PROCEEDINGS

BEEF IMPROVEMENT FEDERATION

RESEARCH SYMPOSIUM & ANNUAL MEETING

March 23-25, 1981
Oklahoma State University
Stillwater, Oklahoma

PROCEEDINGS OF BEEF IMPROVEMENT FEDERATION

Table of Contents

BEEF IMPROVEMENT FEDERATION
ANNUAL CONFENTION

March 23-25, 1981

Oklahoma State University
Stillwater, Oklahoma

Monday, March 23

3:00 - 6:00 p.m.	Oklahoma BEEF, Inc. Test Facility (6 miles west of Stillwater). Refreshments courtesy of the Oklahoma Hereford Association.

Tuesday, March 24

6:45 a.m.	BIF Board of Directors meeting
8:30 a.m.	Symposium Theme - THE PERFORMANCE PACKAGE Richard Willham, Iowa State University presiding
	WELCOME TO THE SYMPOSIUM - Jack Farmer, California, BIF President
	WHAT DATA IS MOST IMPORTANT IN THE BEEF PERFORMANCE PACKAGE - Robert Totusek, Head, Animal Science Department, OSU
9:30 a.m.	Coffee Break
9:45 a.m.	THE DATA AVAILABLE THROUGH THE NATIONAL BEEF RECORDS PROGRAMS
	SIRE PHASE - David Notter, Virginia Poly Tech
	MATERNAL PHASE - James Gibb, University of Illinois
11:45 a.m.	RECOGNITION LUNCHEON - Roger Winn, Virginia, BIF Vice President, presiding.
2:00 p.m.	Symposium (cont.) Ken Ellis, University of California, presiding
	INFORMATION AND DATA NEEDS
	For registered Breeder - Jim Leachman, Montana
	For Commercial Herds - Al Smith, Virginia
	For AI Industry - Bill Durfey, National Association of Animal Breeders

THE POTENTIAL FOR CHANGE IN BEEF PRODUCTION THROUGH APPLICATION OF BEEF IMPROVEMENT RECORDS - Art Linton, Head, Animal and Range Sciences, Montana State University, Bozeman, MT

4:00 p.m. CAUCUS FOR ELECTION OF DIRECORS

4:30 p.m. BUSINESS MEETING

5:15 p.m. RECEPTION AND ATTITUDE ADJUSTMENTS, Courtesy of Select Sires, Plain City, Ohio

6:00 p.m. AWARDS BANQUET - A. L. Eller, Virginia Poly Tech, Master of Ceremonies

Entertainment by OSU Student Entertainers

Wednesday, March 25

8:30 a.m. Leave motel and tour OSU Beef and Research Facilities enroute to Range Cow Unit.

10:00 a.m. UTILIZING THE PERFORMANCE PACKAGE IN EDUCATION (RESEARCH, TEACHING, EXTENSION) - Robert Totusek, OSU, presiding

OSU Beef Cattle Genetics Research Program - Richard Frahm, OSU

OSU Teaching Herds - Bob Kropp, OSU

Oklahoma Beef Education Evaluation Foundation, Inc. Structure and Program - Charles McPeake, OSU

12:00 Noon LUNCH

AFTERNOON SESSION, Frank Baker, OSU presiding

1:15 p.m. WHAT PERFORMANCE RECORDS MEAN TO ME - Paul Bennett, Virginia

1:45 p.m. THE PERFORMANCE PACKAGE TO MEET THE NEEDS OF THE INDUSTRY

Buying the Improvement for a Commercial Program Through the Bull - Charles Nichols, Oklahoma

Breeding Improvement in a Seedstock Operation - Burke Healey, Oklahoma

Specification Buying and Selling of Bulls (Weight, Breeding Values, Physical Measurements and Maternal Traits) - James Brinks, Colorado State University.

3:00 p.m.	ECONOMICS OF THE PERFORMANCE PACKAGE - Jack Farmer, California, BIF President
4:00 p.m.	ADJOURN
6:00 p.m.	BIF DIRECTORS MEETING

WHAT IS MOST IMPORTANT IN THE BEEF PERFORMANCE PACKAGE?

Robert Totusek
Head, Animal Science Department
Oklahoma State University
Stillwater, Oklahoma

What are the most important traits to include in the beef performance package? birth weight? weaning weight? yearling weight? weight per day of age? calving ease? calving interval? height? fat thickness? grade? ribeye eye? It is not the intent of this paper to examine these and other traits in detail, or to pass judgment specifically on which items should be included, but rather to offer some considerations about the performance package and the nature of the items which should be included in it.

For whom is the performance package? I trust we will agree that the performance package primarily needs to serve the needs of two segments, the producing segment (both the seedstock producer and the commercial producer) and the consuming segment. What must the performance package accomplish for these two segments?

The Performance Package and the Producer

Ultimately the performance package must accomplish only one thing for the producer--improve profitability. In this regard we have witnessed a necessary change in the philosophy of performance testing brought on by the world in which we live, although not all agree with and/or are aware of the need for the change in philosophy. Basically, in the early days of performance testing maximum production was equated with maximum profitability, and rightly so in most cases. Gradually there was a shift in thinking to the concept of maximum efficiency. Today, considering changes during the past eight years and recognizing that maximum biological effiency does not always translate to maximum profitability, the basic philosophy must relate to profitability. The performance package must be viewed from the prospective of maximum profitability.

Can the producer afford maximum size? There is a positive relationship among birth weight, growth rate and mature weight. In the early days of performance testing, a 1,000 pound yearling weight was considered good. Later the goal became 1,100 pounds. Today it is assumed that the "good ones" will reach 1,200 pounds or 1,300 pounds. After 1,300 pounds comes 1,400 pounds, then 1,500 pounds. If they can make 1,500 pounds, why not a yearling weight of 2,000 pounds?

By the same token, can the producer afford maximum milk production? We first became acutely aware of the need to look beyond quantity of production and efficiency of production to profitability when some of our research included a comparison of Hereford, Holstein and Hereford X Holstein cows (see Table 1). Obviously, a consideration of only weaning weight or weaning efficiency (expressed by calf weight as a percentage of cow weight) would have grossly misled the producer. (It is good that weaning efficiency has been dropped out of the performance package by BIF. However, the potential hazard of using other biological measures of efficiency in the future should not be forgotten.)

How about reproduction? Reproductive performance is receiving priority attention in the performance package today and appropriately so because it is the most economically important trait in beef cattle production. However, we must keep it in its proper perspective. If we justify records of performance for growth traits and carcass traits because they are moderately to highly heritable, then surely we shouldn't mislead people into thinking they're going to make significant genetic improvement by selection for reproductive traits. Certainly reproductive traits must receive attention and we will always be willing to take whatever genetic improvement we can get, but obviously the level of reproductive performance which we realize will depend primarily upon the kind of environment we provide.

Because of the importance of reproduction, some myths have sprung up and are being perpetuated today. Myth 1: Every open female should always be culled. When we look at all the facts, including heritabilities and repeatabilities, and especially when we apply ecomonics, I'm not sure this one will always hold water. It may not be consistent with total genetic progress in a seed-stock herd. It may not always be the road to maximum profitability in a commercial operation. In fact, it definitely will not be under certain circumstances. Myth 2: We must always provide an environment to allow maximum reproductive performance. False! Myth 3: For maximum profitability the breeding season should not be more than 45 to 60 days long. False! Myth 4: Heifers of the English breeds should attain 650 pounds by first breeding. False!

I don't believe these myths and you won't either if you sharpen a pencil and look at the economics of various situations. In many environments, there is simply no way that maximum reproductive performance can be justified in terms of maximum profitability. We can easily calculate, and have many times, that in certain situations we cannot afford more than a 93% calf crop for example, or 90%, or 87%, or as in 1973-74, even a 70% or 75%. If you don't believe it, apply economics to valid input-output data.

It is true that many cows are too small, or don't produce enough milk, or reproduce poorly, and we must continue to improve these traits in a large part of the beef cattle population. However, we have a challenge ahead. At some point in the future we must accept the fact that more isn't always better, that maximum isn't always consistent with profit, and then set some goals which will be reflected in the performance package. Note table 2 through 6, and try to visualize optimum size and level of milk production. If you do not agree with the assumptions, plug in your own. Analyses of this kind should be helpful in putting the performance package in proper economic perspective in the future.

The Performance Package and the Consumer

The only important traits in the performance package from the consumers' standpoint are those relating to eatability satisfaction. Consumer preference has trended toward less fat. Although this trend was partly caused by misinformation available to the consumer, the trend is likely to continue. Furthermore, as we look at the prospects of higher grain prices in the years ahead the producer is likely to lean in the direction of less fat also. One of the real challenges of the beef cattle industry in the future will be to decrease fat to a desired level while maintaining eatability satisfaction. So it is important that the performance package not only include carcass traits considered desirable today but also that additional items related to eatability satisfaction be added whenever identified and proven valid.

There must be compromises in the future between production efficiency and consumer desires. Without compromises, either producing the kind of cattle considered most efficient, or strictly providing a product most desired by the consumer, there will not be maximum profitability.

So as we think about the total performance package in the future, we must continue to assess the package, be responsive to changing needs in the industry and in society, and keep the package as relevant as possible. Certainly BIF is to be complimented for working very diligently to keep the package updated in the past.

Selling the Performance Package

After noting my comments thus far you may conclude that I am against performance testing. Nothing could be further from the truth. I have spent a good part of my professional life trying to sell the performance package in different settings but especially in the classroom. Admittedly I, along with many others, have been frustrated about the slow adoption of the performance package. Why has this powerful tool been overlooked, ignored and unused by so many cattlemen? There are probably a number of reasons but certainly in some cases we haven't sold the performance package as diplomatically as we could. In fact, in many instances we have likely insulted many producers who have been successful for a lifetime in the cattle business. In some cases we told them that we're giving them all the tools that they need, so from now on they could shut their eyes, and in fact should! This approach is certainly not consistent with the fact that the vast majority of cattle are bought and sold by sight, and to a greater or lesser degree what people see does have some influence on the dollars cattle bring, both purebred and commercial. In some cases we told cattlemen that it wouldn't be real intelligent to keep using traits that are not economically important (such as shade of red in Hereford cattle). Such traits <u>should not</u> be economically important but the fact is that they have been. We have had a similar situation recently regarding height in cattle. In some cases we have told cattlemen they really haven't made any progress in the past because they hadn't used performance testing. I am familiar with one such seedstock producer who avoided performance testing for 25 years but then finally got on the program, and promptly won the first bull test he entered.

This chap is making faster progress now with a good performance program but with the right approach we likely could have had him on the program twenty years earlier. Many good cattlemen have been doing many things consistent with the performance package, so we need to sell them performance testing on the basis that a formalized performance program will be more systematic and more effective, not that it will replace all of the wrong things they've been doing.

We probably made a mistake by telling many seedstock producers that they were stupid to show cattle, even though we do recognize the limitations of the showring in contrast to the total benefits of a good performance testing program. Many seedstock producers desire to show cattle for one or more reasons. We could have and still can sell performance testing as a useful tool that can be used to great advantage with or without the showring. Many seedstock producers have demonstrated in recent years that the showring is compatible with performance testing.

Probably the greatest failure of performance testing as related to the showring has been in steer shows, especially the youth steer shows. The most obvious and important benefit of youth steer shows is in the responsibility and competition experience which accrues to participating youngsters. Anything else is really of minor importance although steer shows can also serve the function of helping to "set the visual pattern" for market steers. The inclusion of a performance aspect in steer shows does little if any good in the genetic improvement of beef cattle. Genetic improvement must be done by seedstock producers. It cannot be done in youth steer shows. So it seems apparent that it is best to let youth steer shows do what they are best designed to do and to do the performance testing where it can be most effective.

We've made another serious mistake in our zeal to sell the performance package. We have misrepresented it to some degree when we imply that performance testing is free or that all of the gain (such as weaning weight increase) is free. Even in performance testing there is no free lunch. Again put the pencil to it. My calculations at various times have indicated that about half of the gain in performance testing ends up in the profit column. The other half must be charged against the cost of performance testing (such as the higher maintainance cost of larger females that result when we select for heavier weaning weights and heavier yearling weights, and the higher purchase cost of bulls with superior records).

Benefits of Performance Package

Basicially, the performance package will allow us to produce a better product more profitably. The availability and use of the best possible package is vital to the long range health of the beef cattle industry. It will allow us to put a superior product on the table and to do it profitably. Frank Baker views the performance package as a survival kit for cattlemen. He is

right. The performance package will allow cattlemen to maximize profits in the good years and to survive in the bad years. Producers who use the performance package to develop a more efficient (profitable) kind of cattle and who utilize all of the side benefits which lead to improved management should be in a much better position to survive the economic downturns than others. Furthermore, and equally important perhaps, the widespread use of the performance package will put the total beef industry in a stronger position in competition with enterprises producing other meat or other food. In other words, the survival of any particular cattlemen and of the beef cattle industry may depend in large part on the effective use of the performance package.

So, we must:

1. Put together a better package.
2. Use it more wisely.
3. Sell it more effectively.

I agree with Charles McPeake who recently said that "performance testing is an effective tool whose time has come". Let's devise, use and sell the package to the best possible advantage for the benefit of the total beef cattle industry.

TABLE 1. Performance of Hereford, Hereford X Holstein and Holstein Females Through Four Calf Crops[1]

Item	Hereford		Hereford x Holstein		Holstein		
	Moderate	High	Moderate	High	Moderate	High	Very high
Mature wt., lb.	1010	1030	1045	1070	1230	1180	1215
Daily supplement, post-calving, lb.	2.94	5.55	2.98	5.81	3.43	5.95	8.28
Daily milk yield, lb.	13	13	19	21	27	28	28
Weaning wt., 240 days lb.	575	565	618	631	693	700	691
Roughage intake[2], %	100	102	115	112	141	140	134
Cows rebred[3], %	95	95	85	92	71	82	98
Annual calf weaned/cow, lb.	502	494	494	538	479	544	624
Return/cow[4], $	129	78	75	69	-7	3	35
Cows/1000 acres[5]	100	98	87	89	71	71	75
Return/1000 acres,$	12,900	7,644	6,525	6,141	-497	213	2,625

[1]Based on research by Department of Animal Science, Oklahoma Agricultural Experiment Station.

[2]Expressed as % of Moderate Herefords as determined by forage intake in drylot trials.

[3]Average as 2-, 3- and 4-year-olds.

[4]Based on non-land fixed cost (without supplement) of $100 per cow, land cost of $150 for Moderate Herefords, $200 per ton for supplement and calf value per cwt. of $85, $80 and $75 for calves of Hereford, Hereford x Holstein and Holstein cows.

[5]Based on forage intake as determined in drylot and carrying capacity of 7 acres per cow for Moderate Herefords.

TABLE 2. Annual Cost Comparison of 1000 Pound Cows Producing 10 vs. 20 Pounds of Milk

	Per cow		Per 1000 acres	
Daily milk, lb.	10	20	10	20
No. cows			100	83
	$	$	$	$
Land	120	144	12,000	11,952
Supplement	30	70	3,000	5,810
Health	10	10	1,000	830
Bull charge	12	12	1,200	996
Marketing	10	10	1,000	830
Labor	25	25	2,500	2,075
Interest (cow)	60	60	6,000	4,980
Taxes	5	5	500	415
Total	272	336	27,200	27,888

TABLE 3. Annual Cost Comparison of 1000 vs. 1400 Pound Cows Producing 10 Pounds of Milk

	Per cow		Per 1000 acres	
Size of cow, lb.	1000	1400	1000	1400
Item No. cows			100	78
	$	$	$	$
Land	120	158	12,000	12,324
Supplement	30	38	3,000	2,964
Health	10	10	1,000	780
Bull charge	12	12	1,200	936
Marketing	10	10	1,000	780
Labor	25	25	2,500	1,950
Interest (cow)	60	84	6,000	6,552
Taxes	5	5	500	390
Total	272	342	27,200	26,676

TABLE 4. Annual Cost Comparison with Differences in Size of Cow and Milk Production

Item	Sixe of cow, lb. / Daily milk, lb. / No. cows	Per cow		Per 1000 acres	
		1000 / 10	1400 / 20	1000 / 10	1400 / 20
				100	68
		$	$	$	$
Land		120	178	12,000	12,104
Supplement		30	78	3,000	5,304
Health		10	10	1,000	680
Bull charge		12	12	1,200	816
Marketing		10	10	1,000	680
Labor		25	25	2,500	1,950
Interest (cow)		60	84	6,000	5,712
Taxes		5	5	500	340
Total		272	402	27,200	27,586

TABLE 5. Necessary Weaning Weight for Cows Varying in Weight and Milk Production

Cows wt.	Daily milk	No. cows	Necessary weaning wt.[1]	Total calf Produced	Necessary weaning wt. adj. for cow salvage[2]
lb.	lb.		lb.	lb.	lb.
1000	10	100	470	42,300	470
1000	20	83	566	42,300	566
1400	10	78	603	42,300	569
1400	20	68	691	42,300	657

[1]Based on 470 lb. calves produced by the 1000 lb. cows producing 10 lb. milk, and a 90% calf crop for all cows.

[2]Adjustment for salvage based on the assumption that the productive life of cows will be six years. An additional year is assessed for the development of the replacement female, so 57 lb. additional salvage is available each year from the larger cows (400 lb. ÷ 7 years = 57 lb.). Since cows have a market value approximately 60% that of calves, 34 lb. (57 lb. X 60%) less necessary weaning weight is required for the larger cows.

TABLE 6. Necessary Selling Price Per Pound of Calf Assumed to be Produced by Cows Varying in Size and/or Milk Production

Cow wt., lb.	Daily milk, lb.	Projected weaning wt., lb.	Necessary selling price[1] $/cwt
1000	10	470	90.00
1000	20	520	98.01
1400	10	530	102.32
1400	20	580	107.25

[1]Based on $90.00/cwt for calves out of 1000 lb. cows producing 10 lb. milk, assuming a 90% calf crop for all cows.

DATA AVAILABLE THROUGH THE NATIONAL BEEF RECORDING PROGRAMS--SIRE PHASE[1]

D. R. Notter

Department of Animal Science
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

Introduction

The information currently being provided by the national beef recording programs for sire traits (traits normally of economic importance in the market animal) can be broken into four broad groups:

growth
carcass merit
calving ease
feed efficiency.

The extent and uniformity of the information provided by the national recording programs varies greatly among these groups. Likewise, the importance of these traits in determining net merit (the "performance package") differs among the groups.

Growth Traits

The growth traits, primarily represented by weaning weight and yearling weight, are the preeminent performance traits reported in all national beef recording schemes. It is a measure of the success of performance testing that the information reported for these traits has become highly standardized among programs. As all of you here know, "weaning weight" is really 205-day weight adjusted for age of dam effects using additive adjustment factors and that these factors are usually specific to the breed involved. Further, "yearling weight" is really 365-day weight and is calculated by adding 160 times postweaning gain to 205-day adjusted weight. Although other measures of growth such as weaning gain, postweaning gain and weight per day of age are occasionally reported, weaning weight and yearling weight provide essentially complete information on the growth performance of an animal.

The documents used to report weaning and yearling weights have three general forms: 1) the breeding value worksheet used to summarize within-

[1]Invited paper presented at the Beef Improvement Federation Annual Meeting, Stillwater, Oklahoma on March 24, 1981.

herd performance data, 2) the performance pedigree and 3) the national sire summary. For the within-herd performance testing summary we still have remarkable uniformity among programs; a listing of actual weights, adjusted weights and ratios (within sex and contemporary group) is the norm. Likewise, the various performance pedigrees usually list performance ratios for the individual, sire, dam, maternal half sibs, paternal half sibs and progeny and further combine these ratios into an estimated breeding value (EBV) which weights the records of all relatives to give a single best estimate of the breeding value of an individual. The EBV's are expressed as either ratios or deviations. Further, the breeds that provide performance pedigrees are also beginning to calculate updated EBV's for weaning and yearling weight for all animals in the herd each time new information is processed and to add these updated EBV's to the selection worksheets. Essentially the same kind of weaning and yearling weight information is presented in national sire summaries, except that the values are now usually expressed as Expected Progeny Differences (EPD's). These EPD's are simply one-half of the EBV's, or the bulls' transmitting abilities. Thus all associations are firmly committed to the breeding value concept for reporting and summarizing growth data. It is a measure of this commitment that some of the more performance-oriented breeds make weaning weight records for females and weaning and yearling weight records for males mandatory for registration.

At this point it is appropriate to ask if this primary emphasis on growth is correct in light of our stated interest in the performance package. In general, I think the answer must be "yes". Swiger et al. (1965) estimated the net profit from beef steers slaughtered at a constant age and obtained genetic correlations of from .91 to .98 between final weight and net profit (table 1). Similarly, the genetic correlations between weaning weight and net profit ranged from .69 to .93. Dickerson et al. (1974) went through a similar procedure and found that economic efficiency in steers slaughtered at a constant age had genetic correlations of .82 with yearling weight and .74 with weaning weight (table 2). However, these correlations do pertain to age-constant slaughter, even though we know that in reality cattle tend to be slaughtered at constant levels of fatness such that larger cattle are normally also older and heavier at slaughter. Smith (1976) estimated the profitability of production systems which used sire breeds differing in mature size on Hereford and Angus cows and in which progeny were assumed slaughtered at 5% ribeye fat (estimated low Choice grade) (table 3). The correlations between mean 405-day weight (which is indicative of the EPD's of the breeds) and profit per cow, profit per calf and cost per lb retail product were .76, .82 and -.82, respectively. In a similar attempt to include negative effects of calving difficulty and mature size on net profit, Dickerson et al. (1974) defined net merit for efficient beef production as a function of the genetic values (G) for age-constant efficiency (E), birth weight (B) and yearling weight (Y) such that:

$$\text{net merit} = G_E - 2.07G_B - .07G_Y$$

This measure of net merit had a genetic correlation with yearling weight of .64. Thus we see that correlations between yearling weight and measures of net merit are uniformly high although, especially in the case given by Dickerson, considerable variation in net merit still remains to be accounted for by other traits.

TABLE 1. GENETIC CORRELATIONS BETWEEN YEARLING WEIGHT AND VARIOUS MEASURES OF PROFITABILITY.

Measure	Genetic correlation with final weight
Net profit to a constant age adjusted for quality grade	.94
Net profit to a constant age ignoring quality grade	.91
Postweaning (feedlot) profitability adjusted for quality grade	.97
Postweaning (feedlot) profitability ignoring quality grade	.98

Swiger et al. (1965).

TABLE 2. GENETIC CORRELATIONS BETWEEN ECONOMIC EFFICIENCY TO A CONSTANT WEIGHT AND WEIGHT

Weight	Correlation with economic efficiency	
	Including quality grade	Ignoring quality grade
Yearling	.82	.80
Weaning	.74	.73

Dickerson et al. (1974).

TABLE 3. EFFECT OF SIRE BREED ON ECONOMIC EFFICIENCY WHEN PROGENY WERE SLAUGHTERED AT ESTIMATED LOW CHOICE QUALITY GRADE[a]

Breed	405-day weight (lb)[b]	Efficiency ($)		
		Cost per lb. retail product	Profit per calf	Profit per cow
Jersey	898	1.02	38	36
Limousin	942	.92	96	89
Hereford and Angus	946	.96	62	59
South Devon	975	.95	71	63
Simmental	1019	.92	96	86
Charolais	1034	.91	106	90

[a]Smith (1976).

[b]Smith et al. (1976).

Carcass Characteristics

Programs to collect and process carcass data are provided on an optional basis by most major breed associations. As you might expect, data collection and reporting procedures for carcass traits are much less consistent than for growth traits. Emphasis in carcass programs is usually placed on further evaluating sires that are already considered above average (or potentially above average) for growth traits. Most programs are administered through the U.S.D.A. Carcass Data Service, and in some associations using designed sire evaluation programs, collection of carcass data is mandatory. The Carcass Data Service report gives:

maturity score
marbling score
quality grade
hot carcass weight
adjusted fat thickness
ribeye area
percent kidney, pelvic and heart fat
yield grade.

This data is usually condensed into two or three pertinent values before being reported, although at least one association reports essentially all the data on their yearling and carcass worksheets. In general, all programs report some measure of carcass quality (quality grade or marbling score) and some measure of carcass yield (yield grade, percent cutability or percent retail yield).

In addition to measuring quality and cutability, most carcass programs also report some measure of rate of production such as retail cuts per day of age, lean per day of age or carcass weight per day of age. However, the revised B.I.F. guidelines indicate that these measures of rate of production should not be used unless the age range at slaughter is very narrow and the feeding environment is very homogeneous. This reccommendation is made because carcass data is usually much less closely adjusted for age and other environmental effects than is yearling weight and is therefore more liable to bias from such effects. Further, the genetic correlation between sire proofs for retail cuts per day of age and for yearling weight are usually very high; an analysis of a subset of data from the 1979 Simmental Sire Summary gave a correlation between these traits of .68. Similar high correlations (r) between weight of retail product and yearling weight were obtained by Dickerson et al. (1974; r=.88), Swiger et al. (1965, r=.96) and Dinkel and Busch (1973; r=.80). These high correlations argue strongly for the use of yearling weight as the primary indicator of the amount of product with the subsidiary use of less highly correlated traits such as percent cutability to indicate the composition of the product. At least one program (the American Hereford Association National Reference Sire Program) attempts to report percent retail yield and quality grade adjusted to a slaughter weight of 1,150 lb. In my opinion this is a useful approach in that it tends to separate growth and composition differences. However, a discussion of the results of that program (Amer. Hereford Assn., 1980)

notes that very limited variation among sire proofs was observed with this procedure. Thus heavy emphasis on cutability in selection programs is probably warranted only if obvious cutability problems exist within the herd or breed involved.

The appropriate use of estimated breeding values for quality grade raises many questions. The quality grade (marbling score) is rather highly heritable and has a small negative genetic correlation with yearling weight (table 4). Thus genetic improvement in carcass quality through selection could be made and would have relatively small undesirable effects on growth rate. However, the cost of data collection and loss of selection intensity for other traits which would accompany emphasis on carcass grade would demand a critical evaluation of probable advantages. I think that it would be fair to say that a producer who had placed heavy emphasis on carcass quality over the past 20 years would not be reaping economic benefits from that emphasis today. This result would be partially a function of changes which have occurred (and which I believe will continue to occur) in the grading standards as we struggle as an industry to find the optimum mix of fat and lean in our product. Also, the fact that the ideal level of fatness represents an intermediate optimum (not too much or too little) makes selection difficult. In general we are only concerned that a sire impart sufficient marbling to allow his progeny to grade low choice. If he does this, no more is needed or desired. This fact complicates selection and also strongly emphasizes the need that cows used in progeny testing programs for carcass traits be representative of the commercial cow population that the sire (or his sons) will ultimately service.

TABLE 4. HERITABILITIES AND GENETIC CORRELATIONS FOR CARCASS QUALITY GRADE

	Heritability	Genetic correlation with yearling weight
Dinkel and Busch (1973)	.34	-.29
Swiger et al. (1965)	.32	-.14
Dickerson et al. (1974)	.34	-.16
1979 Simmental Sire Summary	--	.06
American Hereford Journal (Dec., 1980)	--	-.20

It will be interesting to see if the proposed changes in the grading standards will lead to changes in methods of reporting carcass data. The increased emphasis on backfat in the new standards indicates that sire differences in fat deposition patterns could become more important, especially in light of the intermediate genetic correlations between marbling and backfat (table 5).

TABLE 5. GENETIC CORRELATION BETWEEN MARBLING SCORE AND BACKFAT THICKNESS

Study	Correlation
Dinkel and Busch (1973)	.38
Dickerson et al. (1974)	.55

In summary, progeny data on carcass traits are probably best used to "fine tune" the genetic performance package. Such data can be used to separate truly exceptional individuals from very good ones, but cannot make a mediocre sire into a good one.

Calving Ease

Data on calving ease, either measured directly or indirectly through birth weight, is rapidly becoming as prevalent in performance pedigrees and sire summaries as growth data. This prevalence is a reflection of the tremendous importance that reproductive traits can have on profitability in a beef herd.

