight should be considered a minimum. When feedlot and carcass data is available on half brother bulls may be purchased at a younger age based on 205-day weights and ratios plus the information on half brothers. This would reduce the extra cost of feeding the young bull and reduce the possible injury of breeding ability because of over feeding.

3. COW HERD. A calf cannot be weighed that has not been born and a 600 pound calf weaned from a cow that failed to calve the year before, it is not very profitable. With present cow prices there is no doubt that the most important record for the cow and calf man has is on the reproductive performance of the breeding herd.

Average percent calf crop should be calculated every year and should be based on number of cows exposed to bulls divided by the number of calves born. Percent calf crop calculated in this manner furnishes information that relates directly to reproduction and leaves out calf losses which may be a problem but would require entirely different actions for solutions.

Records should establish calving intervals and if large numbers of cows exceed an average of 12 months then corrective action should be taken in management or breeding to give the best chance possible of one calf each 12 months.

4. WEANING CALVES. Calf and cow weights can indicate many things related to production efficiency. These are not individual weights, but group weights taken at the time calves are weaned. If calves are weaned and sold at one time, calf weights are available. The weight of the cows annually culled from the breeding herd or a random sample of cows is excellent information. This information will have some meaning as annual weight records. The trend of the calf weight and cow weight over a period of years will reflect some changes in nutrition level and possibly some genetic change. These two weights can be expressed as a weight ratio using weaning weight as a percentage of mature cow's weight. Both calf and cow weights become the basis for many comparisons in subsequent records that help answer questions about overall efficiency and profitability of the ranch operation.

5. FEEDER CALVES. A record program for a cow and calf operation should record the kind of product that is being marketed. This product can be measured by its performance through a feedlot and the carcass characteristics after the feeding period. A rancher's goals, as they relate to a product's quality may vary considerably. In all ranching operations, production efficiency, while producing the calf, should be of primary consideration. What the feeder and packer want should be secondary. Many times we are more concerned with what the feeder and packer want and fail to make the cow and calf industry profitable first.

Rate of gain and feed required per 100 pounds gain should be a better figure than cost of gain on long term records because of changing feed prices. This information is not hard to obtain on large ranches since weaning calves are sold in large groups to one buyer, and many groups retain their identity through the feedlot. Some large ranchers maintain ownership of their cattle through a commercial feedlot.

Rate and efficiency of gain can be measured every 3 or 4 years on most large ranches where breeding programs require at least this much time to change one-third of the genetic make up on the breeding herd. Large ranches may wish to use a random sample of the steer calves instead of feeding the entire calf crop.

6. SLAUGHTER CATTLE. Even though cattle are efficient at weaning time and grow efficiently through the feedlot, characteristics have an important effect on total income and profit. To add this last dimension to ranch beef production, two measuring devices, yield grades and quality grades, are used to indicate the product's quality. Grading carcasses on yield and quality can be done by USDA graders. Their record will serve as documentary evidence of these data. If the cattle are sold to a small packing plant, it may be necessary for you or the feeder to make arrangements to have a government grader available at slaughter time.

A large percentage of cattle on long feeding periods are expected to produce cattle with yield grades between one and two in the low choice grade. A rancher must set his own goals which may be for a market with different carcass characteristics. Design the overall ranching operation to be as efficient as possible. The most efficient ranching operation in your locality may or may not require cattle capable of grading choice when slaughtered.

Product quality does not have to be measured on the entire calf crop, but can be measured on a reasonable sample of feeder calves. This information does not have to be measured annually unless there are radical changes in a breeding program.

7. UNIT COST AND INCOME. To be useable in making decisions on ranch management, records should be more detailed than generally shown in total ranch costs and total ranch income. Costs and income per cow along with costs and selling price per 100 pounds of calf weaned give the rancher an opportunity for a different kind of study of total ranch operation. Ranchers can study production efficiency of the present breeding herd, may want to rule out the use of income from culled cows and bulls since their relationship is indirect.

A section should deal with only cost and income per cow showing two meaningful figures that can be compared on the same form. The comparison of these figures should serve as an excellent indicator of production efficiency.

A section on cost and selling price per 100 pounds of weaned calf would be used to make direct comparisons with costs of production and selling price of each 100 pounds of weaned calf. Differences in these figures is probably the best measure of overall efficiency, other than percent return to total capital investment.

8. INDIVIDUAL COW RECORD. Records can be maintained on large ranches without considerable labor provided details associated with good record programs for registered breeders are omitted.

Any individual cow record on large ranches require some kind of number identification on each cow in the breeding herd. This should not be considered an unusual task since other industries individually identify production machinery. This number can be a fire brand, an ear tag, neck chain or neck band.

An individual cow record for large ranches does not require each calf to be identified with its mother. A record showing only the identification number of each cow that did not calve and of each cow that produced a "reject" calf is all that is necessary to establish a useful individual cow record. Cows that calve regularly and produce acceptable calves would be considered normal, and records would be so marked. If it is possible to palpate the cow, you can have a record of non-pregnant cows before the calves are weaned.

REPORT OF CARCASS EVALUATICN AND CARCASS DATA SERVICE COMMITTEE

Lou Chesnut, Chairman
C. O. Schoonover, Secretary

USDA grades were first discussed by the group. Mr. Russell Cross of the USDA standardization branch presented a review of factors affecting maturity and also discussed the cutability formula.

The Committee recognizes that the beef cattle population has changed since the last quality grade change and since the inception of yield grades. It was also suggested that the meat consuming public has also changed and that preference in beef tastes may have also changed.

The Committee strongly urges the USDA to re-examine cutability formula standards and make sure that present standards are applicable to present day cattle.

The growth factor was discussed and it was pointed out that BIF has already recommended that retail cuts per day of age be included in carcass evaluation. The Committee felt that this factor has not been used to its fullest extent. The Committee re-emphasized the need to include this factor when possible in carcass contests and demonstrations.

Dixon Hubbard discussed the carcass data service. 52,000 tags have been issued to 22 sponsoring organizations. 1200 tags have been recovered; 150 tags have been lost.

At this time it appears that the program is working, but more time will be needed before meaningful conclusions can be drawn.

Other subjects discussed were the Canadian grading system, maturity and palatability and double muscling.

REPORT OF CENTRAL TEST COMMITTEE

B. J. Rankin, Chairman

A revised list of central test stations was published in the annual report.

A letter explaining the BIF central test guidelines and encouraging the stations to follow them will be sent to each station.

The committee met for one session, April 12, and discussed at length some variations in methods which seem to be needed at different stations. No changes in the guidelines were recommended by the committee. All stations are encouraged to explain more fully their variations in procedures or measurements in their reports.

REPORT OF REPRODUCTION COMMITTEE

Committee members attending: Doug Bennett, Ch; A. L. Eller Jr., Secretary, Robert Koch, Gordon Dickerson, Jack Rutledge (for Vern Felts), Wayne Singleton, John Sullivan, Jim Brinks.

In addition some 25 others sat in and entered in the discussion.

Dr. Dickerson and Dr. Koch were asked to give research background relative to reproduction records in beef cattle. Dickerson stressed the apparently low heritability of these traits and that because of this progeny testing and family selection, pedigree selection must be used rather than man's selection based on individual records.

Koch says he doesn't worry that h^2 of reproductive traits may be low since this indicates that nature is pretty well taking care of this. He says in research work conception rate per estrous cycle exposed looks promising. He suggested we need to decide what traits to work with and record and not necessarily just how to use them.

There was considerable discussion (Jorgensen, Nemick, Marion, Singleton, et al.) as to a system of reporting calving interval.

Researchers said we do not know about the correlation or association between female and male fertility. Decided to look at them separately.

Question of low h^2 was brought up. Koch explained that h^2 was calculated from the sire differences we can measure and these are small. He said that though h^2 is low the variability is high and the chance to make significant dollar improvement is great. We should not give up on genetics.

Feamle traits agreed upon for recordation (Dickerson):

1. Calving intervals can be calculated from existing information.
2. Birth date on all females.

3. All cows exposed to breeding be included.
4. Dates of beginning and ending breeding season.
5. Whether or not calf produced and why cow disposed of.
6. Birth weight of calf.
7. Whether or not calf weaned.
8. Calving difficulty scores.
9. AI or natural service.

Male traits to collect data on were discussed:

Brinks raised the question as to what should be done on central test station bulls. Committee agreed to recommend that all bulls be given examination (physical exam and semen evaluation). It was agreed that we need recommendations on procedures and methods on minimum standards of semen quality and physical scores.

Recommended sire (bull) input data to record:

1. Breeding data used.
2. Conception rates (return ratio).
3. Service per conception.
4. Cause for removal from service.

Use of the dam information was discussed. Advantages and disadvantages of using calving interval versus a calving date ratio (similar to South Dakota system) were pointed out. Another method suggested for evaluating the cow herds fertility was a figure based on number of calves weaned per cow year or cow month.

It was suggested and agreed upon that the reproduction committee make specific recommendations for recording and utilizing reproductive performance information. This committee will look into the various PT programs already using such records and seek information from other sources. The committee will attempt to have its recommendations completed for presentation at the fall 1973 BIF Board meeting.

Additional members appointed to the reproduction committee are: Bill Durfey, Martin Jorgenson, Lytle Tom, George Nemic.

It was suggested that a fact sheet (similar to the sire selection mimeo publication) containing recommendations for a sound herd management program for optimizing reproductive efficiency be prepared.

REPORT OF NATIONAL SIRE EVALUATION COORDINATING COMMITTEE

E. J. Warwick, Chairman

The committee sponsored an informal meeting on the evening of April 10 for the purpose of reviewing the current status of sire evaluation programs. Organizations with programs in operation or with a potential interest in developing programs were invited and asked to briefly discuss status of programs or plans for programs, problems encountered, suggestions for revision of current BIF guidelines or other items of interest. Approximately 75 persons attended. Five organizations reported programs in operation and a number of others indicated consideration was being given to program development.

Subject to approval of the BIF Board, the committee plans the following activities for the next year:

1. Publication in lay language of a pamphlet tentatively titled "Sire Evaluation Principles and Procedures."
2. Extension and/or revision of current BIF National Sire Evaluation Guidelines in the following areas:
    A. Randomization procedures for cow herds used in progeny testing.
    B. Accuracy of progeny test information and magnitude of random variation.
    C. Recommended procedures for analysis of progeny test information.
    D. Recommended procedures for publication of progeny test results.

REPORT OF PERFORMANCE PEDIGREE COMMITTEE

Clarence Burch, Chairman

The Committee makes the following recommendations:

1. A performance pedigree should include the following:
    A. Recordation of ownership.
    B. Pertinent, permanent information.
    C. No more than two generations of parentage.
    D. Periodic updating as additional facts are accumulated.

2. Each breed should adopt whatever kind of performance pedigree is best for their breed and use in promotional merchandising.

REPORT OF COMMITTEE ON MERCHANDISING PERFORMANCE TESTING

Mack Patton, Chairman

It is proposed to the Board that this Committee formulate a program of a half-day duration to be presented to the BIF Symposium in 1974, the subject to be merchandising of performance tested bulls.

REPORT OF ON THE FARM AND RANCH PERFORMANCE TESTING COMMITTEE

Larry Cundiff, Secretary

The first item of business was consideration of the live animal scoring system proposed by a study committee (A.C. Linton, Chairman; Gary Ricketts; Bill McReynolds; Stan Anderson.)

A scoring system including evaluation of four components including (1) trimness; (2) muscling; (3) size of frame and (4) structural soundness with each trait recorded on a numerical score of at least 1-5 and not to exceed 1-9; with the high number representing a greater degree of expression of the trait, was recommended. After considerable discussion, Art Linton moved that the Committee accept the report (attached) and that the proposal be recommended by the Committee. Motion was seconded by Bill McReynolds. Motion passed.

The second item of business was a discussion of a procedure to measuring cow efficiency. Glenn Butts presented and discussed the procedure used by Performance Registry International:

$$\frac{\text{205 day wt (bull equivalent)}}{\sqrt[3/4]{\text{cow weight} \times 2.67}}$$

$$\frac{\text{365 (366 leap year)}}{\text{calving interval}}$$

Larry Cundiff presented a memo to the Farm and Ranch Committee from H. A. Fitzhugh, Jr. concerning four methods of computing cow efficiency (attached). After considerable discussion, Spike Forbes moved that the Committee adopt method (4) of Fitzhugh's memo:

$$\frac{\text{Calf weight ratio}}{\text{Cow wt .75 ratio}}$$

where cow weight .75 ratios are computed within age management groups. It was further moved that further research be done in this area. Motion seconded and passed.

The final item of business was a discussion of currently recommended age of dam adjustments as opposed to adjustments indicated by recent analysis of Virginia and Illinois data suggesting that 10% adjustments would be more appropriate than 15% for two-year olds. No final action was taken, but consensus was that further study for various breeds in different environments was needed.

Practical Measures of Cow Efficiency

H. A. Fitzhugh, Jr.
Associate Professor
Texas A&M University

Selection methods directed toward increased gain and weight will increase the amount of product sold by cattlemen. But if costs of production increase at the same rate (or worse, at a faster rate) profitability will decrease since the costs of performance testing and selection must be counted against income.

One of the major costs of beef production is the growth, development and maintenance of the beef cow. Thus, the effect of selection for early growth of slaughter cattle on the size of the brood cow must be considered.

A cow is said to be efficient if the weight of her progeny (i.e. her productivity) is great relative to her own weight (i.e. the costs of production). Any practical measure of cow efficiency must be suitable for use in statistically unsophisticated computer programs. At present this criterion eliminates some methods, such as regression and canonical analysis, which have been used in research analyses (e.g. Fitzhugh et al. 1973. Relationships Between Cow Weight and Productivity). Four methods of measuring cow efficiency have been suggested and/or utilized.

