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PROCEEDINGS

BEEF IMPROVEMENT FEDERATION

RESEARCH SYMPOSIUM & ANNUAL MEETING

APRIL 29 - MAY 1, 1987

WICHITA AIRPORT HILTON

WICHITA, KANSAS

1987 CONVENTION PROGRAM

WEDNESDAY, APRIL 29

8:00 a.m.- 7:00 p.m. - **REGISTRATION** - Prefunction Area

8:30 - 10:30 a.m. - BIF Board of Directors Meeting - Consulate II

11:00 a.m. - Board buses at Airport Hilton
- **EARLY BIRD TOUR - SPRING IN THE FLINT HILLS** ($15/person- covers box lunch and transportation)
  - Maurice Erickson - Stocker operator specializing in forage management - Eureka, KS
  - Dalebanks Angus - Purebred Angus - Eureka, KS
  - Brinks Brangus - Kansas Division - Purebred Brangus - Eureka, KS (Dinner will be provided by Brinks Brangus)

6:30 p.m. - Buses arrive back at Airport Hilton

7:30 p.m. - Symposium - **USE OF CROSSBRED BULLS IN SPECIFICATION PROGRAMS**
Salon III & IV
Presiding - Roy A. Wallace, Select Sires, Inc.
- **"Genetic Principles of Using Crossbred Bulls"** - Dave Buchanan - Oklahoma State University
- **"Research Results on Use of Crossbred Bulls"** - J. W. Turner - Louisiana State University
- **"Using Crossbred Bulls in a Production System"** - Lamar Reynolds - Livestock and Range Research Center, Miles City, MT

THURSDAY, APRIL 30

Breakfast on your own - Airport Hilton Legends Rest. or Control Tower Club

7:00 - 9:00 a.m. - **REGISTRATION** - Prefunction Area

8:00 a.m. - Symposium - **TARGETING SPECIFICATION BEEF** - Salon III & IV
- Presiding - Harvey Lemmon, President

- **"The Packer Target"** - Del Allen, Kansas State University
- **"The Feedlot Target"** - Scott Laudert, Kansas State University
- **"The Commercial Producer's Target"** Sam Hands, BIF Commercial Producer of the Year, 1982, Garden City, KS

10:00 a.m. - **COFFEE BREAK** - Compliments of AI organizations

MODIFYING CARCASS TRAITS - Panel
Moderator - Larry Cundiff, US MARC
- **"Genetic Aspects"** - Larry Cundiff, US MARC
- **"Consumer Desires"** - Darrell Wilkes, National Cattlemen's Association
- **"Breed Association Responsibilities"**
  - Rich Whitman, Am. Simmental Assoc.
  - John Crouch, Am. Angus Assoc.
  - Craig Ludwig, Am. Hereford Assoc.

12:15 p.m. - **LUNCHEON** - Salon I & II
Branded beef provided by Excel
Presiding - Bruce Howard, Agriculture Canada
Welcome to Kansas - Don Good - Head, Animal Science Dept., Kansas State University
Seedstock & Commercial Nominee Introduction's - Charlie McPeake and Doug Hixon
Charge to Committees - Dixon Hubbard

2:00 - 5:00 p.m. - **BIF COMMITTEE MEETINGS** - Attend the meeting of your choice

SIRE EVALUATION - Salon III & IV
Larry Cundiff, Chairman

SYSTEMS - Consulate II
Jim Gibb, Chairman

CENTRAL TEST - Consulate III
Charlie McPeake, Chairman

3:30 p.m. - **COFFEE BREAK** - Compliments of AI organizations

5:00 p.m. - **CAUCASS FOR ELECTION OF DIRECTORS**
Salon III & IV - Harvey Lemmon in Charge

6:00 p.m. - **SOCIAL HOUR** - Prefunction Area

7:00 p.m. - **AWARDS BANQUET** - Salon I & II
Certified Angus Beef provided by Hitch Feeders, Garden City, KS and Guymore, OK.
Presiding - Jerry Peterson, Mgr., Circle E Feedlot
Awards - Roy Wallace, Chairman, Awards Committee

FRIDAY, MAY 1

6:00 a.m. - BIF Board of Directors Meeting - Consulate III

7:00 a.m. - **BREAKFAST** - Salon I & II
Sponsored by New Breeds Industry, Inc., and Kansas Artificial Breeding Association
Presiding - Bob Dickinson
"BIF - Your Organization" - R. L. McCraw, BIF Executive Director

8:30 a.m. - Board buses for Feedlot Tour

9:15 - 10:00 a.m. - Tour Confinement Feeding Facilities and Feedlot - Circle E Feedlot, Potwin, KS

10:30 a.m. - Arrive Flint Hills Beef Feeders, Inc., Potwin, KS

"Video-Tale of Four Bulls and Their Progeny" - Henry Gardiner, Angus Breeder, Ashland, KS
- Larry Corah, Kansas State University - Mary Ferguson, CAB Representative

"Cattle that Fit Specification Programs - Live Animal Demonstration" - Packer Perspective, Bob Brown, Excel
- **Research Perspective**, Del Allen, Kansas State University

12:30 p.m. - Flint Hills Fry (Lunch)
Sponsored by Flint Hills Feedyard

1:30 p.m. - Depart for Excel Boxed Beef Plant, Wichita, KS
Walking tour of Excel's Boxed Beef Plant followed by Carcass cut-out demonstration