Because emphasis on calving ease is relatively new, much inconsistency exists among programs in recording and reporting data on this trait. The B.I.F. guidelines suggest that calving ease be scored as:

Score 1 -- No difficulty and no assistance
Score 2 -- Minor difficulty; some assistance
Score 3 -- Minor difficulty; mechanical assistance with jack or puller
Score 4 -- Caesarian section, very difficult or other surgery
Score 5 -- Abnormal presentation.

The guidelines also note that only births with scores 1 through 4 should be averaged for sire or dam summaries. Score 5 should be omitted because it represents a special kind of difficulty rather than just another stepwise increase in severity. The B.I.F. system is most prevalent in the industry, but several others exist in the various programs. The American Hereford Association uses these scores for calving ease and calf vigor:

Calving Ease

1 -- No assistance; calf was born normally
2 -- Assisted, easy; probably could have been delivered without assistance
3 -- Assisted, difficult
4 -- Breech birth, or abnormal presentation
5 -- Caesarian delivery

Calf Vigor

1 -- Nursed immediately, calf was healthy and strong at birth
2 -- Nursed on its own, but took some time
3 -- Required some assistance to nurse
4 -- Died shortly after birth
5 -- Dead on arrival

These scores are not currently being summarized.

The American Simmental Association uses a two-part coding scheme that describes both the difficulty of the birth as:

1 = Unassisted
2 = Easy pull
3 = Hard pull
4 = Caesarian

and the condition of the birth as:

5 = Abnormal presentation
6 = Dead on arrival
7 = Induced or premature

such that an induced parturition which required some assistance would be coded as 2-7. This system is attractive because it allows separation of the conditions of birth from the difficulty of birth. Thus sires can be ranked in terms of calving ease, and sires with abnormally high frequencies of abnormal presentations or stillbirths can also be identified. An ability to rank sires for condition of birth as well as difficulty of birth may be important. Phillipson et al. (1979) indicated that the genetic correlation between calving ease and stillbirth is large, but still far from perfect (r_G = -.6 to -.8).

Most research results indicate that the primary sire effect on calving ease is mediated through the birth weight of the calf. Thus, almost all recording programs provide for reporting of birth weight as well as calving ease, and descrimination against large birth weights still provides the major means of selection for calving ease. This approach is well justified by the very large negative genetic correlations between birth weight and calving ease. Estimates of this correlation range from -.83 (Smith et al., 1978) to an average of -.92 (Phillipson, 1976). Further, when these correlations are coupled with the higher heritability of birth weight than of calving ease (table 6) one is led to conclude that sire selection to improve calving ease could best be accomplished indirectly be selection against birth weight. Assuming equal intensities of selection, the parameters given by Phillipson (1976) would indicate that indirect selection against birth weight would result in 17.5% faster improvement in calving ease than direct selection for ease of calving. A larger advantage of 45.6% was obtained using the parameters of Smith et al. (1978).

TABLE 6. HERITABILITY ESTIMATES FOR BIRTH PARAMETERS AS A TRAIT OF THE SIRE OF THE CALF

Trait	Heifers	Mature cows
Calving ease	.03-.20	.00-.08
Stillbirth	.00-.05	.00-.02
Birth weight	.10-.40	.10-.40
Gestation length	.50	.50

Phillipson et al. (1979).

One reason for the higher heritability of birth weight relative to calving ease is that birth weight is much less affected by maternal

effects and by temporary environmental effects unique to the time of calving (Phillipson, 1976). For example, the liklihood of calving difficulty with a 100 lb calf will depend heavily on the age, size and, perhaps, breeding of the dam, whereas birth weight is much less affected by these variables. An EPD for calving ease in an A.I. sire may not be very useful to a rancher who knows little about how his cows compare to these used to derive the EPD. However, if that rancher weights calves at birth and knows what kind of birth weights have historically given him problems, an EPD for birth weight may tell him what he needs to know. Certainly if EPD's for calving ease are to be useful they must be calculated separately for first-calf heifers and for older cows. Also, analyses to estimate sire by breed of dam interaction for calving ease and birth weight would be very useful in confirming the breadth of applicability of EPD's for birth weights and calving ease.

Some associations have attempted to combine information on birth weight and calving ease in cows of different ages into a calving ease index such as:

.4 (calving ease ratio; first calf heifers) +

.6 (calving ease ratio; second calf and older) +

1.2 (birth weight ratio)

[American Simmental Association].

This is an useful effort, but the correlation between sire proofs for this index and birth weight remain very high (.80).

Interest has occasionally been expressed in selecting for shorter gestation lengths as a means of decreasing birth weight and calving difficulty, and some associations provide space for recording gestation length. However, Phillipson et al. (1979) indicated that the genetic correlation between calving difficulty and gestation length was much less than the correlation between calving difficulty and birth weight (table 7; .3 vs. .9). Thus even assuming a relatively low heritability of .25 for birth weight, the higher heritability of gestation length (.40) would not be sufficient to allow gestation length to approach birth weight as a selection criteria for reducing calving difficulty.

TABLE 7. GENETIC CORRELATIONS AMONG SIRE EFFECTS FOR BIRTH PARAMETERS

	Correlation with		
Trait	Stillbirth	Birth weight	Gestation length
Calving ease	-.6 to -.8	-.9	-.3
Stillbirth		.4	.2 to .3
Birth weight			.4 to .5

Phillipson et al. (1979).

To summarize, calving ease is negatively associated with birth weight and is therefore negatively associated with yearling weight. Further, the magnitude of the negative correlation between calving ease and yearling weight appears to be at least on the order of -.50 (table 8). Thus emphasis on calving ease and small birth weights will limit the possible rate of increase in yearling weight. However, using Dickerson et al.'s (1974) definition of net merit, selection programs which include some negative emphasis on birth weight should increase the rate of improvement in net merit by 6% over selection for yearling weight alone.

TABLE 8. CORRELATIONS AMONG BIRTH TRAITS AND YEARLING WEIGHT FROM THE 1979 SIMMENTAL SIRE SUMMARY

	Correlation with:			
Trait	Calving ease (2nd & later)	Calving ease index	Birth weight	Yearling weight
Calving ease (1st calf)	.04	.85	-.56	-.51
Calving ease (2nd & later)		.56	-.23	-.01
Calving ease index			-.80	-.45
Birth weight				.49

If we choose to put things in a negative light, we can say that, on the average, increases in the yearling weights of sires will be accompanied by decreases in calving ease in their progeny. This is shown in table 9 which indicates the probability of finding sires with specific estimated progeny differences (EPD) for calving ease and yearling weight. For example, the table shows that for sires with an EPD ratio of 104 for yearling weight, only one in 10 will be expected to have an EPD ratio for calving ease of over 100 and only one in 30 is expected to have an EPD ratio for calving ease of 104 or better. But, to accentuate the positive, this table also indicates that sires with positive deviations for both yearling weight and calving ease are out there; they are just rare. If you select for yearling weight alone you are not likely, just by chance, to find a sire that also produces calves that are born easily. But, if you measure birth weight, or calving ease, you should be able to find that one sire in 10 or that one sire in 30. Only by testing and measuring offspring will we be able to find the relatively rare sires that "go against the grain" and are desirable for both of a pair of traits that are, on the average, negatively related. The possibilities are nicely shown by the means reported by Berger and Willham (1980) for progeny birth and yearling weights of Angus bulls born in different years (table 10). These means indicate that over 14 years EPD's for yearling weight have increased by about 30 lb while EPD's for birth weight have declined by about 2.5 lb. Further, these results occurred even though the correla-

tion between EPD's for birth and yearling weight for a random sample of 57 of these bulls was .55. Thus undesirable correlations between economically important traits need not prevent improvement; they just make us work for it.

TABLE 9. PROBABILITY OF FINDING A SIRE WITH A GIVEN EPD FOR CALVING EASE (FIRST CALF) AS A FUNCTION OF HIS EPD FOR YEARLING WEIGHT

EPD for yearling weight	EPD for calving ease				
	100	102	104	106	108
100	.500	.330	.227	.145	.087
102	.240	.160	.097	.054	.028
104	.116	.061	.032	.015	.007
106	.036	.018	.008	.004	.001
108	.010	.004	.002	.000	.000

Standard deviations and correlations derived from the 1979 Simmental Sire Summary.

TABLE 10. GROUP EFFECTS FOR ANGUS SIRES BORN IN DIFFERENT YEARS

Year	Birth weight (lb)	Yearling weight (lb)
≤1964	+.8	-6
1965	+1.0	-17
1966	+.5	-11
1967	+.5	-15
1968	+.5	-9
1969	+.1	-8
1970	+.3	-2
1971	+.0	-2
1972	-.7	+2
1973	-.3	+3
1974	-.4	+7
1975	-.7	+11
1976	-.6	+12
1977	-1.2	+15
1978	-1.7	+18

Berger and Willham (1980)

I want to emphasize that this discussion of calving ease has been restricted to effects of the calf and to sire effects that act through the calf. I have not dealt with maternal (cow) effects on calving ease. Unlike yearling weight, calving ease does not necessarily measure the same trait in cow and calf. There is no guarantee that a sire whose calves are small and born easily will also produce daughters that calve easily. To be born easily, a calf should be small, but to calve easily a cow would probably benefit from being large. Indeed, most estimates of the genetic correlation between sire

effects and maternal effects for calving ease are small and possibly negative (table 11). Further, data from the Simmental Sire Summary indicates a small desirable correlation of .20 between sire proofs for yearling weight and daughters' calving ease.

TABLE 11. GENETIC CORRELATIONS BETWEEN SIRE PROOF FOR CALVING DIFFICULTY IN CALVES AND IN DAUGHTERS

Study	Correlation
Phillipson (1976)	-.19
Phillipson et al. (1979)	0 to .4
Simmental Sire Summary	-.10

Feed Efficiency

Improvement in feed efficiency (the rate of conversion of feed to body weight or retail cuts) should be a primary objective in the selection of beef cattle. But despite its importance, only one association attempts to include estimated breeding values for feed efficiency as a part of their sire summary. This fact should not be viewed as an indictment of other associations, however. Rather it is a reflection of the difficulty in characterizeing feed efficiency as a trait and in ranking sires accurately for feed efficiency. Feed efficiency is profoundly affected by nongenetic factors such as type of diet, length of feeding period and slaughter endpoint and may show sire by feeding system interaction. If cattle were fed like hogs on relatively standard diets under relatively similar conditions, measurement of feed efficiency would be critical. However, we do not really know that feed efficiency in an Iowa feedlot is highly correlated genetically with feed efficiency on Oklahoma wheat pasture or Virginia bluegrass.

We do know that feed efficiency is highly correlated genetically with growth and that a large fraction of the possible genetic improvement in feed efficiency can be achieved through selection for yearling weight. Research at the U.S. Meat Animal Research Center (Smith et al., 1976) indicates that regardless of the slaughter endpoint (constant age, constant weight or constant fat), types which grow relatively rapidly to that endpoint tend to most efficient. Also, the results of the American Herefore Association Reference Sire Program (Amer. Hereford Assn., 1980) indicate that in animals with high growth potential slaughtered at similar weights, variation among sires in feed efficiency was quite small. Thus one must keep the importance of feed efficiency in perspective, realizing that much of the potential improvement in this trait can be achieved by selection for growth without the additional cost and effort required to obtain accurate feed intake records.

Other Traits

Consideration of growth rate, ease of calving, carcass yield and quality and feed efficiency (either directly or indirectly) will go a long way towards defining the performance package. Other traits could, of course, be measured, and the field data forms of most associations provide ample space for recording traits that an individual breeder feels may be useful to him in his own breeding program. Care must be taken, however, in choosing the traits that will receive selection emphasis because as the number of traits considered increases the rate of response in any single trait declines. Thus emphasis on non-economic traits will limit improvement in economically important traits.

One trait of the sire that is of clear economic importance and that has only recently begun to receive selection emphasis is male fertility. Testis size, which is normally measured as scrotal circumference, has been shown to be associated with total sperm production in mature bulls and with the rate of sexual development in young bulls and rams. Reasonably large estimates for the heritability of testis size have been obtained (h^2 = .1 to .3). Also, work in sheep has shown that selection for increased testis size relative to body weight resulted in decreases in age at puberty in rams' daughters. However, selection for testis size also decreased growth rate by tending to select earlier maturing animals, indicating a probable negative genetic correlation between rate of testis development and yearling weight. Thus at this point in time, measures of testis size appear most useful in screening sires for possible reproductive insufficiencies. However, selection emphasis on sire differences in rate of sexual development could also be useful in the development of maternal lines in which maximum growth rates are not required. Further, if we see an increase in the frequency of bull feeding, progeny data on testis growth will become progressively more available.

The other class of traits which should be considered are the soundness and conformation traits. These traits can usually be reported and summarized in an optional way in most performance testing programs, but are usually not an integral part of the recording program. I feel that this approach is appropriate. The use of conformational or structural data may be helpful in individual programs, but, in my opinion, no trait should be included in a national beef recording scheme unless it can be shown to directly relate to the profitability of the commercial animal under almost all environmental circumstances. Clearly, the majority of the conformation and structural traits do not meet this requirement, although some other traits such as probe backfat and the presence of eye pigmentation may meet this constraint.

Conclusion

A great many traits make up the complete performance package, and all of them do not contribute equally to the package. As we measure and summarize more and more traits we find that it becomes progressively harder to find sires with "plus" breeding values for all traits. Indeed,

the sire that has a 103 of 104 ratio for true breeding value for all traits may not be out there, and even if he is, we may never identify him. The simulatneous consideration of many traits make your jobs harder, but it also makes the potential rewards greater. Thus our objective should be to measure as many of the important traits as we can, to put them into some sort of economic perspective for our own unique situation, and, in the words of Robert Bakewell, truly "breed the best to the best".

Literature Cited

American Hereford Association. 1980. AHA's National Reference Sire Evaluation Program Report No. 6. Amer. Hereford J. 71(8):67.

American Simmental Association. 1979. National Sire Summary. Amer. Simmental Assn., Bozeman, Montana.

B.I.F. 1980. Guidelines for Uniform Beef Improvement Programs. Beef Improvements Federation and USDA Extension Service (Draft).

Berger, P. J. and R. L. Willham. 1980. AHIR National Sire Evaluation. In Angus Sire Evaluation A.H.I.R. Field Data Report. American Angus Association, St. Joseph, Missouri.

Dickerson, G. E., N. Kunzi, L. V. Cundiff, R. M. Koch, V. H. Arthaud and K. E. Gregory. 1974. Selection criteria for efficient beef production. J. Anim. Sci. 39:659.

Dinkel, C. A. and D. A. Busch. 1973. Genetic parameters among production, carcass composition and carcass quality traits of beef cattle. J. Anim. Sci. 36:832.

Phillipson, J. 1976. Studies on calving difficulty, stillbirth and associated factors in Swedish cattle breeds. III. Genetic parameters. Acta Agric. Scand. 26:211.

Phillipson, J. J. L. Foulley, J. Lederer, T. Liboriussen and A. Osinga. 1979. Sire evaluation standards and breeding strategies for limiting dystocia and stillbirth. Livestock Prod. Sci. 6:111.

Smith, G. M. 1976. Sire breed effects on economic efficiency of a terminal-cross beef production system. J. Anim. Sci. 43:1163.

Smith, G. M., L. V. Cundiff and K. E. Gregory. 1978. Genetic analysis of birth traits in cattle. J. Anim. Sci. 47 (Suppl. 1): 247 (Abstr.).

Smith, G. M., D. B. Laster, L. V. Cundiff and K. E. Gregory. 1976. Characterization of biological types of cattle. II. Postweaning growth and feed efficiency of steers. J. Anim. Sci. 43:37.

THE DATA AVAILABLE FROM NATIONAL BEEF RECORDS PROGRAMS: MATERNAL PHASE

by
J. B. Gibb
University of Illinois

Beef cattle selection has advanced dramatically during the last decade with increased awareness of the importance of objective evaluation associated with performance testing. Though overshadowed in the past by bull test stations and carcass evaluation, the maternal aspect of performance testing is rapidly being recognized as a vital phase in the total performance package.

Several of the national breed associations have developed complete performance programs. Use of these programs has increased but participation is still somewhat disappointing. One reason for the lack of participation could be the absence of comprehension by breeders of the total impact these programs can have on herd, breed and industry advancement. It is indeed true that 80-90% of the genetic improvement in a typical commercial operation comes through bull selection. However, an extra 10-20% improvement with little additional investment has a high benefit-to-cost ratio. Moreover, the fact also remains that the cow is responsible for one-half of her progeny's genes. Rising use of embryo transfer in the seedstock industry makes the latter even more significant.

While this paper will concentrate upon the data available from national programs with regard to selection decisions, it should be recognized that record utilization for maternal evaluation also assists producers in making daily management decisions in areas like health, nutrition and reproduction.

The six areas of maternal evaluation related to selection are: (1) replacement heifer selection, (2) cow culling, (3) cow selection, (4) cow recognition, (5) sire evaluation and (6) sire selection.

Replacement Heifer Selection

Of the data available, those for replacement heifer selection are most numerous. Shown in Table 1, as in succeeding tables, is a sampling of breed associations with performance programs. Table 1 indicates what data for replacement heifer selection are currently, or will soon be available. The information in this table is partitioned into birth, weaning and yearling data, since initial selection decisions are typically made when the heifers are weaned with a second cut made at one year of age. Birth data available are gestation length (when breeding data is supplied), calving ease and birth weight, while weaning and yearling data include adjusted 205 and 365 day weights, postweaning average daily gain, plus weaning and yearling weight per day of age and frame score.

In addition to trait ratios, a few associations are calculating estimated breeding value ratios for some traits. Since estimated breeding values may include pedigree and progeny data (when appropriate), plus the individuals's own record, they are more accurate estimates of an individual's genotype than the individuals own records. This is particularly true for lowly heritable traits. Estimated breeding values are currently being calculated for growth traits (EBV) such as birth, weaning and yearling weight and maternal traits (MBV) like calving ease and weaning weight. There currently is some confusion regarding differences in the calculation of maternal and growth breeding values. Data used to calculate growth breeding values for replacement heifers include (1) the individual's own record, (2) average record of paternal half-sibs and (3) average record of maternal half-sibs.

Maternal breeding values are calculated using progeny data of daughters of sires in the heifer's pedigree plus the average performance of her dam's progeny. The individual heifer's own record contributes to her estimated MBV only in her effect upon her dam's progeny average. The sires whose daughters' progeny data are included in the calculation are: (1) own sire, (2) paternal grand sire, and (3) maternal grand sire.

Aside from being better indicators of genotype, breeding values also allow for more specialized selection. Weaning growth versus maternal breeding value is a good example. Producers wishing to emphasize growth may utilize the weaning growth breeding value, while producers seeking more milk production can utilize the maternal weaning weight breeding value. Calving ease as a trait of the sire (calf's ability to be born) or dam (ability to have a calf) is another example of specialized selection. Producers wishing to sell easy calving bulls could emphasize the growth calving ease breeding value (trait of the sire) while a producer wishing to develop a herd of easy calving females could emphasize the maternal calving ease breeding value (trait of the dam).

Limited evidence exists regarding the validity of using estimated breeding values. However, shown in Table 2 are actual values from one herd's Angus Herd Improvement Records (AHIR). All data shown for the 43 heifers having their first calves as two-year-olds in 1977 were calculated using their 1975 individual weaning weights. The heifers were divided into a top and bottom half according to weaning ratio, growth breeding value ratio and maternal breeding value ratio. The highest percentage of heifers culled came from the top half of the weaning weight ratio group while the top half of the growth breeding value ratio group had the fewest culls. These data imply that in a herd where females are culled for inferior fertility and growth, growth and maternal breeding values are better indicators of the subsequent productivity of replacement heifers than a simple weight ratio.

Cow Culling

Accurate, objective cow culling is essential to the maintenance of a functional cow herd. Together, fertility, milk production and growth are responsible for the combined genetic inferiority or superiority of beef cow productivity. Table 3 summarizes the data available from the various associations for cow fertility and milk production evaluation.

Since infertility is typically the primary reason for culling cows, it is appropriate that some breed associations offer the opportunity to input breeding data. These data are then processed to give the producer a good record of pregnancy status and expected calving date. This is a good example of how records may assist daily management decision-making. Other cow fertility information available is percent calf crop, calving interval and calving ease related data such as: calving ease score, birth weight and gestation length.

Variation does exist among the programs with regard to the availability of estimated breeding values for fertility traits. The Simmental Association currently possesses the only program providing maternal and growth breeding values for calving ease. As mentioned earlier, growth and maternal calving ease breeding values provide the producer with knowledge of the cow's genotypes for her calves' ability to be born and her ability to give birth, respectively.

Without adequate milk, a calf will have little opportunity to achieve its full growth potential. Average adjusted 205 day weight of calves, MPPA (most probable producing ability) and MBV (weaning weight) are the most common values used to estimate a cow's milk production genotype. The main difference between MPPA and progeny average adjusted 205 day weight is that MPPA accounts for unequal parity among cows. Since the repeatability of weaning weight is only 40%, MPPA is a better method than progeny average adjusted 205 day weight for comparing cows of different parity. One problem with MPPA is that it does not account for genetic trend. In a typical herd where genetic improvement is being made, younger cows should be genetically superior to older cows even though equal MPPA values may indicate otherwise. It should be recognized, however, that MPPA does not differentiate between weaning weight as a function of preweaning growth genotype and milk production genotype. In a case where a producer is attempting to identify cows for culling based upon an estimate of milk production genotype, weaning weight MBV should be a better indicator.

Those data available for identifying a cow's genotypic value for growth are shown in Table 4. Most probable producing ability is included in both the milk and growth categories for reasons already mentioned. Preweaning growth estimated breeding value (EBV) is a good indicator of preweaning growth genotype but is not necessarily a good value to use for cow culling when culling is based on observable productivity. In addition to progeny data, weaning EBV is also influenced by the cow's individual record as well as that of her

paternal and maternal half-sibs. Though not especially common, a cow could have a high weaning EBV and still produce calves with below average weaning weights.

Postweaning growth information available from national programs are also shown in Table 4. Caution should be exercised before relying heavily upon yearling weight averages unless the number of calves included in the average is known. In many instances, only superior calves are weighed as yearlings thus biasing a cow's estimated genotypic value for postweaning growth and other related yearling traits.

Information for cow culling may be obtained from a variety of different forms depending upon the breed association. The most common forms are: (1) cow summaries, (2) produce of dam summaries and (3) cow cards. Table 5 indicates what forms are available from the different associations. Performance pedigrees are also included in Table 5 but will not be discussed until later.

The cow summary is a composite listing of cows whose calves' data were reported in the most recent weaning or yearling report group. It typically lists cows (one cow per line) by order of birth date, tag number or trait rank. If cows are being summarized according to estimated breeding value, their estimated breeding values as well as the data used in their calculation are given.

The produce of dam summary is more detailed in that individual calves are listed by birth year under each cow with the calf's appropriate identification and performance data. The simple cow summary is useful when one needs to quickly identify poor producing cows while the produce of dam summary gives one more detailed information and can clarify questions concerning progeny averages.

One of the most rapidly changing aspects of cow evaluation is the availability of cow cards. A cow card is simply a form containing the history of a cow including up-to-date progeny and management information. The cards vary in style from the Simmental Association's index, file card format that is revised as additional progeny data is available to the backer sheet, overlay combination used for some time by the Hereford Association. The latter format is now being adapted by other breed associations. The backer sheet is a permanent record containing pedigree, individual performance and optional management information like health care and breeding dates while the overlay contains individual progeny data plus the cow's current progeny averages and breeding values. Overlays are updated as additional calf measures are supplied to the association. This is typically done following the submission of weaning and yearling data. The cow card obviously can be a very valuable general management as well as selection tool.

The next step in cow evaluation is the identification of individual superior cows. This aspect has only recently become very important with the development of embryo transfer as a practical tool for genetic improvement. The expense of embryo transfer makes accurate identification of superior cows imperative. Even though estimated breeding values of young cows and heifers are good estimates of subsequent performance, they are only indicators and exceptions do exist. Data obtained from a long-time performance herd's records shown in Table 6 demonstrate the value of progeny data when selecting embryo transfer candidates. The cows had identical statistics in nearly every category as weanling heifers, but their productivity as mature cows was vastly different. Although the females in this example were merely average weanling heifers and unlikely embryo transfer candidates, the data do demonstrate how progeny information may reduce the risk of selecting superior cows.

Data available from the national programs for superior cow evaluation and the forms in which they appear are the same as those described for cow culling with one exception. The performance pedigree available only from the American Angus Association may be utilized by breeders who wish to obtain information on another breeder's cattle. Anyone may request a performance pedigree containing updated pedigree performance data plus the individual's current estimated breeding value ratios for maternal and growth weaning weight and growth yearling weight. It is probable that the performance pedigree is a better aid to sire than female selection, but the potential for its use in selecting superior cows outside the herd does exist.

Breed association sponsored cow recognition programs are yet another aspect of maternal evaluation. Cow recognition programs serve two basic purposes. They are: (1) expression of the breed association's desire to recognize functional females and (2) indirectly recognize breeders who have been utilizing the breed association's performance programs.

The standards that must be met before a cow is recognized vary with each breed association but basically are: (1) she must have weaned a calf every year since she was a two-year-old, (2) she must be at least four year of age and (3) her progeny average weaning weight ratio must be at least 105. A cow must excel in fertility, milk production and growth before being recognized. The Charolais and Simmental Associations have different levels of recognition depending upon level of achievement while the Angus and Hereford Associations have one level of recognition. Those cows receiving recognition are typically listed in their respective breed association's publication. In addition, the Simmental Association has a place on its cow card where an award designation may be indicated. Other associations issue certificates to the owners of recognized cows.

Sire Evaluation

An essential aspect of cow herd record keeping that can easily be overlooked is its importance to sire evaluation. The rising cost of traditional, designed sire evaluation procedures coupled with new advances in statistical methods will likely lead to increased emphasis upon sire summaries derived from field data. The accuracy of such summaries is dependent upon the amount of sire progeny data included. The greater the breeder participation in record keeping programs, the more accurate the sire summaries. Three breed associations have published extensive sire summaries based on field data. Increasingly, more seedstock and commercial producers are making use of these new sire summaries, thus making it imperative that breeders fully comprehend the significance of field data as they relate to herd and, ultimately, breed advancement.

Sire Selection

Sire selection is related to cow evaluation in that identifying cow and/or cowherd performance weaknesses allows one to more accurately select bulls that will move the herd closer to the breeder's designated goals. A producer with a good feeling for the performance level of his herd will find it easier to accurately select bulls to correct weaknesses. Not only may general herd weaknesses be more readily identified, but individual cows with weaknesses perculiar to the rest of the herd may be identified and mated to bulls to correct the specific weakness.

The Future

Future developments in maternal evaluation will likely involve increased application of estimated breeding values. This seems particularly logical when one considers the low heritability of fertility traits, thus the increased selection accuracy afforded by estimated breeding values. Unfortunately, accurate measures of fertility are difficult to obtain, which partially explains the lack of current emphasis upon fertility. However, as breeders become more concerned with fertility and report more fertility related data, the evolvement of fertility breeding values is likely. For example, those associations accepting breeding dates could calculate first service conception rates and corresponding estimated breeding values.

In addition, breeding values for various fertility traits could be combined into a general fertility index. Another step could be the combination of breeding values for various traits like maternal weaning weight, maternal calving ease, maternal first service conception rate and scrotal circumference into a composite maternal index. Indexes could also be developed for growth and milk production. As breeds and lines within breeds become more specialized with regard to their crossbreeding roles, the development of such selection tools could be greatly beneficial.

After sorting through the data available from the national records program, it is readily apparent that these programs have common goals and in most cases are presenting similar information. However, variation in how the data are presented from the standpoint of terminology, sophistication of calculations and form format does vary and can be confusing. As crossbreeding becomes more popular, requiring that commercial and purebred producers be familiar with several breeds' programs, the evolvement of a common program for all breeds should be considered. This is certainly not to say that all breeds should emphasize the same traits, but rather that the need exists for a common program with universal understanding.