1. Ratio of calf weight to cow weight, where calf weight is adjusted to constant sex and age (e.g. 205-days) but not for cow age.

2. Ratio of calf weight to cow weight to the 3/4 power (often called metabolic body weight). Calf weight is adjusted to constant age and sex. PRI uses a variation of this method in which the ratios are expressed relative to an expected constant value (set at 2.67 for PRI).

3. Ratio of calf weight ratio to cow weight ratio. Calf weight is adjusted to a constant age and sex basis prior to calculating calf weight ratio to the mean of his contemporaries (the ratio itself may remove sex effects); cow weight ratio are calculated relative to the mean weight of her contemporaries of the same age, genotype, etc.

4. Ratio of calf weight ratio to ratio for cow weight to 3/4 power. Basically similar to method 3 except that the ratio for (cow weight) 0.75 is substituted for the ratio of cow weight.

Comparison of methods. From a computer operation standpoint methods 1 and 2 appear to be the simplest since both can be calculated as the original data are entered for each individual cow-calf pair. Methods 3 and 4 require that means for contemporaries first be calculated; this can be done on the initial reading of data. Then calf and cow weight ratios can be computed. Thus, at first glance methods 3 and 4 would appear more difficult; however, calculation of means for groups of contemporaries and then ratios must be done anyway so there is, in fact, no real extra effort involved for methods 3 and 4.

Since degree of computational difficulty is similar for all methods, the choice of the best method can be limited to the most important criteria--accuracy and unbiasedness. Both theoretical consideration of growth curves and experience with real data indicate that methods 1 and 2 are strongly biased in favor of young cows who have not yet grown to their mature weight. Method 2, utilizing weight 0.75, is slightly less biased than method 1 by virtue of the effect of the 0.75 power transformation on cow weight. A major

problem is that young, growing cows will generally require more feed than older cows, even though the older cows are maintaining more weight. If comparisons are made on a strict economic basis in which depreciation is considered along with probability and profitability of future productivity (the future discount accounting method), the capital cost of producing a calf from an old, previously parous, value depreciated cow is much less than the cost of producing a calf from a young cow. Thus, any measure of cow efficiency which is biased in favor of young cows should be avoided if the measure will be used to influence culling and selection decisions.

Methods 3 and 4 may be criticized because the number of cows per age group may be small, particularly in small herds. The "accuracy" of comparisons and selections will increase with the number of observations per group effort. Yet while methods 3 and 4 may be subject to sampling errors they are at least not subject to the apparent bias of methods 1 and 2.

Example. The example illustrates the bias favoring young cows in methods 1 and 2 very clearly. So clearly that the question will be raised if the example was constructed specifically to make this point. It was not! Cow weights were chosen to be typical of weights of genotypically similar beef females at 2 and 6 years of age. Calf weights were similarly chosen.

The phenotypic correlation assumed between calf weight and cow weight for this example is essentially zero, following research results of many studies in Texas and elsewhere. As figure 1 depicts, there are several sources of correlation between calf weight and cow weight. The genetic portion is positive and has an expectation of 1/2 the genetic correlation between weight at birth and maturity. However, the other components of the phenotypic correlation which involve environmental effects and maternal ability may be either positive or negative. For example, good milking ability in the cow will increase progeny weight but will probably decrease the cow's weight. The net effect of cumulating the positive and negative components is usually to yield a near zero correlation.

Metabolic Weight. Methods utilizing metabolic weight ($W^{0.75}$) have been suggested under the assumption that cow maintenance is proportional to $W^{0.75}$ rather than $W^{1.00}$. Careful interpretation of research purported to substantiate use of $W^{0.75}$ reveals several key points.

1. The California research (Garrett et al., 1959), on which the NRC formula for energy requirements is based, utilized rapidly growing, immature cattle not mature cows.

2. Missouri research (Brody, 1945) did indicate that differences among species for maintenance requirement at maturity was proportional to $W^{0.73}$. Guilbert and Loosli (1951) similarly related TDN requirements of domestic species to $W^{0.73}$. The key point is that $W^{0.73}$ (or $W^{0.75}$) is appropriate to the genetic differences between species. It does not necessarily follow that $W^{0.75}$ is appropriate to phenotypic differences in maintenance requirements within species. Indeed, Taylor and Young (1968) clearly showed in their experiments with cattle that energy requirements for maintenance were proportional to $W^{1.00}$.

3. Energy requirements for activity and other productive functions, such as lactation, are generally assumed proportional to $W^{1.00}$. In addition, fixed per head costs (service sires, taxes, grazing fees, veterinarian expenses, etc.) should be counted in addition to cow maintenance costs.

Combination measures of cow efficiency. PRI (Better Beef Business, April, 1973) has suggested combining calving interval with relative cow productivity as a joint measure of cow efficiency. This is risky since cows may rank high or low for two different traits--relative productivity and fertility. These traits vary in expected heritability and little is known about the genetic and phenotypic correlations between them.

Conclusions and Recommendations

1. Measures of cow efficiency should be provided to cattlemen as they make selections. The goals of their individual breeding program will vary with the potential commercial usage of the breeding cattle they produce. Knowledge of cow efficiency will provide more flexibility in their selection and culling programs.

2. Measures which are biased should not be used. When applied in comparisons of cows of the same age, the four methods illustrated in the example rank cows similarly. However, when used to compare cows of different ages, methods 1 & 2 are biased in favor of young cows and their use will likely lead to incorrect selection decisions. Methods 3 & 4 appear appropriate to use in herd-wide comparisons.

3. The choice between methods 3 & 4 can be argued at length. Conclusive research evidence has not been presented to favor either $W^{1.00}$ or $W^{0.75}$ as the best indicator of total production costs. My approach is when in doubt choose the simpler, more straightforward method; in this case, method 3.

4. Provide ranchers with separate, not combination, measures of relative cow productivity (i.e. cow efficiency) and of fertility (probably, calving interval) so that they can clearly distinguish which traits they are emphasizing in their breeding programs. It would be possible, of course, to construct individual selection indexes to meet the specific needs of each individual's program.

References

Brody, S. 1945. Bioenergetics and Growth. Reinhold Publ. Co., N.Y.

Garrett, W. N., J. H. Meyer and G. P. Lofgreen. 1959. The comparative energy requirements of sheep and cattle for maintenance and gain. J. Animal Sci. 18:528.

Guilbert, H. R. and J. K. Loosli. 1951. Comparative nutrition of farm animals. J. Animal Sci. 10:22.

Taylor, St. C. S. and G. B. Young. 1968. Equilibrium weight in relation to food intake and genotype in twin cattle. Animal Prod. 10:393.

TABLE 1. A COMPARISON OF COMPUTATIONALLY PRACTICAL MEASURES OF COW EFFICIENCY.

	Cow				Calf			
Age	Wt	Wt Ratio	$W^{0.75}$	$W^{0.75}$ Ratio	Wt	Wt Ratio	Calf Wt / Cow Wt	Rank[1]
2	700	0.8235	136.09	0.8657	300	0.80	0.429	(5,5)
2	750	0.8824	143.32	0.9116	400	1.07	0.533	(1,1)
2	800	0.9412	150.42	0.9568	425	1.13	0.531	(2,2)
2	850	1.0000	157.42	1.0013	375	1.00	0.441	(4,4)
2	900	1.0588	164.32	1.0452	400	1.07	0.444	(3,3)
2	950	1.1176	171.12	1.0884	350	0.93	0.368	(7,9)
2	1000	1.1765	177.83	1.1312	375	1.00	0.375	(6,8)
Total	5950	7.0000	1100.52	7.0000	2625	7.00	3.121	
Avg	850	1.0000	157.21	1.0000	375	1.00	0.446	
6+	1100	0.8800	191.00	0.9091	345	0.80	0.314	(5,12)
6+	1150	0.9200	197.48	0.9399	460	1.07	0.400	(2,7)
6+	1200	0.9600	203.89	0.9705	489	1.13	0.408	(1,6)
6+	1250	1.0000	210.22	1.0006	431	1.00	0.345	(4,11)
6+	1300	1.0400	216.50	1.0305	460	1.07	0.354	(3,10)
6+	1350	1.0800	222.72	1.0600	403	0.93	0.299	(7,14)
6+	1400	1.1200	228.87	1.0893	431	1.00	0.308	(6,13)
Total	8750	7.0000	1470.68	7.0000	3019	7.00	2.428	
Avg	1250	1.00	210.10	1.0000	431	1.00	0.347	

[1] First number is rank within age group; second is rank across age group.

[2] Actual PRI method involves dividing ratios by a constant (2.67) which has no effect on ranking.

TABLE 1. Continued

		Cow Efficiency			
PRI^2	Rank	Calf Ratio / Cow Ratio	Rank	Calf Ratio / $Cow^{0.75}$	Rank
2.204	(5,7)	0.971	(5,7)	0.924	(5,9)
2.791	(2,2)	1.213	(1,1)	1.173	(2,2)
2.825	(1,1)	1.201	(2,2)	1.181	(1,1)
2.382	(4,5)	1.000	(4,78)	1.000	(4,7)
2.434	(3,3)	1.011	(3,6)	1.024	(3,6)
2.045	(7,11)	0.832	(7,14)	0.854	(7,14)
2.109	(6,9)	0.850	(6,13)	0.884	(6,11)
16.790		7.078		7.040	
2.399		1.011		1.006	
1.806	(7,14)	0.909	(5,10)	0.880	(6,12)
2.329	(2,6)	1.163	(2,4)	1.138	(2,4)
2.398	(1,4)	1.177	(1,3)	1.164	(1,3)
2.050	(4,10)	1.000	(4,78)	0.999	(4,8)
2.125	(3,8)	1.029	(3,5)	1.039	(3,5)
1.809	(6,13)	0.861	(7,12)	0.877	(7,13)
1.883	(5,12)	0.893	(6,11)	0.918	(5,10)
14.400		7.032		6.852	
2.057		1.005		0.979	

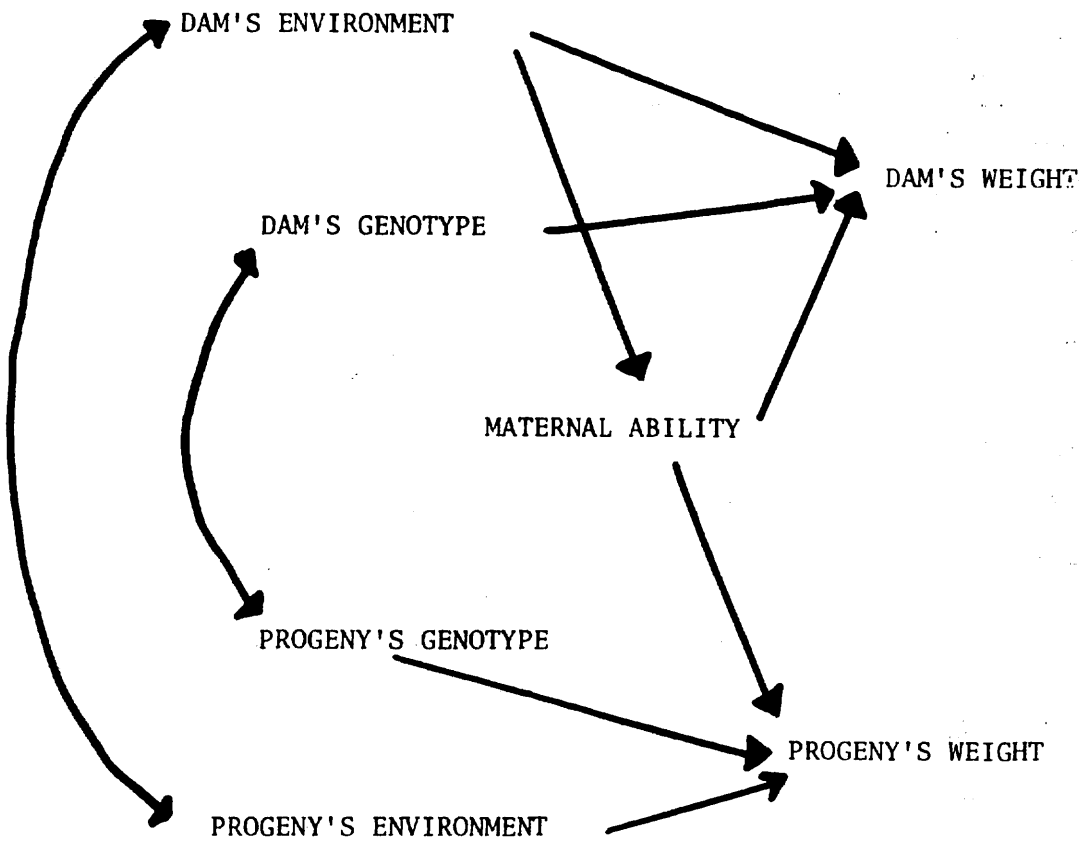

Figure 1. Diagramatic representation of inter-relationships among factors influencing weights of dam and her progeny.

PRESIDENT'S ADDRESS

J. David Nichols

Shakespeare observed, "the past is prologue." Performance testing has attracted people that look forward to the future, rather than dwelling in the past. I'm not suggesting that the performance movement does not have a heritage that has been characterized by great individuals, who despite personal ridicule and suggestions that some how these paper shuffling weigh and prayer's were unworthy of the title "cowboy." Performance organizations spawned the same kind of reaction. Many college professors and extension people put their positions on the line for evaluating on a basis that represented economic traits. While breed associations were late in getting started, the programs they are offering are sound forward thinking ones. I think we must recognize the breed associations are taking the lead in developing and utilizing National Sire Evaluation. BIF can take special pride in the role it played in setting up the guidelines for National Sire Evaluation. History will have several gold pages for the breed association that gives leadership, guidance and effort in promoting these programs in their breeds.