3:30 - 4:30 p.m. - Buses will be departing (at 15 minute intervals) for Airport Hilton

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PROCEEDINGS OF BEEF IMPROVEMENT FEDERATION
1987 ANNUAL CONVENTION

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GENETIC PRINCIPLES OF USING CROSSBRED BULLS

David S. Buchanan

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Crossbreeding has long been a staple in the commercial beef cattle industry. Few other management techniques add as much to production efficiency. Good crossbreeding programs can be expected to increase pounds of calf per cow in the breeding herd as much as 20 to 25% (BIF, 1986). These values have been proposed for systems that take advantage of the crossbred calf and the crossbred cow. Large amounts of experimental resources have been devoted to studying the benefits from crossbreeding in beef cattle and in other species. Despite this large investment in research of crossbreeding , relatively little effort has been devoted to the study of crossbred bulls. The reasons for this smaller commitment are twofold. Most people recognize that the benefits of crossbred bulls are probably not as substantial as the use of the crossbred cow. Also, some segments of the beef cattle industry have been reluctant to embrace the use of crossbred bulls. The following discussion is intended as background material for the companion papers on experimental results and use of crossbred bulls in production systems. A more technical description of the theory of the crossbred male will soon be published in the Journal of Animal Science (Notter, 1987).

What is a crossbred bull? In the strictest sense, a crossbred bull is simply the result of a cross of two pure breeds. Confusion about the definition of a crossbred bull is not as severe as confusion over crossbred males in swine. Large breeding organizations that sell crossbred and/or hybrid males have had minimal impact on the beef industry compared to the swine industry. The use of bulls that are "percentage" bulls from new breeds could be included in a broad definition of crossbred bulls, but their use does not arise from a desire to garner all the potential benefits of crossbreeding. Rather, many "percentage" bulls are a product of a breeding up program where "purebred" or "full blood" individuals are not readily available. Similarly, bulls in recently developed breeds may display some of the advantages of being crossbred. However, if the breed is recognized as a purebreed and has progressed beyond the F_1 cross, such bulls should not be referred to as crossbred bulls.

Heterosis. Heterosis is one of the two primary benefits gained by proper use of crossbreeding. It is the advantage observed in the crossbred individual relative to the average of individuals in the parental breeds. This advantage may result in the crossbred being superior to purebreds of either breed or the crossbred may be superior to only one of the parents, but still superior to the average of the parental breeds. Heterosis has been demonstrated experimentally for numerous traits. Generally, traits associated with reproduction or livability show high levels of heterosis when breeds are crossed. There is a fairly consistent advantage for growth and feed efficiency in crossbred animals, but there has been little evidence of any heterotic advantage in carcass traits.

The basis for heterosis is probably a composite of several different theoretical models. Three models were put forward by Sheridan (1981). The dominance theory suggests that each breed or line is homozygous dominant for a different pair of genes. This can be illustrated qualitatively using traits that all beef cattle producers are familiar with (Example 1).

Example 1. Dominance model for heterosis using qualitative traits

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It is well recognized that Hereford cattle have the trademark white face and black Angus cattle are solid black. The white face results from a dominant gene at one locus (gene location) while the black color of the Angus results from a dominant gene at a different locus. The gene action for these two traits is illustrated here:

WW - white face	BB - black
Ww - white face	Bb - black
ww - solid color	bb - red

From this it can be seen that Herefords are WWbb and Angus are wwBB. When Herefords and Angus are crossed the result is a heterozygous individual:

Hereford	x	Angus	=	"Black-baldy"
WWbb	x	wwBB	=	WwBb

If it is decided that black color and a white face are both desirable, then heterosis is observed since the crossbred calf shows both of the desired traits while the purebreds each only exhibit one of the desired traits.

A similar example can be constructed for the dominance model of heterosis using quantitative traits (Example 2).

Example 2. Dominance model of heterosis using quantitative traits.

Suppose that two gene pairs are isolated that have an effect on weaning weight of calves. Dominance is observed with each gene pair so that heterozygous individuals are similar to one homozygous individual, for that gene pair:

AA - +10	BB - +10
Aa - +10	Bb - +10
aa - 0	bb - 0

In this example an individual carrying at least one of the dominant genes for either gene pair is expected to be 10 pounds heavier than a calf without the dominant gene. The two gene pairs are independent so that the expected superiority of a calf is the sum of the values derived from these two pairs. Obviously, additional gene pairs and environmental factors also contribute to the actual weaning weight of the calf.

The purebred individuals would be homozygous dominant for one pair of genes and homozygous recessive for the other.

AAbb	x	aaBB	=	AaBb
+10		+10		+20

The second proposed model is the overdominance theory, which says that the heterozygote is superior to either homozygote. Only a single gene pair is needed to illustrate this model: AA - +10 Aa - +20 aa - +10. In this case the purebreds would be AA and aa. When crossed they result in the heterozygote Aa which has a value which exceeds either purebred.