Summary

In summary, the following points should be made.

1. A performance testing program without maternal evaluation is not a total performance program.

2. The national beef records programs have grown and progressed dramatically during the last decade and will continue to develop to meet the needs of the beef industry.

3. The national programs offer a variety of useful, informative data that may enhance within as well as across herd cow evaluation.

4. Breeders not utilizing the national programs likely fall into at least one of the following categories:

   a. Involved with a new or non-progressive breed.
   b. Don't comprehend the impact of the program upon herd, breed and industry advancement.
   c. Lazy.
   d. Afraid of what the data might reveal about the productivity of their cattle.

Table 1. Data Available for Replacement Heifer Selection

	Birth						Weaning						Yearling					
Breed	Calving Ease	EBV	Wt.	Ratio	EBV	Gest. Length	WDA	Adj 205	Ratio	EBV	MBV	Frame	Adj 365	Ratio	EBV	Frame	ADG	WDA
Angus	X		X	X				X	X	X	X	X	X	X	X	X	X	
Brangus	X		X	X			X	X	X			X	X	X		X		X
Charolais	X		X			X	X	X	X				X	X			X	
Hereford	X		X				X	X	X	X	X	X	X	X	X	X		X
Limousin			X			X		X	X				X	X			X	
P. Hereford	X		X	X				X	X	X	X		X	X	X		X	
Red Angus	X		X	X	X			X	X	X	X		X	X	X		X	
Simmental	X	X	X	X	X			X	X	X	X		X	X	X			

Table 2. Accuracy Of Cow Productivity Predictors

	Weaning Ratio	Growth EBV	Maternal EBV
Top 1/2	44	33	37
Bottom 1/2	56	67	63

Table 3. Date Available For Cow Evaluation - Fertility And Milk

	Fertility							Milk	
Breed	Calving Dates	Calving Ease	EBV	MBV	Gest. Length	% Calf Crop	Calving Interval	MPPA	Weaning Wt. MBV
Angus	X	X				X	X		X
Brangus		X					X	X	
Charolais	X				X		X	X	
Hereford		X					X	X	X
Limousin					X			X	
P. Hereford		X							X
Red Angus	X	X			X	X			X
Simmental	X	X	X	X	X			X	X

Table 4. Data Available For Cow Evaluation - Progeny Growth

	Birth			Weaning						Yearling					
Breed	Weight	Ratio	EBV	Adj 205	Ratio	EBV	ADG	WDA	Frame	Adj 365	Ratio	EBV	Frame	ADG	WDA
Angus	X	X		X	X	X	X		X	X	X	X	X		
Brangus	X	X		X	X			X		X	X				X
Charolias				X	X					X	X			X	
Hereford	X	X		X	X	X		X	X	X	X	X	X		X
Limousin	X			X	X					X	X			X	
P. Hereford	X	X	X	X	X	X	X			X	X	X	X	X	
Red Angus	X	X		X	X	X				X	X	X			X
Simmental	X	X	X	X	X	X				X	X	X			

Table 5. Cow Record Forms

Breed	Cow Summary	Cow Cards	Performance Pedigree	Performance Registration Certificate
Angus	X	X	X	X
Brangus	X	X		
Charolais	X			
Hereford	X	X		
Limousin	X			
P. Hereford	X	X		X
Red Angus	X			X
Simmental	X	X		X

Table 6. Cow Variation

Cow ID	Weaning Ratio	Growth EBV	Maternal EBV	4 Calf Average Weaning Ratio
5108	102	100	101	107
5228	99	100	101	97

INFORMATION AND DATA NEEDS OF COMMERCIAL HERDS

Al Smith

Commercial cattlemen need all the information and data available in order to make sound profitable decisions on herd sire selections and female replacements. Some seedstock producers are providing an ample amount of performance information but the majority of them are not. Mary Garst is an example of a producer who is providing the total information needed in order to make these decisions.

I would like to take a few minutes to show you portions of the results of a survey of 400 cow-calf operations taken by Miller Research Service during May and June of 1980. Geographic locations of those contacted follows the population density of beef cows reasonably well in the United States:

1. How many brood cows do you have?

10-49	133
50-99	126
100-199	99
200-499	32
500-Plus	10

2. Have you purchased any bulls in the past 12 months?

Yes:	167
No:	233

3. How many bulls did you buy last year?

1	73
2	51
3 or 4	24
5 or more	19

4. Did you buy a registered bull?

Yes:	126
No:	29
Some were, some Not:	12

5. Is a registration certificate an indicator of:

	Quality	Dependability	Performance
Yes	55%	57%	56%
No	40%	35%	39%
Don't Know	5%	8%	5%

6. What else does a registration certificate tell you?

Parentage and Bloodlines	55%
Nothing	32%
Purebred	11%
Gain	3%

7. Are these traits important?

	Fertility	Growth	Carcass Quality	Ease of Calving	Temperment
Yes	30%	35%	9%	21%	2%
Yes after discussion	68%	64%	84%	76%	88%
No	2%	1%	7%	3%	10%

8. Where do you prefer to buy bulls?

Production Sales	15%
Consignment Sales	3%
Private Treaty	70%
No Preference	12%

9. What items are important to you when buying a bull?

Rate of gain	51%
Weaning weight	20%
Parentage & Bloodline	18%
Past performance	13%
Birth weight	11%
Appearance	9%
Nothing	8%
Records	6%
Fertility	5%
Calving ease	4%
Breeder reputation	2%

10. Do the breeders you buy from provide this information?

Yes:	81%
No:	10%
Don't Know:	9%

11. If you were to decide on the basis of one item only where to buy your bull, which of these would it be?

Breeder Reputation	57%
Performance Data	31%
Available Supply	8%
No opinion	4%

12. Are you a commercial producer?

Yes:	53%
No:	47%

13. Do you performance test?

Yes:	23%
No:	77%

14. Do you raise only registered cattle?

Yes:	14%
No:	86%

15. Do you utilize a terminal cross?

Yes:	27%
No:	73%

16. What more could registered breeders do to help the commercial producer?

Nothing	33%
Production records	20%
Don't know	19%
Better quality cattle	11%
Performance test	6%
Rate of gain	5%
Less pampering	1%
Larger size	1%
Reduce price	1%

There are several facts that stand out in this survey:

1. Breeder reputation or breeder creditability. If this is not established then all other information is useless. I cannot buy a herd sire based on information that is suspect. If seedstock producers do not conduct their sales and business with honesty and integrity, then they cannot be relied upon for accurate information.

   When you talk about breeders that are creditable with honesty and integrity, you have to think of Doc Bartenslauger. Here is a gentleman whose reputation is beyond question. He is a shining example to the whole industry. Doc sells many bulls every year that the buyers never see until after they have purchased them. He is able to do this because of the reputation he enjoys. My hat's off to him.
2. Fertility-commercial cattlemen must have available to them several facts pertaining to fertility:
   A. Scrotal circumference-this is an easily obtained measurement that is very important to total sperm production. At a recent national breed bull show, 25% of the bulls shown did not meet minimum scrotal circumference standards. These animals were in the wrong show. They should have been in the steer show. Commercial cattlemen need to know that this kind of bull gets castrated instead of paraded around pretending to be a bull.
   B. Ejaculation and semen study-more work is involved here but a bull that has been tested is worth more money to me. Most bulls are guaranteed to be breeders when they are purchased and most breeders will make good on them if they aren't. However, I can never make up the lost time if cows are not bred when I discover that a bull is infertile.
   C. Reproductive organs should be examined for abnormalties before a bull is ever sold. Here again, is a simple process that can keep a bad bull from being purchased.
3. Ease of calving-birth weights should be recorded and made available on every bull that is ever sold. Big birth weights are not bad when they are known. I can select my bulls to use on different age and breed of cows if I know birth weights. This way I can decrease my chances of calving difficulty and benefit

from larger birth weights rather than suffer losses because of them.

4. Growth, weaning weight, rate of gains and yearling weight, I will lump into one group. This information needs to be available in order to select for specific needs. My weaning weights may be okay, but I might need to improve rate of gain or yearling weights and can do so by selection of bulls with these good traits.
5. Carcass information is important to some commercial cattlemen who sell their beef on the rail. There are currently several breed associations who are doing excellent work in this area, and I hope they continue to do so.

There is also a lot of information which is important to commercial herds in female selection. It is my opinion that reproduction and performance records should be kept on all females. At Neuhoff Farms we breed our heifers for two heat periods and our cows for three heat periods. After a pregnancy test we cull all open females. A cow that does not raise a calf every 365 days is not profitable to us.

I also feel that calving ease records are very important for females. I have heard Dave Nichols say on several occasions that Nichols' cows calved by themselves or die trying. We need more seedstock producers to adopt this philosophy so that the calving difficulty is not passed on to the commercial herds.

Now you take all of this information and data and put it together and you have what James Bennett calls "predictable performance". James will give you as an example of predictable performance:

> Cow #207 is 9 year old. Her weaning and yearling ratios on seven calves are 105 and 106. One of her daughters has 5 calves with ratios of 110 and 111, one of her granddaughters has three calves with ratios of 115 and 116. By breeding these cattle to top performance bulls he can predict the performance of their offspring. Thus, he has taken some of the gamble out of raising cattle. As Ike Eller often says, all of these records are worthless unless they are used.

The commercial cattle producers who survive the 1980's will be the ones who get what they pay for. We don't mind paying for a good bull, but we want to be sure it is a profitable bull. The bitterness of poor quality remains long after the sweetness of low price is forgotten.

We must be able to produce our product as efficiently and cheaply as possible. Already the chicken burger and soon the pork burger will be making in roads in the consumption of hamburger. It is going to be hard for the beef industry to regain this loss unless we are competitive price wise.

In summary, in order to be competitive price wise, we must have the following information readily available:

1. Known reputable breeders
2. Fertility information
   A. Scrotal circumference
   B. Ejaculation and semen studies
   C. Reproductive organs exams
3. Ease of calving
4. Growth, weaning, rate of gain and yearling weight
5. Carcass information
6. We must know that our cows can and will reproduce every 365 days without calving problems.
7. Put it all together for predictable performance.

Ladies and gentlemen, facts do not cease because they are ignored and the facts are that the cattlemen who survive the 1980's are going to be the ones who use the total performance package. We are going to survive. Are you?

THE PERFORMANCE PACKAGE: INFORMATION AND DATA NEEDS FOR THE A.I. INDUSTRY

Wm. M. (Bill) Durfey
Executive Vice President
National Association of Animal Breeders
Columbia, Missouri

All of us attending this meeting believe that genetic progress in beef cattle breeding can result from the use of performance records.

Even though we agree that performance records are useful - or better yet - essential for genetic progress, we should understand the role of different industry segments. Thus, I will first attempt to put the role of the A.I. industry into perspective with respect to the "performance package."

There is considerable variation in thinking in regard to the role or purpose of the A.I. industry. Some seem to view the A.I. industry as having the sole purpose of collecting and processing semen. Thus, it might be considered that the A.I. stud should be expert in semen technology and nothing more. Certainly, the A.I. industry must have expertise in semen technology - and we do have highly trained specialists in semen collection, processing and freezing. But -this in reality is a means to the end.

I am not implying that semen technology is not important, because it is a critical element of success in the use of artificial insemination. However, the real purpose of artificial insemination is to provide a means to optimize genetic improvement by capitalizing on genetically superior bulls through their identification and widespread use. Therefore, our primary purpose and role is in the field of animal breeding. We provide a vehicle for utilizing the principles of population genetics to evaluate, select and distribute semen from genetically superior bulls. In turn, purebred and commercial producers have access to the best genetics for planned use in their breeding programs.

To better illustrate the A.I. industry role in animal breeding I wish to outline our basic procedures for sire evaluation and selection. The first step is to select a group of yearling bulls whose performance pedigrees and individual performance records indicate they possess superior genetic potential for the desired traits.

Sources of these young bulls include central test stations and individual breeding herds -wherever reasonably good records are available. Unfortunately, this is an extremely difficult process because of the general lack of the right kind of performance records being available. Performance record systems simply have not progressed in the beef industry to the point that we can evaluate the relative genetic levels of young bulls in different herd and test center populations. However, the A.I. industry has been generally successful in identifying superior bulls under the circumstances.

The next step is to progeny test these young bulls. Here again, the beef industry has only recently begun to advance in the necessary technology. Although, we are progressing in our evolutionary process.

The highly structured progeny test programs characteristic of a number of beef sire evaluation programs in the past are simply inadequate. They inherently

For presentation at the annual meeting of the Beef Improvement Federation, Stillwater, OK, Mar. 24, 1981.

limit the number of bulls that can be progeny tested and restrict the accuracy of the data because of small numbers of progeny. They are relatively complex in design and are complex in operation for the producer collecting the records.

On the other hand, the sire evaluation procedures utilizing field performance records from all sources can be far more effective. An increasing number of breed associations have and are adopting this procedure. As a consequence, a greater number of bulls will be evaluated with greater accuracy. Furthermore, data accuracy will improve as more progeny records are added each time a bull is resummarized.

Once the progeny test is complete and a bull's genetic summary is available the best bulls are selected for continued use in A.I. service. Those that don't make the cut are eliminated. Obviously, the accuracy of this selection step will continue to improve as more and more performance records and sire summaries become available.

The success of artificial insemination in facilitating genetic progress in cattle breeding has been well documented in the dairy industry. Production testing, national sire evaluation and artificial insemination have been combined by dairymen to make phenomenal genetic progress. This is demonstrated by the fact that milk production per cow in the U.S. has doubled in the last twenty-five years. This period of time corresponds with the availability of data from national evaluation for dairy sires and increased use of artificial insemination.

As will be the case with beef sire evaluation, the dairy sire evaluation system has undergone several changes since its inception in the 1930's. Even greater progress in dairy cattle breeding is on the horizon as the dairy industry feels the real impact of new statistical procedures implemented in 1974 and further improvements which have been added since that time.

All this sophistication in dairy sire evaluation has enabled the artificial insemination industry to truly select the very best dairy sires and serve dairymen by making semen available from these sires.

The point of this brief discussion of dairy sire evaluation is to illustrate the potential for genetic improvement of cattle where artificial insemination is combined with accurate sire evaluation. The beef industry should in time be able to make genetic progress of a magnitude at least comparable to that of the dairy industry.

Now, I will more specifically address the question of what bits of data are necessary for the A.I. industry to best fulfill its role as a part of the beef industry "Performance Package."

A simplistic yet accurate answer to this question is that "the data needs of the A.I. industry are precisely parallel with the data needs of the cattle producer."

Performance records are not -and need not be - collected and maintained by producers specifically for the A.I. industry. Performance records - i.e. weaning weight, yearling weight, etc. - are recorded and maintained by a producer primarily for use in making herd management decisions. Otherwise, you simply won't go to the trouble and expense.

You, the producer weighing your calves, must receive some direct and virtually immediate benefits or you won't weigh them. It is only human nature that you would not be willing to weigh your calves simply so the A.I. industry can evaluate bulls to be used in A.I. service and sell semen. To do so would yield benefits for you, but would seem long term and you could lose interest pretty fast.

We must recognize that use of performance records for national sire summaries is in fact a secondary use of the records. Consequently, the real question that should be addressed is "how can the available records normally collected in the field be best utilized in national sire evaluation programs to enable the A.I. industry to most effectively serve your needs for superior genetics?"

In other words, the computer should not dictate to the producer and make the system more complex at the ranch level. Computers and computer technology have enough sophistcation and flexibility to simplify performance programs at the ranch level instead of making them more complex.

Only a few records - parentage, breeding dates, birthdate, calving ease, weaning weight and yearling weight - are the basic records maintained for herd management. But, these same few records provide the basis for complex national sire evaluation programs provided your records get into the computer system and the computer specialists do their job.

The important thing is that the basic records are input into the computer system on a consistent basis year after year. If this is done, - over time- additional data on succeeding generations will result in objective performance pedigrees - again for use by the producer and to enable the A.I. industry to be more precise in that first step of selecting young sires for progeny testing.

To follow up on my discussion thusfar, I wish to review a few points of concern.

First, there is a critical need for the terminology used in national sire evaluation program summaries to be standardized. For example, the Simmental sire summary uses "Ratio" to indicate the relative difference among bulls in each trait. But, the Angus sire summary uses "Expected Progeny Difference" or EPD.

Similarly, Simmental uses "Accuracy" to indicate how accurate the ratio is. In contrast, Angus uses "Effective Progeny Number" or EPN to indicate accuracy of EPD.

This wouldn't be so bad if you are only working with one breed. But, if you are a commercial breeder using more than one or two breeds in a crossbreeding program, it can become confusing. Also, if you are a commercial A.I. stud working with several breeds it can be dif-ficult to educate your field people so they can properly present the data to their customers in an understandable manner.

I recognize that the computer programs used by Angus and Simmental are different. And, I know that E.P.N. and accuracy are different as are EPD and ratio. But, this further emphasizes my earlier point about the need to keep the complexity at the computer level and simplify performance programs and information for the cattleman and other segments of the industry.

Consequently, in looking to the future we need to get our act together and take advantage of available computer technology to make proper adjustments so the sire summary results for all breeds can be identified in a standardized fashion.

This same point is applicable to the manner in which the data for certain traits is presented. For example, in the Simmental summary a birth weight ratio above 100 indicates a bull that will sire calves that are lighter at birth than the average, which might be interpreted to be more desirable. In contrast, in the Angus summary, a plus EPD for birth weight indicates birth weights heavier than breed average.

I should emphasize that I am not picking on Angus and Simmental. The same problem exists among sire summaries of other breeds. But we should overcome breed individuality in this regard. There simply is no need for every breed to reinvent the wheel. I have mentioned Simmental and Angus in this discussion because I am currently most familiar with their summaries. In fact, these two breeds should be applauded for being real leaders in the development of national sire evaluation.

Next, I wish to underline the need for a greater understanding and appreciation of the value and use of national sire evaluation data among all segments of the industry. As a general rule I feel that the value of national sire evaluation data is underestimated. We all should share the responsibility for this educational need.

Consistent with this last point, we should define and concentrate on the beef cattle traits that are most important and not waste time with superfluous traits that are unimportant and which impede progress. An example of what I have reference to is marbling scores and perhaps certain other so called carcass quality indicators.

I will grant that these do have some economic significance as long as they are a part of our carcass grading and marketing system. But we need to realize that fed - and I underline fed - beef is going to have generally consistent palatability when it reaches the consumer. Further, there is new processing technology being developed that can help insure tenderness and palatability.

We need to change our grading system accordingly and concentrate on efficient production of red meat - just as the dairy industry has concentrated on milk production. The one caution I would interject here is that such changes in the grading and marketing of carcasses should be designed such that they will provide incentives for the production of genetically superior, more efficient cattle. Changing the grading system simply to accomodate shorter fed cattle could be self-defeating.

In conclusion, I would summarize by saying that the data needs for the A.I. industry are accurate, objective national sire evaluations and performance pedigrees on a large number of animals in all breeds of significance. Further, these should be consistent in their method of presentation and terminology across breeds such that they are consistently understandable.

With this type of information available to all segments of the beef industry, the significance of national sire evaluation will be better understood - and it will be possible for the A.I. industry to better fulfill its role in beef cattle breeding as a part of the "Performance Package."

THE POTENTIAL FOR CHANGE IN BEEF PRODUCTION THROUGH APPLICATION OF BEEF IMPROVEMENT RECORDS

Art Linton
Animal and Range Sciences Department
Montana State University
Bozeman, MT 59717

Instead of discussing the assigned topic this afternoon I would like to rephrase my title to read "The Potential for Progress in Beef Production". After all, to change something is relatively easy. To improve it implies directional change, which can certainly be more difficult.

The previous speakers on today's program have identified for you the information needs of their particular segment of the industry. Even though their requirements may differ somewhat, their goal is essentially the same: to generate a profit. The seedstock producer and the AI industry both market germ plasm or, if you will, a genetic package. Their objective is to produce or identify those individuals that are superior genetically, then to promote and profitably merchandise the genetic package.

The balance of the beef industry is largely dependent upon the exploitation of these genes to maximize their efficiency of production. For example, in a feedlot steer we really couldn't care less about its genetics except as this hereditary input contributes to the efficiency of production and the marketability of the end product.

RATE OF PROGRESS

The first step in any breeding program is to establish some long range selection goals. Perhaps this is more easily said than done, simply because we are part of a dynamic industry that is continually changing. But as we survey the industry and identify those breeders that are the source of much of the superior germ plasm today, we note that there is a striking degree of commonality among these people. In general, they have more foresight than the average breeder and have been more perceptive in determining the direction the industry is going. Another unique feature of this group is that they have been totally committed to their objectives and have been unswerving in their dedication to the achievement of these goals. It should not be surprising, then, that some of the superior beef cattle genetics today, at least in the Hereford breed, are the by-products of some research project that have been pursuing the same selection objectives for over 30 years, in spite of extreme criticism that was often directed toward the scientists involved.

A relatively simple formula tells us how much progress we can expect to make as a result of selection:

$$\text{ANNUAL PROGRESS} = \frac{\text{Selection Intensity X Heritability of Trait}}{\text{Generation Interval}}$$

SELECTION INTENSITY

This is also measured as the selection differential and is simply the difference between the average merit of those individuals selected to be parents of the next calf crop and the herd average. One must remember that half of the genetic contribution to a calf crop comes from each parent, so in calculating the selection differential equal emphasis must be given to each parent. Because of the differential reproductive rate of the two sexes, one normally achieves a much higher selection differential for bulls than for females. This is the reason why it is often said, and rightly so, that 80-90% of the true progress that is achieved comes from bull selection. One of the ideas behind artificial insemination is that it increases the reproductive potential of superior bulls thus increasing the selection differential.

HERITABILITY

This value tells us the degree to which a trait is under genetic control. The phenotype of an individual for each trait is a combination of its genetic make-up and the environment in which it was reared. The relative importance of each gives us the heritability value. Obviously, if a trait has a low heritability then little progress can be expected from direct selection.

GENERATION INTERVAL

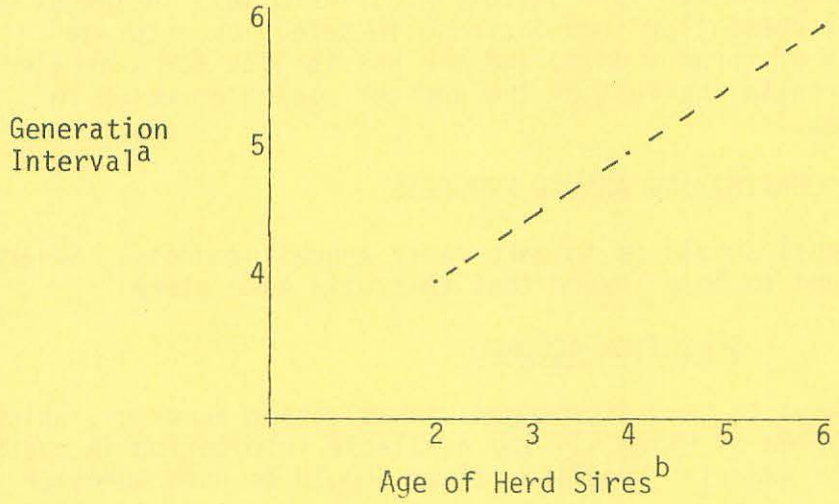
Unlike insects, rabbits or even swine, cattle have a relatively long generation interval. Because of the comparatively poor reproductive rate and the limitations imposed by the age of puberty, most realistic generation intervals for cattle run between 5.5 and 6 years. Here again, equal emphasis is given to each parent in this calculation:

$$\text{Generation Interval} = \frac{\bar{A}m + \bar{A}f}{2}$$

where $\bar{A}m$ and $\bar{A}f$ = average age of the male and female parents at the time the offspring are born.

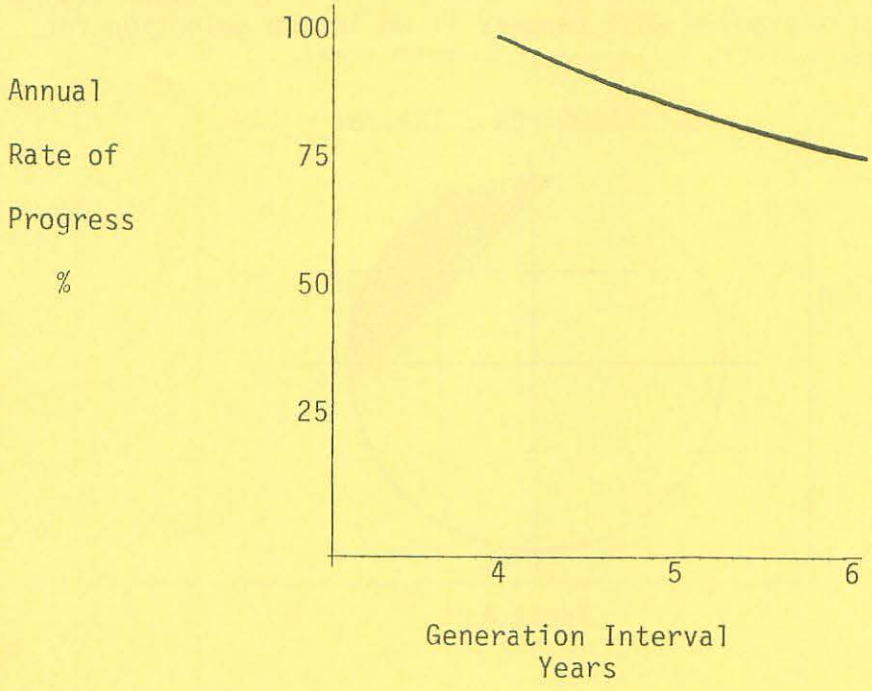
It is difficult to do a great deal about the female's contribution to this formula. However, by using younger bulls as herd sires much can be done to reduce the generation interval as shown below:

Figure 1. INFLUENCE OF BULL AGE UPON GENERATION INTERVAL



[a]Assumes average cow age of 6 years
[b]At time calves are born

Figure 2. EFFECT OF GENERATION INTERVAL UPON RATE OF PROGRESS



As the generation interval increases, normally the rate of progress per year goes down. However, there are some trade offs involved between generation interval and selection differential. A longer generation interval does allow some increase in selection accuracy (through the use of progeny data) and the possibility for a greater selection differential because of the greater pool from which to select herd sires.

MAXIMIZING ANNUAL PROGRESS

Everyone's goal should be to make rapid annual progress. Several things can be done to help insure that this will take place.

SELECTION ACCURACY

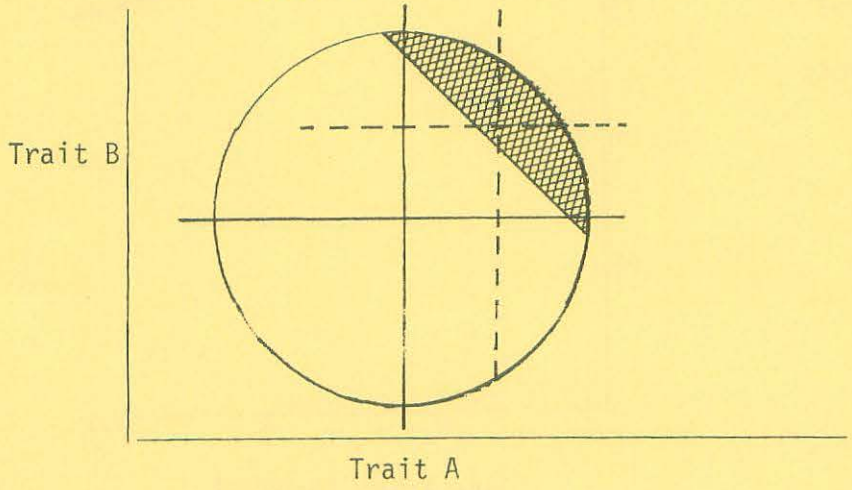
One of the keys to beef improvement is selection accuracy, which can best be achieved by using all the available information in the most useful form. For example, breeding values should be used whenever possible.