If any of you here think we are toiling in vain or simply talking to each other, you are wrong. This morning I received a call from a farmer about some bulls for his commercial herd. After answering his questions regarding our performance program--prices, etc.... I started explaining for the overall low levels of performance this year because of mud, snow and the terrible winter. He interrupted me and said, "Quit wasting my telephone charges telling me about the winter weather; I'm an expert on that too. Give me the ratios, dammit, ratios!!!"

My five-year-old son, Fletcher, attends nursery school. The other day I took him to school. He was met by his classmate, Scott Lund, at the car. They started looking and pointing at a set of vapor trails going across the sky. Fletcher indicated that the trails were left by a Boeing 747. "No," Scott corrected, "that definitely is a Douglas DC 10 powered by Lockheed's newest jet engine that develops ten thousand pounds thrust each, without the after the after burner." Fletcher said, "No! It was definitely the British built Rolls Royce with the General Dynamics design that developed 16 thousand pounds thrust and is capable of producing 30% less pollution at takeoff." Just then the bell rang and Fletcher scoffed. "Well, I guess we had better go in and string those darn beads." We are stringing too many beads in the beef breeding industry. We have proven the value of performance testing, central bull tests, applying knowledge of population genetics to estimated breeding values and identifying superior sires through national sire evaluation. But we still don't make selections on performance unless they "are the right kind." We realize our sons and daughters must be equipped when they graduate from college to compete in an industry that is comprised of giants that use every available scientific technique to succeed. But what do we have these students doing? They are looking at feet and heads of live animals on judging teams. Stringing Beads!

We still fill an arena with people to see a man visually evaluate 200 different animals of all ages from 200 different environments. All of us know the folly of comparing animals of different ages from different ages for anything. Yet we heap words of praise for the one animal selected as the champion. Stringing beads!

Finally performance breeders engage in petty arguments that somehow the performance of one line or breed is superior to the performance of their fellow breeders cattle. The character assassination of breeders and their cattle is "stringing beads."

Let us start gathering the resources of our people and organization and start breeding cattle for the 80's. They may be quite different from the 60's and 70's. The time lag from seedstock to the meat counter is at least four years so time is short. It appears the fabrication of carcasses and merchandising techniques are changing fast. Capital and people outside the industry are trying to intergrate the various phases of the beef industry. This could mean that commercial cattle will be priced according to their value as they relate to the whole industry. Certainly this will have ramifications as far as the value of specific genetic inputs are concerned. These changes and others should push us forward into new programs and concepts in our breeding programs. In our own herd some of the projects we have underway include the following. While not all new they represent opportunities for us.

1. Lines comprised of different breeds bred for specific purposes.
2. Calves birth recorded from date of conception rather than actual birth.
3. Calves unadjusted for age.
4. Multiple sires used only once as yearlings.

These are just a few ideas that we are trying. Of course many other people are trying other things.

In closing I'd like to read a poem that seems to characterize the performance breeder and organization.

God gave us two ends to use.
With one end we sit.
The other we muse.
Heads we win,
Tails we lose.

The annual meeting of BIF was called to order by President J. David Nichols. The Secretary's report was requested.

Secretary's Report by Frank H. Baker

The primary activities of 1973 were:

1. Beef Carcass Data Service Program Activation.
2. Eastern Regional Conference - Montgomery, Alabama.
3. Bull Selection Problem Brochure.

1973-74 plans are:

Establishment of regional secretaries:

A. L. Eller - Eastern Region
Robert deBaca - Midwest Region
Bobby Rankin - Western Region

These secretaries will concentrate on maintaining internal communications with state affiliates of their region and developing regional projects. External communication with regional and national news media on stories from the region will be another important role of these men.

The national secretary will concentrate on communications with the national organizations and coordination in the national interest. The national secretary will work with board and national officers.

We anticipate monthly or bimonthly communication with the member and associate members. This may take the form of a national newsletter.

We anticipate the publication and distribution of materials committees recommend.

Coordination of committee activities will continue to rest on the Program Coordinator, Dixon Hubbard.

I recommend review of by-laws in relation to five years' experience. I recommend review of program format in relation to needs of organization. I recommend that committees be active during the year.

I recommend that consideration be given to dividing the "Guidelines publication" into sections for the next revision in order that sections may be revised as new committee action is forthcoming.

The 1973 BIF registration summary is:

More than 170 participants represented 31 states, Australia and Uruguay They were a mixture of cattlemen, national association representatives, AI firm representatives, bankers, university personnel, USDA personnel and press representatives. Eleven breed associations had representatives present in the meeting. Nine AI firms participated in the meeting.

As we look ahead to the next five years of BIF, our challenges are greater because of our past successes. It has been a pleasure to serve as your secretary during these years. I am looking forward to a great future for BIF.

The Secretary's report was approved.

The financial report was called for and presented by the Executive Secretary. The financial report was approved.

The report of the directors' election was requested.

Directors elected were:

Midwest BCIA	- Robert Miller	- Mabel, Mn.
Southern BCIA	- James Bennett	- Red House, Va.
BCIA-at-Large	- J. David Nichols	- Anita, Ia.
Breed Assns.	- Raymond Meyer	- Red Angus Assn. of America Sorum, S. D.
	- Robert Vantrease	- North American Limousin Foundation Denver, Co.
Other Organizations	- John Airy	- American National Cattlemen's Assn. Johnston, Ia.
	- William Durfey	- National Assn. of Animal Breeders Columbia, Mo.

Committee reports were called for and presented (published elsewhere in the proceedings).

The proposed by-law change regarding defining associate members recommended by the Board of Directors was approved. The change reads as follows:

"Associate (non-voting) members of this Federation will consist of organizations, firms, public agencies or individuals interested in beef cattle performance programs."

The meeting adjourned at 4:30 p.m.

ELECTION OF BOARD OF DIRECTORS

Vacancies of the Board of Directors were filled by election in accordance with the by-laws i.e. representatives of breed associations caucus and elect members to represent them; state BCIA representatives elect regional directors in regional caucuses and at-large directors in a caucus of all BCIA's.

Director	Address	Representing	Term Expiration
Breed Associations			
Fred Francis	3201 Frederick Blvd. St. Joseph, Mo. 64506	Am. Angus Assn.	1974
Craig Ludwig	Hereford Drive Kansas City, Mo. 64105	Am. Heref. Assn.	1975
Raymond Meyer	Sorum, S. D. 57654	Red Angus Assn. of Am.	1976
C. D. Swaffar	8288 Hascall St. Omaha, Ne. 68124	Am. Shorthorn Assn.	1975
Don Vaniman	Box 24 Bozeman, Mt. 59715	Am. Simmental Assn.	1975
Robert Vantrease	309 Livestock Ex. Bldg. Denver, Colo. 80216	No. Am. Limousin Foundation	1976
State BCIA's & PRI			
D. D. Bennett	Box 352 Hermiston, Or. 97838	BCIA Western Region	1975
Robert Miller	Viewlawn Angus Farm Mabel, Minn. 55954	BCIA North Central Region	1976
James Bennett	Red House, Va. 23963	BCIA Southern Region	1976
William Gray	Falkland Farms Schellsburg, Pa. 15559	BCIA Northeast Region	1975
Louis C. Chesnut	4314 Scott Spokane, Wash. 99200	BCIA-at-Large	1974
J. David Nichols	Anita, Ia. 50020	BCIA-at-Large	1976
Martin Jorgenson	Ideal, S.D. 57541	BCIA-at-Large	1974
Max Hammond	Bartow, Fla. 33830	BCIA-at-Large	1974
Clarence Burch	Mill Creek, Ok. 74856	PRI	Continuing
Other Organizations			
John Airy	Pioneer Beef Johnston, Ia. 50131	Am. Natl. Cattlemens Assn.	Continuing
William Durfey	512 Cherry St. Columbia, Mo. 65201	Natl. Assn. of An. Brdrs.	Continuing
Ex Officio			
Dixon Hubbard	Extension Service, USDA, Washington, D.C. 20250		
Everett Warwick	Agricultural Research Service, Beltsville, Md. 20705		
Don Nicholson	Livestock Div., Dept. of Ag. of Canada, Ottawa, Canada		
Robert deBaca	Animal Sci. Dept., Iowa State Univ., Ames, Ia. 50010		
A. L. Eller	Animal Sci. Dept., VPI, Blacksburg, Va. 24061		
Frank H. Baker	Animal Sci. Dept., Univ. of Nebr., Lincoln, Ne. 68503		
Bobby J. Rankin	Animal Sci. Dept., New Mexico State Univ., Las Cruces, N.M. 88003		

MINUTES OF THE BOARD OF DIRECTORS MEETING

April 11 and 12, 1973

The meeting was called to order at 7:15 a.m., April 11, by Vice President Ray Meyer in the absence of President Nichols.

Secretary Frank Baker reviewed minutes of the mid-year meeting as published in the proceedings of the mid-year conference. The minutes were approved.

The Secretary reviewed the membership applications of:

(1) The International Brangus Inc. Association to advance from associate member to full membership. (Burch moved approval. Second by Chesnut. Motion passed.)

(2) Galloway Performance International's application for full membership. (Jorgenson moved approval. Second by Bennett. Motion passed.)

(3) American Chianina Association. (Vaniman moved approval. Second by Durfey. Motion passed.)

(4) Tentative request for membership by American Red Brangus Association. (Vaniman moved approval subject to a satisfactory review of their performance program by Secretary Baker. Second by Durfey. Motion passed.)

To facilitate action on future membership applications. Swaffar moved that the Secretary be authorized to act for the Board in reviewing and approving membership applications in accordance with the by-laws. Second by Chesnut. Motion passed.

Secretary Baker reviewed the regional organization plan with:

A. L. Eller	- Virginia	- Eastern Regional Secretary
R. C. deBaca	- Iowa	- Midwest Regional Secretary
Bobby J. Rankin	- New Mexico	- Western Regional Secretary

These regional secretaries will concentrate on communicating with state affiliates and news media of the region in achieving more effective BIF programs. Regional secretaries will be responsible for annual surveys, award nominations and membership reports from the region.

The executive secretary will work with the national member affiliates and with the Board of Directors.

This regional operational plan had been approved by mail ballot. This approval was formally endorsed by the Board.

The financial report was reviewed and approved. (Motion by Burch. Second by Jorgenson).

The Board discussed the proposed change in by-laws to clarify the definition of associate membership which was mailed to the members on October 6, 1972. The new definition proposed is "Associate (non-voting) members of this federation will consist of organizations, firms, public agencies or individuals who are interested in beef cattle performance programs." Durfey made a motion that the Board recommend approval of this defintion by the membership. Swaffar seconded. Motion passed.

Meeting was recessed until 5:00 p.m., April 12.

The Board returned to session with President Nichols in charge.

The election was conducted in accordance with the by-laws by secret nominating ballots.

J. David Nichols was reelected President

Raymond Meyer was reelected Vice President

Frank Baker was reelected Executive Secretary

C. D. Swaffar was reelected Treasurer

The Board discussed the annual meeting. A Program Evaluation Committee of Warwick, Meyer and Vaniman was appointed.

The committee reports were reviewed and the following action taken in addition to approval of all reports for publication in the proceedings of the conference:

(1) Merchandising Committee - Report was referred to the newly-appointed Program Evaluation Committee.

(2) Performance Pedigree Report - No action needed.

(3) Sire Evaluation - Authorized publication of a leaflet.

(4) Reproduction Committee - Asked to draft outline of proposed leaflet. Directed that the committee concentrate on record-keeping needs of reproduction rather than herd management.

(5) Carcass Evaluation Committee - The Secretary was asked to write a letter to the Assistant Secretary of Agriculture requesting attention to analyses of data relevant to precision of the USDA cutability formula on today's cattle population.

(6) Farm and Ranch Testing Committee - Report on live animal evaluation and scoring was reviewed and discussed. Chesnut offered a motion that "In the next printing of BIF Guidelines for Uniform Beef Improvement Programs, the section on conformation scores be dropped. (In past printing USDA program 1020 on pages 10, 11 and 12 or in the April 1972 preliminary printing on pages 12, 13, 14 and 15)." Second by Vantrease. Motion passed.

The cow efficiency criteria were returned to the committee for further study.

Burch moved and Hammond seconded that active Board members of past and future be given certificates of appreciation.

The Board requested review by the Secretary and Regional Secretaries of the regional boundaries of areas for election of BCIA directors in relation to achieving active directors in all positions. A report will be given at the mid-year meeting.

A motion by Vaniman seconded by Jorgenson to authorize the Secretary to purchase and present appropriate gift certificates to Miss Vicky Kobes and Mrs. Virginia Marcussen for past assistance to the BIF Secretary and Board.

The Board discussed all possible locations for the 1974 annual meeting. At the conclusion of the discussion the President called for a vote on locations. Denver, Colorado was selected as the location.

The date for the 1974 meeting was set for approximately April 15.

Meeting adjourned at 8:30 p.m.