The third theory which has been proposed is the epistasis theory. This model requires action of multiple pairs of genes which are not independent. This actually encompasses several different sub-theories since epistatic effects can manifest themselves in numerous ways. Many times predictions about various crossbreeding systems are made with the assumption that heterosis results only from an increase in heterozygocity as described in the dominance or overdominance theories. However, there has been some support for heterosis from epistatic effects which suggests that all three models may contribute to observed heterosis (Koch et al., 1985).

Types of heterosis. Heterosis is generally classified in three basic categories: individual, maternal and paternal. Individual heterosis is the advantage observed in the crossbred calf in comparison with purebred contemporaries. It is a well documented phenomenon (Long, 1980). Maternal heterosis is the advantage of the crossbred dam compared to the average of purebred dams from the component breeds. Maternal heterosis has also been reviewed elsewhere (Long, 1980). The benefits of maternal heterosis result from improved fertility, calf survival and milk production.

Paternal heterosis, the advantage of the crossbred bull compared to the average of purebred bulls from the same breeds, is also possible for some traits. The mechanism by which paternal heterosis manifests itself is generally rather different from the mechanism for maternal heterosis. The crossbred cow is, on the average, a better mother than a purebred cow. She is more fertile and she is better at providing care for the calf. Therefore, the calf is more likely to survive and should grow faster. The advantages that the calf receives from its mother being crossbred result from her presence and involvement in its life until it is weaned. Since the bull is not present, and does not directly influence the calf, other than as a supplier of half its genes, it is difficult to visualize mechanisms for paternal heterosis for traits other than those associated with achieving pregnancy.

The evidence for paternal heterosis in cattle is the subject of the next paper in this series. An understanding of the general concept of heterosis in animals suggests that crossbred bulls would probably reach sexual maturity earlier. Earlier puberty, larger testis size, higher sperm concentration and a greater pregnancy rate among females mated to a crossbred bull would be expected. Most of these advantages have been observed for both swine (Buchanan, 1987) and sheep (Leymaster, 1987). There is little reason to suspect further advantages in survival rate, growth, efficiency or carcass merit.

Breed complementarity. Breed complementarity is the second primary advantage associated with the use of crossbreeding. It is simply the optimum use of available breed resources. Many breeds of beef cattle excel at either maternal characteristics, such as fertility and milk production, or terminal sire characteristics, such as growth rate, feed efficiency and carcass merit. Few breeds are superior for both maternal and terminal sire traits. A large portion of the advantage due to crossbreeding results from optimizing these breed resources.

Crossbred bulls can play a role in optimization of breed use. A producer may have a production system that would benefit from a small contribution from a particular terminal sire breed. However, that production system might be penalized by marketing of calves that have 50% of their genes from this breed. An example of such a situation might be a producer that wants some of the genes for rapid growth and efficiency from a very large framed, fast growth breed. However, this situation might provide a penalty if the calves show too much evidence of this breed because of fears that they will be too large before reaching acceptable grade. Bulls that result from a cross of the rapid growth breed and a smaller breed with superior carcass quality might be a logical compromise for this producer.

Recombination loss. If the epistatic theory of heterosis has a contribution to observed heterosis in beef cattle, recombination loss is possible when crossbred parents are used (Dickerson, 1973). Recombination loss may result from breaking up favorable combinations of genes at different loci (gene locations) that have occurred in purebreds. Selection in purebreds should accomplish two things: an increase in frequency of desirable genes and establishment of combinations of genes at different loci that lead to superior performance for the traits under selection. Since breeds have different bases and different selection histories, it is expected that these favorable combinations would be different for different breeds. When breeds are crossed these sets of genes are broken up and may lead to some loss in performance.

If recombination loss is an important phenomenon, it affects offspring of female crossbred parents as well as male crossbred parents. However, the advantages of the crossbred cow are so substantial and obvious that recombination effects can be ignored safely. In addition, most of the experiments that have evaluated crossbred cows have been designed in such a way that the estimate of maternal heterosis is actually a composite of "actual" maternal heterosis from the cow and any possible recombination loss in the calf. If the advantages of paternal heterosis are small and actual recombination losses are much larger than expected, the advantages of using a crossbred bull could be counterbalanced by the potential disadvantages from recombination effects.

The experimental evidence for recombination loss in beef cattle is scanty, but there has been more extensive research on the use of crossbred males in pigs. Not only has there been more research, but the experiments have generally involved larger numbers of animals. There is no evidence for recombination loss in swine for growth rate, feed efficiency or carcass merit and only very weak evidence for recombination loss in litter size (Buchanan, 1987). There is little reason to suspect that they would be substantially larger with cattle.

Interaction of bull genotype with cows in mating system. It needs to be recognized that the possible advantages in conception rate associated with use of a crossbred bull are dependent upon the genotype and physiological condition of the mates. Cows that are not prepared to conceive will not be helped by mating to a crossbred bull. On the other hand, a herd in stressful environmental conditions might be helped more by use of a crossbred bull since they may be more adaptable to stress. It has been suggested that such interactions between heterosis and environmental conditions are likely to exist (Barlow, 1981).

Variability of offspring performance. A frequent concern pertaining to the use of crossbred males has been that offspring will supposedly be more variable. Unfortunately, this concern has been fueled by some authors that have stated that offspring of crossbred males are expected to be more variable. However, it has been recently pointed out that performance traits are not expected to be more variable among offspring of crossbred males (Siler and Houska, 1986). Again, the evidence from pigs is much more extensive than from cattle (Buchanan, 1987). Several studies have shown no reason to suspect any change in the variability of offspring performance if crossbred males are used.