MINIMAL TRAIT SELECTION

Sometime it would be well for each of us to make a list of those traits which we consider in herd bull selecting. After you make this list, examine those traits listed to see just how many are directly related to performance.

Let's consider for a minute the effect of multiple trait selection upon the progress one cna expect for each trait. Up to this point in our discussion we have dealt pretty much with a single quantitative trait. Now let's examine what happens if we impose selection for multiple traits.

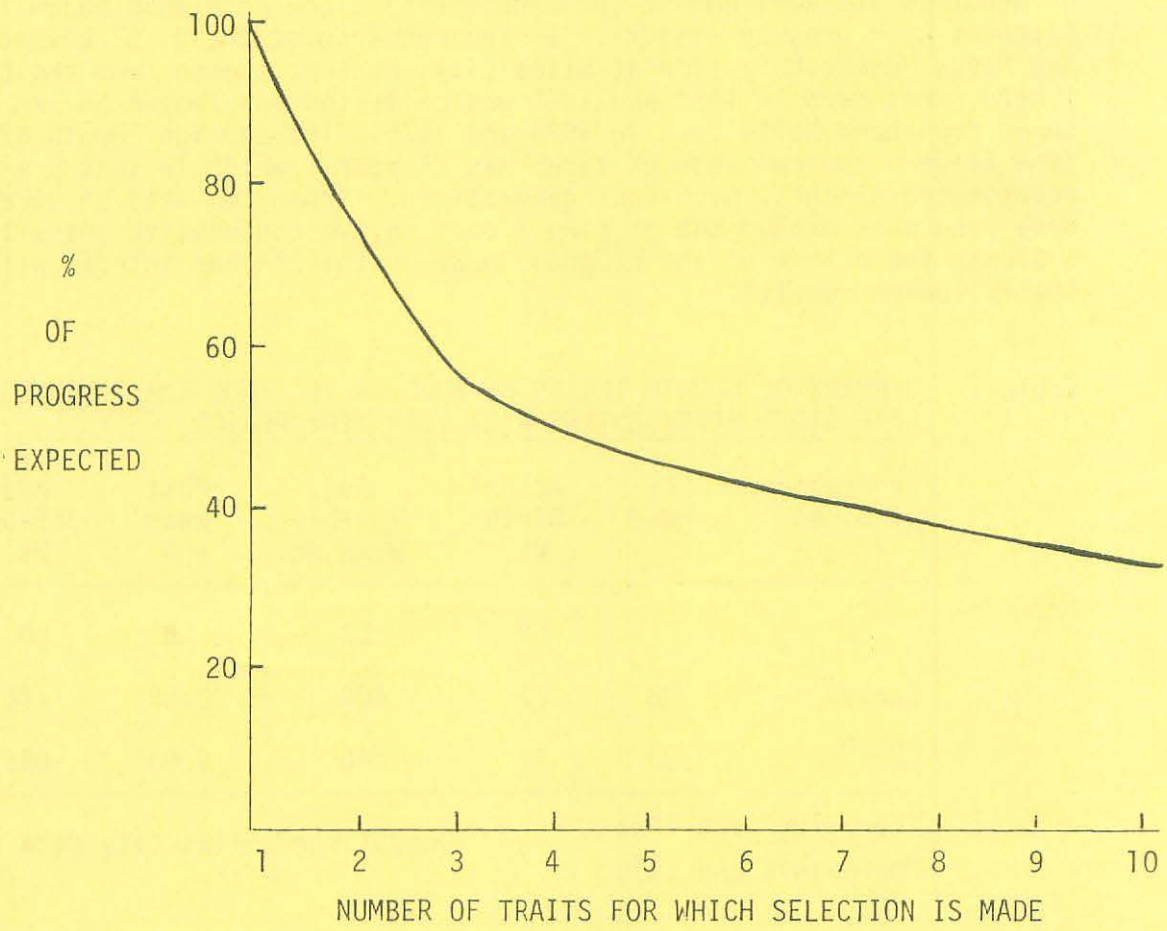
Figure 3. SELECTION FOR 2 TRAITS



If we select for a single trait we will maximize the rate of progress for that trait. When we select for two completely unrelated traits, the rate of progress in each is reduced to 71%. Some of the individuals selected as replacements based upon an index will be just average for one of the traits.

As we increase the number of traits included in our selection index, the progress in each continues to go down.

Figure 4. MULTIPLE TRAIT SELECTION



Your comment may be: "I can't realistically base my selection on a single trait". Again may I refer to those ongoing selection projects in which emphasis has been basically given to the single trat of growth (within certain reproductive limitations). The result has been some of the top cattle within their breed for several traits as evaluated through national sire evaluation programs. I hope you don't think I am taking a simplistic view of cattle breeding. In reality I am just trying to say: "Keep things in their proper perspective".

DOES THE THEORY WORK

All of this theory may sound well and good, but some of you may be asking the question now: "Does it really work". Fortunately, in nearly every case where the theory has been tested in a long range selection experiment the results have been just what we would expect. There is a whole list of such research projects, two of which I would like to use as examples.

MILES CITY, MONTANA

The problem in any genetic trend research is to separate the effect of genetics and environment (or management) since both have major influences upon progeny weights. In the research at the U. S. Livestock and Range Research Station at Miles City, Montana, semen from the Line 1 herd sires born in 1953 and 1955 was collected and frozen as was the semen from herd bulls born in 1974 and 1975. The average length of time between the two sets of sires was 21 years, which in that project represented slightly over four generations. These two sets of sires were used on a random set of Line 1 cows in two consecutive years to evaluate the extent of the progress made in the 21-year interim with the following results.

Table 1. SUMMARY OF GROWTH TRAITS OF BULL CALVES FROM EARLY VERSUS LATE SIRES REPRESENTING A 21-YEAR TIME PERIOD.

Generation of Sires	No. Head	Actual Birth Wt.	Adj. 205-Day Wean Wt.	Post Wean ADG	Adj. 365-Day Wt.
		LB	LB	LB	LB
Early[a]	28	72	400	2.58	796
Late[b]	33	81	440	2.84	885

[a]Born 1953 and 1955

[b]Born 1974 and 1975

Unpublished Miles City data

Table 1. Cont. GENETIC PROGRESS STUDY

	Actual Birth Wt.	Adj. 205-Day Wean Wt.	Post Wean ADG	Adj. 365-Day Wt.
Progeny Differences	9	40	.26	89
Genetic Differences Between Sires[a]	18	80	.52	178

[a]Progeny differences equal 1/2 genetic sire difference if maternal genetic input is equal

CLAY CENTER, NEBRASKA

A similar study has been conducted at the U. S. Meat Animal Research Center at Clay Center, Nebraska. In the Nebraska work, selection in each of three lines was based upon weaning weight, yearling weight, and an index giving equal emphasis to yearling weight and a muscle score, respectively. An unselected control line was also maintained in this project to provide the basis for comparison. It is interesting to note the rate of response for the primary trait in each line.

Table 2. ESTIMATED GENETIC CHANGE PER GENERATION

Live	Birth Wt.	Wean Wt.	Yearling Wt.	Muscle Score
	LB	LB	LB	Units
Wean Wt.	1.8	10.6	25.9	-.08
Yearling Wt.	2.3	7.8	31.0	.02
Index	2.3	6.9	23.8	.60

Koch et al (1974) MARC data

ESTIMATED GENETIC CHANGE PER GENERATION

Just as a point of interest, the generation interval for this project was 4.6 years.

CORRELATED RESPONSE

Two conclusions can be drawn from these and other studies. First, the theory of selection and response works, and that is why many of us

are hooked on cattle breeding. Secondly, traits do not respond independently. Selection for one trait often results in a change in another one. This is where the whole concept of correlation enters the picture. Correlations probably result because the same set of genes affects more than one trait, although possibly to a different degree. It is only natural, for example, to expect those genes which cause an animal to grow fast after birth to have a similar effect from conception to birth.

It is important to remember that correlations may be either positive or negative. They may either help us or hurt us in our breeding program. For example, if we select only for weaning weight we will also experience an increase in yearling weight. However, we can also expect an increase in birthweight and, perhaps more calving difficulty. The challenge to each of us is to know something about those correlations that are important to use and then build our selection programs accordingly. We also need to stay abreast of new information as it becomes available. This is especially true in the area of reproduction where we are just now beginning to really obtain answers relative to genetic control and relationships between reproductive and other production traits. We must recognize that there some antagonisms that do exist. Because of this, it is not possible for any one breed to excell in all characteristics of economic importance. Nor is it possible to expect simultaneous improvement in all characteristics from selection within breeds.

CONCLUSIONS

1. Measureable, directional progress can be achieved over time by any cattle breeder who establishes a selection program based upon heritable traits and then adhere to it.

2. The rate of progress is directly proportional to the degree to which objective measurements are taken, accurately recorded and then used.

3. Progressive cattle breeding is not easy nor does it yield rapid results, but it is challenging and rewarding.

Beef Cattle Genetics Research at Oklahoma State University[1]

R.R. Frahm

The Oklahoma Agricultural Experiment Station has a tradition of strong support for a significant research effort in the area of beef cattle genetics. In total approximately 700 cows are devoted to beef cattle genetics research at two locations: the Lake Carl Blackwell Research Range 15 miles west of Stillwater, Oklahoma and the Southwestern Livestock and Forage Research Station at El Reno, Oklahoma. At both locations the cattle are maintained under extensive range conditions (native grass and bermudagrass) typical of these areas. It has been the objective of this research program to conduct research studies that will provide basic information needed by beef cattle breeders to develop effective breeding programs to maximize the efficiency of producing beef.

In order to provide some understanding of the scope and nature of beef cattle genetics research at the Oklahoma Agricultural Experiment Station, three current projects will be briefly summarized. The dates in parentheses following the title of each project is the expected duration of the project.

I. Selection Procedures for Beef Cattle Improvement (1964-1981)

A. Reasons for undertaking the work: Beef cattle are very important economically to the U.S. and Oklahoma (accounting for about 20% of all agricultural income in the U.S. and approximately 60% in Oklahoma). Information that can guide breeders in designing optimum breeding plans for the genetic improvement of beef cattle will benefit both the producer and the consumer and will have a favorable impact on the economy of the state and nation.

Increasing total demand for beef and accelerating production costs make it imperative that every effort be made to genetically improve the level of production and efficiency of production per cow unit. Selection is the only directional force at the disposal of the breeder for changing the genetic composition of animals within a breed. Appropriate breeding programs to make genetic improvement will have a significant impact on increasing total beef production as well as efficiency of production. This will accrue due to increased productivity of purebred herds as well as providing genetically superior germ plasma for crossbreeding programs.

In addition to obtaining basic information relative to the total effect on productivity as a result of selection for increased weight at a given age in beef cattle populations,

---

[1]Presented at the Beef Improvement Federation Meetings March 23-25, 1981, Stillwater, OK.

the date collected will provide answers to many important practical problems facing the beef cattle industry today and in the future.

B. Objectives.
1. Measure the direct and correlated responses to selection for increased weaning and yearling weight.
2. Determine the realized genetic correlation between weaning weight and yearling weight.
3. Compare realized genetic response from selection based on individual performance with selection based on a combination of individual and progeny test performance for increased weaning weight.

C. General Project Plan: A total of six lines with 50 cows per line are involved in this study. Selections are based on heaviest weaning weight in one Hereford and one Angus line. In two other lines (one Herefore and one Angus) selections are based on heaviest yearling weights. A third Angus line is selected for heavy weaning weight in which progeny data are used for making sire selections. A fourth Angus line serves as a control line for evaluating genetic changes in other lines. Complete performance data to yearling age (12 months for bulls and 14 months for heifers) are collected on all calves produced.

D. Results to date: Selection responses obtained in this project are currently being analyzed and will be reported in the near future. Preliminary analyses at an earlier stage in the selection process indicated similar responses from selection based on either heavy weaning weight or heavy yearling weight. Both selection procedures have resulted in approximately ½ to 1% improvement in total growth performance per year of selection. About 80% of this improvement was due to bull selection and about 20% to cow selection. Data collected in this study have also been very helpful in answering many practical problems facing cattlemen (e.g. testing adequacy of age of dam correction factors for weaning weight widely used by the industry; comparison of feedlot performance and carcass composition of bulls, steers and heifers; importance of sire x sex interaction in progeny testing procedures; estimating repeatability of cow performances from year to year; and evaluation of the effectiveness of visual classification scores as indicators of cow productivity).

II. Comparison of Lifetime Productivity under Range Conditions Among Certain F_1 Crossbred Cow Groups (1972-1986)

A. Reason for doing the work: Crossbreeding studies to date have shown that production in terms of pounds of calf weaned per cow exposed to breeding can be increased at least 20% by systematically crossing the British breeds. Previous crossbreeding studies with beef cattle have clearly demonstrated the increase in overall productivity due to heterosis

for calf survival and early growth rate exhibited in the crossbred calf, and maternal heterosis in the crossbred cow for reproduction efficiency and total productivity. Studies are needed however, to provide information on how systematic crossbreeding programs can be developed that will combine the desirable characteristics of available breeds in order to maximize production efficiency under Oklahoma range conditions.

B. Objectives.
1. To compare lifetime productivity of eight F_1 crossbred cow groups (Hereford-Angus, Angus-Hereford, Simmental-Angus, Simmental-Hereford, Brown Swiss-Angus, Brown Swiss-Hereford, Jersey-Angus and Jersey-Hereford) when mated to terminal cross sires of a third breed.
2. To compare various breeds as terminal cross sires.

C. General Project Plan: Eight F_1 crossbred cow groups (Hereford-Angus, Angus-Hereford, Simmental-Angus, Simmental-Hereford, Brown Swiss-Angus, Brown Swiss-Hereford, Jersey-Angus, Jersey-Hereford) were established from appropriate matings to approximately 400 Angus and Hereford cows that produced calves in 1973, 1974 and 1975. A representative sample of 12 bulls (4 each year) from each sire breed was used to produce the crossbred cows to be evaluated. Lifetime productivity under Oklahoma range conditions among crossbred cow groups will be compared when mated to a common set of bulls. Complete data will be collected on the reproductive and maternal performance of crossbred cows and growth performance and carcass evaluation of their calves. A sample of cows from each crossbred group will be transferred to drylot in order to measure total nutrient intake. Shorthorn and Red Poll bulls have been used to sire the first calf from two-year-old crossbred cows. Charolais and Brahman bulls have been the sire of calves produced by the three-year-old cows. From 1978-81 the calves have been sired by Charolais and Limousin bulls. The calves in 1982 will be sired by Limousin and Gelbvieh bulls.

D. Results to date: Complete evaluation of performance from birth to slaughter of the various two-breed cross steers and early results on productivity of the two-breed cross cows have indicated a wide range of biological characteristics among the crosses involved. This basic information will be useful to a producer in selecting specific breeds for crossbreeding programs to most efficiently attain specific production goals.

Early productivity has been evaluated on 434 crossbred cows. As two-year-olds the cows produced calves sired by Red Poll and Shorthorn bulls and as three-year-olds the calves were sired by Brahman and Charolais bulls. The average productivity of reciprocal Angus-Hereford cross cows for the first two years of production was 281 lb. of calf weaned per cow exposed to breeding. Lower productivity was obtained from

Simmental-Hereford cows by 10 lb. (3.6%) and Brown Swiss-Hereford cows by 57 lb. (20.3%). As compared to Angus-Hereford reciprocal cross cows, the other crossbred cow groups were more productive in terms of pounds of calf weaned per cow exposed to breeding by 41 lb. (41.6%) for Simmental-Angus, 43 lb. (15.3%) for Brown Swiss-Angus, 80 lb. (28.5%) for Jersey-Angus and 114 lb. (40.6%) for Jersey-Hereford.

One measure of cow efficiency is the ratio of calf weaning to cow metabolic weight. On this basis, as three-year-olds, Jersey cross, Brown Swiss cross and Simmental cross were 19.9, 10.8 and 5.4% more efficient, respectively, than Hereford-Angus reciprocal cross cows.

Productivity of these cow groups when mated to Charolais and Limousine bulls for the 1978 and 79 calf crop has been summarized. In 1978 the herd consisted of 404 three-, four- and five-year old cows and in 1979 there were 390 four-, five- and six-year-old cows.

Brown Swiss cross and Simmental-Angus cows produced calves that were 67 lb (12.3%) heavier and Simmental-Hereford and Jersey cross cows produced calves 34 lb (7.2%) heavier at weaning than reciprocal Hereford-Angus cows. Conformation scores were average choice or higher for calves from all crossbred cow groups.

Herd productivity, measured as pounds of calf weaned per cow exposed to breeding, was similar for Simmental cross and reciprocal Hereford-Angus cows. Productivity was highest for Brown Swiss-Angus cows which exceeded that of reciprocal Hereford-Angus cows by 20.9 percent. Jersey cross and Brown Swiss-Hereford cows were more productive than reciprocal Hereford-Angus cows by 10.9 and 4.9 percent, respectively.

Cow efficiency, measured as the ratio of calf weaning weight to cow metabolic size, favored Jersey cross cows over reciprocal Hereford-Angus cows by 16.7 percent. Brown Swiss cross and Simmental cross cows were more efficient than reciprocal Hereford-Angus cows by 9.4 and 4.0 percent, respectively.

III. Evaluation of Crossbred Cows with Different Proportions of Brahman Breeding under Alternative Management Systems (1980-1991)

A. Reasons for doing the work: The germ plasm base for beef production in the United States has been broadened with the introduction of a number of new breeds during the past decade. Breeds are now available for use in crossbreeding systems that vary significantly in important production characterisitcs such as reproduction, growth, carcass composition, mature size and milk production. Research is in progress to evaluate performance of a variety of breeds in various crossbreeding systems under a wide range of management circumstances.

Comparisons among breeds varying widely in important production characteristics such as reproduction, growth carcass composition, mature size and milk production seem to depend to some extent on the quality and quantity of forage available as well as perhaps general climatic conditions which implies

the presence of a genotype-environment interaction. Genotype environment interactions (GEI) exist for a particular trait if the differences among genetic types evaluated varies significantly from one production environment to the next. In the presence of significant GEI, genetic evaluation programs and recommendations will be dependent upon the specific production environments involved and management system recommendations may be dependent upon the particular genetic types involved. The strategy in such a situation would be to identify optimal combinations of genetic type and management system that will maximize overall production efficiency under a particular production environment.

The long range trend appears to be toward the utilization of more forage and less feed grains in the total beef system and it is likely that aspects of GEI related to efficiency of converting forage to red meat will command increased attention. A multidisciplinary study to evaluate crossbred animals with different proportions of Brahman breeding under different management systems would be timely and of major importance to the beef industry. Such a study would yield basic information on: (1) production efficiency of different levels of Brahman breeding, (2) production efficiency of alternative management systems and (3) extent and nature of GEI.

B. Objectives:

1. To evaluate productivity of crossbred cows that are 0, ¼ or ½ Brahman.
2. To compare productivity of Brahman x Angus and Brahman x Hereford cross cows.
3. To evaluate total production efficiency of alternative management systems.
   (a) Phase 1. Compare spring and fall calving systems for the first four calf crops.
   (b) Phase 2. Compare adequate and restricted levels of protein supplementation for the last three calf crops.
4. To determine the extent of interactions between genotypes (crossbred cow types) and environments (season of calving for Phase 1 and level of protein supplementation for Phase 2).
5. To determine biological bases of observed genotype-environment interactions.
   (a) Compare digestibility of nutrients and utilization of nitrogen among genotypes and determine underlying biological mechanisms for any observed differences.
   (b) Compare efficiency of protein and energy deposition among genotypes.

C. General Project Plan: Appropriate matings to Hereford and Angus cows are being made to produce the five specific kinds of crossbred cattle in 1981, 82 and 83. The five kinds of crossbreds to be evaluated are: (1) Hereford x Angus reciprocal crosses, (2) ¼ Brahman:¼ Hereford:½ Angus, (3) ¼ Brahman:¼ Angus:½ Hereford, (4) Brahman-Angus and (5) Brahman-Hereford. Approximately 150 cows (30 per crossbred group) will be managed

on a spring calving program and another 150 cows will be managed on a fall calving program. Cows will be evaluated when mated to bulls of an unrelated breed.

HERD PLAN
PUREBRED BEEF CATTLE HERD
(May, 1980)

Bob Kropp
Oklahoma State University

INTRODUCTION

Cattle have always been an important feature of the agricultural program in Oklahoma and Oklahoma State University. Currently, Oklahoma ranks second in beef cow numbers in the U.S. with approximately 2.2 million cows. When total land area is taken into account, Oklahoma ranks first in cows/acre. In terms of agricultural income, beef cattle account for 47-54% of total cash receipts, certainly establishing the major importance of beef cattle to the welfare of Oklahomans.

The primary justification of the Beef Cattle Center is teaching. Cattle from this herd are used extensively in numerous courses taught in the Animal Science Department as well as several in the College of Agriculture and Veterinary Medicine. Additionally, the herd offers students the opportunity to work with cattle of currently acceptable type and pattern and serves as a demonstration of modern beef cattle management techniques as well as practical seedstock herd.

HISTORY

The Animal Science Department of Oklahoma State University dates back to 1915 when the institution was known as Oklahoma A&M College. W. L. Blizzard was the first head of the department and remained head until 1943, at which time he was appointed Dean of Agriculture. The Dean was widely known for his livestock ability and was instrumental in getting the purebred beef program at OAMC off to a good start.

One of the first notable Hereford victories was Laredo Boy, Champion Hereford steer at Ft. Worth in 1917 and considered by many to be the model of the breed. Early day beef herdsman was Fred Bayliss. The chief herd bull in the Hereford program in the early 1920's was Brae Repeater, calved January 1921, owned and exhibited by OAMC. Brae Repeater was grand champion bull at Fort Worth and Oklahoma City in 1923. Not only was he a great show bull, but he sired champions; mainly Rupert B, grand champion steer at the 1926 Chicago International, and College Ideal, the grand champion steer at the 1929 American Royal. Mr. C. M. Ives was the beef herdsman in the late 1920's and showed Rupert B.

In 1928, Arthur MacArthur started as beef herdsman and served in that capacity until 1940. Evascus of Page, bred by Hartley Farms, Page, North Dakota, was the principal Angus bull during the late 1920's and through the 1930's. Evascus of Page sired many outstanding progeny, one of which was G. Page, an Angus steer, bred, owned, and fed by OAMC

and shown by Arthur MacArthur to the grand championship in the 1936 Chicago International. Master Page, another son of Evascus of Page, was the principal herd sire from 1935 through 1950. Master Page sired many champions and several outstanding females. Many of the present day Emulous cattle date back to this bloodline on the dam side. Mastercup, the 1939 grand champion steer at the American Royal, was also a son of Master Page.

During the 1940's, OAMC had three different herdsmen, Orville Deewall served from 1940 to 1942 at which time he was called to military service. Art Carrier was the herdsman from 1942 to 1943 and Dwight Stephens served as herdsman from 1943 to 1946. At the close of the war, Orville Deewall returned to his position as herdsman and served in this capacity until 1953 when he resigned to become manager of the Parker Hereford Ranch. Dr. A. E. Darlow was named head of the department in 1943, and was also extremely prominent in livestock circles. In 1953 he was named Dean of Agriculture.

Three principal herd bulls were used extensively in the Hereford program during the 1940's: T Royal Rupert 23, bred by the Turner Ranch, Dandy Domino 19, and Hillcrest Larry 2, purchased by the college in 1948 at the American Royal for $10,100. The get of Hillcrest Larry 2 were extremely popular during the early 1950's. He sired the first place group of steers in 1951, American Royal and the Chicago International. The Chicago pen was also named the reserve champion pen over all breeds. In 1952, Larry sired the grand champion pen of three steers at the American Royal. An extremely popular bull of the 1940's in the Angus breed was Quality Prince of Sunbeam, used extensively in the college herd. Sunbeam cattle were the rage of the country. A sale sponsored by OAMC was developed as an avenue for people who were using sons of Quality Prince to sell their progeny. This sale lasted for several years and it was one of the first production sales at OAMC. A son of Quality Prince and out of a Master Page cow was born at OAMC in 1952 and became one of the great carcass bulls of the period. Quality's Master Prince was one of the principal Angus sires of the 1950's Known for his tremendous muscling and low fat cover, Master Prince was ahead of his time. Another bull, Eileenmere Quality Prince sired some excellent females, one being the champion heifer in the Southwest Regionals and later third at Denver. Eileenmere Quality Prince sold for $20,000.

Albert Rutledge was the beef herdsman during the 1950's. During the late 1950's other Angus bulls used were O Bardoliermere 40, purchased from Ohio State University, Imperial Privet of Walls, a bull imported from Scotland, K Eileenmere 29, a ton bull, purchased from Kansas State University, Keystone B30 of Kermac, purchased from Senator Robert Kerr. In 1958 only 3 bull calves were steered that were sons of Keystone B30 and they became the grand champion pen of three steers at Kansas City in 1959. Mr. Glen Bratcher was head of the department starting in 1953 until 1963 at which time he became secretary of the American Angus Association until his death in 1968.

In 1962 EHR Zato Heir 5, son of TR Zato Heir, was purchased from Fred Eiler at Woodward, Oklahoma. A son named Zato Rupert later became a ROM Hereford sire, siring many of the good Hereford cattle of the period. Another son, O Star Chief 516, sired in 1973 was the Denver Champion female. In 1964 Tex Real Onward 165 was purchased from Born Hereford Ranch in Follett, Texas. An extremely large bull whose offspring proved to do well in consignment sales and his daughters were tremendous milkers. The Angus herd was repopulated during the early 1960's primarily from Bardolier bred heifers from Illinois. Keystone B30 and Pyros Monarch of TVR, purchased from Fred McMurray, were the principal Angus bulls. Mac Suthers served as beef herdsman from 1962 until 1966. The head of the Animal Science Department from 1963 to 1967 was L. S. "Bill" Pope and the department was reorganized in 1966, and the Department of Animal Science and Industry was formed with Dr. J. C. Hillier as the head. Also in 1966 Jim Dugger became beef herdsman.

In the late 1960's the Hereford program took a different direction. Dr. Don Pinney, Dr. J. C. Hillier, and Jim Dugger purchased TT Mark Donald 407 from the Harold Thompson herd in Washington. They also purchased several outstanding Stone Ranch bred females from Stone Hereford Ranch. The daughters of 407 and out of the Onward 165 cow proved to be tremendous females and the foundation of the Hereford program during the 1970's.

In 1968, in a move toward larger framed Angus cattle, an interest in Garden's Bandolier Lad 6 was purchased from Arlo and Dick Jansen, Lorraine, Kansas. Lad 6 daughters were excellent good-milking, large framed females and contributed much to the improvement of growth in the Angus program. During the early 1970's, a move toward a total Emulous pedigree cow herd was initiated. A part interest in Biffles Emulous 932 was purchased from Ned Biffle, Allen, Oklahoma. A large, growth, high performing son of Biffles Emulous 795, 932 served as the principal herd sire until 1975. An almost total AI program was also utilized in the Angus herd with major bulls being, Biffles Emulous 795, Emulous TN 70, Emulous Master 209, and Spur Emulous Master.

In 1972, the foundation of the Hereford herd of the 1980's was purchased as a young summer yearling. WR Rock 9941, termed as a sale sleeper in the Turner Ranch Mighty Mainstream Dispersion, has provided the extra elevation, body length and total growth to improve the Mark Donald cow herd. Without question, he is one of the great Hereford bulls in the U.S. Mike Deewall served as beef herdsman from 1973 to 1974. In 1975 Gaylin Bryson was hired as beef herdsman and serves in that capacity today. Dr. J. C. Hillier retired in 1976 and Dr. Robert Totusek was named department chairman. At that time, Dr. Bob Kropp was given charge of the purebred beef herd and is in control of the breeding program today.