Beef Improvement Federation
Financial Statement
April 1, 1972-March 31, 1973

Date	Description	Expenditures	Deposit	Balance
4-1-72				2,932.82
4-6-72	Postage & Mailing Expense	34.75		
4-7-72	Mailing Expense for Press Releases	194.36		
4-7-72	Preparation of Press Release & Misc. Expense	100.00		
4-17-72	Secretarial Assistance	108.00		
4-20-72	Stamps	30.00		
4-25-72	Cash for Convention Expenses	100.00		
5-1-72	Memberships		525.00	
5-1-72	Convention Registration		630.00	
5-2-72	Bank Statement Balance			3,520.71
4-25-72	Colorado Corporation Fee	5.00		
4-25-72	Printing & Art Work Convention Material	440.40		
4-25-72	Convention Supplies	11.00		
5-3-72	Printing & Convention Material	281.90		
5-3-72	Photography	47.09		
5-3-72	Trophies	82.94		
5-10-72	Check for Insufficient Funds	10.00		
5-11-72	Convention Expenses	284.61		
5-21-72	Postage	25.04		
5-25-72	Secretarial Assistance	70.00		
6-1-72	Bank Statement Balance			2,262.73
5-17-72	Printing Carcass Guidelines	269.98		
5-25-72	Photography	150.38		
6-5-72	Mailing Permit & Deposit	95.00		
6-5-72	Legal Fee	5.00		
6-19-72	Printing Annual Meeting Proceedings	312.20		
6-19-72	Misc. Convention Registration Fees		65.00	
7-3-72	Bank Statement Balance			1,495.17
6-29-72	Printing of Member Dues Notice	28.80		
6-30-72	Rubber Stamps	6.85		
7-12-72	Office Supplies	25.50		
7-13-72	Office Supplies	14.25		
7-14-72	Membership Dues		400.00	
7-21-72	Membership Dues		850.00	
7-27-72	Membership Dues		300.00	
8-2-72	Bank Balance			2,969.78
8-17-72	Stamps & Postage	20.00		
8-28-72	Office Supplies	85.00		
8-8-72	Membership Dues		600.00	
8-22-72	Membership Dues		600.00	
9-1-72	Bank Statement Balance			4,064.78
9-6-72	Office Supplies	368.59		
9-8-72	Postage	22.40		

Date	Description	Expenditures	Deposit	Balance
9-8-72	Office Supplies	81.27		
9-20-72	Erroneous Deposit		1,600.00	
9-25-72	Correction of Erroneous Deposit	1,600.00		
9-8-72	Membership Dues		350.00	
9-28-72	Membership Dues		250.00	
10-2-72	Bank Statement Balance			4,192.52
9-29-72	Printing of BCDS Letter	53.20		
10-20-72	Membership Dues		200.00	
10-20-72	Eartag Sales & BCDS		91.50	
11-1-72	Bank Statement Balance			4,430.82
10-20-72	Printing of Meeting Letter	120.16		
11-15-72	Stamps	30.00		
11-16-72	Printing	14.15		
11-20-72	Regional Meeting Expense	49.09		
11-2-72	Membership Dues		200.00	
12-1-72	Bank Statement Balance			4,417.48
12-11-72	BCDS Eartag Expense	100.00		
12-13-72	Publication Development Expenses	100.00		
12-17-72	Secretarial Assistance	24.00		
12-22-72	Membership Dues		550.00	
12-22-72	BCDS Sales		300.00	
1-2-73	Bank Statement Balance			5,043.48
12-21-72	Refund on BCDS	40.00		
12-21-72	BCDS Tags & Expenses	1,314.50		
1-17-73	Secretarial Assistance	39.00		
1-17-73	Mailing Permit	30.00		
2-1-73	Bank Statement Balance			3,619.98
1-20-73	BCDS Expense	2.60		
2-13-73	Printing Eastern Reg. Conf. Proc.	249.40		
2-28-73	Stamps	50.00		
2-28-73	Postage (Mailing Permit)	50.00		
2-22-73	Memberships		450.00	
2-22-73	BCDS Sales		750.32	
3-1-73	Bank Statement Balance			4,468.30
3-5-73	Secretarial Assistance	66.00		
2-22-73	Printing Press Releases	4.80		
2-10-73	Colorado Corporation Fee	5.00		
3-30-73	Stamps & Office Supplies	32.00		
3-28-73	Printing Leaflet & Meeting Program	326.68		
4-2-73	Bank Statement Balance			4,033.82

1972 BIF AWARDS' PROGRAM

1972 BIF Continuing Service Award

Clarence Burch, Mill Creek, Oklahoma, Angus breeder, is past president of Performance Registry International. He served as the first president of BIF from 1968 to 1970. He continues as a member of the Board of Directors and Chairman of the Performance Pedigree Committee.

1972 BIF Organization of the Year

Beef Improvement Committee of Oregon Cattlemen's Association

D. D. Bennett serves as the Chairman and Dean Frischknecht serves as the Secretary of the Beef Improvement Committee. They collected a total of 61,600 weaning records, 22,800 yearling records for 390 members. Seven-hundred eighty-six bulls were tested in two central stations and 5,250 bulls were tested on farms. The Committee conducted 29 carcass contests and demonstrations. They collected carcass data on 3,310 steers. Three field days were sponsored.

1972 BIF Beef Performance Seedstock Breeder

John Crowe, Whitemore, California, has been keeping production data on his herd since 1942. The Crowe Hereford cattle have been used as foundation seedstock in many of the leading U.S. purebred herds, namely, Ferry Carpenter, Hayden, Colorado; San Isabel Ranch, Westcliffe, Colorado; E. S. Gardner, St. George, Utah; California breeders include: J. D. Kuck and Frank Day, Montague; Les Fearrien, Hydesville; Tejon Ranch Co., Bakersfield. In addition to supplying seedstock for these breeders, the Crowe bulls have been used extensively in numerous large commercial herds; for example, Cockrell, Inc., Cedarville, California, purchased 55 bulls in 1970. The Crocker-Huffman Co. of Merced, California, for many years were heavy buyers from the Crowe ranch. Other commercial breeders include: Yamsi Cattle Co., Chiloquin, Oregon; Abner McKenzie, Red Bluff; Rehse Bros., Orland; Hart Cattle Co., Montague, California, and many others.

John Crowe has sponsored many educational events on the ranch to demonstrate principles of cattle improvements through effective use of records. Data from the herd has been used as a basis for magazine articles, textbook examples, and university bulletins. John Crowe has improved his cattle and the beef industry through use of his records.

1972 BIF Commercial Producer

Chan Cooper's ranch in Willow Creek, Montana consists of 7,500 acres of which 450 acres are irrigated. Hay is the main crop, but around 100 acres of grain are raised each year in rotation with hay. Chan has worked close with the soil conservation, and has put in cross fences on his range for pasture rotation, and has reseeded some to more productive grasses. Each year so many

acres are deferred under the soil conservation plan, and has also developed several springs. Under the irrigated land about 120 acres have been leveled and ditches reorganized and several windbreaks have been planted. The ranch runs around 350 head of cattle, 290 are brood cows. Individual records are kept on all cows, who are number branded with the year and an individual number. As each calf is born it is ear tagged. The date, sex, and cow number and calf number is recorded. At weaning time each calf is weighed individually and this information is sent to the Montana Beef Performance Association and run through a computer. He picks his replacements from his records and computer information. He has increased his weaning weights by 85 pounds since 1963.

1972 BIF Certificates of Excellence

As a beef performance breeder of 1972.

John Crowe, California.	Nominated by Ca. BCIA.
Dale H. Davis, Montana.	Nominated by Mt. BPA.
Elliot Humphrey, Arizona.	Nominated by Ariz. Cattlemen's Assn.
Jerry Moore, Ohio.	Nominated by Am. Simmental Assn.
James D. Bennett, Virginia.	Nominated by Va. BCIA.
Harold A. Demorest, Ohio	Nominated by Am. Int. Charolais Association.
Marshall A. Mohler, Indiana	Nominated by Red Poll Cattle Club.
Billy L. Easley, Kentucky	Nominated by Kentucky BCIA.

As a commercial producer of 1972.

Chan Cooper, Montana.	Nominated by Mt. BPA.
Alfred B. Cobb, Jr., Montana.	Nominated by Am. Int. Charolais Association.
Lyle Eivins, Iowa.	Nominated by Ia. BCIA.
Broadbent Brothers, Kentucky.	Moninated by Ky. BCIA.
Jess Kilgore, Montana.	Nominated by Am. Simmental Assn.

1973 BIF AWARDS' PROGRAM

1973 BIF Continuing Service Awards

F. R. Carpenter - Hereford Breeder - Hayden, Colo.

Ferry Carpenter is a giant in performance testing circles for the work in improving his own Hereford herd and for early leadership in Performance Registry International. He is a member of the Colorado Beef Improvement Association. Ferry arranged the first meeting of organizations wherein the BIF concept was discussed. He helped develop the plans for BIF and helped select its name.

E. J. Warwick - USDA Researcher - Beltsville, Md.

Everett Warwick represented the Agricultural Research Service in the planning meetings for BIF. He has served as the ARS ex officio member of the BIF Board of Directors since the beginning. Everett served as chairman of the BIF Sire Evaluation Committee throughout the development of the National Sire Evaluation Program and he continues to serve as the Chairman of the committee guiding that program. Prior to the formation of BIF, Dr. Warwick had a long history of service in research and public assistance on performance testing.

Robert deBaca - Extension Beef Specialist - Iowa State University

Robert deBaca has been a key figure in performance testing circles for the past 15 years. His greatest work has been through developing and advising the Iowa Beef Improvement Association since its beginning. Today, the Iowa association has one of the largest and most active programs in the country. Bob was active in the planning meetings for BIF and has served effectively as assistant secretary and director of publicity. Bob also chaired the BIF committee on Promotion and Sales which developed a widely used report.

1973 BIF Pioneer Research Awards

JAY L. LUSH, Professor emeritus, Iowa State University, was a leader in research of the principles upon which BIF is based. His book, Animal Breeding Plans, has promoted the use of population genetics principles for the improvement of beef animals. He has made important contributions to the U. S. Range Station data analysis and to current reports on crossbreeding, germ plasm evaluation and selection.

A member of the National Academy of Science, Dr. Lush's picture is displayed among those of other recognized livestock leaders in the Saddle and Sirloin Club in Chicago. He received the American Society of Animal Science Breeding and Genetics Award in 1965, and the first Morrison Award the society presented in 1946.

JOHN H. KNOX, Professor emeritus, New Mexico State University, was a leader of early New Mexico research which served as the basis for the pre-weaning "on the ranch" performance testing programs throughout the country which led to the founding of BIF.

Knox has served in various capacities in the American Society of Animal Production (now American Society of Animal Science), and received their Distinguished Teacher Award in 1959.

Professor Knox organized annual feeders' day and ranch day programs at New Mexico State as early as 1936 to present research findings to livestock people. He also conducted an annual cattle breeders' school for the New Mexico Cattle Grower's Association, and was selected as Cattleman of the Year in 1954 by that group.

1973 BIF Organization of the Year

The South Dakota Livestock Production Records Association, under President Bob Healy, collected a total of 56,500 weaning records and 10,000 yearling records from 480 beef herds. The 800-member organization provides a complete data processing service for weaning and yearling records and cow summaries, and coordinates bull testing stations and individual and herd certifications.

1973 BIF Beef Performance Seedstock Breeder

Mrs. R. W. Jones, Leslie, Georgia, operates Polled Hereford herd that has representatives in herds in 28 states, nine universities and experiment stations, and five artificial inseminating services. Her RWJ ranch received the Georgia Beef Cattle Improvement Association "Outstanding Herd Award" each year from 1969-72. Mrs. Jones and her late husband, who was elevated to the American Polled Hereford Hall of Fame in 1971, set out to increase weaning and yearling weights from their original 500 and 1,000 pound averages. Today, RWJ cattle are reaching weights of over 700 pounds at 205 days and 1,300 pounds at 365 days.

1973 BIF Commercial Producer

Pat Wilson, Frostproof, Florida, the commercial producer of the year, is president of a corporation whose reaching operations consist of approximately 150,000 acres and as many commercial cattle. He also runs purebred herds of Polled Hereford, Charolais and Brahman cattle, and is upgrading a Simmental herd. Wilson is not only one of the founders of the American Simmental Association, but also the first president of the Florida Simmental Association. Three years ago he received the Florida Banker Award for the greatest herd improvement in a year.

1973 BIF Certificates of Excellence

As a beef performance breeder of 1973.

Messersmith Herefords, Alliance, Ne. 69301 (Robert, Frank & Ken).	Nominated by Nebr. BCIA.
Robert Miller, Viewlawn Angus Farms, Mabel, Mn.	Nominated by Minn. BCIA.
James D. Hemmingsen, Newell, Ia.	Nominated by Ia. BCIA.
Clyde Barks, Egeland, N.D.	Nominated by N.D. BCIA.
C. Scott Holden, Cascade, Mt. 59421.	Nominated by Mt. BP Assn.
William F. Borror, Gerber, Ca. 96035.	Nominated by CBCIA.
Raymond Meyer, Sorum, S.D. 57654.	Nominated by S.D. PRA.
Heathman Herefords, Hartline, Wa. (Earl & John)	Nominated by Wa. BCIA.
Albert West III, Rt. 9, San Antonio, Tx. 78211.	Nominated by Am. Simmental Assn.
Mrs. R. W. Jones, Jr., Leslie, Ga.	Nominated by Ga. BCIA.
Carlton Corbin, Fittstown, Ok.	Nominated by PRI.

As a commercial producer of 1973.

Clifford Ouse, Rothsay, Mn.	Nominated by Mn. BCIA.
Pat Wilson, Frostproof, Fla.	Nominated by Am. Simmental Assn.
John Glaus, Chamberlin, S.D. 57325.	Nominated by S.D. BPRA.
Sig Peterson, Almont, N.D.	Nominated by N.D. BCIA.
Max Kiner, KII Ranch, Almira, Wa.	Nominated by Wa. BCIA.
Donald Schott, Box 14, Stockett, Mt.	Nominated by Mt. BPA.
Stephen Garst, Coon Rapids, Ia.	Nominated by Ia. BIA.
J. K. Sexton, Willows, Ca.	Nominated by Ca. BCIA.
Elmer Maddox, Freedom, Ok.	Nominated by PRI.