The concern about variability is more real if simply inherited traits, such as color, are considered. Clearly, if a crossbred bull resulting from different colored breeds is mated to females that will allow the range of possible color patterns to be expressed, color variation will exist in the offspring. This could lead to questions about breed background of the calves, and, therefore, could affect selling price. However, variation in color pattern due to use of a crossbred bull needs to be viewed in the light of all potential sources of variation in cattle going into a feedlot. Use of crossbred cows, also leads to variation in appearance of the offspring. Much more importantly, a set of calves being considered for purchase is rarely composed of calves of common genetic origin. In fact, in many cases, they are not from the same herd, and the total breed background may be highly variable. Possible variation due to some sires being crossbred, rather than purebred, is almost certainly quite small compared to the total range of possibilities when combining a set of cattle for a feedlot.

Genetic merit of crossbred bulls. The main function of the bull is to supply genes to the calf. A crossbred bull should supply genes that are similar in merit to the average of purebred bulls from the parental breeds. This is assuming that the parents of crossbred bulls were not selected differently than parents of purebred bulls. This may not be a valid assumption. Producers of crossbred bulls should maintain the same performance standards and should supply potential buyers with the same performance information as producers of purebred bulls. This performance information needs to be viewed with the understanding that crossbred bulls will, on the average, have better performance than purebred contemporaries. This is, of course, the result of individual heterosis in the bulls. This should not provide a substantial problem to potential customers, since the data can be adjusted accordingly, based on knowledge of heterosis for various traits in cattle.

Place of crossbred bulls in the industry structure. Widespread use of crossbred bulls would introduce an addition to the mating structure of the beef cattle industry. Many commercial cow-calf enterprises operate so that only bull replacements need to be purchased. Even those that depend upon purchase of crossbred heifers frequently use crossbred types in their cow herd that are readily available from other commercial producers. Extensive use of crossbred bulls would dictate a place in the industry structure for their production. Many breeds that are normally thought of as "terminal sire" breeds do not have outstanding reproductive characteristics. Producers willing to tailor their system toward the production of crossbred bulls may be difficult to find.

Conclusions. Genetic theory does not provide any compelling reason to favor or reject the use of crossbred bulls. If there is exploitable heterosis for traits associated with male reproduction, their use is probably indicated for some herds. The use of crossbred bulls might also provide the opportunity to include certain breeds at optimum levels where use of purebreds might lead to performance extremes. A commercial producer with easy access to crossbred bulls of high genetic merit should be encouraged to use them.

Use of crossbred bulls may lead to calves in which breed composition is difficult to determine by appearance. However, this source of difficulty is small relative to the other problems feedlot managers have determing breed composition of cattle. There is quite clear evidence that variation in performance characteristics is not enlarged by the use of crossbred males.

If there is enough heterosis in male reproductive traits to warrant use of crossbred bulls, there need to be producers willing to produce these bulls and provide accurate, useful performance data for them. The final answer on use of crossbred bulls rests mainly on the potential advantages from male heterosis and optimization of breed use vs the additional complexity in industry breeding structure.

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Koch, R.M., G.E. Dickerson, L.V. Cundiff and K.E. Gregory. 1985. Heterosis retained in advanced generations of crosses among Angus and Hereford cattle. J. Anim. Sci. 60: 1117.

Leymaster, K.L. 1987. The crossbred sire: experimental results for sheep. J. Anim. Sci. (in press).

Long, C.R. 1980. Crossbreeding for beef production: experimental results. J. Anim. Sci. 51:1197.

Notter, D.R. 1987. The crossbred sire: theory. J. Anim. Sci. (in press).

Sheridan, A.K. 1981. Crossbreeding and heterosis. Animal Breeding Abstracts 49:131.

Siler, R. and L. Houska. 1986. A comparison of variability in three- and four-way pig hybrids. Scientia Agriculturae Bohemoslovaca 18:27.

Research Results on Use of Crossbred Bulls

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Introduction

Beef cattle crossbreeding is widely accepted as a result of considerable research attention. The advantages of utilizing heterosis in reproductive, maternal and growth traits and the fact that crossbreds are genetic intermediates has established the merits of crossbred cows. However, very limited attention has been directed to using crossbred bulls. Many early producers and researchers observed calves from grade or mixed bulls and cows as more variable. Purebred sires were established as a must to control the creation of heterozygous gene pairings in crossbreeding and the use of crossbred bulls was avoided based upon obvious genetic recombination effects that resulted in more variable genotypes being produced by mating crossbred bulls to crossbred cows. However, there are production circumstances that warrant consideration of crossbred bulls. Certainly the creation of new gene pools and closed herd selection in creating synthetic and/or composite breeds requires the use of bulls of mixed inheritance. The intent of this review will be to evaluate what is known about the use of crossbred bulls as compared to purebreds and under what circumstances should crossbred bulls be considered or recommended.