CURRENT STATUS

The purebred beef cattle herd is maintained at two principal locations: (1) the Beef Cattle Center, located three miles west of Stillwater

on State Highway 51 and (2) the Lake Carl Blackwell range, located 5 miles west, 3 miles north and 1 1/2 miles west of Stillwater. All producing cows, approximately 100 Angus and 100 Hereford mother cows, and herd bulls are maintained at the Lake Carl Blackwell range. The range area used by the Beef Cattle Center consists of 1700 acres of native pasture with a carrying capacity of one cow/eight acres. Replacement heifers and young bulls are kept at the Beef Cattle Center which consists of 160 acres of improved bermuda grass pastures along with a rearing barn, progeny testing facility and a teaching arena-domitory unit.

OBJECTIVES AND PLANS

Objective 1. To provide students with beef cattle and beef cattle facilities that will best prepare them to meet the needs of the beef cattle industry.

Ways to accomplish:

A. Maintain beef cattle content in courses to enhance student contact with cattle in classroom and laboratory teaching.
B. Develop class laboratories to provide students with an opportunity to obtain practical experience.
C. Provide as many job opportunities as possible for student to work with the University beef herds.
D. Review and evaluate current recommended purebred breeding and management programs to insure that students are able to view up-to-date purebred operations.

Objective 2. To breed cattle with the performance, frame size and eye appeal to meet the needs of the beef industry and be in demand by other breeders.

Ways to accomplish:

A. With present acreages at the Lake Carl Blackwell range and pasture land at the Purebred Beef Center, adequate land appears available for 200 head of mother cows. At the present time, 100 head of producing cows are available in each of the Angus and Hereford herds. If in the future, additional land is obtained, new breeds should be added to increase the teaching, extension and research functions of the herd. New breed additions should consist of a Brahman-based breed and a Continental breed.
B. Breeding and Calving Seasons - Currently approximately one-half of the Angus and Hereford cows calve in the spring and the other half in the fall. After study of past records and proposed selection system, it appears more desirable to breed for only one calving season per year. A number of advantages, as compared to both fall and spring calving, can be seen: (1) a more uniform environment for expression of genetic potential used for selection of herd replacements and sire evaluation, (2) more ease in applying management procedures, (3) reduced feed and labor costs associated with feeding fall calving cows, (4) larger weaning weights and larger frame scores associated with spring calves and (5) larger numbers of similar age cattle to aid in the teaching program as well as in herd improvement. Therefore,

a breeding season extending from April 1 through July 1 each year has been established, resulting in a calving season from early January through early April. This program will necessitate breeding heifers to calve at two years of age and will require that weanling heifers must be fed to attain 0.75 to 1.0 pounds daily gain through the wintering period.

A total artificial insemination program will be followed. Through the use of prostaglandin and estrus synchronization, every cow in the herd will be artificially inseminated for the first 60 days of the breeding season. During the final month of the breeding season, cows will be exposed naturally to young herd bull prospects selected on frame and growth traits or other traits deamed important. The use of artificial insemination gives the Purebred Beef Center an unequalled opportunity to increase genetic improvement, while estrus synchronization decreases time and labor associated with an A.I. program.

C. Beef Improvement Programs - All records on breeding, calving, weaning data, yearling data, and feedlot test information will be maintained by continued use of the American Hereford Associations's Total Performance Record Program and the American Angus Association's Angus Herd Improvement Record. Calves will be weaned, weighed and measured on October 1. At weaning, cows will also be weighed and measured. Yearling weights on heifers will be taken on April 1 and yearling weights on bulls will be taken at the end of the 140-day bull testing program. Frame scores will be determined by a height measurement taken at the hip at weaning, yearling age and later dates as deemed necessary. Adjustment factors for height at weaning and yearling will be those used in the Beef Improvement Federation Guidelines.

D. Selection of Replacement Heifers - Realizing that a heifer's growth rate is determined by both her inherent ability to gain and her dam's milk production, and that both are important inherited traits in beef cattle, major selection pressure will be placed on weaning and yearling weights and ratios as well as frame score. Assuming an equal number of bulls and heifers are produced each year and we wean a 95% calf crop, then approximately 90-95 heifer calves should be weaned each year. Also assuming that 15-20% of the cow herd will be replaced each year, 30-40 heifers must be available as replacements each spring. At weaning, heifers will be selected on the basis of maternal breeding value, adjusted weaning weight, weaning weight ratio and frame score. Obviously, inferior heifers (poor maternal breeding value, low weaning weight and ratio, frame score less than 4.0) will be culled and sold. Remaining heifers will be selected on the basis of adjusted yearling weight, yearling weight ratio and frame score (4.5 minimum). The final decision on heifers to be retained will be based on overall performance and frame criteria, a subjective visual evaluation plus a pregnancy check on October 1. Heifers not retained as herd replacements will be offered for sale. Heifers

selected using these criteria should represent those with inherent milk producing ability, genetic potential for growth and frame necessary to maximize beef production potential.

E. Selection of Bull Calves - Determining which calves should be used as yearling herd bulls is an important factor in determining the success of the Beef Center program. Any calves obviously small, inferior or with unsatisfactory testical development or other traits of economic importance may be castrated prior to weaning. All other bulls will be weaned on October 1, then preconditioned for four weeks preliminary to a 140-day gain test to begin on November 1. During the preconditioning period, the bulls will be halter broken and gentled. During the feed test, the bulls will be measured for height and scrotal circumference and weighed each 28-day period. In addition, weights will be taken on the 126 and 154th day of test to be used along with the 140-day weight as an average for the final weight. The bulls will be fed the Purebred Bull Test Ration free-choice. Following the completion of the test, the bulls will be placed on pastures and be fed a growing ration. Selection of the top herd bull prospects will be based on the weaning and yearling data plus the 140-day test information. The best yearling bulls will be used in both the purebred (teaching) and commercial (research) herds to accelerate genetic improvement and decrease generation interval. Other bulls will be sold privately, in various consignment sales or in an annual production sale.

F. Selection of Herd Sires - With the aid of the National Reference Sire Program in both the Angus and Hereford breeds, bulls judged to be among the best will be selected on overall performance on the basis of weaning weight, yearling weight, weight per day of age, feed efficiency, carcass grade and carcass cutability. In addition, outstanding herd sire prospects as determined by performance of their progeny in the OSU herds will also be used.

A system of progeny testing within the purebred herd may also be developed. To do this, the cow herd of each breed will be divided into a "superior" group of 50% of the herd and a "test" group composed of the other 50%. This classification will be based upon the maternal breeding value (MBR), most probable producing ability (MPPA) and/or yearling breeding value (YBV) for each individual cow. The cows within the "test" group will be mated to two or three bulls, assigned at random within age groups. One of these bulls should be a proven herd sire and serve as a reference sire. Each sire will be evaluated on the basis of the average for his progeny for selected traits. The "superior" group would be mated to proven herd bulls.

G. Culling the Cow Herd - Selection of replacement heifers must be coupled with an intelligent method of culling the cow herd if genetic progress is to be made. All cows and heifers will be palpated for pregnancy in October of each year. Open heifers will be culled regardless of the reason or their record. Open cows will be culled unless they are in the upper 25 percent of cows within the breed based upon their producing ability or breeding value. Unsound or diseased cows will be replaced with the top ranking heifers. Since only 100 females of each breed will be maintained, the remaining heifers will be added to the herd to the extent that cows in the herd are culled for low weaning weights, an indication of poor milking ability and poor growth rate of the calves. It is assumed that approximately 15-20 percent of the cow herd will be replaced with heifers each year.

H. Breeding Program

1. Hereford - The major emphasis in the Hereford breeding program the last ten years has been the establishment of a closely related, large, growthy cow herd with excellent milk production potential. With the purchase of The Progressor in 1972 and his resulting breeding value, this objective has been achieved. The major thrust for the 1980's will be to increase the frame size and growth of the herd without sacrificing volume and productivity. The Line One pedigreed cattle, developed at the U.S.D.A. Research Station in Miles City, Montana, appear to be the answer to the 1980 objective. The major breeding plan will be to develop three lines of cattle - LINE 1, MARK DONALD and D4 plus various crosses among lines.

2. Angus - The Angus herd has been developed for superior performance, primarily by utilizing Emulous breeding. With the introduction of Sayre Patriot breeding last year, a tremendous improvement in frame and length was realized. A definite goal for the 1980's in the Angus breeding program will be the introduction of outside blood from different pedigreed cattle and the development of a line cross breeding program. Four distinct lines (Emulous, Wye, Jorgensen and Erdmann) will be developed through purchase and a fifth through line crossing. The system is designed to line cross all first calf heifers and have a 30% replacement rate of the mature cow herd.

Objective 3. To reduce the incidence of disease within the Beef Cattle Center in order to minimize death losses, diseases which retard growth and thriftiness and to reduce the amount of treatments currently necessary to control disease outbreaks within the herd.

Ways to accomplish:

A. The herd health program for the Beef Cattle Center has been prepared in close cooperation with the College of Veterinary Medicine. The specific program which follows was developed by Dr. Robert A. Smith and Dr. Fred Hopkins of the Large Animal Clinic.

I. Calves

A. Calving Procedures

1. Cows expected to calve within 2 weeks should be kept in an area that is not crowded, grassy and free of excess dust, and should be in an area that can be checked conveniently.
2. Heifers should be checked at least every four hours for signs of labor.
3. Cows should be checked at least every 8-10 hours for signs of labor.
4. Assistance may be required for heifers which have been in hard labor for greater than 2 hours. Cows in hard labor for 4 hours should be examined and assisted. Allowing labor to exceed this period of time will result in a dead calf.
   a. Before examination by the herdsman, the vulva of the cow and the hands and arms of the herdsman should be thoroughly washed with an antiseptic soap (Betadine scrub^{R}) and then rinsed with clean water. This will reduce the incidence of post-partum infections, retained fetal membranes, etc. by eliminating manure and other contaminants that may be introduced into the birth canal by the examiner's arm.
   b. A clean disposable sleeve should be used when examining the birth canal and determining the position of the fetus.
   c. The first determination to make is whether the calf is coming frontwards or backwards.
      1. If the calf is coming frontwards, the next step is to determine if both front feet and the head are coming into the pelvis.
         a. If all three (2 feet and head) are coming into the pelvis, the chains (disinfected) should be applied above the fetlock (ankle).
            1. Manual traction is then applied to see if the head and front legs can pass into the birth canal. If all three come into the pelvis at the same time, it can probably be pulled. Caution should be used with the fetal extractor as enough pressure can be applied to the calf to permanently injure it.
         b. If both front feet and head are not coming into the pelvis, then a malposition exits. If it cannot be corrected within 30 minutes, professional assistance is required. Caution: most uterine tears occur when correction of malposition is taking place.

c. If both front feet and the head are trying unsuccessfully to come into the birth canal and you can't pull them into the birth canal with manual traction, then the calf is probably too large for the birth canal and professional assistance should be sought.

2. If the calf is backwards and both feet are presented, apply chains above the fetlocks and apply manual traction. If the calf's pelvis is into the cow's pelvis, you should be able to pull it. If not, seek professional help.

a. If only the buttocks and tail are presented and the rear feet are directed forward, you can afford to spend 30 minutes correcting this. If it takes longer, seek professional help. Again, its easy to tear the uterus when correcting this malposition.

5. After the calf has been delivered, go back in with the gloved arm and check for tears and a second calf. If any doubt exists, have her examined by someone from the Large Animal Clinic. While examining the cow, insert 3 Furear boluses deep into the uterus. Check the udder to insure that the cow has adequate milk, no mastitis, patent teats, etc.

6. If the cow does not clean within 12 hours, call the Large Animal Clinic so that the cow can be examined and treated.

B. Newborn Calves

1. Calves that are congested (have a lot of fluid in the respiratory tract and having difficulty breathing should have fluid and mucous removed from the mouth with the fingers. Sticking a straw up the nose to stimulate sneezing and vigorous rubbing of the thorax to stimulate breathing are very helpfu.

2. Navals should be dipped with tincture of iodine as soon as possible after birth.

3. Calves should receive colostrum within 2 hours of birth. If unable to nurse within 2 hours, give the calf 1-2 pints with a bottle.

4. Calves not able to rise on their own within 1 hour should be assisted to their feet. If any doubt exists, call the Large Animal Clinic.

5. Calves should be premanently identified, such as with a tattoo, shortly after birth to insure proper identification for future registration.

C. Two-Four Months of Age
   1. Brucellosis vaccinate heifers.
   2. Blackleg/malignant edema vaccination for all calves.
   3. Intranasal IBR/P13 vaccination for all calves.
   *4. Grub control with pour-on for calves 3 months of age and older. Treat calves 3-6 months of age lightly.
   *5. Grub control with pour-on for mother cows and bulls.
   6. Vaccinate mother cows with 5 strain Lepto at this time.
   7. Vaccinate calves with Lepto pomona, C&I vaccine.

*Do not use systemic grubcide during the months mid-October thru March 1 as fatal reactions may occur.

D. Weaning
   1. Deworm calves at weaning with TBZ past one year and Levamasole the next. Rotating wormers will help to eliminate resistance of worms.
   2. Insure that weaned calves are in dust-free area and receive good quality feed for 1-2 weeks to reduce stress.
   3. Observe closely for coccidiosis and respiratory disease in the post weaning period.

E. Eight-Nine Months of Age
   1. IBR/BVD/P13 vaccine IM. Vaccinating at 8 months of age or older with IBR/BVD will provide lifetime immunity.
   2. Booster blackleg/malignant edema vaccination.
   3. 3 strain Lepto vaccination, if a booster is given before breeding.

F. Breeding Age (15-16 months of age)
   1. Deworm as in D above.
   2. Booster 5 strain Lepto vaccination.
   3. Last blackleg/malignant edema booster.

II. Cows

A. IBR/BVD/P13. Recent lab data indicates that the Purebred Beef Herd has BVD, P13 and RSV virus. There is no vaccine for RSV. The adult cows and all bulls and heifers over 8 months of age will need to vaccinated for IBR/BVD/PI13 in the muscle this year. The cows must be vaccinated <u>while open</u> and <u>30 days or more before rebreeding</u>. Vaccination while pregnant may induce abortion. This vaccination administered to cattle over 8 months of age is considered permanent for IBR/BVD and need not be repeated. Once mother cows are vaccinated, they will pass antibodies through the colostrum to their calves.

B. Leptospirosis. Cows should be vaccinated with 5 strain Lepto vaccine when their calves are gathered at 2-4 months of age. Bulls should also be vaccinated at this time. This will provide annual vaccination for Lepto. Teeth, eyes, lameness and general health should be checked at this time.

C. Grub control. Cows should receive pour-on grubcide treatment when their calves are gathered for vaccination at 2-4 months of age, unless it is from mid-October thru March 1. The calendar of events may require grub treatment at another time other than when their calves are gathered. Bulls should also be treated at this time.

D. Lice control. Cows, calves and bulls should receive pour-on lice treatment in January and February each year. Do not use a grubcide at this time.

E. Pregnancy Examination. Should be done as calves are weaned and a decision made at that time whether to cull or have checked by theriogenologist from Large Animal Clinic to determine reason for non-pregnancy. The Large Animal Clinic will pregnancy examine all cows with no charge for this service.

F. Anaplasmosis control. Anaplasmosis is endemic in Oklahoma and a constant threat to all cattle herds. A good formula to remember is: Carriers + vectors + no control = outbreak.
We can reduce vectors by controlling flies. But a control program is also essential. The following is recommended:

1. Chlortetracycline in the salt from June 1 thru October each year. Offer free choice.
   100# salt needs 288-320 grams chlortetracycline
   1 ton salt needs 5760-6400 grams chlortetracycline.
2. Have clinical cases of anaplasmosis examined by Large Animal Clinic staff and treat positive cases to rid the carrier state.
3. Blood test herd bulls for anaplasmosis and vaccinate clean bulls. This requires two doses the first year a booster dose every other year in the spring. Caution: Do not vaccinate bulls that may be shipped to Canada or overseas.

III. Bulls

A. IBR/BVD/PI3, Lepto, Anaplasmosis and parasite control have been previously discussed. General health will be evaluated each time the bull is seen.

B. Semen evaluations should be performed on any bull before his first breeding season or on any bull whose status is doubtful.

IV. Records
   A. Individual health records should be kept on all cattle owned by the Purebred Beef Unit.
      1. If all of the work is done by the Large Animal Clinic, we would maintain these for you.
      2. If you choose to do some of the procedures yourself, we suggest that the same records be maintained in the herdsman's office and that the data be promptly recorded.

Objective 4. To serve and enhance the beef industry through continuing education and understanding.

Ways to accomplish:

A. Insure that the Beef Cattle Center serves as a demonstration of a practical, up-to-date purebred breeding and management program employing currently recommended beef cattle management practices.
B. Provide beef cattle for educational programs such as judging contests, workshops, cow-calf clinics and producer conferences.
C. Encourage beef cattle personnel to make farm and ranch visits to remain current or become more familiar with various breeding programs and beef production techniques.
D. Encourage beef cattle personnel to participate in important beef events and become better acquainted with industry leaders.

Objective 5. To provide beef cattle for applied research programs.

Ways to accomplish:

A. Bulls on 140-day feed test will be measured for hip height, weight and scrotal circumference at beginning of test and every 28 days until test end. This information should be useful in studies of growth and development of beef cattle.
B. Heifers will be supplied for physiology research at the Southwestern Livestock and Forage Research Station in El Reno. These heifers are to be used in a 24 vs 30 month calving study.
C. Supply bulls for breeding research studies at the Southwestern Livestock and Forage Research Station.
D. Supply bulls for nutrition and physiology research studies at Lake Carl Blackwell Cow Research Center.
E. Provide cows for supplement consumption studies during winter supplementation period.

Oklahoma BEEF, Inc., Structure and Program

Charles A. McPeake
Extension Beef Cattle Breeding Specialist

Introduction

Utilization of the performance package in education and in this particular case, Extension education, is extremely important, not only to the producer but also to the consumer. The producer tests bulls to evaluate a breeding program. The consumer uses tested bulls to improve a breeding program.

Oklahoma BEEF, Inc. is a bull test station conceived from a notion and dedicated to the improvement of beef cattle. The majority of the animals tested are from Oklahoma, likewise the majority tested remain in Oklahoma to hopefully imporve its quality of beef.

The latest statistical reports estimate that Oklahoma contains approximately 2.2 million beef cows. If assumptions are made like 5 percent of beef cows are bred AI, thirty cows are bred to the same bull, and on the average a bull will last 5 years, Oklahoma requires almost 14,000 bulls annually to meet the demand. There is a need for predictability of performance through education of the producer utilizing the performance package.

History

The awareness of genetic principles and the desire for genetic improvement of beef cattle prompted the organization of Oklahoma BEEF, Inc. on June 11, 1973 as a non-profit organization.

It was a joint venture between 26 Hereford and 25 Angus breeders, Cooperative Extension Service and the Department of Animal Science at Oklahoma State University. These progressive breeders contributed $86,000 to build the initial facilities. Oklahoma State University provided the land and advisory personnel. This sizeable investment was made for the mere right to have priority of gain-testing selected bulls. These breeders do not pay any pen rental fee but do pay operating cost, feed, veterinarian services and maintenance.

Five breed groups are testing bulls. They include Angus, Brangus, Charolais, Hereford and Polled Hereford. The order and dates of breed involvement are as follows: Angus and Hereford in 1974, Polled Hereford in 1975, Charolais in 1977, and Brangus in 1978. Testing facilities are available for each breed along with a common office and sale center. As of January 1981, Oklahoma BEEF, Inc. represents a total investment by breeders in excess of $300,000.

Purpose and Eligibility for Membership

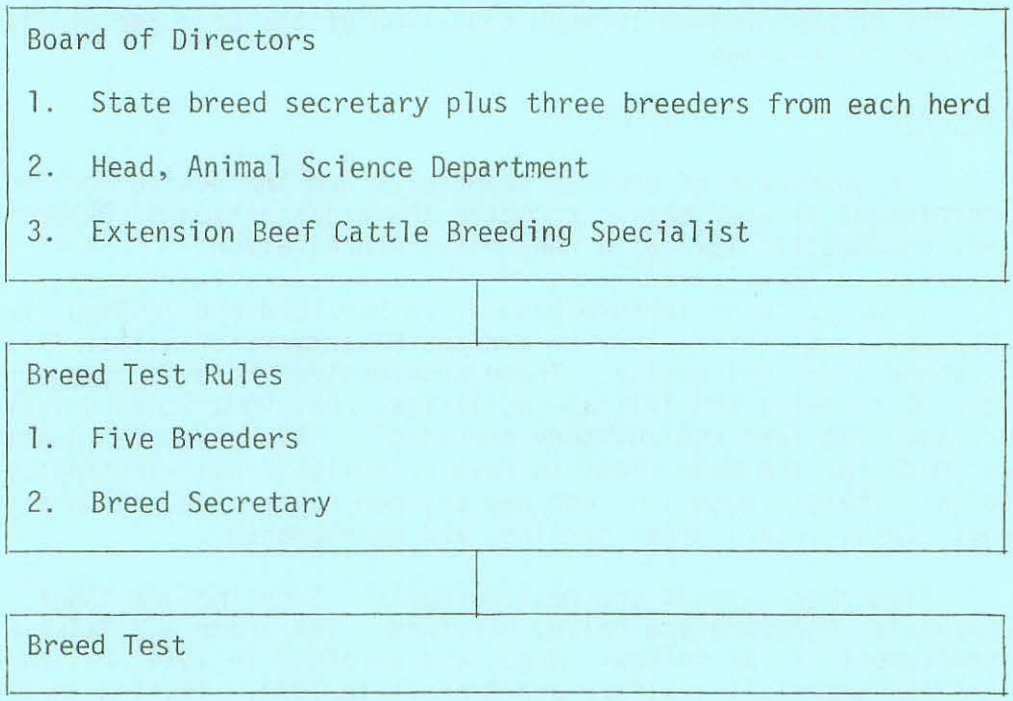
The purpose of Oklahoma BEEF, Inc. is to study, evaluate, provide for, promote, advance, improve, support and facilitate the genetic improvement of beef cattle.

Any purebred beef cattle organization desiring to participate in or to support performance testing is eligible for membership in Oklahoma BEEF, Inc. The requirements are that each breed organization build a facility to accommodate their breed and that the cattle to be tested are purebred.

Structure

Oklahoma BEEF, Inc. is governed by a Board of Directors elected by the members and with each breed represented equally. Also, each breed has a test rules committee which regulates its own test. Oklahoma State University Personnel (Head, Department of Animal Science and Extension Beef Cattle Breeding Specialist) serve as voting members of the board of directors and as advisors for the test rules committees.

TABLE 1. STRUCTURE OF OKLAHOMA BEEF, INC.



Progress at Oklahoma BEEF, Inc.

In 1975 three breeds had 284 bulls finishing test compared to the 1980 results of 658 bulls completing test from five breeds. The breed by year breakdown of animals finishing test is as follows:

TABLE 2. NUMBER OF BULLS FINISHING TEST PER YEAR

Breed	1975	1976	1977	1978	1979	1980
Angus	136	186	167	158	233	200
Brangus	N/A	N/A	N/A	N/A	82	90
Charolais	N/A	N/A	61	69	88	114
Hereford	116	164	123	128	208	137
P. Hereford	32	46	81	99	96	117
Total	284	396	432	454	707	658

Improvement Through Oklahoma BEEF, Inc.

A sample of approximately the first 100 bulls tested and the last 100 bulls within each of the three breeds that started first were compared. The following table shows that a positive change has occurred in all growth traits studies both within breed and among bulls.

TABLE 3. COMPARISON OF THREE GROWTH TRAITS AT OBI

	No. Bulls	ADG	365	WDA
Breed A				
First	105	3.34	1045	2.78
Last	103	3.46	1086	2.94
Difference		+.12	+ 41	+.16
Breed B				
First	74	2.94	974	2.64
Last	74	3.17	1035	2.77
Difference		+.23	+ 61	+.13
Breed C				
First	85	3.33	980	2.65
Last	108	3.36	1045	2.82
Difference		+.03	+ 65	+.17
Among Breed Comparison				
First	264	3.22	1004	2.70

Last	285	3.35	1057	2.85
Difference		+.13	+ 53	+.15

Traits Measured

A. Average daily gain

1. 28 day period basis
2. Cumulative basis

B. Weight per day of age

C. Adjusted 365--day weight

D. Ribeye area (sq. in.)

E. Rib fat (in.)

F. Adjusted 365--day hip height

Information Reported

A. Assigned OBI number

B. Tattoo

C. Name of sire

D. Birthdate

E. Adjusted 205--day weight

F. Age of dam

G. Initial weight

H. 28-day basis

1. Actual weight
2. 28--day average daily gain
3. Cumulative average daily gain

I. 140--day average daily gain ratio

J. Weight per day of age

K. Weight per day of age ratio

L. Adjusted 365--day weight

M. Adjusted 365--day weight ratio

N. Ribeye area (sq. in.)

O. Rib fat (in.)

P. Adjusted 365--day hip height

Q. Index based on ADG, WDA and 365--day adjusted weight

Traits To be Considered in Future Testing

The traits to be measured and or reported in the future are presently not available for all breeds in the entirety of the following list. The two that are not yet available for all breeds are weaning and maternal breeding values. As numbers are gathered and breed associations begin to estimate breeding values they will be reported when possible. The following is a list of additional traits to be reported by Oklahoma BEEF, Inc. in the near future.

A. Birthweight

B. Adjusted 205--day weight

C. Weaning weight breeding value

D. Maternal breeding value

E. Adjusted 205--day height

F. Scrotal circumference

OBI's reporting goal is to provide information on the more important traits in order to give ample opportunity to both the producer and consumer to select and breed cattle for their individual needs.

THOUGHTS ON PERFORMANCE TESTING

Paul Bennett

Needless to say, my lack of education and experience make me unable to shed much light on the issues that confront the beef cattle industry. My father summed this situation up quite well a few weeks ago. When I was home from Virginia Tech one weekend, he was inquiring about my progress in getting this speech put together. He said that a great deal of effort needed to be put into it because I would be the only program speaker that would have everyone wondering why I had been asked to speak. I would say he is right.

Even though I am merely a sophmore in college, I have been deeply involved in a serious beef cattle breeding and performance testing program for well over half of my life. My first duty relating to our performance testing program was to fill out individual cow cards on our cow herd when I was nine years old. At that time, it was like homework to me and I didn't think the world of it. However, my feelings drastically changed in a hurry, and I have come to place great value on the worth of sound honest performance testing. The reason my thinking and outlook on cattle breeding are such is most definitely attributable to the breeders and industry leaders I have been exposed to and who have taken time with me over the years. I am deeply indebted to those people--people like my father, Mrs. R. W. Jones, Dr. Ike Eller, Mr. Jack Farmer and Dr. C. K. Allen. It is people like these, open minded, innovative thinkers, like everyone involved with BIF, that have made the performance testing concept so catching and so influential in the vast beef producing industry.

A great deal of my thought is spent analyzing the progress of the pure-bred and commercial beef cattle industries in the past ten years and even more is spent contemplating the future, especially since I intend to be a part of it and I hope to have a hand in influencing it. In light of what will happen in the future, we need to consider what is taking place today. Everyone will agree that more true progress and more constructive ideas have come about in the last ten years than in the total of many years before that. Today, a higher percent of breeders are using performance records and more of them have a progressive goal in mind than at any other time. However, it is my belief that far too few breeders really and truly take to heart the ultimate purpose of the beef cattle industry--to efficiently provide mankind with a high quality product.

Those breeders that are making the most genetic progress today are those who have well established goals and are seriously selecting for only the economically important traits. Their breeding programs are undisturbed by temporary fads and they think for themselves, not allowing their direction to be dictated by fly-by-night frills and thrills. I

greatly admire those who establish a sound, logical breeding program and stick to it, even though it may be somewhat contrary to the popular trends. It is so vitally important for young cattlemen to develop concrete plans and goals early in life in order to have sufficient time to see them through. As an undergraduate in animal science and with this thought in mind, I am concerned about the acceptance of the performance testing concept by high school and college students. Apparently, most view performance records like they do taxes; they're something that you don't bother with until you grow up and you have to. Needless to say, the showring segment of our industry is more appealing and it has done great things to stimulate youth interest in animal science. I have no criticisms of it, but I do feel that more effort should be put into diverting young people's interests in the direction of practical beef production at an earlier age. I feel that the reason my interests are as such is because I was taught this and exposed to this early in life and have been brought up thinking this way.