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Roy A. Wallace
Select Sires Inc.
Rt. 3, Box 126
Plain City, Oh. 43064

Everett J. Warwick
USDA, Rm. 306 No. Bldg.
ARC-West Natl. Prog. Staff, ARS
Beltsville, Md. 20705

Douglas Washburn
Dale Washburn & Son
Harnick RR 1
Harnick, Ia. 51026

Henry W. Webster
109 Polk Hall
N.C. State U.
Raleigh, N.C. 27607

Burt Weichenthal
U. of Ill. Dept. of An. Sci.
Urbana, Ill. 61801

Ray Weilage, Jr.
Natl. Bank of Commerce
Lincoln, Ne. 68508

Bob Wekesser
Lost Creek Ranch
5301 A Street
Lincoln, Ne. 68510

Dan Weppler
Mt. BPA
Mt. State U. An. Sci. Dept.
Bozeman, Mt. 59715

John R. Whaley, III
Wye Plantation
Queenstown, Md. 21658

W. W. Wharton
Oh. State U. An. Sci. Dept.
Columbus, Oh. 43210

Richard L. Willham
Ia. State U. An. Sci. Dept.
Ames, Ia. 50010

Doyle Wolverton
Ia. State U.
2 Northerest Drive
Council Bluffs, Ia. 51501

W. H. Yaw
The Farm Clinic
207 Hill Arcade Bldg.
Galesburg, Ill. 61401

Don Young
Carnation Genetics
Rt. 2, Box 2244
Sunnyside, Wa. 98944

William Zmolek
Ia. State U. An. Sci. Dept.
Ames, Ia. 50010

Keith O. Zoellner
Ks. State U. An. Sci. Dept.
Manhattan, Ks. 66502

W. A. Zollinger
U. of Ne. Soeast Hdqtrs.
Lincoln, Ne. 68503

BEEF IMPROVEMENT FEDERATION

MEMBER REPORTS & YEARBOOK

APRIL, 1973

BEEF IMPROVEMENT FEDERATION

Member Reports & Yearbook

April, 1973

Index

This report is for the program year of 1972. It was prepared and edited by Frank H. Baker, BIF Secretary, Animal Science Department, University of Nebraska, Lincoln, Nebraska 68503 with special assistance from Miss Vicky Kobes. Information contained in the report was submitted by representatives of the organizations or by state extension specialists. Identification of the associate members is (*) and states not affiliated with BIF is (**). It is hoped that all state improvement programs will ultimately affiliate with BIF. No attempt was made to present a grand total of data included in state and national organization reports because of possible duplication of the same data. Apologies are offered for unintentional omissions of key data and undetected errors in the report.

Summary of Participation in Beef Improvement Programs

			Central Stations				Farms & Ranches			Carcass Eval.		Sire Eval.	
No. Reporting	Weaning Records	Yrlg. Records	No. Herds	No. Bulls	No. Brdrs.	No. Sta.	No. Bulls	No. Brdrs.	Total Brdrs. Testing Bulls	No. Brdrs.	No. Sires	No. Brdrs.	No. Sires
						STATE TOTALS							
46 States	475,741	89,324	7,787	12,593	2,609	203	57,833	3,149	4,495	983	1,460	3,175	8,120
						BREED ASSOCIATION TOTALS							
8 Assns.	226,659	64,799	5,262	824	126	15	1,891	258	---	138	225	2,413	393
						PERFORMANCE REGISTRY INTERNATIONAL TOTALS							
	24,945	8,010	---	109	---	---	---	---	---	---	109	---	109

State	Weaning Records	Yrlg. Records	No. Herds	Central Test Stations			Farms & Ranches		Total Brdrs. Testing Bulls	Carcass Eval.		Sire Eval.	
				No. Bulls	No. Brdrs.	No. Sta.	No. Bulls	No. Brdrs.		No. Brdrs.	No. Sires	No. Brdrs.	No. Sires
Ala.	7,225	420	117	145	48	1	425	25	48	2	15	---	---
Ariz.	---	---	---	81	24	1	---	---	24	---	---	---	---
Ark.[1]**	5,000	150	82	160	48	3	600	20	60	3	10	---	---
Ca.	2,053	492	130	438	47	3	1,500	100	147	2	25	---	---
Colo.	4,061	---	32	330	59	2	---	---	59	97	---	5	26
Conn.**	350	30	15	---	---	---	12	1	1	1	2	---	---
Fla.	7,495	269	78	---	---	---	242	10	10	12	12	---	---
Ga.	8,786	490	125	222	89	3	450	14	96	---	---	---	---
Ha.	695	437	13	---	---	---	193	7	7	---	---	10	56
Idaho	23,000	---	235	250	60	3	5,000	100	115	20	30	20	30
Ill.	14,197	2,506	500	25	10	3	900	---	---	---	---	---	---
Ind.**	7,830	1,174	627	71	37	2	387	77	88	145	92	202	149
Iowa	12,584	1,066	211	608	185	2	1,500	150	150	30	60	50	200
Kan.	40,650	6,650	485	620	124	5	5,150	185	190	22	46	---	---
La.*	6,100	300	75	160	34	1	230	8	36	---	---	2	8
Maine**	315	232	14	---	---	---	---	---	---	---	---	---	---
Ky.	5,976	1,914	263	107	43	1	1,829	206	210	---	---	---	---
Mass.	252	78	19	---	---	---	2	1	1	---	---	---	---
Mich.**	3,411	1,227	136	53	36	2	---	---	---	---	---	---	---
Minn.	6,004	1,398	108	56	18	1	1,070	56	63	14	36	108	400
Miss.	5,982	272	85	---	---	---	600	42	42	---	---	85	242

[1] 1971 Data.

State	Weaning Records	Yrlg. Records	No. Herds	Central Test Stations: No. Bulls	Central Test Stations: No. Brdrs.	Central Test Stations: No. Sta.	Farms & Ranches: No. Bulls	Farms & Ranches: No. Brdrs.	Total Brdrs. Testing Bulls	Carcass Eval.: No. Brdrs.	Carcass Eval.: No. Sires	Sire Eval.: No. Brdrs.	Sire Eval.: No. Sires
Mo.	13,809	1,478	488	450	87	6	5,000	240	275	200	300	250	500
Mont.	26,354	7,586	338	1,181	237	4	4,919	186	423	---	---	---	---
Nebr.	19,000	2,072	171	516	99	3	1,600	120	140	40	70	99	174
Nev.**	---	---	---	95	13	1	510	8	18	1	2	---	---
N.H.	107	36	12	---	---	---	4	3	3	---	---	3	4
N.J.**	50	20	3	5	3	2	50	3	4	4	4	4	4
N.M.	327	122	25	122	25	1	200	4	26	10	20	27	65
N.Y.	839	73	44	37	18	1	50	5	20	5	8	5	8
N.C.	12,344	370	223	135	56	1	223	36	70	3	3	223	832
N.D.	10,958	300	117	80	20	1	3,393	150	150	10	10	10	10
Ohio	13,350	2,500	350	92	44	1	200	2	46	22	34	100	194
Okla.**	1,472	109	24	1,342	200	7	2,500	250	300	40	80	300	750
Ore.	64,550	23,300	440	795	65	2	5,650	290	330	110	240	330	475
Pa.	1,521	44	47	15	5	3	35	2	6	11	14	6	9
S.C.	4,466	---	102	90	26	1	---	---	30	---	---	---	---
S.D.	56,500	10,000	480	350	65	5	3,300	160	200	35	75	480	1,700
Tn.	6,550	550	194	69	30	1	240	65	81	---	---	---	---
Tx.	43,849	10,532	596	2,892	488	123	5,549	355	783	102	218	799	2,190
Utah	5,327	4,886	117	77	30	1	1,643	79	79	2	2	3	1
Va.	10,447	1,666	165	124	42	1	664	30	52	3	6	3	5
Ver.**	512	150	53	---	---	---	---	---	---	---	---	---	---
Wash.	12,000	4,000	105	158	37	1	1,250	16	50	20	25	30	50
W.V.	7,627	225	243	112	42	1	113	4	4	---	---	4	15
Wisc.	1,816	200	100	270	92	2	110	92	---	---	---	---	---
Wyo.	---	---	---	260	23	1	540	47	58	17	21	17	23

Assn.	Weaning Records	Yrlg. Records	No. Herds	Central Test Stations			Farms & Ranches		Total Brdrs. Testing Bulls	Carcass Eval.		Sire Eval.	
				No. Bulls	No. Brdrs.	No. Sta.	No. Bulls	No. Brdrs.		No. Brdrs.	No. Sires	No. Brdrs.	No. Sires
Angus	56,303	20,138	924	---	---	---	---	---	---	---	---	30	120
AHA	102,000	40,800	1,400	---	---	---	---	---	---	109	204	71	151
APHA	13,303	1,418	300	---	---	---	---	---	---	---	---	---	---
R.Ang.	6,625	877	975	374	86	15	870	178	---	---	---	---	---
Shtn.[1]	290	35	12	450	40	---	---	---	---	20	12	12	29
Sim.	44,923	1,021	1,421	---	---	---	1,021	80	---	9	9	2,300	93
Char.	3,015	510	155	---	---	---	---	---	---	---	---	---	---
Gelb.	200	---	75	---	---	---	---	---	---	---	---	---	---
PRI[1]	24,945	8,010	---	109	---	---	---	---	---	---	109	---	109

[1] 1971 Data.

REPORT OF BCIA ACTIVITIES

ALABAMA BEEF CATTLE IMPROVEMENT ASSOCIATION, INC.

201 Extension Hall
Auburn University
Auburn, Alabama 36830

John Besh, President
Jimmy Collins, Vice Pres.
W. W. Harris, Treasurer
Richard E. Deese, Secretary — 114 Members

The ABCIA offers its members data processing of weaning records, on-the-farm bull testing and central bull testing.

The Association co-sponsored and hosted the Eastern Regional BIF Conference at Montgomery in 1972. The ABCIA sponsors its annual meeting and one annual sale of on-the-farm tested bulls in conjunction with a beef conference at Auburn.

BEEF CATTLE IMPROVEMENT COMMITTEE, ARIZONA CATTLE GROWERS ASSOCIATION

Adams Hotel
Room 274
Phoenix, Arizona 85004

Vince Butler, President
Milton Sechrist
Chairman, BCIC
2425 E Thomas Rd., Suite 4
Phoenix, Arizona 85016 — 24 Members

ABIC sponsors bull testing and provided an award for Arizona's carcass show winner at the Arizona National Show. They plan an inventory of performance testing for 1973 and a series of publications on testing.

ARKANSAS** (1971 Report)

Carl E. Lueker
Extension Animal Husbandman
P. O. Box 391
Little Rock, Arkansas 72203

Arkansas offers bull testing (station and farm), cow herd test and data processing.

Educational activities include field days at the bull test stations, short courses on beef improvement, beef cattle clinics and feeder calf sales.

CALIFORNIA BEEF CATTLE IMPROVEMENT ASSOCIATION

150 Animal Science Bldg.
University of California
Davis, California 95616

Vincent S. Meyer, President
L. H. McDaniel, Vice Pres.
Charles C. Wagner, Secy-Treas. — 123 Members

The CBCIA offers a limited data processing service--calf weaning and postweaning reports (includes listings by sire, index, tattoo number and breed, within sex); carcass merit program. CBCIA also provides two Central Bull Tests and Sales (one in Northern Calif. and the other in Central Calif.). CBCIA emphasizes the demonstration of performance procedures to breeders.

The CBCIA sponsored a field day and the annual meeting. CBCIA's programs are presented at numerous meetings by members and extension specialists.

CBCIA has sponsored research projects such as (1) the short scrotum method of castration, (2) carcass bone, muscle and fat content correlation by the Butterfield method, (3) multiple births, (4) predicting performance and carcass merit by a rib probe technique and (5) semen testing.

COLORADO BEEF CATTLE IMPROVEMENT ASSOCIATION

Animal Science Department
Colorado State Univ.
Ft. Collins, Colo. 80521

Ben Kettle, President
Laurence Huntington, Vice Pres.
Ray Blackford, Secy-Treas.
Jim Carpenter, Ed. Advisor

98 Members

CBCIA offers its members a central bull testing station, data processing on record of performance weaning and yearling records and on feedlot gain and carcass evaluation programs. Colorado's feedlot gain and carcass evaluation programs for 1971 were conducted at two locations in the state. One had 1,239 cattle from 109 ranches and the other had 127 cattle from 17 ranches.

CBCIA sponsored a field day at Miller Feedlot, LaSalle, Colo. on July 17. About 250 people made up of ranchers, feeders, packers, bankers, scientists and extension personnel attended this function.

CBCIA conducted a preconditioning trial involving 414 head of calves from 20 ranches in Colo. This trial was conducted in cooperation with the School of Veterinary Medicine and Animal Science Department of Colorado State University.

The CBCIA sponsored its annual meeting held in conjuction with the mid-winter meeting of the Colorado Cattlemen's Assn. in Colorado Springs.

CONNECTICUT BEEF CATTLE IMPROVEMENT PROGRAM**

Dept. of Animal Industries
University of Connecticut
Storrs, Connecticut 06268

15 Members

The CBCIP offers data processing and educational activities through the Extension Specialist

FLORIDA BEEF CATTLE IMPROVEMENT ASSOCIATION

313 Rolfs Hall
Univ. of Florida
Gainesville, Florida 32601

Ralph Sexton, President
Mike Milicevic, Vice Pres.
Orie Lee, Treas.
R. G. Sand, Secy.

78 Members

FBCIA offers its members data processing and assistance in grading for on-the-farm testing programs.

Research is now in progress on adjustment factors and genetic principles on all data collected during the last 14 years.

GEORGIA BEEF CATTLE IMPROVEMENT ASSOCIATION, INC.

Coop. Extension Service
University of Georgia
Athens, Georgia 30602

Marion Barnett, Jr., President
Fairfax Mullen, Vice Pres.
Julius Lazenby, Mansfield, Secy-Treas.

392 Members

The GBCIA offers data processing for weaning and yearling cattle. The Association sponsors one of our three bull testing stations in the state. The Association sponsors educational displays and meetings for improvement of beef production.