Genetic Concepts

Dickerson (1969) presented the genetic concepts relative to utilizing breed resources with major attention to crossbreeding. He cited Bradford et al. (1963) in noting "Heterosis in male reproductive performance and negligible recombination effects could even indicate use of crossbred sires." It was noted that the three-breed cross progeny of a purebred sire selected for best individual performance and females of a breed cross (singlecross) that excel in maternal performance will approach maximum efficiency of production. These statements point to breed selection for both additive gene effects and the unique merits of heterozygous genotypes in the crossbred cow and three-breed cross progeny that are reflected in economically important performance traits (heterosis). The individuality or breeding value of individual parents is extremely important and reflects the need to stress selection in traits controlled mainly by additive gene action. To consider use of crossbred bulls adds an extra dimension to the theory. If like singlecross bulls and cows (heterozygous genotypes) are intermated, using a simple one gene pair (2 alleles) model, genetic recombination indicates three possible progeny genotypes and creation of recombination genotypes of homozygous gene pairs. This simple example of genetic recombination has resulted in the general recommendation that crossbred sires should not be used because more variable (number of genotypes) progeny will result. Also, if heterosis is important to performance, a loss of 50 percent of the heterozygous advantage is observed in the progeny generation as compared to the parental F-1 generation. Conversely, purebred sires, assumed homozygous for many gene pairs, transmit singular gametes (gene content) allowing for maximum creation of heterozygous genotypes when mated to non-related females (genetically). This simple fact surely lead many early cattle producers to favor use of purebred sires. The advantage of more accuracy in predicting breeding values in purebred males (additive gene effects) also surely added to the recommendation to use only purebred sires.

Research Results

Crossbreeding research has not been directed at specifically evaluating the use of crossbred sires. Most research has compared systems of mating and/or crossbreeding schemes aimed at utilizing and maintaining heterosis and documenting breed combinations (complementarity) for several performance traits when compared to straightbred or purebred performance under the same environmental conditions. Considerable crossbreeding research directly resulted in regions and climates that were notably restrictive to the majority of cattle breeds (<u>Bos taurus</u>) and required the use of <u>Bos indicus</u> cattle. Crossbreeding has now been widely accepted and the possible advantages of composite and/or synthetic breeds has resulted in the questioning of crossbred bulls and their utility.

Franke (1973) presented an early review of Florida, Louisiana and Texas research concerning the use of crossbred bulls. Rhoad and Black (1943) reported birth and weaning weights (6 months) on Angus (A) and Brahman (B) crossbreds used to generate Brangus (A^5B^3) cattle. Birth and weaning weights for BA, B^1A^3, B^3A^5 and $(A^5B^3)^2$ calves were 70, 62, 61 and 60 lbs. and 368, 441, 378 and 358 lbs., respectively. F-1, B^1A^1, cows were used to produce Angus backcross calves (B^1A^3) that were breeding types used to produce Brangus. Purebred Brahman bulls on Angus cows resulted in an average 368 lbs. weaning weight. Angus bulls on B^1A^1 cows produced 441 lbs. calves. Brangus calves, B^1A^1 x B^1A^3 and B^1A^3 x B^1A^1 matings, weighed 378 lbs. Clearly, crossbred bulls produced intermediate weights. These results do reflect confounding with maternal effects since only percentage of breeding was used in classification.

Baker and Black (1950) reported additional data, Table 1 (Franke, 1973), that shows several mating types. Most importantly, evaluation of weights to 6 years of age did reveal that progeny by mating group from crossbred bulls and cows tended to be more variable (size of standard deviation). The BA x BA mating tended to have the largest standard deviation for each weight. Progeny of crossbred bulls tended to be intermediate but the data can be evaluated to illustrate the advantage for the singlecross cow.

Kidder et al. (1964) was cited by Franke (1973) as reporting weaning weights of matings with F-1 Brahman x Devon bulls in producing D^3B^3 cattle. A regular crisscross scheme (using purebred Devon bulls on B^3D^1 cows) was also utilized. Weaning weights were similar for F-1, backcross and crisscross matings. The <u>inter se</u>, $(D^5B^3)^2$, mating was lower.

In Texas research (Cartwright et al. (1964)) Herefords and Brahmans were intermated with F-1 and backcross sires and dams used. Weaning weight was evaluated. The heaviest weaning weight favored progeny of F-1, B x H, cows. Progeny of crossbred bulls were slightly lower than backcross matings of both Brahman and Hereford sires. Calculated heterosis revealed F-1 bulls on F-1 cows created 17.6% heterosis while F-1 bulls on purebred cows (H and B) resulted in 9.3% observed heterosis. Clearly, the crossbred bull is less advantageous than use of F-1 cows. <u>Inter se</u> matings of F-1 bull x F-1 cow compared well with the average of the two backcrosses, B x BH and H x BH, 17.6% heterosis versus 18.8% heterosis.

Franke (1973) concluded that F-1 bulls mated to purebred cows showed a reduction in weaning weight performance due to less heterosis as compared to F-1 progeny by purebred bulls. Crossbred sires were collectively observed to be less productive in <u>inter se</u> matings and crossbreeding as compared to purebred sires mated to the same type of crossbred cow but were considered competitive. These conclusions were based on data of crossbred bulls mated to cows of similar breed inheritance and reflected expected changes in heterozygosity in progeny genotypes.

TABLE 1 AVERAGE WEIGHTS AND STANDARD DEVIATIONS OF CROSSBREDS BY GENERATIONS UTILIZED IN PRODUCING THE B_3A_5 CROSS AT THE USDA STATION, NEW IBERIA, LA.