As I see it, the future of beef cattle improvement is in sire selection. The rate of improvement that is made will be a direct function of the progress that is achieved by the breed associations in getting the National Sire Evaluation Programs off of the ground and into heavy use. Regardless of what trait is being selected for, much more progress can be reached through sire selection than through any other means. As has been in several cases, the effect that one sire can have on a breed and the industry is truly phenomenal. Probably the best example is found in the Holstein breed. When one bull is the sire of over 10% of all the bull calves registered in a breed in one year's time. I'd say he has had a dramatic impact on the direction of that breed. I'd also say that if you are interested in making things happen, then the area of sire selection would be a pretty good place to start.

As times have changed, we've put ourselves in an ideal position for a national scale sire evaluation program. With the extensive use of artificial insemination in both purebred and commercial herds, everyone has the opportunity to use the same bulls and breeder's progress is largely a result of his ability to select the right sires. It sounds awfully simple, but unfortunately this is not the case. The hang-up is not in being able to get the cows bred AI, especially with aids in estrous synchronization, it is not in having access to the desired semen or in being able to afford it, in most cases, but is in simply knowing which sire to select. It is indeed frustrating and discouraging to be in a position to use the best bull in the world and then not be able to find out which one he is.

The beef industry has prestige and glamour, especially in the eyes of many outsiders. As a result, we now have more people with non-agricultural business interests in the beef cattle industry than ever before. For the most part, they are statistically and scientifically oriented, but the majority of them enter the beef cattle business via

the showring angle. At present, this seems logical from their standpoint, but there's no reason for it to be totally so in the future. Performance programs like National Sire Evaluation could and should be enjoying the limelight, as they can provide just as much competition and excitement as the showring. To be truley effective, the sire evaluation programs, and all performance programs in general, must be enticing and appealing to all, regardless of their reason for being in the business.

The usefulness of a sire evaluation program lies in the accuracy of the data it produces. In light of this, it seems only logical that we put extensive effort into obtaining every piece of performance data on every calf possible. The need for having all herds, whether 20 or 2,000 in size, on their breed performance program has never been as great as it is today and will be tomorrow. It is the responsibility of each breed association to compile field data summaries and it is the responsibility of each breeder to fulfill his obligation in helping to make the summaries as accurate and complete as they can be. Once full breeder participation is obtained, sire selection conditions can be optimum. Cattlemen will be able to identify those sires that truly excell in calving ease, fertility, lean growth and maternal traits. By the same token, those inferior sires can be pinpointed, rejected and forgotten, and their impact will be no more. I strongly feel and believe that cattlemen failing to contribute to and take advantage of these programs will find themselves lost in the dust in the days to come.

Beef cattle breeders are on the move. Cattlemen are innovative and original in their thinking. For those who are realistic, yet dare to be different and are willing to create change and ride it through, I am indeed thankful, for they are molding the future. Because of our leaders, because of you, I have great optimism. The beef industry has a bright future and BIF has an essential role in that future. The future holds countless challenges and many problems to be solved. I am ready to be a part of it.

BREEDING IMPROVEMENT IN A SEEDSTOCK OPERATION

Burke Healey

"Keep doing it better or you may
not have a chance to do it at all."
-ARNOLD GLASGOW

I'm a survivor in the beef business--and proud of it. My brother and I are entering our fourth decade as partners in our registered operation. Over that many years you see a lot, you learn a lot, and yes, you make a lot of mistakes. We've made our share, but we've also had our successes, and never for one minute did we stand still. Skip and I adopted the philosophy a long time ago that "the most effective way to cope with change was to help create it". We've adhered to that principle ever since.

It's been our observation that to have a successful purebred operation whether it was thirty years ago or today, a breeder has to have a certain philosophy, certain techniques and certain tools. Believe it or not, there were many of us who were advocating that we measure the value of our cattle by their performance in the early 50's.

THE PHILOSOPHY

Most of these early pioneers in performance evaluation had and still have a similarity in their philosophical outlook. First, it seems there was always a firm conviction about each of these people. They believed in what they were doing and they did it.

Almost without exception they had an unbelieveable dedication to their task. They hitched their wagon to a star and never looked back. These are the romantic traits--the ones we like to put on the plaques when we honor them years later. They're the traits that keep us going when the rivers rise or the drouths go on and on or our breeding programs take a temporary set back. They are the dreams that keep us going, but it's the philosophy we translate into actions that make us a success. For instance, all these great herds have breeders behind them that have a tremendous thirst for knowledge. They're the ones that constantly examine every new idea--every new procedure. They are the fellows who ALWAYS ASK WHY.

These are flexible men. Regardless of their calendar years they never let time or changes in our industry pass them by. If there is one key to success in this business it might be flexibility. Have you ever noticed the flexible man has an open mind? I think we make a mistake sometimes in bestowing the accolades on a breeder as being a "great breeder" simply because he started out breeding "his kind" of cattle thirty, forty or fifty years ago and all of a sudden he's got the right kind for today's market. We forget that for twenty or thirty years he starved or paid for his operation with other income.

We forget that for so many of those years he had a product that was of no use to his industry. You've got to remember in all segments of our livestock industry the industry has certainly not demanded or paid a premium for the same type or kind of animal over the past thirty or forty years. Is not the better pioneer breeder the one who supplied an animal worth a premium over all his years as a seedstock producer? Think about it, because we may be coming into another new era--an era where increased production per animal unit just for its own sake may not be as profitable as other alternatives. Will the performance advocates to which we've been passing out the accolades for the last dozen or so years recognize the change and have the flexibility to adapt? I'm afraid some won't. The true performance advocate, the breeder that measures performance in over all profitability will. They are the flexible ones.

In addition to flexibility you notice in almost all these great performance breeders an adherence to detail. Almost without exception great herds were built by master observers. They were and are men who respect the forces of nature. They don't buck nature they bend and mold it just slightly to their advantage.

These fellows are constantly on the run. In this business it's run, run, run. Your competitors are constantly breathing down your neck and regardless of what anyone says, "success is being first."

It's been my observation that there's one final character in the approach of all these great breeders. They are men of integrity. To be a real success in this business you can't fudge one weight or one date. A CHEATER CAN'T WIN IN THIS GAME.

If you analyze the philosophy behind the breeders in the herds that have made significant breeding improvement for themselves and their customers you'll find most of these traits.

THE TECHNIQUES

There won't be common agreement between breeders on the techniques to use in making breeding improvement in a seedstock operation. There is, however, general agreement that the successful breeder has to have a plan. He has to have the conviction that the plan will work.

I can only point out some of the techniques that have worked for us. I like to look at it this way. There are only four factors or variables that can really affect the improvement or response you get in each generation:

(1) THE ACCURACY OF SELECTION
(2) THE INTENSITY OF SELECTION
(3) THE VARIATION AVAILABLE
(4) THE GENERATION INTERVAL

Some of these factors play against each other, but for real success every technique we employ should be to maximize each of these variables in our favor.

First, however, the breeder must pick only one or two traits on which which to concentrate his improvement program. The traits he chooses should be highly heritable and of economic importance. The accompanying chart (Chart 1) illustrates that we make little progress in any trait if we select for too many traits. If, for instance, you only select for one trait you can expect to make 100% of the possible improvment you could achieve in that trait. Add three more traits, however, and you've reduced the possible achievement you can make in any of the four traits to half what was originally possible if selecting for that trait alone.

Granted, regardless of what performance trait we desire to select for we always have to weed out and select against certain undesirable traits such as unsound feet, ill shaped udders and teats, or inherited tendencies to bloat or founder, etc. But think what you do to your chances of making rapid improvement if you clutter up your program with selecting for a lot of needless fads, fancies, pedigrees or barnyard myths. So, once you've picked one or two important traits to improve, YOU MUST THEN MAXIMIZE THE SELECTION PRESSURE EVERY WAY YOU CAN.

We're all agreed that the more accurate the selection we can make for a given trait the more response we'll get. The first key to accurate selection is naturally to stick to highly heritable traits. That's rather general knowledge. You can build an even bigger edge, however, if you adopt the following technique in addition--TREAT ALL ANIMALS ALIKE AND ALWAYS TREAT ALL ANIMALS!

It's so important to follow that rigid principle. Do everything you can to eliminate environmental differences. If you can do this, you increase the effective heritability estimate for that trait in your herd.

For instance, feed the same ration year after year. Don't go for all the feed additives-using this one this year and that one next year. Your main objective is to increase or improve the animal's response to feed through his genetics--not through environmental engineering. You're misleading yourself if you select a bull this year because he has a 30 pound better yearling weight, if it's simply due to a new, hotter feed.

There are other techniques that also help eliminate environmental differences and increase the accuracy of selection for you. Weigh the animals you're testing frequently, and increase their feed in direct proportion to their weight. You can also wean the calves at frequent intervals with a relatively short and consistant age span in each group. As they approach the age to adjust for yearling weights take frequent weights on the animals, perhaps weekly or every ten days, and give each animal the best adjusted weight it achieves. This eliminates unfair differences that can occur if only one general weighing is made--differences that might be due to an animal not filling, or over filling, or due to an animal being sick.

You can also breed your cows for a relatively short calving interval--45 to 90 days. The closer the calves are born together the less seasonal

variation you'll have to contend with. Feed your cows and calves alike. If you creep some, creep all. If you feed some, feed all equally. These techniques will greatly increase the accuracy of your selection.

Just as you improve the accuracy of selection you can also increase the intensity of your selection. Generally speaking, the fewer animals you keep, the more intense you make the selection pressure. The problem is you have to put enough calves back in the herd each year to maintain your herd numbers. There's no rule, however, that says all these must be raised in your herd or a closed herd. You can greatly increase the selection intensity, if you'll go out and buy top females or bulls equal to or better than the top five or ten percent of your own herd.

If you select animals from outside that are high enough in the performance trait you're working on, you can also improve the upper end of the genetic variation you have available. Usually the number of animals you have to keep and the genetic variation you have to keep are antagonistic to each other. If you try to keep just the extreme top animals that have the best possible genetic variation, you don't have enough numbers to keep your herd up. Keep your herd open and adding outside animals of a genetic potential equal to or better than your best changes these factors and markedly improves the response you'll get.

"Rolling the generations" or shortening the generation intervals is also a useful technique to make breeding improvement more rapidly. It stands to reason that if you're working with highly heritable traits the offspring have better genetic potential than the parents or grandparents. Select directly for the trait from the animal's own record and use the animal as quickly as possible. Roll the young animals into your herd and roll the older ones out--especially the older animals with low breeding values or poor records in the trait for which you're selecting. Following this technique simply means that if you can normally expect a certain number of units of improvement in a generation and the average generation interval in your herd is 4 1/2 years then you'll make twice the improvement as the herd whose average generation interval is 9 years.

All these techniques when employed together and backed up with the right philosophy can give a breeder a considerable edge over the average breeder. Most breeders just haven't got the dedication, the conviction, the thirst for knowledge, or the attention to detail necessary to compete against such a program.

THE TOOLS

As long as we're in the performance game the primary tool for improvement will always be the scale. We sell by the pound and as long as we do, we have to evaluate by the pound. Without scales there can be no program for improvement in today's market.

I addressed this group two years ago concerning frame scores. The presentation drew both praise (much unjustified) and criticism (some unwarrented). Even then I said the scales come first. Measuring and evaluating frame scores can help you bracket performance levels. I never

advocated in my talk that any one frame score was superior to another. I did, however, say there are strong correlations between an animal's eventual mature size and how that animal responds to feed in efficiency, average daily gain, and yearling weight. I don't think it would be misquoting them to say that the papers presented that year by Dr. E. L. Lasley, Dr. Danny Fox, and Dr. A. L. Eller bore out the same conclusions.

The purpose of measuring frame score is to help predict in advance how an animal will subsequently perform. It in effect helps your accuracy of selection. Weaning weights alone aren't a good predictor of yearling weights. We all know, for instance, that you can have two types of 600 pound calves at 205 days--the short, milk fat, butterball off a heavy milking cow or the taller growthy, well grown out calf with moderate condition. Add frame score to these weight descriptions, and most of you will agree that you can then better predict which calf might more readily have the 1100 pound yearling weight.

I've since been taken to task that frame scores don't tell the whole story--that you can find marked differences in feed efficiency or average daily gain between two bulls of the same frame size. I agree. My presentation pointed out back then that as you reduce the genetic variation within a breed or a cattle population (as we had done in our own herd over a decade) the correlations between frame score and performance begin to drop. Can you seriously deny, however, that generally speaking, the performance in such traits as feed efficiency at a given weight, average daily gain, or yearling weights would be much higher with a frame six bull than with a frame two bull?

This then is the purpose of linear measures--to help describe the animals and more accurately predict what their future performance will be. As I said then and repeat now, frame scores can help you to raise, lower or fix any given level of performance you desire in a wide range of traits.

The tool we have just begun to appreciate, however, is the computer. As we approach the third and fourth generations of computers the sky's the limit in terms of their potential use. With good input data and accurately honed formulas we're going to be able to estimate breeding values on our animals with an accuracy once undreamed.

I would, however, throw out these words of caution. First, our input data and formulas must be correct. We've got to be able to completely trust the output data we get back. If we can, then we can make our decisions with full faith and assurance. Secondly, we must never, never let the tail start wagging the dog in these computer programs. At meeting after meeting I hear researchers and breed association representatives connected with the computer programs make remarks like, "We can't do that. We've go to simplify or change what the breeders are doing so that this input data will fit our computer program." Think about what they or you are saying! The computer's very job and advantage is that it can take this mass of hard, unrelated data and put it together to come out with new, more meaningful data that we can use. We should think twice before we ever require the breeders to change their programs simply to make them "fit" the computer's program.

In conclusion, it's these very computers as tools that are going to usher us into a new era of performance evaluation. I said two years ago, and I repeat now, "We are fast approaching the point when always bigger or always more may not be better." We have to start analyzing and measuring desired performance in terms of maximizing profits. That's not easy. It's a different set of rules for different segments of our industry and for different terrains and climates. There will be compromises, as there always have been, and there will be different answers for different folks, but our simulated computer models are going to be the tools that can help give us these kinds of answers.

Remember, in the words of Arnold Glasow, "If we don't keep doing it better, we may not have a chance to do it at all."

CHART 1

Percent Progress Per Trait Added To The Selection Criteria

NO. OF TRAITS SELECTED FOR	PROGRESS PER TRAIT
1	1.00
2	.75
3	.58
4	.50
5	.45
10	.32
N	$1/\sqrt{N}$

SPECIFICATION BUYING AND SELLING OF BULLS

J. S. Brinks
Colorado State University

Selection of superior bulls is an all important decision in achieving genetic progress and production goals in both seedstock and commercial herds. In herds when complete performance information has been determined and used for selection purposes, over 80 percent of the genetic improvement has been due to size selection. In commercial herds, probably 90-95 percent of the opportunity for genetic improvement is dependent upon selection of bulls.

SEEDSTOCK INDUSTRY

Since most commercial cattlemen buy bulls from purebred producers, it is probably worthwhile to look at where the seedstock industry is in terms of the art and science associated with genetic improvement.

It appears to me that Breed Associations have adopted the proven techniques in performance programs very rapidly over the past five years and are looking for new and improved methods from researchers. All the large Breed Associations have fairly sophisticated computer programs for record-keeping and performance programs. The numbers of herds and cattle on these programs is increasing rapidly. Thus, fairly large amounts of performance information are available to the commercial producer.

One of the newer concepts reported to the purebred producer is Estimated Breeding Values (EBV). Most Breed Associations report EBV's for weaning weight, yearling weight and maternal ability for each calf produced. Some Breed Associations are also reporting EBV's for birth weight and calving ease and other associations are planning to incorporate these values into their program. Also, the National Sire Evaluation Programs of most associations are reporting Expected Progeny Difference (EPD) of sires based on progeny performance for calving ease, birth weight, weaning weight, yearling weight and carcass characteristics. These values are equal to one-half of the Breeding Value Estimates.

In any business the management wants as much and as accurate information as possible before making decisions affecting their business. Since selection of bulls is a very important decision, the commercial cattleman should insist on as much information as possible from the seedstock producer. Estimated Breeding Values combine all available information into a single value for a specific trait. This information is a must for the cattleman if he is going to engineer his cattle toward his goals from a genetic standpoint as rapidly as possible.

USE OF BREEDING VALUES

The beauty of the Breeding Value Estimate is that it combines all available information into one value for easy use by the breeder and/or bull buyer. The commercial cattleman needs to decide what traits in his herd need the most

Presented at the Beef Improvement Federation meetings, Stillwater, Oklahoma, March 1981.

attention. He could then write out specifications for bulls that fit his program and that will push his herd toward his desired goals.

As an example, consider a commercial cattleman who is using a two-way rotational crossing system along with the use of terminal sires on a portion of his herd. Figure 3 depicts the crossbreeding scheme used in the example. I use crossbreeding as an example since three different types of bulls with different specifications are needed which aids in illustrating some important points. Also, crossbreeding takes advantage of the non-additive value resulting in hybrid vigor for increased production.

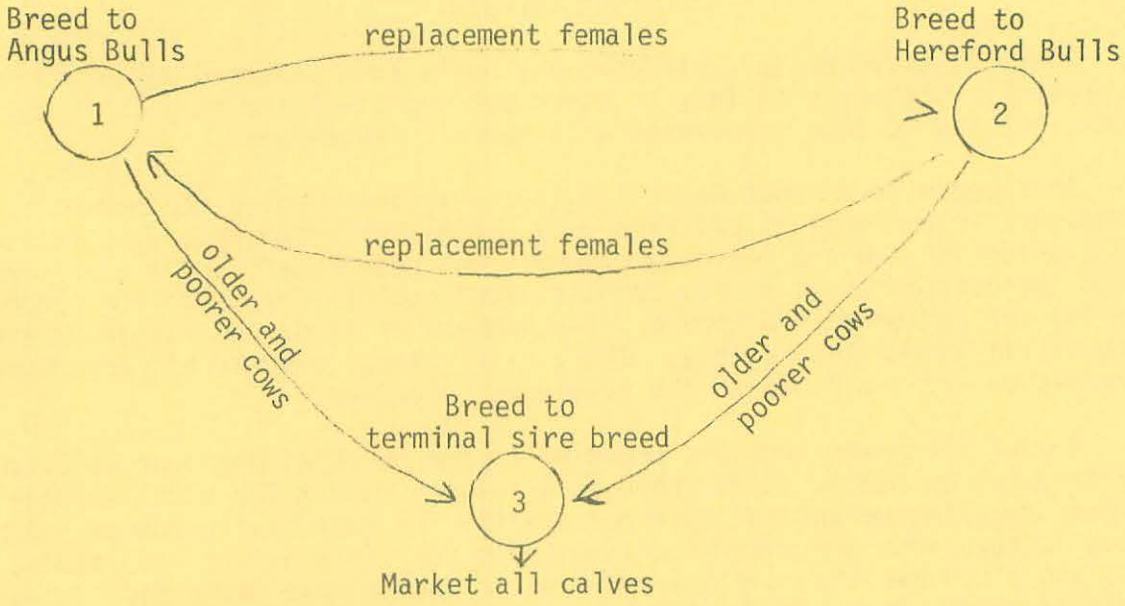


Figure 3. Combination system using 2-breed rotational system with terminal sires on one-half herd.

Herds 1 and 2 would comprise about one-half of the breeding age females. All young females, yearlings, 2's and possibly 3's would be in herds 1 and 2 and all replacement females would come from herds 1 and 2. Herd 3 would comprise about one-half the herd and be made up of the older and poorer cows. All offspring produced from herd 3 would be marketed.

Assumptions

1) Assume the above crossbreeding scheme
2) Assume 500 cow herd
3) Assume heifers make up 20 percent of herd
4) Use of 1 bull to 25 cows

Bull Needs - 20 bulls

1) 2 Angus and 2 Herefords for yearlings in rotational scheme
2) 3 Angus and 3 Herefords for cows in rest of rotational scheme
3) 10 terminal sire bulls

Bull Specifications

Now that the bull needs have been assessed, one can decide specifications for the three types of bulls. An example of writing down these specifications for individual values and EBV's for the 3 types of bulls needed is shown in Table 1.

All bulls should be reproductively sound. There are no EBV's for Breeding Soundness as yet but there may be in the near future. Many purebred breeders do submit all their bulls for a breeding soundness exam. Ask to look at the results and make sure the bull has good scrotal circumference and a low percentage of sperm abnormalities. Larger scrotal circumference has been shown to be associated with better semen characteristics and earlier age at puberty in half-sib heifers and offspring.

Traits to be emphasized for bulls to be mated to yearling heifers include easy calving, low birth weights and high maternal ability since some replacement heifers should be saved from these matings. One will probably have to sacrifice some on growth potential but should have average to somewhat above average EBV's for weaning and yearling weight.

In selecting bulls for the other cows in the 2-way rotational crossing scheme, one could emphasize growth (heavy weaning and yearling EBV's) and maternal ability with somewhat less emphasis on easy calving and birth weights. For all bulls to be used in the 2-way rotational cross, some emphasis could be placed on body composition through low backfat probes, higher frame size or EBV's for cutability, and carcass grades. Also, one should select bulls to fit his goals for mature cow size so that cow size is matched to the ranch's nutrition and management resources. Holding down birth weights should also aid in keeping mature weights in check.

Terminal sires should be selected for high growth potential (weaning and yearling EBV's) and for superior carcass characteristics (high cutability and carcass grade). Less attention would be given to calving ease and none to maternal ability since no heifers would be saved as replacements.

Both the individual performance values and EBV's in Table 1 are shown as an example and may differ from your goals. The individual values, especially for postweaning traits, may differ depending upon the seedstock producers management scheme. Also, the EBV's may appear high for commercial bulls and one may have to adjust to the size of his pocketbook. However, cattlemen using AI should have little trouble finding semen from bulls that meet these specifications.

Table 1. Individual and Breeding Value Specifications for 3 Types of Bulls

	Individual Record at 14 Months	Breeding Value %
All bulls		
Breeding Soundness Exam	85 or >	105 or >[3]
Scrotal circumference	36 cm or >	
% Primary Abnormalities	<10%	
% Total Abnormalities	<25%	
Heifer bulls (2 H, 2 A)		
Calving ease	no assistance	105*[2]
Birth weight	<80 lbs.	105*[2]
Weaning weight	>500 lbs.	103[1]
Maternal (milk)		105*[1]
Yearling weight	>1000 lbs.	103[1]
Mature Size (est.)	±goal	±100[3]
Carcass cutability	<.3" probe	±100[2]
Bulls for cows (3 H, 3 A)		
Calving ease	no assistance	±100[2]
Birth weight	<90 lbs.	±100[2]
Weaning weight	>550 lbs.	108*[1]
Maternal		108*[1]
Yearling weight	>1050 lbs.	108*[1]
Mature size (est.)	±goal	±100[3]
Carcass cutability	<.3" probe	±100[2]
Bulls for terminal cross (10 terminal sire)		
Calving ease	no assistance	±100[2]
Birth weight	<100 lbs.	100 or <[2]
Weaning weight	>600 lbs.	High*[1]
Maternal	N.A.	N.A.
Yearling weight	>1100 lbs.	High*[1]
Mature size	High	Prob. High[3]
Carcass cutability	<.2" probe	105*[2]

*Most important values
[1]Available from most Breed Association programs
[2]Available from some Breed Association programs
[3]Available in the future

WANT ADS

It seems like I see a zillion ads for "Bulls for Sale" in the various livestock publications. This is fine, but I would dearly love to see a

"Bulls Wanted - Must Meet Following Specifications" ad placed by a commercial cattleman. The specifications could be similar to those listed in Table 1. I believe such an ad would receive a big response.

GENETIC RESPONSE

Genetic improvement depends entirely on the use of animals (mainly bulls) with superior breeding values for the traits the cattleman is interested in improving. Bulls with superior breeding values possess a higher frequency of desirable genes that they can pass on to their offspring. This genetic improvement is accumulative over time.

The cattleman can estimate the expected genetic improvement for a particular trait using the following formula.

$$\text{BV of Progeny (Response)} = \frac{\text{BV of Cow Herd} + \text{BV of Sires}}{2}$$

Thus, the genetic improvement one makes depends somewhat on the present cow herd production level. A bull produced in a seedstock herd with a BV of 105 for weaning weight may be 110 in your herd or may only be 100. Therefore choosing a seedstock herd with high genetic potential is very important.

The largest opportunity to make genetic improvement rests with using sires with high Breeding Values.

SUMMARY

The long-winded talk can be summed up very quickly.

1. Decide what traits are important to you and set goals.
2. Write down a list of specifications for your bull needs.
3. Make sure you have documented evidence that the bulls you are buying come close to your specifications.
4. Buy and use bulls with superior breeding values.

The genetic improvement you obtain will be directly proportional to the difference in Breeding Values of the bulls you buy and the average Breeding Values of your cow herd. The progeny Breeding Values and thus their performance will be the average of the cow herd and the bull battery.

OUR CHALLENGE FOR THE FUTURE

Jack Farmer, President
Beef Improvement Federation

The Beef Improvement Federation (BIF) is a symbol of industry cooperation to improve communications for the betterment of the total beef industry. Beef producers interested in performance testing were having to struggle with 40 plus organizations using different procedures for computing and processing performance data. This was causing problems and restricting the performance movement. Thus, some dedicated people put the welfare of the beef industry above their own personal and organizational goals and structured the organization of organizations (BIF) to address these problems. In doing this, they set forth some noble purposes:

1. Uniformity
2. Development
3. Cooperation
4. Education
5. Confidence

Mark Keffeler talked about these purposes in his speech last year and reviewed some of the progress we have made.

Through BIF, the talents and resources of BCIA's breed associations, PRI, NAAB, and NCA, as well as research scientists and Extension specialists from Land-Grant and other universities and USDA, have been focused on achieving these purposes. Numerous people have voluntarily contributed untold hours toward accomplishing the purposes of BIF.

We have been blessed with the very best talent in this country as well as other countries. We have also had excellent leadership by BIF officers and Board members. Thus, we have gone a long way toward accomplishing many of our original purposes. Our "Uniformity," "Development," and "Confidence" purposes are basically realities. What we have to do is continue to maintain and fine tune these accomplishments. We still have a ways to go on our "Cooperation" and "Education" purposes. However, with the momentum we now have and with seemingly everyone in the total performance movement participating in our meetings, contributing to our guidelines, and being willing to serve on our Board and as officers, I can't help but believe that BIF will ultimately achieve all of its purposes and continue to prosper for the unforeseeable future.

This is not to say we don't have problems and opportunities. Percentagewise, the number of seedstock producers collecting and utilizing performance data is still low. Also, there are only a small percentage of commercial producers demanding performance on the bulls they buy.

These two situations are probably highly correlated. There is considerable room for expanding the market for performance tested seedstock if we can develop the demand for our product. The bottom line is profit. If our product is a profitable investment, it will ultimately be accepted and utilized by a broad segment of our industry--just like hybrid seed corn.

It was said by Charles Dickens in The Tale of Two Cities, "These are the best of times. These are the worst of times." This has application to the beef improvement movement. Most of us have witnessed the acceptance of the performance concept by our industry and the development of strong performance programs that are highly promoted. We have seen sire evaluation become a reality. We have seen BIF grow and prosper and become the forum where our industry unites behind the common cause of performance testing. The contacts, working relationships, and close friendships developed through BIF have more than justified its existence. However, the most important accomplishment we have witnessed is that a few conscientious seedstock producers are making serious application of performance data in selection. Thus, the foundation is being laid for a sound and prosperous beef industry in the future.

Conversely, the majority of beef producers who performance test do not effectively utilize their records in selection. Most of them collect records primarily for merchandising purposes and few ever mature to whole herd testing. Also, some highly-respected and nationally-known producers of performance-tested seedstock run bulls year-round and pay little attention to reproductive performance.