The GBCIA makes all their data available to the Animal Science Dept. for any analysis that they want to do for research activity.

The GBCIA helps sponsor the state FFA and 4-H judging teams that travel out-of-state.

HAWAII BEEF CATTLE IMPROVEMENT ASSOCIATION

James Nolan, Jr.
Animal Sciences Dept.
Univ. of Hawaii
1825 Edmondson Rd.
Honolulu, Hawaii 96822

Jack Greenwell, President
George Schattauer, Vice Pres.
Allen Wall, Secy-Treas.

13 Members

HBCIA offers its members data processing of weaning and postweaning records, grading service and breeding plans based on accumulated records.

The organization sponsored one educational meeting this year emphasizing growth and carcass evaluation.

Research of an applied nature is being conducted to demonstrate to members and interested commercial cattlemen sire differences under feedlot conditions. It is hoped that this may lead to support of a bull testing station and a carcass evaluation program for the members of HBCIA.

The HBCIA sponsored the Mealani Beef Cattle Field Day, a one-day program designed to keep the beef cattle producers up-to-date on advances made in the industry and at the University of Hawaii.

IDAHO CATTLEMEN'S ASSOCIATION BEEF CATTLE IMPROVEMENT COMMITTEE

2230 Main Street
Boise, Idaho 83706

Ralph Steele, President
Bob Henderlider, Exec. Secy.

2,698 Members

The Idaho BCIC provides a full program of record of performance. Production testing, performance testing and progeny evaluation are provided. Records are data processed at the University of Idaho if the cooperator desires.

The IBCIC sponsors field days at central test stations and the BCI manual.

ILLINOIS BEEF IMPROVEMENT FEDERATION

326 Mumford Hall
Univ. of Ill.
Urbana, Ill. 61801
Gary Ricketts, Advisor

Ted Shambaugh, President
Leland Wenzel, Vice Pres.
Larry Crandall, Secy-Treas

22 Members

The Illinois BIF offers its members data processing for both weaning and post-weaning records. The Federation sponsors educational activities, field days and clinics concerning beef testing programs.

Three cow-calf tours were sponsored this year. Two new bull testing stations were opened and others are expected next year. A new publication on bull testing procedures was released this year.

INDIANA COOPERATIVE EXTENSION SERVICE AND INDIANA CATTLEMENS ASSOCIATION**

Lilly Hall
Purdue Univ.
Lafayette, Ind. 47907

George Morten, President
Ralph deKoch, Vice Pres.
K. G. MacDonald, Secy., Ind. Cattlemens Assn.
L. A. Nelson, Coordinator Ind. Beef Perf. Testing Program

1300 Members

Indiana offers its members data processing (cost of data processing is borne by Indiana Cooperative Extension Service).

The Indiana Beef Performance Testing Program is sponsored by the Indiana Cooperative Extension Service and ICA.

Events sponsored include the Indiana Cattle Feeders Day, Indiana Cow-Calf Field Days, Indiana Performance Tested Bull Sale, Hoosier Beef Show, and the Southwestern Indiana Cattle Feeders Day and county meetings.

IOWA BEEF IMPROVEMENT ASSOCIATION

123 Airport Road
Route 2
Ames, Iowa 50010

Frank C. Myatt, Lost Nation, President
J. David Nichols, Anita, Vice Pres.
Robert C. deBaca, Ames, Secy.
Tom Chrystal, Coon Rapids, Treas.

300 Members

The IBIA offers its members data processing (weaning, yearling, carcass); bull testing (3 central stations, bull testing on farm with 28-day weights, steer testing in central stations and on farm); bull sales (from central tests and on farm); and heifer sales (from on farm). Also semen-test and backfat probe tested bulls.

Educational activities include: field days, annual meeting, newsletter, speaking engagements for officers and directors, special displays at cow-calf clinics and the state fair and the IBIA co-sponsored the BIF annual meeting in Omaha.

KANSAS LIVESTOCK ASSOCIATION BEEF IMPROVEMENT COMMITTEE

2044 Fillmore
Topeka
Kansas 66604

Henry C. Gardener, Chairman
Keith Zoellner, Weber Hall, KSU, Manhattan, Secy.

The Kansas Livestock Association BIC offers its members bull testing. The Association is also sponsoring the Beef Carcass Data Service for Kansas.

KENTUCKY CATTLEMENS ASSOCIATION BEEF IMPROVEMENT COMMITTEE

803 Ag Sciences Center
Univ. of Kentucky
Lexington, Kentucky 40506

Carl Mikel, President
Jere Cannon, Vice Pres.
A. W. Young, Secd. Vice Pres.
Russell Bredahl, Secy.
Robert Brewer, Treas.

85 Members

The Association provides data processing for on-farm testing, coordinates bull testing and distributes beef carcass data service eartags.

The Association sponsors activities associated with two sales for on-farm performance tested cattle and one central test station sale.

LOUISIANA BEEF CATTLE IMPROVEMENT ASSOCIATION*

Room 239
Knapp Hall
LSU
Baton Rouge, La. 70803

John Barry, Baton Rouge, President
H. F. Keever, Lake Charles, Vice Pres.
John Sullivan, Jr., Baton Rouge, Secy-Treas.

25 Members

The LBCIA offers to its members data processing of the cow herd; yearling records; bull testing (on-the-farm and central station). A spring field day and annual meeting is held. A bull sale is sponsored in the fall.

The LBCIA prepared a slide presentation of performance testing programs for use throughout the state. Programs were presented to producers on an area basis. Special training sessions are also sponsored for county agents.

MAINE BEEF CATTLE IMPROVEMENT PROGRAM**

Department of Agriculture
Augusta, Maine
James Worthley
Livestock Specialist

14 Members

MASSACHUSETTS BEEF CATTLE IMPROVEMENT ASSOCIATION

University of Mass.
Animal Science Dept.
Amherst, Mass. 01002

Marcel Rondeau, President
David Keizer, Vice Pres.
John Hill, Treas.
Byron Colby, Secy.

24 Members

MBCIA services offered to its members are data figured on calculator, weighing and grading, and bull testing on farms (there may be a regional bull testing unit set up in New York State).

The MBCIA works with other groups and the industry each year in sponsoring educational events.

MICHIGAN BEEF CATTLE PERFORMANCE TESTING PROGRAM**

105 Anthony Hall
Animal Science Dept.
Michigan State University
East Lansing, Michigan 48823

130 Members

Participants in the Performance Testing Program are offered on-farm weighing and grading at both weaning and at a year of age.

After cattle are enrolled in the program and have been weighed and graded, the records are processed by use of automatic data processing equipment. Breeders receive the following information: 1) individual 205-day adjusted weaning weights, 2) weight ratio, 3) individual conformation grade, 4) grade ratio, 5) ranking by sires, 6) summary of the performance by individual sires and ranking of each calf by sex, within the sire group and 7) overall summary of herd performance. In addition, individual cow performance records plus code sheets for both bulls and cows are made available to the breeder.

MINNESOTA BEEF CATTLE IMPROVEMENT ASSOCIATION

101 Peters Hall
Univ. of Minn.
St. Paul, Minn. 55101

Robert Sallstrom, President
Maurice Mitchell, Vice Pres.
James Bryan, Secy-Treas.
Charles Christians, Ed. Advisor

330 Members

Data processing is offered to MBCIA members through two systems. One is through the University of Minnesota Extension Service computing service and the second is through each of the breed association's programs. The BCIA works cooperatively with each association. If the producer is enrolled in his national program, he automatically is on the MBCIA program, or vice versa.

The Association sponsored: 1) Meat and Livestock Clinic, 2) area and county performance testing meetings, 3) a performance tested steer contest in 4-H and youth programs in each county (the top performing steer in each county receives a trophy), and 4) annual meeting and central test station field day.

MISSISSIPPI BEEF CATTLE IMPROVEMENT ASSOCIATION, INC.

Box 5425
State College
Mississippi

J. A. Howarth, President
W. M. Swoope, State College, Secy-Treas.
Mickey Black, Sidon, Vice Pres.

193 Members

The MBCIA offers its members data processing and bull testing.

The Mississippi BCIA in conjunction with the Extension Service, sponsored four area performance testing workshops primarily for county extension agents and interested cattlemen. Results are already seen from this effort in that there has been an increase in participation in the program, with the supervising of weighing and grading being done by county extension agents and/or cattle committees.

MISSOURI BEEF CATTLE IMPROVEMENT ASSOCIATION

John W. Massey
132 Mumford Hall
University of Mo.
Columbia, Mo. 65201

Wilford Dugan, President
Everett Forkner, Vice Pres.
Myra Bryson, Secy.
Keith Dunn, Treas.

700 Members

The MBCIA cooperates in an advisory capacity with two central testing stations.

Educational activities included the state and area cow-calf clinics.

Research activities include supplying funds to evaluate bulls with whole body counter.

Two state-wide performance tested bull and heifer sales and five to ten area performance tested sales are sponsored.

MONTANA BEEF PERFORMANCE ASSOCIATION

Room 604
Cobleigh Hall
Montana State Univ.
Bozeman, Mont. 59715

Dale Davis, President
Bob Sitz, Vice Pres.
Dan L. Weppler, Exec. Secy.
Wayne Gibson, Treas.

650 Members

The Montana BPA offers its members data processing which includes: nursing ratios, gain ratios, yearling ratios, IPR indexes, sire summaries, performance pedigree credit, IPR certificates, plus the various adjusted daily gains, adjusted age weights, adjusted age of dam factors, adjusted inbreeding coefficients, etc. They calculate all information for all bull testing stations located in Montana as well as for individual members. Other services available are: various types of cow cards, signs, computer data storage notebooks, calving notebooks, scales, etc. The BPA publishes a bi-monthly newsletter and an annual membership directory.

The Montana BPA works with various groups around the state presenting slides, examples of data processing, examples of services available, and occasionally accompany guest speakers from the research branch of the agriculture department at MSU.

Presently the BPA is working closely with the Agriculture Department at MSU in checking various age of dam adjustment factors basically to see if there is a significant difference between breeds.

The annual convention hosts nationally known speakers. This is a two-day event. MBPA had a display booth promoting performance testing at their two state fairs as well as some county fairs. The MBPC contributes to many county and area educational meetings and field days.

NEBRASKA BEEF CATTLE IMPROVEMENT ASSOCIATION

209 Marvel Baker Hall
University of Nebraska
Lincoln, Ne. 68503

Roger French, Mullen 69152, President
Bob Mueller, Kimball 69145, Vice Pres.
Ken Messersmith, Alliance 69301, Treas.
Jim Gosey, Univ. of Ne., Lincoln 68503, Secy.

183 Members

The NBCIA sponsors three Nebraska bull test stations and four feedlot locations for steer testing, data processing service through the South Dakota Association.

The NBCIA publishes a bi-monthly newsletter and a bi-annual membership directory.

The NBCIA sponsors its annual meeting and presents a Sire of the Year Award, Commercial Man of the Year Awand and a Purebred Breeder of the Year Award.

NEVADA BEEF CATTLE IMPROVEMENT ASSOCIATION**

Animal Science Division
University of Nevada
Reno, Nevada 89507

Ed Sarman, Gardnerville, President
Steve Biddinger, Fallon, Vice Pres.
Laura Lingenfelter, Reno, Secy-Treas.

10 Members

The NBCIA offers bull testing, progeny testing and commercial steer samples at its central testing station. The BCDS eartag program is also sponsored by NBCIA.

The NBCIA field day is held annually.

NEW HAMPSHIRE BEEF PRODUCERS ASSOCIATION

Durham
New Hampshire 03824

David Hamilton & James Roantree, Co-Chairmen
James Roantree, Treas.

12 Members

NEW MEXICO BEEF CATTLE PERFORMANCE ASSOCIATION

Northeastern Branch Sta.
Tucumcari, N. M.
or
Box 3AE--NM State Univ.
Las Cruces, N. M. 88001

Gene Robberson, President
A. L. Grau, Secd. Vice Pres.
John Hicks, First Vice Pres.
George Meeks, Third Vice Pres.
Ted Peabody, Secy.
John Mahill, Treas.

50 Members

The central bull test offers the members a basis to select sires for future use. The Bull Session newsletter is published by the N. M. Extension Service.

The New Mexico Beef Cattle Performance Association has had their Annual Performance Tested Bull Sale in March of every year for the past 10 years.

NEW YORK BEEF CATTLEMENS ASSOCIATION

114 Morrison Hall	Owen Boyd, President	
Cornell University	Ardeau Warner, Vice Pres.	
Ithaca, N. Y. 14850	Ellis Pierce, Secy.	
	Roger Bradley, Treas.	649 Members

The NYBCA offers its members data processing.

The NYBCA sponsors educational meetings, feeder calf sales, marketing and grading demonstrations, a state-wide tour and their annual meeting.

NORTH CAROLINA BEEF CATTLE IMPROVEMENT PROGRAM

109 Polk Hall	Charles Lockhart, President	
N.C. State Univ.	Jerry White, Vice Pres.	
Raleigh, N.C. 27607	C. M. Reese, Secy-Treas.	250 Members

The N.C. Beef Cattle Improvement Program offers its members preweaning (205 day weight), postweaning on-the-farm 140 day test, central bull testing station and yearling weights for heifers (optional).

County, area and state meetings and field days are sponsored.

NORTH DAKOTA BEEF CATTLE IMPROVEMENT ASSOCIATION, INC.

University Station	Soren Iverson, President	
Fargo	Gerold Efferty, Vice Pres.	
North Dakota 58102	Lloyd Nygard, Treas.	
	M. A. Kirkeide, Secy.	120 Members

The NDBCIA offers data processing to its members which is made available through the University. The Association cooperates with two bull testing stations and offers both sire certification and cow certification programs.