Mating group	No.	Birth wt.	SD	Wt. (6 mo.)	SD	Wt. (12 mo.)	SD	Wt. (24 mo.)	SD	Wt. (6 yr.)	SD
A × A	27	55	6.8	292	36	435	62	689	90	910	104
B × A	56	66	8.8	349	43	560	80	766	94	1047	85
BA × BA	21	61	10.0	375	51	520	88	732	102	...	...
A × BA	54	62	8.0	392	35	603	63	766	84	982	145
BA × A	42	63	12.0	353	48	555	70	737	73	969	52
A_3B_1 × A_3B_1	50	60	11.0	356	43	503	80	672	82	...	...
A_3B_1 × BA	24	62	12.0	395	42	521	84	691	78	980	42
BA × A_3B_1	24	65	9.0	360	36	470	75	671	85	977	60
B_3A_5 × B_3A_5	15	63	13.0	374	44	478	73	686	74	...	...
A_t × A	31	64	12.0	350	53	527	75	725	83	1038	108
A_tA × A_tA	15	64	10.0	322	36	503	55	694	46	...	...

SOURCE: Baker and Black (1950). - Franke (1973)

More recently Roberson et al. (1986) published preweaning data comparisons of F-1 Hereford x Brahman-sired calves with Hereford and Brahman purebred sired-calves from Hereford, Brahman and Hereford x Brahman, F-1, crossbred cows. Figure 1 shows the average birth weight performance of calves by each breeding combination.

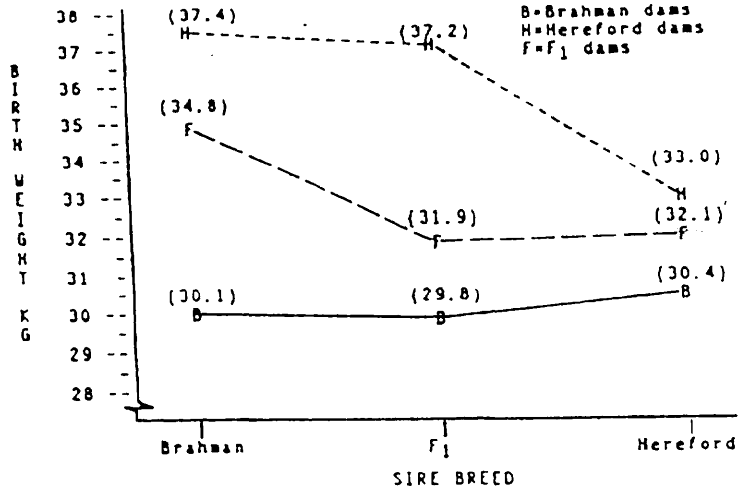

Figure 1 Model I birth weight least-squares means (standard errors ranged from .14 to .95) for each mating combination.

Figure 2 illustrates breeding effects for preweaning average daily gain. These figures clearly illustrate that F-1 sires are intermediate in sire-breed effects to the purebred Brahman and Hereford sires.

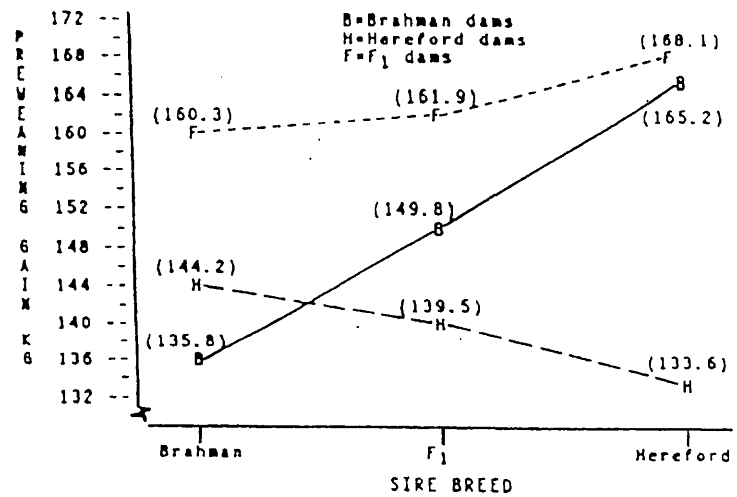

Figure 2. Model I preweaning gain least-squares means (standard errors ranged from .79 to 4.26) for each mating combination.

Peacock et al. (1986) reported comparisons of Angus (A), Charolais (C) and Brahman (B) cattle for preweaning traits that involved use of F-1 and F-2 crossbred bulls of each combination - AB, AC and BC on purebred - A, B and C - and crossbred cows - AB, AC and BC. This Florida experiment compared backcross and three-breed crossbred progeny by F-1 bulls to inter se crosses of F-1 x F-1 and F-2 x F-2 using the crossbred cow types. The percent advantage of crossbred performance was expressed as the performance over the weighted purebred breed average. For estimated 205-day weight backcross calves averaged 2.1% advantage, three-breed cross calves averaged 7.3% and inter se progeny of F-1 x F-1 and F-2 x F-2 breedings averaged 11.6%. Clearly, the results reflect what is expected in degree of heterozygosity in progeny and the combined maternal advantage of using crossbred cows. An interesting comparison possible from this experiment was that of comparing a three-breed cross calf with the inter se crossbred bull x crossbred cow calf where percentage of blood composition (additive effects) is identical. As an example, AC x B progeny equal the inheritance in the average AB and CB F-1 progeny or the reciprocal cross mating. The calves from the purebred dam parent, B, showed lower calculated levels of heterosis for the preweaning traits than did the average inter se crosses. The three-breed cross calves would get a heterozygous genotype while inter se progeny would have a combination of individual and maternal heterosis. These results would be expected based on possible heterozygosity. Peacock et al. (1986) concluded that use of crossbred bulls in designed crossbreeding systems to maintain a mildly fluctuating level of Zebu germ plasma in both steer and replacement heifers may be a viable system for southeastern cattlemen. Tables 2 and 3 are taken from this research and are used to document the performance and effects previously described.