BIF and its member organizations are to be commended for their accomplishments, but we still have a big challenge if performance testing is to ever accomplish its full potential. Although it seemed difficult at the time, BIF has probably accomplished the easiest part of its mission. Future demands for our product depends on how well we accomplish our purposes of education and cooperation in getting what we know utilized.

The future demand for our product depends on seedstock producers who conduct sound performance programs which methodically provide for continuous improvement. Seedstock producers who change their breeding program annually in accordance with the most popular selling line in the breed and not in accordance with their performance data, cannot provide commercial producers with a product that is consistent in increasing the productivity of their herds. Until we can provide commercial producers with a consistently performing product, performance tested seedstock will never be fully accepted by them. BIF needs to take an active role in getting this message engrained into the minds of all seedstock producers.

The beef industry has a dystocia problem. We have done a good job of selecting for growth which is highly correlated with birth weight which, in turn, is the major contributing factor to calving difficulty. This has resulted in numerous veterinarians recommending against the use of performance tested bulls. Have we created our own monster? Have we been partially responsible for this delemma by putting so much emphasis on growth

in our programs? Commercial producers are now willing to sacrifice considerable growth rate for a lighter birth weight. There are so many environmental factors that influence birth weight, I doubt if raw birth weight data is very meaningful. However, it's being used. Thus, BIF needs to take the leadership in developing guidelines for ratioing birth weights, calculating breeding values for this trait, and helping seedstock producers identify and select cattle with acceptable birth weights that have superior growth rates.

Data on progeny resulting from ova transplants present some problems in performance testing. Thus, BIF needs to provide the leadership in getting guidelines developed in this area so this data will be handled uniformly by our member organizations.

In our efforts to perpetuate the performance movement, we have fallen into the trap of researching and teaching performance testing as a single component instead of part of a total system. We have tended to ignore the fact that different management systems support different levels of performance. We have tended to assume that seedstock producers who performance test and commercial producers who use performance tested bulls provide an adequate environment for the animals they produce to express their genetic potential.

It is no more justifiable to expect inferior management systems to profit from superior breeding animals than for superior management systems to profit from inferior breeding animals. We can do commercial producers an injustice by selling them superior performing bulls and encouraging them to save replacement heifers from these bulls if they are unwilling or unable to adjust their management systems to accommodate an increased level of performance. They not only get lower growth rates than expected, but they get decreased reproductive efficiency from cows from their superior performing bull, especially in the rebreeding of first-calf heifers. It isn't the cow's fault; they are just not provided with the increased inputs necessary to accommodate their increased output. There are also certain environments that just can't accommodate high levels of performance independent of how well they are managed. Either way, when inputs by management are inadequate to accommodate the outputs of their cowherd, a wreck is imminent. If performance tested seedstock are being used, they are generally blamed for the problem. Pride will seldom let producers admit that their management is inferior.

There isn't any question in my mind but that most producers who have implemented performance testing programs have made as many or more improvements through management than they have through genetics. Most of the management changes they have made were probably economical. But how can we be sure? Optimum profitability of their operation could possibly have been realized at a lower level of performance. It's time that BIF started addressing performance testing within the context of a total management system. We need to help producers evaluate the level of performance that is most economical for their system and/or help them identify the changes they need to make in their systems to accommodate the level of performance they want to achieve.

The management system under which a bull is produced is as important to the commercial producers as the bull's performance record. In fact, the two cannot be separated.

There are vast differences in how hard cows work at making a living and having calves. A lot of this difference relates back to the management system under which they have been expected to perform. Pampering cows, helping them do things they should do by themselves, ultimately results in a herd of cows that produce progeny that are a detriment to the commercial cattle producer. BIF needs to get involved in encouraging the collection of management data in conjunction with performance data. It could be very helpful in evaluating a sire if we knew the particular type of environment under which his progeny performed the best. It would also help us evaluate animals with the same ratio for a trait but produced in different herds. Granted we have formulas that also help do this. However, ratios have more meaning to me when the performance data from which they are derived are collected under similar environmental and management conditions to my own. This same feeling has been expressed to me by commercial producers who purchase my bulls. They know that the same ratio for a trait on two different animals produced in two different herds can have totally different meanings in relation to their herds.

The most important factor in econimical beef production is producing live calves from a high percent of the cowherd. Performance data on cows that don't calve regularly or at all or lose their calf at birth is very revealing. Reproductive failure was the highest priority problem identified by cow-calf producers in the National Cattlemen's Association's survey of their membership to establish their research priorities. This should indicate that BIF is going to have to get serious about reproductive efficiency. It is questionable for commercial producers to buy bulls from a seedstock herd that wouldn't be profitable as a commercial herd, and commercial cows that don't calve every year are not profitable. Reproductive efficiency can't be separated from environment and management. Therefore, we need to supply commercial bull buyers with calving data on the cows of the bulls they buy and the management system under which this data was collected. If they can't match the management system, we need to tell them they can't expect the same level of performance. It could cost the seedstock producer a few sales in the beginning, but it will pay big dividends in the end.

BIF needs to become more sensitive to the fact that most of the performance testing programs offered by BIF members take more time and provide more data than is needed by everyone who wants to performance test, especially beginners and commercial producers. We need to help provide programs that give producers the opportunity to start simple and evolve to the more complex. Maybe we have made performance testing look so complicated that we've turned them off or scared them away.

Some commercial producers will never need to do any more than tie themselves to a seedstock producer who has a good progressive performance program, buy bulls from him, and save their growthiest heifers at weaning. If they do this along with pregnancy testing and culling

open cows, it provides them with a simple system that will insure progress. However, even if they don't performance test, they will need to understand performance testing to be able to intelligently buy bulls and select replacements. Thus, BIF needs to get involved in helping State BCIA's and Extension design a strong educational program which incorporates the talents and resources of BIF member organizations in educating potential buyers of performance-tested breeding stock independent of whether they ever plan to performance test their herds.

It's time that BCIA's sit down with breed association and Extension personnel and work out procedures for inputting data into breed association computers, accessing these computers for data on herds in their States, and develop an Extension program that would increase participation in these programs and increase the educational value of data from these programs. This will take time, patience, and hard work. However, the mutual benefits to all parties and the clientele they serve are well worth the effort. In fact, it would be worth the effort for national sire evaulation alone.

This three-way partnership between BCIA's, breed associations, and Extension would maximize the strengths and minimize the weakness of each organization in delivering performance testing programs to producers. Thus, if being as responsive as possible to the needs of cattle producers is the common goal of BIF member organizations, there will need to be more cooperation in this area. BIF should provide the leadership in getting dialogue started and help get a result demonstration started in this area.

One of the biggest problems in performance testing has always been turn-around time on data. Gathering cattle to collect performance data and then gathering them again to cull and sell based on this data has been a real detriment to the performance movement. The solution to this problem could be close at hand if we can marry centralized data systems to mini-computer or programmable calculator systems. This would allow the best of both worlds. Producers could have enough data at weaning time to cull their cattle as well as complete data on their herd in a central system which could be used for herd summaries, calculating lifetime performance, and identifying outstanding breeding animals. BIF needs to pursue the potential of this technology and provide guideline on how it can best be utilized in performance testing. We probably should already be evaluating software programs for mini-computers and programmable calculators to determine which ones are most compatible with our present mainline computer programs. Rich Benson has organized a group in California to do just this and we have had one meeting already.

Producers who plan to optimize the performance of their herds must someday come to the realization that they must whole-herd test. Then comes the question of sacrificing data by putting bulls in central test. I truly believe there is a place for central testing in the overall performance movement. However, I do believe there are some producers for which central testing is questionable and should be weaned from central testing. Also, I think for some it is used more for promotional than genetic purposes. However, if you truly analyze the situation, I think some breeders can't afford to central test bulls from the standpoint of maximizing the overall performance of their herds. BIF should provide

guidelines to help producers evaluate this situation in light of the goals they have set for their herds.

In closing, I want to express my appreciation to have been able to serve as President of BIF. It's a great organization that has made a major contribution to the performance movement, and BIF can take pride in its accomplishments.

There are still numerous challenges for BIF to help conquer. I have tried to cover some of those I think are important. I am sure there are others that many of you consider to be more important that I have not covered. If so, get them to me or any of our Board members. We represent you, and we need to know the issues as you see them.

BIF is healthy, strong, and able to provide the leadership that will ultimately make it possible for cattle producers to reap the full benefits of performance testing. I look forward to working with you, and for you, in achieving this goal.

MINUTES OF THE BOARD OF DIRECTORS
Beef Improvement Federation

Holiday Inn
Stillwater, Oklahoma
March 24, 1981

The meeting was called to order by President Jack Farmer at 7:00 a.m. on March 24, 1981. Those present included Directors Borror, Butts, Cook, Durfey, Farmer, Holden, Keffeler, Martin, Paschal, Peterson, Radakovich, Scarth, Spader, Winn, plus Baker, Boston, Cundiff, Eller, Ellis, Hubbard, and Linton.

Motion Minutes

The reading of the minutes of the mid-year Board of Directors meeting was dispensed with since they had previously been circulated to the Direcotrs. It was moved by Keffeler, and seconded by Scarth, that the minutes be approved as circulated. Motion carried.

Finances

The financial report was presented by Linton, a copy of which is attached. It was moved by Borror and seconded by Boston, that the financial report be approved as read. Motion carried.

Guidelines

Dixon Hubbard gave a progress report on the revised BIF guidelines. He indicated that this publication should be available on May 1st, and that 5000 copies would be available after this first printing.

OLD BUSINESS

Awards

Art Linton reported upon the award recipient selection process for 1981. He indicated that the new nomination form facilitated the nomination process by the nominating organizations as well as the evaluation and selection process by the evaluators. All comments had been extremely favorable in this regard. A constructive comment that had been received from one of the evaluators was that perhaps a different nomination form should be developed for use in nominations for the Commercial Producer award, than the one that is used in the Seedstock Producer award. Tom Cook and Greg Martin volunteered to work together to develop such a form.

1982 Convention

Mark Keffeler reaffirmed that the South Dakota BCIA wishes to host the BIF convention at Rapid City in 1982. A discussion of dates for the 1982 convention followed and the days of April 29th, 30th and May 1st were identified as the most desirable time for the convention. Mark indicated that he had already reserved hotel space for those dates.

1981 Convention

Frank Baker reviewed the program for the 1981 convention with the Board.

The meeting was recessed at 7:50 a.m. to be reconvened at 6:00 a.m. on March 25, 1981.

Respectfully submitted,

Arthur C. Linton

Arthur C. Linton
Executive Director

BEEF IMPROVEMENT FEDERATION

FINANCIAL STATUS - January 1, 1981

by

Arthur C. Linton

	1-1-80	1-1-81
Checking Account	$2,197.57	$1,189.34
Savings Account	4,201.04	3,469.81
Certificate of Deposit	10,288.12	19,000.00
CSU Development Fund	165.47	
	$16,852.20	$23,659.15

1980 BIF INCOME

Convention		
Registration	8,368.00	
Sale of Proceedings	71.50	
Coffee break sponsors	600.00	
	9,039.50	
Proceedings	310.50	
Dues	8,562.23	
Interest	2,022.75	
TOTAL INCOME	$19,934.98	

1980 BIF EXPENSES

Convention	
Printing-programs	439.81
Secretarial	46.80
Convention Bureau	50.00
Speaker costs	1,638.77
Hotel	8,546.79
Awards	189.02
	10,911.19
Printing	1,358.50
Postage	214.75
Board meeting	208.75
Exec. director's travel	255.60
Copies	49.46
Supplies	119.78
Legal	10.00
TOTAL EXPENSES	$13,128.03

MINUTES OF THE BOARD OF DIRECTORS
Beef Improvement Federation

Holiday Inn
Stillwater, Oklahoma
March 25, 1981

The meeting was called to order by President Jack Farmer at 6:15 a.m. on March 25, 1981. Those present included Directors Borror, Butts, Cook, Durfey, Farmer, Holden, Keffeler, Martin, Paschal, Peterson, Radakovich, Scarth, Spader, and Winn, plus Baker, Boston, Cundiff, Eller, Ellis, Hubbard and Linton.

Election of Directors

President Farmer asked for a report on the election of directors. Linton reported that all of the directors whose terms expired in 1981 were re-elected to another term as directors. These directors included Jack Farmer, representing BCIA's at large, Les Holden, Western BCIA's and Greg Martin and Robert Scarth, both representing Breed Associations.

1981 Convention Report

Frank Baker gave a progress report on the 1981 convention. He reported that people had registered and also reported on the expected expenses for the convention. Those directors in attendance were in agreement that the convention was running extremely smoothly and that they wished the Oklahoma State University Animal Science staff to be thanked formally for their efforts. Glenn Butts moved and Les Holden seconded that the Animal Science Department be thanked for so graciously hosting the 1981 BIF Convention. Motion carried.

Election of Officers

Mark Keffeler, Chairman, gave the report of the nominating committee which included the nomination of Roger Winn as President and Steve Radakovich as Vice-President. Bill Borror moved and Greg Martin seconded that the report of the nominating committee be accepted and that a unanimous ballot be cast for both individuals. Motion carried. Roger Winn replaced Jack Farmer as the prsiding officer at the meeting.

Ad hoc Finance Committee

Chairman Ike Eller reported that with increasing travel costs, participation as an elected board member of Beef Improvement Federation has become a potential financial hardship on several of the elected board members. In light of the fact that the Federation has operated in a financial surplus situation for the past several years, it was the recommendation of the committee that a flat amount be appropriated on

an annual basis to supplement the expense of travel to the annual meeting and the mid-year Board meeting of the board members elected by the Beef Cattle Improvement Associations. Greg Martin moved for the adoption of this committee report and for the implementation of this policy. The motion was seconded by Dick Spader. Motion carried. Ike Eller moved that this policy be implemented immediately and that it should cover transportation costs to the 1981 Annual BIF Convention. This motion was seconded by Dick Spader. Motion carried. President Winn instructed the executive director to develop further guidelines for the implementation of this policy.

NEW BUSINESS

Sire Evaluation Committee

The proposal presented to the Sire Evaluation Committee by Richard Willham was discussed. It was moved by Ike Eller and seconded by Tom Cook that this proposal be returned to the committee for further evaluation and action before the board acts upon it. Motion carried.

USDA Beef Carcass Grades

BIF Director Gene Shroeder is Chairman of the National Cattlemen's Association Committee to evaluate present USDA beef carcass grades. This committee has developed a proposal for revision of beef carcass grades. After discussion, it was moved by Greg Martin that BIF go on record in support of the proposal for the revision of these carcass grades. The motion was seconded by Jack Farmer. After discussion of this motion, Bill Durfey moved that this motion be tabled. The motion was seconded by Earl Peterson. The motion to be table the main motion was passed unanimously.

Mid-year BIF Board Meeting

After discussion, a straw-vote indicated that the Board preferred to hold the mid-year board meeting in Kansas City at the Holiday Inn at the airport. The date of October 3rd was elected for this meeting.

1983 Annual Meeting

A discussion ensued pertinent to the location for the 1983 Annual meeting. Greg Martin moved thatthe 1983 meeting be held in Sacramento, California. The motion was seconded by Jack Farmer and passed unanimously.

Program Committee

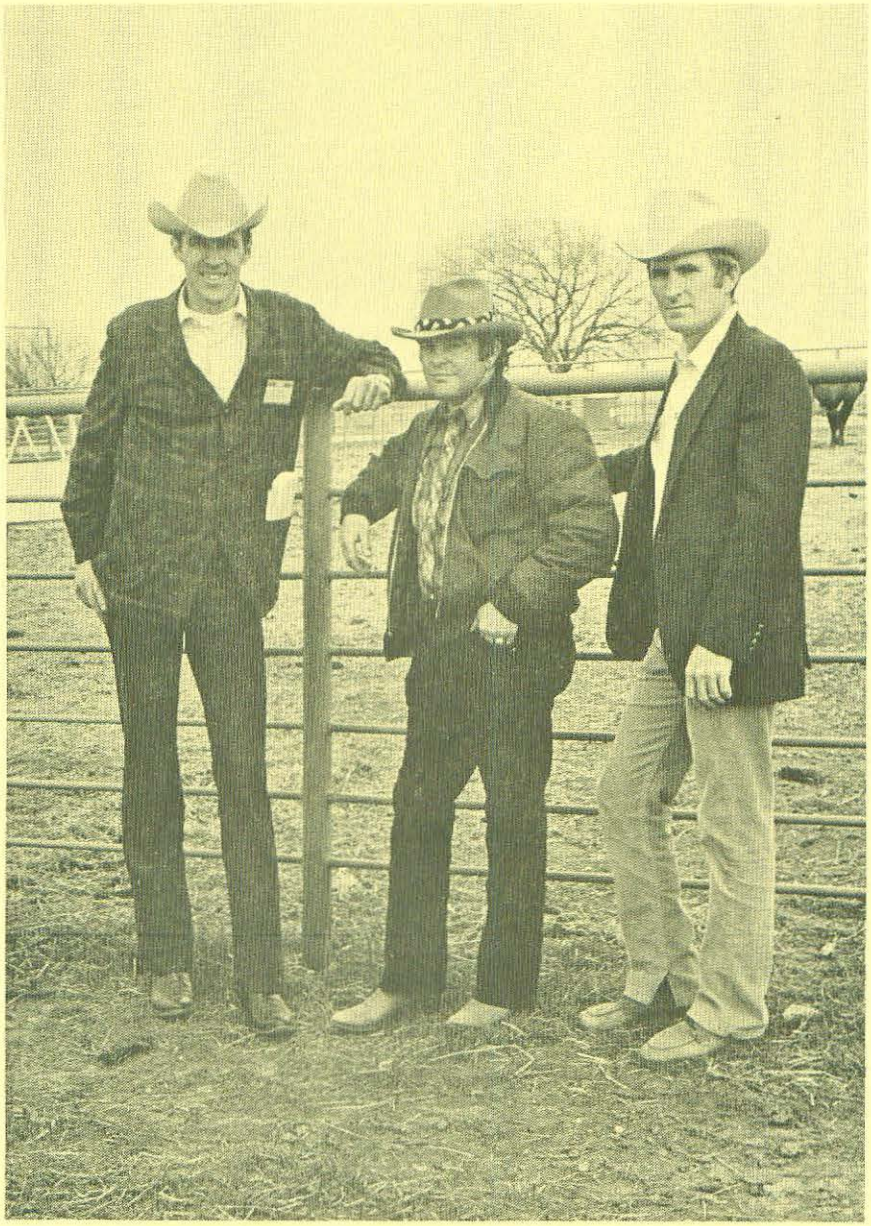
President Roger Winn appointed a program committee responsible for planning the 1982 Convention as follows: Steve Radakovich as Chairman, Mark Keffeler, Bill Borro and Greg Martin.

The meeting was adjourned at 8:10 a.m.

Respectfully submitted,

Arthur C. Linton

Arthur C. Linton
Executive Director



Art Linton, left, executive director of the Beef Improvement Federation (BIF), welcomes Roger Winn, center, and Steve Radakovic as new officers. Winn, a commercial producer of crossbred cattle, is from Axton, Virginia. He was elected president of the group. Radakovich was elected vice president. He is a breeder of registered Hereford and Angus cattle, and makes his home near Earlham, Iowa. The elections took place during the BIF annual meeting held in Stillwater, Oklahoma in March.

BIF AWARDS PROGRAM

The Commercial Producer Honor Roll of Excellence

Chan Cooper	MT	1972
Alfred B. Cobb, Jr.	MT	1972
Lyle Eivens	IA	1972
Broadbent Brothers	KY	1972
Jess Kilgore	MT	1972
Clifford Ouse	MN	1973
Pat Wilson	FL	1973
John Glaus	SD	1973
Sig Peterson	ND	1973
Max Kiner	WA	1973
Donald Schott	MT	1973
Stephen Garst	IA	1973
J. K. Sexton	CA	1973
Elmer Maddox	OK	1973
Marshall McGregor	MO	1974
Lloyd Nygard	ND	1974
Dave Matti	MT	1974
Eldon Wiese	MN	1974
Lloyd DeBruycker	MT	1974
Gene Rambo	CA	1974
Jim Wolf	NE	1974
Henry Gardiner	KS	1974
Johnson Brothers	SD	1974
John Blankers	MN	1975
Paul Burdett	MT	1975
Oscar Burroughs	CA	1975
John R. Dahl	ND	1975
Eugene Duckworth	MO	1975
Gene Gates	KS	1975
V. A. Hills	KS	1975
Robert D. Keefer	MT	1975
Kenneth E. Leistritz	NE	1975
Ron Baker	OR	1976
Dick Boyle	ID	1976
James D. Hackworth	MO	1976
John Hilgendorf	MN	1976
Kahua Ranch	HI	1976
Milton Mallery	CA	1976
Robert Rawson	IA	1976
Wm. A. Stegner	ND	1976
U. S. Range Experiment Station	MT	1976
John Blankers	MN	1977
Maynard Crees	KS	1977
Ray Franz	MT	1977
Forrest H. Ireland	SD	1977
John A. Jameson	IL	1977

Leo Knoblauch	MN	1977
Jack Pierce	ID	1977
Mary & Stephen Garst	IA	1977
Odd Osteroos	ND	1978
Charles M. Jarecki	MT	1978
Jimmy G. McDonnal	NC	1978
Victor Arnaud	MO	1978
Ron & Malcolm McGregor	IA	1978
Otto Uhrig	NE	1978
Arnold Wyffels	MN	1978
Bert Hawkins	OR	1978
Mose Tucker	AL	1978
Dean Haddock	KS	1978
Myron Hoeckle	ND	1979
Harold and Wesley Arnold	SD	1979
Ralph Neill	IA	1979
Morris Kuschel	MN	1979
Bert Hawkins	OR	1979
Dick Coon	WA	1979
Jerry Northcutt	MO	1979
Steve McDonnell	MT	1979
Doug Vandermyde	IL	1979
Norman, Denton and Calvin Thompson	SD	1979
Jess Kilgore	MT	1980
Robert & Lloyd Simon	IL	1980
Lee Eaton	MT	1980
Leo & Eddie Grubl	SD	1980
Roger Winn, Jr.	VA	1980
Gordon McLean	ND	1980
Ed Disterhaupt	MN	1980
Thad Snow	CAN	1980
Oren & Jerry Raburn	OR	1980
Bill Lee	KS	1980
Paul Moyer	MO	1980

1981

G. W. Campbell	IL	1981
J. J. Feldmann	IA	1981
Henry Gardiner	KS	1981
Dan L. Weppler	MT	1981
Harvey P. Wehri	ND	1981
Dannie O'Connell	SD	1981
Wesley & Harold Arnold	SD	1981
Jim Russel and Rick Turner	MO	1981
Oran and Jerry Raburn	OR	1981
Orin Lamport	SD	1981
Leonard Wulf	MN	1981

BIF AWARDS PROGRAM

The Seedstock Breeder Honor Roll of Excellence

John Crowe	CA	1972
Dale H. Davis	MT	1972
Elliot Humphrey	AZ	1972
Jerry Moore	OH	1972
James D. Bennett	VA	1972
Harold A. Demorest	OH	1972
Marshall A. Mohler	IN	1972
Billy L. Easley	KY	1972
Messersmith Herefords	NE	1973
Robert Miller	MN	1973
James D. Hemmingsen	IA	1973
Clyde Barks	ND	1973
C. Scott Holden	MT	1973
William F. Borror	CA	1973
Raymond Meyer	SD	1973
Heathman Herefords	WA	1973
Albert West III	TX	1973
Mrs. R. W. Jones, Jr.	GA	1973
Carlton Corbin	OK	1973
Wilfred Dugan	MO	1974
Bert Sackman	ND	1974
Dover Sindelar	MT	1974
Jorgensen Brothers	SD	1974
J. David Nichols	IA	1974
Bobby Lawrence	GA	1974
Marvin Bohmont	NE	1974
Charles Descheemaeker	MT	1974
Bert Crane	CA	1974
Burwell M. Bates	OK	1974
Maurice Mitchell	MN	1974
Robert Arbuthnot	KS	1975
Glenn Burrows	NM	1975
Louis Chesnut	WA	1975
George Chiga	OK	1975
Howard Collins	MO	1975
Jack Cooper	MT	1975
Joseph P. Dittmer	IA	1975
Dale Engler	KS	1975
Leslie J. Holden	MT	1975
Robert D. Keefer	MT	1975
Frank Kubik, Jr.	ND	1975
Licking Angus Ranch	NE	1975
Walter S. Markham	CA	1975
Gerhard Mittness	KS	1976
Ancel Armstrong	VA	1976
Jackie Davis	CA	1976
Sam Friend	MO	1976
Healy Brothers	OK	1976

Stan Lund	MT	1976
Jay Pearson	ID	1976
L. Dale Porter	IA	1976
Robert Sallstrom	MN	1976
M. D. Shepherd	ND	1976
Lowellyn Tewksbury	ND	1976
Harold Anderson	SD	1977
William Borror	CA	1977
Rob Brown, Simmental	TX	1977
Glenn Burrows, PRI	NM	1977
Henry & Jeanette Chitty	FL	1977
Tom Dashiell, Hereford	WA	1977
Lloyd DeBruycker, Charolais	MT	1977
Wayne Eshelman	WA	1977
Hubert R. Freise	ND	1977
Floyd Hawkins	MO	1977
Marshall A. Mohler	IN	1977
Clair Percel	KS	1977
Frank Ramackers, Jr.	NE	1977
Loren Schlipf	IL	1977
Tom and Mary Shaw	ID	1977
Bob Sitz	MT	1977
Bill Wolfe	OR	1977
James Volz	MN	1977
A. L. Grau		1978
George Becker	ND	1978
Jack Delaney	MN	1978
L. C. Chestnut	WA	1978
James D. Bennett	VA	1978
Healey Brothers	OK	1978
Frank Harpster	MO	1978
Bill Womack, Jr.	AL	1978
Larry Berg	IA	1978
Buddy Cobb	MT	1978
Bill Wolfe	OR	1978
Roy Hunt	PA	1978
Del Krumwied	ND	1979
Jim Wolf	NE	1979
Rex and Joann James	IA	1979
Leo Schuster Family	MN	1979
Bill Wolfe	OR	1979
Jack Ragsdale	KY	1979
Floyd Mette	MO	1979
Glenn and David Gibb	IL	1979
Peg Allen	MT	1979
Frank and Jim Willson	SD	1979
Donald Barton	UT	1980
Frank Felton	MO	1980
Frank Hay	CAN	1980
Mark Keffeler	SD	1980

Bob Laflin	KS	1980
Paul Mydland	MT	1980
Richard Tokach	ND	1980
Roy & Don Udelhoven	WI	1980
Bill Wolfe	OR	1980
John Masters	KY	1980
Floyd Dominy	VA	1980
James Bryan	MN	1980
Blythe Gardner	UT	1980
Richard McLaughlin	IL	1980
Charlie Richards	IA	1980

1981

Bob Dickinson	KS	1981
Clarence Burch	OK	1981
Lynn Frey	ND	1981
Harold Thompson	WA	1981
James Leachman	MT	1981
J Morgan Donelson	MO	1981
Clayton Canning	CAN	1981
Russ Denowh	MT	1981
Dwight Houff	VA	1981
G. W. Cornwell	IA	1981
Bob and Gloria Thomas	OR	1981
Roy Beeby	OK	1981
Herman Schaefer	IL	1981
Myron Aultfather	MN	1981
Jack Ragsdale	KY	1981