The NDBCIA sponsors an educational program at its annual meeting. The Association cooperates with fairs on the carcass evaluations. The Association also sponsored calf grading schools and the computer cow game. New brochures and publications on beef improvement were published this year.

OHIO BEEF CATTLE PRODUCTION TESTING PROGRAM

2029 Fyffe Rd.	W. W. Wharton	
Ohio State Univ.		
Columbus, Ohio 43210		350 Members

The Ohio BCPTP offers to its members data processing of 205/365/550 day

data, lifetime cow records including days between calvings (progeny record of each cow), bull testing station and carcass data. The Ohio data processing service is used by breeders in Pennsylvania and Connecticut.

The Ohio BCPTP cooperates with Select Sires, Inc. in sire analysis with cooperating herds of 300 cows. OBCPTP processes records for select sires for out-of-state research herds and they cooperate with Ohio Research & Development Center in processing and analyzing research herds (breed differences).

The Ohio BCPTP sponsors displays and exhibits at state cattle meetings, exhibited at Farm Science Review on PT and conducted grading demonstrations at the 1971 Farm Science Review (approximately 6,000 people).

BEEF CATTLE IMPROVEMENT COMMITTEE OF OREGON CATTLEMENS ASSOCIATION

212 Withycombe
Oregon State Univ.
Corvallis, Oregon 97331

Bill Wolfe, Chairman
W. Dean Frischknecht, OSU,
Corvallis 97331, Secy.

440 Members

Agents weigh and grade on ranches and at test stations. Record analysis is provided for those not wanting computerized records (prefer breed programs & PRI for data processing). Educational meetings are conducted for understanding and evaluation of testing and related procedures.

The BCIC of Oregon Cattlemens Association had 36 steer carcass contests or demonstrations involving 900 steers and 4400 people in 1972. The Computer Cow Game was conducted 6 times for 580 participants. A mobile refrigerated beef exhibit trailer brings the story of quality beef to approximately 40,000 people each year.

There are now 170,000 commercial cows in Oregon which are individually identified. During 1971, detailed carcass information was collected on 3560 head of steers. Oregon's Progeny Testing Station tests 444 steers representing progeny of 39 sires.

The Oregon BCIC co-sponsored, with the state breed associations, cattlemen and the Beef Council, the Annual Beef Day at Oregon State University, the Annual Field Day at the Progeny Testing Station and the Annual Field Day at RSI Bull Testing Station. The BCIC also sponsors the beef carcass service eartag program and has distributed 3500 eartags.

PENNSYLVANIA BEEF CATTLE IMPROVEMENT PROGRAM

324 Animal Industry Bldg.
University Park
Pa. 16802

Fred E. Smalstig, President
Gilbert Watts, Vice Pres.
Ben Morgan, Secy.

115 Members

Pennsylvania conducts on-farm testing programs using Ohio data processing service. An animal evaluation center at the University handles 10 sire groups for growth data and complete carcass evaluation.

SOUTH CAROLINA BEEF CATTLE IMPROVEMENT ASSOCIATION

Room 230
P & A Bldg.
Clemson, S.C. 29631

Ben Oswald, Allendale, President
Jim Suber, Vice Pres.
L. F. Cato, Secy.
Mell Gerard, Treas.

102 Members

The SCBCIA offers data processing and calf weighing and grading to its members.

The South Carolina BCIA presents plaques for the top producer of each breed annually.

SOUTH DAKOTA LIVESTOCK PRODUCTION RECORDS ASSOCIATION, INC.

801 San Francisco St.
Rapid City
South Dakota 57701

Bob Healy, President
Leo Hamm, Vice Pres.
Mick Crandall, Secy.
Gunther Flier, Treas.
Lowell Anderson, Director of Field Activities

800 Members

The S. D. Livestock Production Records Association offers a complete data processing service (weaning, yearling and cow summaries) and coordination of bull testing stations, individual and herd certification for qualified individuals and herds. The Association also supplies field books and all necessary forms for keeping the records. The Association also sells ear tags and scales to members. A slide series on European cattle was developed.

The Association is assisting with research on weaning weights of cross-bred versus straightbreds. The Association also contributed to the weather modification research.

TEXAS & SOUTHWEST CATTLE RAISERS ASSOCIATION

410 East Weatherford St.
Fort Worth
Texas 76102

William C. Donnell, President
Hilmar Moore, Vice Pres.
Don C. King, Secy.
L. A. Maddox, Beef Improvement Advisor

TENNESSEE BEEF CATTLE IMPROVEMENT PROGRAM (1971 Report)

University of Tennessee
P. O. Box 1071
Knoxville, Tenn. 37901
ATT: Dr. Haley M. Jamison

270 Members

The TBCIP processes birth to weaning data for all participants. A central test station for participants and supervision of the on-the-farm bull testing program is available.

A number of educational activities and events were sponsored by the TBCIP in 1971.

Three research projects were conducted in 1971.

UTAH BEEF IMPROVEMENT ASSOCIATION

88 West
100 North Federal Bldg.
Provo, Utah 84601

Gayle Evans, President
Preston Marchant, Vice Pres.
Clair R. Acord, Secy-Treas.

50 Members

Data processing for on-the-farm testing and bull testing is available to members of the UBIA.

Activities include a field day, reporting results of bulls and discussing programs, a tour for members, and a sale for bulls on test.

VIRGINIA BEEF CATTLE IMPROVEMENT ASSOCIATION

Agnew Hall
Va. Tech.
Blacksburg, Va.

W. A. Stuart, Jr., President
Robert Alger, Vice Pres.
Joseph C. Kelley, Secy-Treas.
A. L. Eller, Advisor

250 Members

Services offered to members of the VBCIA are 1) on-farm weighing and grading of calves and yearlings, 2) computer processing of calf and yearling data, 3) central bull feed tests and 4) regular news correspondence to members including a periodic newsletter "The Bull Sheet."

Research activities included testing a modified grading procedure based on frame-size and fatness. Genetic principles are researched in using records collected in the program. Beef Carcass Data Service tags are sponsored to assist members in carcass evaluation.

Educational activities include cooperating with other cattle interests in an annual convention. A series of member analyses meetings are also held.

WASHINGTON BEEF CATTLE IMPROVEMENT ASSOCIATION

121 Clark Hall
Washington State Univ.
Pullman, Wa. 99163

L. C. Chesnut, President
Lawrence Berg, Vice Pres.
Howard Copenhaver, Treas.
Bill McReynolds, Secy.

60 Members

WBCIA members are offered data processing, bull testing, F1 heifer certification and certification of breeding bulls. The Beef Carcass Data Service is available to all cattlemen in the state.

The WBCIA co-sponsored the Washington Beef Cattle Improvement Day held in conjunction with the test station sale.

WEST VIRGINIA BEEF CATTLE PERFORMANCE TESTING PROGRAM

Agri. Science Bldg.
West Virginia University
Morgantown, W. Va. 26506

Sherman Beard, President
H. L. Reggle, Vice Pres.
Joe Emch, Secy.
Ben Wamsley, Ed. Advisor

259 Members

The members are offered data collection and processing on calfhood program, central bull testing program and sale, on-farm bull testing and replacement heifer sale (performance records required).

WISCONSIN BEEF IMPROVEMENT ASSOCIATION

224 Stock Pavilion
Madison
Wisconsin 53706

Lowell Keach, President
Don Udelkoven, Vice Pres.
Vern Felts, Secy.
Carl Hirschinger, Treas. — 340 Members

Data processing and bull testing are offered to members of the WBIA.

Sonoray demonstrations, and performance exhibits at field days are key educational activities. Special programs are offered at the bull sale. Beef Carcass Data Service eartags are also sponsored for members.

WYOMING BEEF PERFORMANCE ASSOCIATION

Box 3354
University Station
Laramie, Wyoming

Ed Barnes, President
Marilyn Jarvis, Secy-Treas. — 15 Members

The Association sponsors the bull testing activities.

REPORT OF NATIONAL ASSOCIATION ACTIVITIES

AMERICAN ANGUS ASSOCIATION

3201 Frederick Boulevard
St. Joseph
Missouri 64501

Robert Swain, President
Sam Fullerton, Vice Pres.
Lloyd D. Miller, Exec. Secy. — 46,000 Members

The AAA offers its members production measure, carcass evaluation, herd classification and the National Sire Evaluation Program.

AMERICAN HEREFORD ASSOCIATION

Hereford Drive
Kansas City
Missouri 64105

Alfred Meeks, President
P. T. White, Vice Pres.
W. T. Berry, Jr., Exec. Vice Pres.
Craig Ludwig, Director of Research & TPR — 11,435 Members

Data processing for calf and yearling records is offered to anyone enrolled in the TPR program. The AHA staff assists and supervises the Hereford progeny testing program in five cooperating feedlots. AHA assists with 48 state field days and 5 to 10 area conferences.

At Texas Tech the AHA, with cooperation from Texas Tech, is measuring fattening differences between bulls, steers and heifers at various ages and of different body types.

AMERICAN-INTERNATIONAL CHAROLAIS ASSOCIATION

1610 Old Spanish Trail
Houston
Texas 77025

Bill Campbell, President
Walker Wilson, Vice Pres.
Harold Demorest, Treas.
J. Scott Henderson, Exec. Secy.
Mrs. D. E. Barns, Recording Secy.

18,520 Members

The Charolais Herd Improvement Program (CHIP) is offered to members. This is a newly initiated data processing service that is complete from breeding through all stages of production including carcass data, and sire and dam summaries. The system is designed to combine the records necessary for registration and performance plus computer printed applications for registration are available.

The AICA sponsored a leadership conference for junior Charolais breeders stressing production techniques including performance testing.

Research projects financially supported by AICA: 1) Calving Difficulty Study at the US Range Livestock Experiment Station, Miles City, Mont., 2) Female Fertility Study at the US Range Livestock Experiment Station, Miles City, Mont., 3) Sexual Behavior and Fertility of Charolais Bulls, Pa. State Univ., 4) Study of Double Muscling, Texas A&M, 5) Study of Double Muscling, Univ. of Cal. Support is also given to several production studies by assisting in the enlistment of breeder cooperation to provide needed semen and/or cattle.

AMERICAN POLLED HEREFORD ASSOCIATION

4700 East 63rd Street
Kansas City
Missouri 64130

Orville K. Sweet, President
C. K. Allen, Ed. Director

771 Members

Data processing, bull testing, progeny testing and national sire ranking are offered members of the APHA.

In 1972 APHA sponsored the Cattlemens Conference at Fort Collins, Colo. APHA collected weights, ages, fat thickness and skeletal measurements of cattle in leading Polled Hereford Shows. Performance information and composite judging was used in judging. APHA supports research at Penn. State on genetic defects.

AMERICAN SHORTHORN ASSOCIATION

8288 Hascall Street
Omaha
Nebraska 68124

Lyle V. DeWitt, President
R. B. Stimson, Vice Pres.
C. D. Swaffar, Secy.
Ted L. Aegerter, Asst. Secy.

7,000 Members

Herd classification and records of performance are available to members.

AMERICAN SIMMENTAL ASSOCIATION

P. O. Box 24
Bozeman
Montana 59715

Jerry Moore, President
Dale Cutler, Vice Pres.
Rob Brown, Treas.

2,402 Members

The members of the American Simmental Association are offered complete data processing on performance and a performance pedigree which includes data on birth, calving, weaning, yearling, carcass, most probable producing ability for the cows, and the national sire summary for the bulls.

AMERICAN GELBVIEH ASSOCIATION

Rt. 1, Box 126
Newkirk
Oklahoma

Gallagher Rule, President
Jack Shoup, Vice Pres.
Mitchell Dobson, Secy.
Carl Foster, Treas.

135 Members

Performance data and performance pedigrees are available through cooperative programs with PRI.

RED ANGUS ASSOCIATION OF AMERICA

Box 776
Denton
Texas 76201

Kenneth Thatcher, President
Julius Todd, Exec. Secy.

975 Members

The Association provides computerized data processing service and recently added breeding values for four traits printed on pedigrees.

Educational activities include the Computer Cow Game for members, field days and meetings on regional or state basis and the annual convention.

PERFORMANCE REGISTRY INTERNATIONAL

P. O. Box 133
Joplin
Missouri 64801

Tom Burch, Mill Creek, Ok., Pres.
Wm. Graham, Miami Lakes, Fla., Treas.
Carlton Corbin, Eureka, Ks., Vice Pres.
Glenn Butts, Exec. Secy.

1,843 Members
(1971 Report)

Data processing and registry are offered PRI members.

Performance pedigrees are an important phase of the PRI program. PRI has printed 20,000 performance pedigrees. Twenty-five Certified Meat Sire Award Certificates were issued in the last six months of 1972. Of approximately 100,000 cows enrolled in PRI programs, 90% have at least two performance reports certified.

PRI sponsors educational activities at their annual meeting.

NORTH AMERICAN LIMOUSIN FOUNDATION

Livestock Exchange Bldg.
Denver
Colorado 80216

Burwell M. Bates, President
Bryan Harris, Vice Pres.
R. H. Vantrease, Ex. Vice Pres.
David Allard, Secy.
Fred DeMier, Treas.

INTERNATIONAL MAINE-ANJOU ASSOCIATION

P. O. Box 5636
Kansas City
Missouri 64102

Calvin Fryar, President
Ancel Armstrong, Vice Pres.
Bill Webb, Secy-Treas.
Richard Sneddon, Ex. Director

AMERICAN BRAHMAN BREEDERS ASSOCIATION

4815 Gulf Freeway
Houston
Texas 77023

R. W. Mayronne, Jr., President
M. E. Hammond, Vice Pres.
Harry Gayden, Secy.

RED POLL CATTLE CLUB OF AMERICA

3275 Holdrege Street
Lincoln
Nebraska 68503

LaVerne S. Russell, President
Paul B. Hanks, Vice Pres.
Wendell H. Severin, Secy.