Neville et al. (1985) published a recent experiment in Georgia comparing calves from F-1 sires, Angus x Santa Gertrudis (A x SG) and Santa Gertrudis x Angus (SG x A) with those of Purebred Angus and Santa Gertrudis bulls mated to Polled Hereford cows. The crossbred bulls were generated from an earlier phase in the study. Preweaning and postweaning growth traits were evaluated along with reproductive performance of cows bred to purebred and crossbred bulls. When comparing breeding performance of the bull types there was no difference in reproductive performance due to breeding of sire. Angus bulls were highest, Santa Gertrudis lowest and F-1 bulls intermediate. For birth weight and weaning weight comparisons of calves by breeding of sire, F-1-sired calves were intermediate. Noticeably, calves by A x SG bulls were better than those by SG x A bulls.

An important aspect of this study was comparison of variability among progeny of the crossbred and purebred sires.

Results did not indicate any significant difference in the variability of calves by either purebred or crossbred sires. Table 4 is presented to document these results.

Lastly, Neville et al. (1985) compiled a tabular summary (Table 5) of other research for comparison. In summary, the genetic effects in comparison of calf performance of F-1 versus purebred sires appears to be due to mean transmitted (additive) effects and mean heterotic (heterozygosity) effects.

Thrift and Aaron (1987) prepared an excellent review that summarized research results of using crossbred bulls. They chose to classify crossbred bulls into Bos taurus x Bos taurus and Bos indicus x Bos taurus groups for review. Also, attention was directed to reproductive traits and progeny growth traits. The review concluded that crossbreed bulls were younger at puberty (1.8% for Bos taurus x Bos taurus and 5.0% for Bos indicus x Bos taurus). Sperm concentration favored crossbred bulls over staightbred. Actual pregnancy and weaning rates of cow herds bred to straightbred and crossbred sires tended to favor crossbred bulls but the differences were small (.2% for pregnancy rate and 4.0% for weaning rate for Bos taurus x Bos taurus bulls and 1.4% and 3.7%, respectively, for Bos indicus x Bos taurus bulls). A collective summary of birth weight and weaning weight progeny data from published research revealed that both types of crossbred bulls produce comparable to straightbred sires when mated to comparable cows.

TABLE 2. LEAST-SQUARES BREED-GROUP MEANS ± SE FOR WEANING TRAITS[a]

Mating system	Calves weaned, no.	Age at weaning, d	Weaning wt, kg	205-d wt, kg	Condition score
Total	902	227 ± 1.1	205 ± 1.3	188 ± 1.1	9.7 ± .05
Purebreds					
Angus (A)	85	229 ± 2.3	176 ± 2.9	160 ± 2.4	9.3 ± .10
Brahman (B)	84	223 ± 2.4	186 ± 2.6	170 ± 2.4	9.2 ± .11
Charolais (C)	85	226 ± 2.3	226 ± 2.9	208 ± 2.3	9.5 ± .10
Backcrosses					
AB X A	28	233 ± 3.9	186 ± 5.0	168 ± 4.0	9.6 ± .18
AB X B	20	219 ± 3.7	185 ± 5.9	175 ± 4.8	9.5 ± .18
AC X A	29	232 ± 3.9	186 ± 4.4	168 ± 4.0	9.6 ± .17
AC X C	24	231 ± 4.2	221 ± 5.3	192 ± 4.3	9.7 ± .19
BC X B	24	225 ± 4.2	191 ± 5.3	177 ± 4.3	9.6 ± .19
BC X C	23	225 ± 4.4	220 ± 5.5	205 ± 4.5	9.6 ± .20
Three-breed crosses					
AB X C	18	225 ± 4.9	205 ± 6.1	190 ± 5.0	9.6 ± .22
AC X B	26	222 ± 4.1	217 ± 5.1	203 ± 4.2	10.9 ± .18
BC X A	25	223 ± 4.2	193 ± 5.3	181 ± 4.3	9.8 ± .19
Inter se crosses					
AB X AB	160	230 ± 1.9	220 ± 2.4	200 ± 1.9	10.5 ± .08
AC X AC	146	234 ± 1.9	210 ± 2.4	188 ± 2.0	10.0 ± .09
BC X BC	125	226 ± 2.0	232 ± 2.5	213 ± 2.0	10.1 ± .09
Mating system means					
Purebreds	254	226 ± 1.4	195 ± 1.8	179 ± 1.4	9.3 ± .06
Backcrosses	148	228 ± 1.8	198 ± 2.3	182 ± 1.8	9.6 ± .08
Three-breed crosses	69	223 ± 2.6	205 ± 3.3	191 ± 2.7	9.7 ± .10
Inter se crosses	431	230 ± 1.3	221 ± 1.6	200 ± 1.3	10.2 ± .06

[a]The progeny of F_1 and F_2 sires differed from straightbreds by similar amounts and were combined to simplify presentation.