Continuing Service Awards

Clarence Burch	Oklahoma	1972
F. R. Carpenter	Colorado	1973
E. J. Warwick	ARS-USDA Wash. DC	1973
Robert De Baca	Iowa State Univ.	1973
Frank H. Baker	Okla. State Univ.	1974
D. D. Bennett	Oregon	1974
Richard Willham	Iowa State Univ.	1974
Larry V. Cundiff	RLHUSMARC	1975
Dixon D. Hubbard	USDA-FES, Wash.DC	1975
J. David Nichols	Iowa	1975
A. L. Eller, Jr.	VPI & SU	1976
Ray Meyer	South Dakota	1976
Don Vaniman	Montana	1977
Lloyd Schmitt	Montana	1977
Martin Jorgensen	South Dakota	1978
James S. Brinks	Col. State Univ.	1978
Paul D. Miller	Am. Breeding Svc-Wis	1978
C. K. Allen	Am. Angus Assn.	1979
Wm. Durfey	NAAB	1979
Glenn Butts	PRI	1980
Jim Gosey	Univ. of Neb.	1980
Mark Keffeler	South Dakota	1981

Commercial Producer of the Year

Chan Cooper	MT	1972
Pat Wilson	FL	1973
Lloyd Nygard	ND	1974
Gene Gates	KS	1975
Ron Baker	OR	1976
Steve and Mary Garst	IA	1977
Mose Tucker	AL	1978
Bert Hawkins	OR	1979
Jess Kilgore	MT	1980
1981		
Henry Gardiner	KS	1981

Seedstock Breeder of the Year

John Crowe	CA	1972
Mrs. R. W. Jones	GA	1973
Carlton Corbin	OK	1974
Leslie J. Holden	MT	1975
Jack Cooper	MT	1975
Jorgensen Brothers	SD	1976
Glenn Burrows	NM	1977
James D. Bennett	VA	1978
Jim Wolf	NE	1979
Bill Wolfe	OR	1980
1981		
Bob Dickinson	KS	1981

Organizations of the Year

Beef Improvement Committee, Oregon Cattlemen's Assn.	1972
South Dakota Livestock Production Records Assn.	1973
American Simmental Association Inc.	1974
American Simmental Association Inc. (Breed)	1975
Iowa Beef Improvement Association (BCIA)	1975
The American Angus Association (Breed)	1976
The North Dakota Beef Cattle Improvement Assn. (BCIA)	1976
The American Angus Association (Breed)	1977
The Iowa Beef Improvement Association (BCIA)	1977
The American Hereford Association (Breed)	1978
Beef Performance Committee or Cattlemen's Assn.	1978
The Iowa Beef Improvement Association (BCIA)	1979

Pioneer Awards

Jay L. Lush	Iowa State Univ.	Research	1973
John H. Knox	New Mexico State Univ.	Research	1973
Ray Woodward	American Breeders Svc.	Research	1974
Fred Willson	Montana State Univ.	Research	1974
Charles E. Bell, Jr.	USDA-FES	Education	1974
Reuben Albaugh	Univ. of California	Education	1974
Paul Pattengale	Colorado State Univ.	Education	1974
Glenn Butts	Performance Registry Intl.	Service	1975
Keith Gregory	RHLUSMARC	Reserach	1975
Bradford Knapp, Jr.	USDA	Research	1975
Forrest Bassford	Western Livestock Journal	Journalism	1976
Doyle Chambers	Louisiana State Univ.	Research	1976
Mrs. Waldo Emerson Forbes	Wyoming Breeder	Breeder	1976
C. Curtiss Mast	Virginia BCIA	Education	1976
Dr. H. H. Stonaker	Colorado State Univ.	Research	1977
Ralph Bogart	Oregon State Univ.	Research	1977
Henry Holszman	South Dakota State Univ.	Education	1977
Marvin Koger	Univ. of Florida	Research	1977
John Lasley	Univ. of Missouri	Research	1977
W. C. McCormick	Tifton, Georgia Test Stn.	Research	1977
Paul Orcutt	Montana Beef Perf. Assn.	Education	1977
J. P. Smith	Performance Registry Intl.	Education	1977
James B. Lingle	Wye Plantation	Breeder	1978
R. Henry Mathiessen	Virginia Breeder	Breeder	1978
Bob Priode	VPI & SU	Research	1978
Robert Koch	RLHUSMARC	Research	1979
Mr. & Mrs. Carl Roubicek	Univ. of Arizona	Research	1979
Joseph J. Urick	U. S. Range Livestock Experiment Station	Research	1979
Bryon L. Southwell	Georgia	Research	1980
Richard T. "Scotty" Clark	USDA	Research	1980
F. R. "Ferry" Carpenter	Colorado	Breeder	1980

1981

Clyde Reed	Oklahoma State Univ.	1981
Milton England	Panhandle A&M College	1981
L. A. Maddox	Texas A&M Univ.	1981
Charles Pratt	Oklahoma	1981
Otha Grimes	Oklahoma	1981

1981 COMMERCIAL PRODUCER OF THE YEAR

Henry Gardiner of Ashland, Kansas, has been named the 1981 Beef Improvement Federation (BIF) Commercial Producer of the Year. Since Gardinar was unable to attend, his son and partner, Greg, accepted the honor during the group's annual meeting held in Stillwater March 23-25.

Some 250 persons representing 38 states and Canada saw the honor awarded. BIF is a coalition of cattle interests such as the American National Cattlemen's Association, national breed organizations, beef cattle improvement associations, and others.

The 600-cow Angus herd Gardiner maintains has long been recognized for superior genetics, resulting largely from the use of performance records, according to Art Linton, executive director of BIF. Because of the careful breeding management involved, Gardiner's herd has been the source of steer progeny resulting in the certification of 14 Certified Meat Sires through the Performance Registry International (PRI) and 24 bulls tested by the American Angus Association (AAA) Sire Evaluation Program.

Gardiner is continuing to use his animals as a national test herd for the AAA. Approximately 250 calves are produced each year for this program, including the progeny of two reference sires plus the test bulls.

Measurements recorded on these calves include birth, weaning and yearling weights and calving ease information. They also include feedlot gain, carcass quality and yield grade information on the steer progeny. As a result of his use of superior sires and management changes, the average pay weight on Gardiner's steers has increased from 508 pounds in 1970 to 668 pounds in 1980.

"I believe we are entering a new era in Angus cattle breeding," Gardiner says. "Sire evaluation is giving us rather precise measurements on the genetic ability of many bulls and this information is going to improve the breed faster than ever before."

"In a few years, as we get more generations tested and culled, we will have cattle with more genetic predictability than we now have. As this happens, our cattle will become more and more valuable."

Gardiner has served the beef industry on the board of directors for the American National Cattlemen's Association, the American Angus Association and the Performance Registry International. He has served as chairman of the Kansas Livestock Association Beef Improvement Committee and as President of the Board of the Kansas Livestock and Meat Industry Countil.

"Henry Gardiner leads the beef cattle industry in the adaptation of production technology and through service in cattlemen's organizations," Linton says.

1981 SEEDSTOCK PRODUCER OF THE YEAR

For the first time, a Simmental breeder was named 1981 Seedstock Producer of the Year at the Beef Improvement Federation (BIF) annual meeting held in Stillwater, Oklahoma March 23-25.

Graham, Kansas, cattleman Bob Dickinson, was recognized for the honor by the BIF group, which is a coalition of cattle interests such as the American National Cattlemen's Association, national breed associations, beef cattle improvement associations and others. Some 250 persons representing 38 states and Canada were in attendance at the annual meeting.

Dickinson began performance testing in 1960 with a weaning weight program. Over the past 11 years he has recorded birth, weaning and yearling weights on all calves, plus maintaining carcass data on a portion of the cattle he produced.

When he began keeping weaning weights, Dickinson's steer calves averaged 420 pounds and heifers just under 400 pounds. In 1980, his average adjusted 205-day weights were 624 pounds and 554 pounds on bulls and heifers, respectively.

Yearling weights on his bulls have increased 150 pounds over the past 11 years, but at the same time, he has managed to decrease calving problems. He accomplished this by using bulls with reputations for ease of calving as reported in the Simmental Sire Summary and by culling females with small pelvic areas.

AI bulls and natural service sires are all selected after careful evaluation of performance information. Extensive cow herd culling is based upon cow productivitiy after weaning the first calf.

Dickinson has been a strong supporter of the Kansas Bull Testing Station, where he has tested more bulls than any other producer. Twice his bulls have won the Sire Group of Three award and one holds the record for test gain by a Simmental. The test station has been a source of herd bulls for the Dickinson herd. Bob is justifiably proud of DS Bar 5 257E, a home raised herd bull, that has been recognized by the American Simmental Association (ASA) as a Genetic Trait Leader for calving ease.

Dickinson has earned the role and title of "Mr. Performance" in the ASA. He has also been chairman of the ASA Performance Committee for the past three years.

During that period the ASA made more refinements and improvements to performance programs than during any previous period, according to Art Linton, executive director of BIF. Linton says Dickinson was instrumental in the addition of estimated breeding values and more comlete progeny performance records to the registion certificates. He was also a leader in redesigning the National Sire Summary, making it more readable.

Dickinson was elected ASA president in January.

Accepting the 1981 BIF Commercial Producer of the Year Award for Henry Gardiner is his partner and son, Greg, at left. The Gardiners raise Angus cattle near Ashland, Kansas. At right is Bob Dickinson, the 1981 BIF Seedstock Producer of the Year winner. He is the first Simmental breeder to win this award

1981 CONTINUING SERVICE AWARD

Sturgis, South Dakota, cattleman Mark Keffeler was presented a Continous Service Award by the Beef Improvement Federation (BIF) during that group's annual meeting held in Stillwater, Oklahoma March 23-25.

Keffeler is a long-time member of the BIF, and has served the organization in several capacities, including president. BIF is a coalition of cattle interests such as the American National Cattlemen's Association, national breed organizations, beef cattle improvement associations, and others.

The Continuous Service Award is intended to show appreciation for long-time service and an overall "job well done", according to Art Linton, executive director of BIF.

"Mark has not only served as president, but he is now chairman of our Commercial Committee, which has the function of putting technical information into a form useable to commercial cattlemen and seeing to it that the material is distributed," Linton said.

Keefeler raises registered Hereford cattle and maintains a commercial ranching operation near Sturgis.

1981 PIONEER AWARDS

L. A. Maddox, extension beef specialist for Texas A&M University, was named a Pioneer in Beef Cattle Improvement Programs at the Beef Improvement Federation (BIF) annual meeting held in Stillwater, Oklahoma March 23-25.

As animal husbandryman for Texas Tech Univeristy, Maddox helped organize and conduct the first Pan Tech Bull test in 1950. He helped organize the American Beef Cattle Performance Testing Association in 1954, which later became Performance Registry International (a record-keeping entity which aids breeders in improving livestock).

Maddox became the west Texas livestock extension specialist and helped initiate an on-ranch, cow-calf performance testing program in 1954. In 1956, the program was expanded to include the whole state and Maddox moved to College Station.

Since that time he has been recognized for his service by many groups including the Texas and Southwest Cattlemen's Association in 1964; the American Society of Animal Science in 1967; the Texas A&M Former Students Association in 1973 and the Performance Registry International in 1978.

Now, in 1981, he can add the BIF Pioneer in Beef Cattle Improvement Programs Award.

Clyde Reed, a retired extension beef specialist from Oklahoma State University, was named a Pioneer in Beef Cattle Improvement Programs at the Beef Improvement Federation (BIF) annual meeting in Stillwater, Oklahoma March 23-25.

Reed became a beef cattle specialist for OSU in 1954, after having served as a vocational agriculture instructor and an official of state government. As a beef cattle specialist, he provided leadership for the initiation of OSU's on-farm performance testing program.

Under his guidance, the program grew to include a computerized record system, a commercial feeder calf program, cooperation with the Performance Registry International's (a record-keeping entity which aids breeders in improving livestock) Certified Meat Sire Program and cooperation with four active bull testing stations in the state.

Reed also served as the extension area beef cattle agent for southwest Oklahoma for a few years prior to his retirement.

Otha Grimes of Fairland was named a Pioneer in Beef Cattle Improvement Programs at the Beef Improvement Federation (BIF) annual meeting held in Stillwater, Oklahoma March 23-25.

Grimes is owner of Ogeechee Farms near Fairland. His farm was one of the first Polled Hereford operations to provide performance data on cattle sold in production sales. Concepts of improvement through selection on the basis of weaning and yearling weights and growth rates have been demonstrated to other breeders, 4-H and FFA members at many Ogeechee Farms field days.

Grimes has long been active in performance oriented organizations such as BIF, and in state and national breed association programs. Through sales of performance proven cattle and participation in regional and national organizations, he has influenced cattle breeders in many states toward the performance movement.

Charles Pratt of Oklahoma City was named a Pioneer in Beef Cattle Improvement Programs at the Beef Improvement Federation (BIF) annual meeting held in Stillwater, Oklahoma March 23-25.

After serving as an extension agent in Okmulgee and Muskogee counties, Pratt became a beef cattle performance testing agent for northeastern Oklahoma in 1955. He worked with commercial and registered breeders throughout the area in on-farm testing programs.

Working with agribusiness leaders of northeastern Oklahoma, Pratt helped establish exchange visits between cattlemen in his area and the cornbelt states of Illinois and Indiana to establish an improved sales program for high performing cattle.

He became a state extension livestock specialist in 1960 and continued to work on improving and marketing livestock. In 1966 he became livestock marketing specialist and later, general manager of the National Livestock Marketing Association headquartered in Denver. Earlier this year, he returned to manage the Oklahoma Livestock Marketing Association.

Milton England, Professor and head of animal and science at Panhandle A&M College, Goodwell, was named a Pioneer in Beef Cattle Improvement Programs at the Beef Improvement Federation (BIF) annual meeting held in Stillwater, Oklahoma March 23-25.

In 1952, England worked with 14 breeders to organize the Panhanle Bull Test Station. The breeders helped pay for renovation of college beef cattle facilities into a bull testing facility. Each breeder involved received a 10-year option on the use of a pen in the station. After 10 years, the facilities were remodeled and expanded.

Fifty-six bulls were tested that first year. The 29th test was completed this year, with 131 bulls included. Close to 3,000 bulls have been tested since the inception of the facility, representing breeders in Kansas, Colorado, New Mexico and Texas.

Significant changes occurring over the last three decades that England emphasizes include improvement in growth rates and cattle feed efficiency and more importantly, progressive changes in breeder attitudes toward the use of performance data for herd and breed improvement.

Representing many years of service to the cattle industry are these 1981 winners of awards given during the Beef Improvement Federation annual meeting. Pioneer Beef Cattle Improvement Awards went to, from left: L. A. Maddox, College Station, TX, Clyde Reed, Stillwater, OK: Otha Grimes, Fairland, OK; Charles Pratt, Oklahoma City, OK; and Milton England, Goodwell, OK. At right is Mark Keffeler from Sturgis, South Dakota who received a Continuous Service Award.

ATTENDANCE - BEEF IMPROVEMENT FEDERATION CONFERENCE - 1981

C. K. Allen
Rt. 3, Box 177
Savannah, MO 64485

Myron C. Aultfather
Route 2, Box 205
Austin, Minn. 55912

R. D. Bailey
19 Timber Creek
Shawnee, OK 74801

Burt G. Bartlett
2517 S. W. 25
Oklahoma City, OK 73108

Roy G. Beeby
Prairie City Center
Marshall, OK 73056

Danny R. Belcher
Rt. 3, Box 780
Thomson, GA 30824

Morgan Bell
Star Rt. 1, Box 128
Pryor, OK 74361

Harold W. Bennett
1224 Alton-Darby Rd.
Columbus, OH 43228

James D. Bennett
Red House, VA 23963

Paul S. Bennett
Red House, VA 23963

Richard C. Benson
Animal Sci. Ext.
Univ. of California
Davis, CA 95616

Larry L. Benyshek
Rt. 1
Danielsville, GA 30633

Ron Bieber
Leola, SD 57456

Bill Borror
Rt. 1, Box 359
Gerber, CA 96035

Andrew C. Boston
Sir John Carling Bldg.
Ottawa, Ontario
Canada K1A 0C5

Bill J. Bradley
Rt. 2
Memphis, TX 79245

J. S. Bray, Jr.
Su RFD 1
Bedford, KY 40006

Daryl L. Brinkman
5405 NW 108 Terrace
Oklahoma City, OK 73132

James S. Brinks
212 Animal Sci. Bldg.
Fort Collins, CO 80523

Hayden A. Brown
C-102 Animal Sci. Bldg.
Fayetteville, AR 72701

Doug Buchanan
Rt. 2
Fayetteville, TN 37334

Clarence Burch
Rt. 1
Mill Creek, OK 74856

Glenn Burrows
Rt. 2, Box 80
Clayton, NM 88415

Glenn Butts
Rt. 1, Box 126
Fairland, OK 74343

G. W. Campbell
RR 1, Box 106
Villa Grove, IL 61956

Clayton W. Canning
Souris Manitoba
Canada

Larry Cannon
228 W. Ikerd
Blackwell, OK 74631

Jack Chase
Box 186
Leiter, WY 82837

George C. Chiga
Box 699
Guthrie, OK 73044

Charles J. Christians
101 Peters Hall
Univ. of Minnesota
St. Paul, MN 55108

Tom Chrystal
Scranton, IA 51462

L. E. Clarkson
Rt. 1, Box 129
Winfield, KS 67156

Eldon W. Cole
P.O. Box 388
Mt. Vernon, MO 65712

Gary Conley
Rt. 1, Box 31
Perryton, TX 79070

Tom Cook
P.O. Box 569
Denver, CO 80201

E. R. Cotulla
Rt. 1, Box 100
Hugo, OK 74743

Quinn Courtney
Star Route, Box 56
Grady, OK 73545

Mark Cowen
8416 N.E. Boone
Kansas City, MO

Mick Crandall
801 San Francisco
Rapid City, SD 57701

Larry V. Cunduff
P.O. Box 166
Clay Center, NE 68933

Joe Dearing
Rt. 7
Harrison, AR 72601

Russell Denowh
Girard Route
Sidney, MT 59270

Mrs. Russell Denowh
Girard Route
Sidney, MT 59270

Bob Dickinson
Gorham, KS 67640

Tom L. Drake
Box 188
Davis, OK 73030

Bill Durfey
Columbia, MO

A. L. Eller
500 Patrick Henry Dr.
Blacksburg, VA 24060

Kenneth W. Ellis
145 Animal Sci. Bldg.
Univ. of California
Davis, CA 95616

Jim Falvey
Box 4528
Des Moines, IA 50306

Jack O. Farmer
3053 Chileno Vy. Rd.
Petaluma, CA 94952

Leonard Fawcett
Box 50
Ree Heights, SD 57370

Joseph D. Ferguson
1521 Hillcrest
Woodward, OK 73801

Mead Ferguson
1521 Hillcrest
Woodward, OK 73801

C. W. Flint
P.O. Box 490
Tulsa, OK 74101

Joe Flusche
Rt. 4, Box 389
Muskogee, OK

Frank W. Fox
541 Couper Dr.
San Luis Obispo, CA 93401

Don Franke
1130 Louray Dr.
Baton Route, LA 70808

Lynn Frey
RR 1, Box 115
Granville, ND 58751

Mary Frichot
Rt. 1, Box 240
Shawnee, OK 74801

Mary Garst
Box 267
Coon Rapids, IA 50058

Odell W. Gelvin
Rt. 1, Box 214
Fairland, OK 74343

Jim Glenn
123 Airport Rd
Ames, IA 50010

Ann Gooding
Fredosicka Brookside
St. Joseph, MO 64501

Dick Grace
Rt. 1
Macomb, OK 74852

Otha H. Grimes
Box 3327
Tulsa, OK 74101

Dean D. Haddock
201 S. Mill
Beloit, KS 67420

Nancy Haddock
201 S. Mill
Beloit, KS 67420

Clifford J. Halfmann
Rt. 1, Box 74
Rowena, TX 76875

S. P. Hammack
1206 Meadowlark
Stephenville, TX 76401

Kenneth D. Harden
Box 1779
Ada, OK 74820

Burke Healey
Flying L. Ranch
Davis, OK 73030

Skip Healey
Flying L Ranch
Davis, OK 73030

Robert Henningsen
RR 1, Box 148
Sadorus, IL 61872

Bud Hills
Box 246
Mankato, KS 66956

Mrs. Lee Holden
Star Route
Valier, MT 59486

Les Holden
Star Route
Valier, MT 59486

Mrs. J. Harold Howard
Box 573
Sentinel, OK 73664

J. Harold Howard
Box 573
Sentinel, OK 73664

Dixon D. Hubbard
USDA
Room 5525-South Bldg.
14th & Independence,SW
Washington, D.C.

Chuck Huedepohl
9718 107th St.
Edmonton, Alberta
Canada T5K 2C8

Don V. Hutzel
NOBA Inc. Box 607
Tiffin, OH 44883

Richard W. Judy
Mankato, KS 66956

Mark Keffeler
26 Hereford Rt.
Sturgis, SD 57785

Mrs. Mark Keffeler
26 Hereford Rt.
Sturgis, SD 57785

Jess Kilgore
Three Forks, MT

Richard Kinnard
Route 2, Box 179A
Wilburton, OK 74578

Melvin A. Kirkeide
Hultz Hall
University Station
Fargo, ND 58105

David Kirkpatrick
P.O. Box 1071
Knoxville, TN 37901

Clifford L. Knight
P.O. Box 95346
Oklahoma City, OK 73109

Paul A. Kunkel
11740 U.S. 42
Plain City, OH 43064

Dennis W. Lamm
108A Animal Sci. Bldg.
Fort Collins, CO 80523

Jake Laison
Almont, ND 58520

Eldin A. Keighton
New Mexico State Univ.
Box 3-I, Dept. Ani. Sci.
Las Cruces, NM

Art Linton
Animal/Range Sci. Dept.
Montana State University
Bozeman, MT 59717

John Lockhart
Box 5, Site 3, RR 1
Okotoks, Alberta
Canada TOLITO

May Lockhart

Troy Lotspeich
Rt. 1
Rosston, OK 73855

Craig Ludwig
P.O. Box 4059
Kansas City, MO 64101

Carl E. Lueker
Rt. 1, Box 3
Buffalo, MO 65622

Don McCormick
P.O. Box 938
Hughson, CA 95326

Roger L. McCraw
NC State Univ.
109 Polk Hall
Raleigh, NC 27650

Steve McGuire
1 Simmental Way
Bozeman, MT 59715

Derald McNutt
Box 97
McAlester, OK 74501

Roy D. McPhee
14298 N. Atkins Rd.
Lodi, C \ 95240

Bill McReynolds
121 Clark Hall
Pullman, WA 99164

L. A. Maddox, Jr.
Texas A&M University
College Station, TX 77843

Terry Maddox
423 South Cheyenne
Hennessey, OK 73742

Ron Malcom
Rt. 1, Box 401
Claremore, OK 74017

Susan Malcom

Greg L. Martin
100 Livestock Exc. Bldg.
Denver, CO 80216

John W. Massey
130 Mumford
Columbia, MO 65211

John Masters
RFD 2, Box 298
Mayslick, KY 41055

Brett Keith Middleton
439 S. Maple #5
Ames, IA 50010

Joe Minyard
109 Santee Trail
Brookings, SD 57006

Marshall A. Mohler
11402 S. County Line Rd
Wanatah, IN 46390

Mike Moss
P.O. Box 391
Little Rock, AR 72203

John Musselman
P.O. Box 566
Albany, TX 76430

Carolyn Musselman
P.O. Box 566
Albany, TX 76430

Terry Nelsen
Box 538
Warner, OK 74469

John G. Nemeth
3275 Holdrege
Lincoln, NE 68503

Wiliam R. Newman, DVM
Rt. 2 Indian Summer Ranch
Fayetteville, TN 37334

Charles Nichols
Rt. 2, Box 15-0
Arnett, OK 73832

Lee Nichols
RR 1
Bridgewater, IA 50837

Marvin D. Nichols
Ankeny RR 1
Ankeny, IA 50021

Davis Noller
Scranton, IA 51562

David Notter
Blacksburg, VA

Dan O'Connell
Creighton, SD 57729

Mrs. Dan O'Connell
Creighton, SD 57729

Larry W. Olson
P.O. Box 247
Blackville, SC 29817

Del L. Osborne
Rt. 1, Box 145
Ramona, OK 74061

Jon Ott
2044 Fillmore
Topeka, KS 66604

Ron Parker
Box 3AE
Las Cruces, NM 88003

Joe C. Paschal
1610 Old Spanish Trail
Houston, TX 77054

Earl B. Peterson
1 Simmental Way
Bozeman, MT 59715

John W. Pierce
1830 Lakecrest Circle
Carrollton, TX 75006

Tom Price
DeForest, WI

Steve Radakovich
Earlham, IA

Jack Ragsdale
Sutherland Farm
Prospect, KY 40059

Dr. Gunterh W. Rahnefeld
Box 610
Brandon Manitoba
Canada R7A 5Z7

Bobby J. Rankin
Box 3692
Las Cruces, NM 88003

Tinker R. Ray
Rt. 1
Atoka, OK 74525

Paul D. Redd
P.O. Box 326
Paradox, CO 81429

T. D. Rich
4700 East 63rd
Kansas City, MO 64130

Larry W. Richardson
Rt. 2, Box 75A
DeLeon, TX 76444

Tom Risinger
Rt. 9, Box 242
San Antonio, TX 78227

Jim Ross
University of Missouri
Columbia, MO 65215

Ivan Rush
4502 Avenue 1
Scottsbluff, NE 69361

Tom Saxe
901 W. Washington
Benton, IL 62812

Bob Scarth
4700 E. 63rd St.
Kansas City, MO 64130

Robert Schalles
Kansas State Univ.
Weber Hall
Manhattan, KS 66506

David Seibert
U of I Regional Office
ICC-Interim Campus
East Peoria, IL 61635

Danny D. Simms
170 W. 4th St.
Colby, KS 67710

Brad R. Skaar
Room 233, Kildee
Iowa State Univ.
Ames, IA 50010

Al Smith
Rt. 2, Box 213
Dublin, VA 24084

Richard L. Spader
3201 Frederick Blvd.
St. Joseph, MO 64501

Lyle V. Springer
P.O. Box 776
Denton, TX 76201

Warner Stevens
1660 W. Bell Rd.
Phoenix, AZ 85023

Daryl Strohbehn
109 Kildee Hall
Iowa State Univ.
Ames, IA 50011

Richard W. Tetherow
Valentine, NE 69201

Harold Thompson
Box 40
Connell, WA

Arthur H. Tooby
P.O. Box 5
Fairfield, CA 74533

Thomas B. Turner
Ohio State Univ.
2029 Fyffe Road
Columbus, OH

Keith Vander Velde
Westby, WI 54667

W. Norman Vincel
P.O. Box 370
Rocky Mtn., VA 24151

Wayne Wagner
1675 Observatory Dr.
Madison, WI 53706

Roy A. Wallace
11740 Rt. 42
Plain City, OH 43064

Dr. W. M. Warren
P.O. Box 1257
Kingsville, TX 78363

Harvey P. Wehri
RR 2, Box 62
Hebron, ND

Arelene Weepler
Rt. 1
Ryegate, MT 59074

Dan Weppler
Rt. 1
Ryegate, MT 59074

Bill Whittle
P.O. Box 369
Mt. Berry, GA 30149

Richard L. Willham
Animal Science Dept.
Iowa State Univ.
Ames, IA 50011

Doyle E. Wilson
600 Schilletter
Ames, IA 50010

Roger M. Winn
Rt. 1, Box 23
Axton, VA 24054

John Wolfe
Rt. 1, Box 395
Collinsville, OK 74021

Lu Anne Wright
P.O. Box 166
Clay Center, NE 68933

Leonard Wulf
RR 3
Morris,MN 56267

Mrs. Leonard Wulf
RR 3
Morris, MN 56267

Keith O. Zoellner
Kansas State Univ.
Weber Hall
Manhattan, KS 66506

NEWS MEDIA

Nita Effertz
Farm Journal

Mark Lee
Tulsa World

Henry Buchanan
Farmer-Stockman

Fred Causley

OKLAHOMA STATE UNIVERSITY
ANIMAL SCIENCE PERSONNEL

Robert Totusek
Charles McPeake
Richard Frahm
Joe Whiteman
Keith Lusby
Robert Kropp
Joe Hughes
Don Gill
Fred Ray
Carla Chenette