NATIONAL ASSOCIATION OF ANIMAL BREEDERS

512 Cherry Street
Columbia
Missouri 65201

W. L. Campbell, President
Robert E. Walton, Vice Pres.
William Durfey, Secy.

AMERICAN NATIONAL CATTLEMENS ASSOCIATION

1001 Lincoln Street
Denver
Colorado 80218

John Trotman, President
William McMillan, Ex. Vice Pres.
George Spencer, Ex. Vice Pres.
Gordon VanVleck, Vice Pres.
J. Burton Eller, Secy.

INTERNATIONAL BEEF BREEDERS*

P. O. Box 29009
Denver
Colorado 80229

Walter Rowden, BIF Representative

INTERNATIONAL BRANGUS BREEDERS ASSOCIATION*

908 Livestock Exchange Bldg.
Kansas City
Missouri 64102

Royal Buckley, President
Roy Lilley, Exec. Secy.

CURTISS BREEDING SERVICE*

Box 7205
Lexington
Kentucky 40502

Melvin C. Kenley, President
Bernard M. Jones, Jr., BIF Rep.

CARNATION BREEDING SERVICE*

Carnation
Washington 98014

C. L. Hall, General Manager
Ed Harmon, BIF Rep.
Rt. 2, Box 243
Ft. Lupton, Colo.

MIDWEST BREEDERS COOP.*

Shawano
Wisconsin

Robert Ellis, President
Robert Fincham, BIF Rep.
2212 S Duff
Ames, Iowa 50010

NOBA, INC.*

Box 607
Tiffin
Ohio 44883

Max Drake, Manager
Don Hutzel, BIF Rep.

AMERICAN BREEDERS SERVICE*

DeForest
Wisconsin 53532

Robert Walton, President
Ray Woodward, BIF Rep.
Box 1195
Bozeman, Mont. 59715

SELECT SIRES*

1224 Alton Darby Rd.
Columbus
Ohio

Roy Wallace, BIF Rep.

NAME AND ADDRESS OF CENTRAL BULL TESTING STATIONS

This list was compiled by the Beef Improvement Federation Central Test Committee. The addresses were obtained from state extension specialists. This listing does not imply that the stations are sponsored by nor certified by B.I.F. or the respective state B.C.I.A.'s. The list is being made available solely to facilitate communication.

ALABAMA

Auburn University Test Station
Animal Science Department
Auburn University
Auburn, Alabama 36830
Operator: Dr. Troy B. Patterson

ARIZONA

Arizona Beef Cattle Improvement Station
Tucson, Arizona 85721
Operator: Dr. Bruce Taylor, Supervisor
University of Arizona

ARKANSAS

South West Branch Experiment Station
P.O. Box 573
Hope, Arkansas 71801
Operator: Mr. Cecil Bittle

Newport Beef Substation
P. O. Box 663
Newport, Arkansas 72112
Operator: Mr. William T. Wallace

Main Experimental Station
Department of Animal Science
University of Arkansas
Fayetteville, Arkansas 72701
Operator: Dr. C. J. Brown

CALIFORNIA

Will Gill Feedyard
25719 Avenue 13
Madera, Ca. 93637
Operator: Will Gill, Jr.
Contact: Ken Ellis, Tech. Advisor
Calif. BCIA
University of California
Davis, Ca. 95616

Cal Poly Bull Test Station
Calif. State Polytechnic College
San Luis Obispo, Ca. 93401
Operator: Frank Fox

Bill Peters Ranch
Route 1, Box 593
Montague, Ca. 96064

Operator: Bill Peters
Contact: Ken Ellis, Tech. Advisor
Calif. BCIA
University of California
Davis, Ca. 95616

COLORADO

Hereford Bulls, Inc.
3090 Grandview Ave.
Canon City, Colorado 81212

Colorado State U. Exp. Sta.
Hesperus, Colorado 81326
Operator: Dr. Jim Brinks

FLORIDA

Lykes Brothers Feedlot
Brooksville, Fla.

GEORGIA

Beef Bull Gain Evaluation Test Station
Coastal Plain Experiment Station
Tifton, Georgia 31794
Operators: W. C. McCormick
North Georgia Beef Cattle Evaluation Center
Northwest Georgia Branch Experiment Station
Calhoun, Georgia 30701
Contact: M. K. "Curly" Cook
Extension Animal Scientist
University of Georgia
Athens, Georgia 30601

IDAHO

Shaw Beef Evaluation Center
Route 2
Caldwell, Idaho 83605
Operator: Tom Shaw & Sons

Intermountain Beef Cattle Performance Center
Route 2, Box 173
St. Anthony, Idaho 83445
Operator: L. L. Rudd

ILLINOIS

Beef Evaluation Station
Western Illinois University
Department of Agriculture
Macomb, Illinois 61455
Operator: Dr. Loren Robinson

Shaw's Bull Testing Station
RR #1, Box 137
Trivoli, Illinois 61569
Operator: Allen Shaw

INDIANA

Southwestern Indiana Angus Association Station
Chrisney, Indiana 47611
Operator: Ed Cissna

Indiana Coop. Bull Test Station
Springville, Indiana 47462
Operator: Lawrence County Farm Bureau Coop.
1427 "G" St.
Bedford, Indiana 47421

IOWA

Iowa Beef Improvement Assn.
123 W. Airport Road
Ames, Iowa 50010
Operator for the following tests:

IBIA-Beukema Bull Test
Newton, IA 50208

IBIA-Salsness Bull Test
Bronson, IA 51007

IBIA-Ehm Bull Test
Creston, IA 50801

KANSAS

Central Kansas Performance Test Station
Route 2
McPherson, Kansas 67460
Operator: M. H. Georing

Corbin Bull Test Station
Route 1
Eureka, Kansas 67045
Operator: Carlton Corbin, Jr.

Cimarron Valley Bull Test
Rolla
Kansas 67954
Operator: David and Sam Bozone

KENTUCKY

Seayway Farms, Inc.
c/o Silas Mingua
Route 5
Paris, Kentucky
Contact: Russell BreDahl
Extension Beef Specialist
803 Ag. Sciences Center, South
University of Kentucky
Lexington, Ky. 40506

LOUISIANA

Livestock Testing Station
Louisiana State University at Alexandria
LeCompte, Louisiana 71346
Operator: John E. Pontif

MARYLAND

Maryland Testing Station
Ellicott City, Maryland 21043
Operator: Dave Green, Manager

Contact: Bill Curry
Extension Animal Scientist
University of Maryland
Jull Hall
College Park, Maryland 20742

MICHIGAN

Southwestern Polled Hereford Association
8164 Gull Road
Richland, Michigan 49083
Operator: Kent M. Beckman

Shorthorn Bull Test
Route #1, Box 234
Charlotte, Michigan 48813
Operator: Gary Walters

Southwestern Polled Hereford Association
Route 1, Box 225
Augusta, Michigan 49012
Operator: Dr. Donn Blevins

Charolais Bull Test
897 Ottawa Beach Road
Holland, Michigan 49423
Operator: Leland Bauer

Good Bull Test Station
Route 2
Charlotte, Michigan 48813
Operator: Fred Good

MINNESOTA

Minnesota Bull Testing Station
Lake Benton, Minnesota 56149
Operator: Jack Delaney

MISSOURI

Central Testing Station
University of Missouri
125 Mumford Hall
Columbia, Missouri 65201
Operator: Keith Leavitt, Supervisor

North Missouri Center
Spickard, Missouri 64679
Operator: Larkin Langford, Superintendent

Ozarkia Test Station, Kingview Ranch, Inc.
Star Route, Box 22, Marshfield, Mo., 65706
Contact: Lloyd Hanna

Show-Me Certified Feeder Calf Evaluation Center
Albany, Mo., 64402
Contact: Fred Conner, Area Livestock Specialist

Wiley Stock Farm
Calhoun, Mo., 65323
Contact: Jerry Wiley

Northeast Missouri Test Station
Bethel, Mo., 63434
Contact: Larry Coon

Burk Test Station
2743 West Chestnut Expressway
Springfield, Mo, 65802
Contact: Dale Burk

Boyle's Test Station
RFD 3, Box 127, Warrensburg, Mo., 64093
Contact: E. Rodger Boyle, Jr.

MONTANA

MBCPT
Leo McDonnell
2315 Colton Boulevard
Billings, Montana 59102
Area Code: 406, Phone 656-5638

Production Indexing Center
Stanford, Montana 59479
Area Code: 406, Phone 566-2240
Manager: Lloyd Schmitt

Ankony Breeding Systems
Box 250
Stanford, Montana 59479
Area Code: 406, Phone 566-2223
Manager: Lloyd Schmitt

Moiese Performance Bull Test Center
Roy Snyder
Moiese, Montana 59824
Area Code: 406, Phone 644-2348

Red Rock Testing Center
Gerald Raaum, Owner
Arne Skedsvold, Manager
Culbertson, Montana 59218
Area Code: 406, Phone 787-6634

Treasure State Testing Station
Irvin Meiwald
Box 502
Havre, Montana 59501
Area Code: 406, Phone 265-9296

Gold Nugget IPR Test Center
Harlen Krass
Krass Feedlot
Hogeland, Montana 59529
Area Code: 406, Phone 379-4251

NEBRASKA

Eastern Nebraska Bull Test Station
Schuyler, Nebraska 68661
Operator: Gary Sierks

Western Nebraska Bull Test Station
Ogallala, Nebraska 69153
Operator: Bill Roesch, Whitman, Nebr.

North Central Nebraska Bull Test Station
Ainsworth, Nebraska 69210
Operator: Bud McBride

Black Angus Testing Station
Bellwood, Nebraska
Gordon Zeller

NEVADA

Nevada Beef Cattle Improvement Assn. Test Station
University of Nevada
Reno, Nevada 89507
Operator: University of Nevada

NEW JERSEY

Go to Maryland or New York Test Stations

NEW MEXICO

Tucumcari Bull Test Station
Northeastern Branch Station-NMSU
Operator: David Williams
Tucumcari, New Mexico 88401
Supervisor: Wallace Cox
Box 3AE, NMSU
Las Cruces,New Mexico 88003

NEW YORK

Richard Hamilton
Manager
Emmadine Farm
Poughquag, New York

NORTH CAROLINA

North Carolina Central Bull Testing Station
Route 1
Battleboro, North Carolina 27809
Operator: T. M. Gorham

NORTH DAKOTA

Beef Evaluation Center
Lynn Frey, Manager
Sawyer, North Dakota

OHIO

Ohio Exposition Center
Columbus, Ohio 43215
Contact: W. W. Wharton
Extension Animal Scientist
Ohio State University
2029 Fyffe Road
Columbus, Ohio 43210

OKLAHOMA

Holdenville Bull Test Station
Holdenville, Oklahoma 74848
Box 271
Operator: Holdenville Chamber of Commerce

Panhandle State College Bull Test Station
Panhandle State College
Animal Science Department
Goodwell, Oklahoma 73939
Operator: Milton England

Connors State College Bull Test
P. O. Box 53
Warner, Oklahoma 74469
Operator: Robert A. Hodges

Noble Foundation Bull Test
P. O. Box 878
Ardmore, Oklahoma 73401
Operator: Noble Foundation

Southwest Sire Evaluation Center
Route 4
Frederick, Oklahoma 73542
Operator: Edgar L. Hamm

American Beef Cattle Evaluation Center
Ringling, Oklahoma 73456
Operator: Hollis Dickey

Scott Sands Testing Station
Route 2
Tonkawa, Oklahoma 74653
Operator: Murray Scott

OREGON

Ranch Services Incorporated Bull Testing Station
Poe Valley Route
Klamath Falls, Oregon 97601
Operator: Eddie E. Meeker

Central Oregon Bull Testing Station
Emerald Glen Ranch
Route 1, Box 555
Prineville, Oregon 97754
Operator: Dr. Harry S. Pollard

SOUTH CAROLINA

South Carolina Beef Cattle Testing Station
Clemson University
Clemson, South Carolina 29631
Operator: Clemson University
c/o J. F. Wise
Extension Animal Scientist

SOUTH DAKOTA

Badlands Bull Testing Station
Kadoka, South Dakota 57543
Operator: Ron Barber

Ideal Beef Center
Ideal, South Dakota 57541
Operator: Wayne Nelson

Northwest Bull Evaluation Center
Lemmon, South Dakota 57638
Operator: Gene Durick

TENNESSEE

U.T. Bull Evaluation Station
Middle Tennessee Agricultural Experiment Station
Spring Hill, Tennessee 37174
Contact: Dr. Haley M. Jamison
Animal Science Dept.
University of Tennessee
P. O. Box 1071
Knoxville, Tn. 37901

TEXAS

Navarro County Junior College Test Station
Corsicana, Texas 75110
Operator: Junior College

Pan Tech Research Farm
Panhandle, Texas 79068
Operator: Research Farm

UTAH

Utah Bull Testing Station
Centerfield, Utah 84622
Operator: Allen Frandsen

VIRGINIA

Culpeper Agricultural Enterprises
Culpeper, Virginia 22701
Operator: Leece George, Manager

Red House Bull Evaluation Center
James Bennett, Manager
Red House, Virginia 23963

WASHINGTON	Lacrosse Bull Testing Station Lacrosse, Washington 99143 Operator: Blaine Hinderer
WEST VIRGINIA	W. Virginia Bull Test Station College of Agriculture W. V. University Morgantown, West Virginia 26506 B. W. Wamsley, Jr. Ecucational Advisor
WISCONSIN	Platteville Bull Testing Station Platteville, Wisconsin 53818 Operator: Manager Phil Wyse
WYOMING	Beef Improvement Assessment Station P. O. Box 54 Sheridan, Wyoming 82801 Operator: Morris Dixon