Source: Peacock et al. (1986)

TABLE 3. HETEROSIS ESTIMATES ± SE BY MATING SYSTEM AND BREED-GROUP WITHIN SYSTEM

Mating system	Expectation[a]	Age at weaning, d	Condition score		Weaning wt		Estimated 205-d wt	
			Units	%[b]	Kg	%[b]	Kg	%[b]
Backcrosses[cd]								
AB X A, B	$.5h^D_{AB}$	.1 ± 3.4	.35 ± .15*	3.8	7.1 ± 4.3	4.0	7.6 ± 3.7*	4.6
AC X A, C	$.5h^D_{AC}$	3.7 ± 3.3	.21 ± .15	2.2	2.4 ± 4.1	1.2	1.1 ± 3.5	.6
BC X B, C	$.5h^D_{BC}$	.3 ± 3.4	.25 ± .15	2.7	1.7 ± 4.3	.8	2.5 ± 3.7	1.3
System mean	$.5h^D$	1.4 ± 2.2	.27 ± .10**	2.9	3.7 ± 2.7	1.9	3.8 ± 2.3	2.1
Three-breed crosses[c]								
AB X C	$.5h^D_{AC} + .5h^D_{BC}$	−1.2 ± 5.1	.20 ± .23	2.1	2.8 ± 6.4	1.4	4.9 ± 5.5	2.6
AC X B	$.5h^D_{AB} + .5h^D_{BC}$	−3.6 ± 4.3	.73 ± .19***	7.8	26.2 ± 5.4***	13.7	27.6 ± 4.6***	15.6
BC X A	$.5h^D_{AB} + .5h^D_{AC}$	−3.9 ± 4.4	.53 ± .20	5.7	3.3 ± 5.5	1.7	7.0 ± 4.7	4.0
System mean	h^D	−2.9 ± 2.8	.48 ± .13***	5.1	10.8 ± 3.6**	5.5	13.1 ± 3.1***	7.3
Inter se crosses[c]								
AB X AB	$.5h^D_{AB} + h^M_{AB}$	3.9 ± 2.3	1.29 ± .10***	13.9	41.9 ± 2.9***	23.4	37.4 ± 2.5***	22.7
AC X AC	$.5h^D_{AC} + h^M_{AC}$	7.1 ± 2.4**	.56 ± .11***	6.0	9.7 ± 3.0**	4.8	4.0 ± 2.6	2.2
BC X BC	$.5h^D_{BC} + h^M_{BC}$	1.6 ± 2.5	.72 ± .11***	7.7	28.1 ± 3.1***	13.8	24.7 ± 2.6***	13.1
System mean	$.5h^D + h^M$	4.2 ± 1.7*	.86 ± .08***	9.2	26.6 ± 2.1***	13.7	22.0 ± 1.8***	11.6

[a] h^D designates direct heterosis; h^M designates maternal heterosis.

[b] Percent advantage over weighted purebred average.

[c] Type of sire is indicated first.

[d] For backcross matings, breeds of dam were combined due to small number of observations.

*P<.05.

**P<.01.

***P<.001.

Source: Peacock et al. (1986)

TABLE 4. VARIANCES FOR FIVE TRAITS FROM CALVES OF STRAIGHTBRED AND CROSSBRED (F_1) SIRES[a]

Breeding of sire	Preweaning trait						Postweaning trait			
	Birth wt (kg)		ADG (kg)		205-d wt (kg)		ADG (kg)		W/DA (kg)	
	No.	s^2	No.	s^2	No.	s^2	No.	s^2	No.	s^2
Straightbred	627	61.4	576	.0162	576	806	254	.0127	254	.0061
Crossbred (F_1)	329	58.6	308	.0157	308	778	143	.0120	143	.0064

[a]Variances are in kg^2.

TABLE 5. COMPARISONS OF CROSSBRED (F_1) SIRES BY EVALUATION OF PROGENY PERFORMANCE FROM VARIOUS EXPERIMENTAL DATA

Source and type of data[a]	Preweaning					Postweaning		
	Birth wt, kg	ADG, kg	180-d wt, kg	205-d wt, kg	Weaning wt, kg	ADG (kg) Steers	ADG (kg) Heifers	W/DA, kg
Data in this report								
AXPH, SGXPH	35.3	.680		175.4		.843		.783
(AXSG) X PH, (SGXA) X PH	35.3	.679		173.9		.856		.782
Two-breed – three-breed cross[b]	.0	.001		1.5		−.013		.001
Gaines et al. (1966), Vogt et al. (1967)								
AXH, HXA, AXS, SXA, HXS, SXH	32.2	.777			192.0	.517	.795	
(AXH) X S, (AXS) X H, (HXS) X A	31.9	.767			190.8	.513	.803	
Two-breed – three-breed cross[b]	.4	.010			1.2	.004	−.008	
Cartwright et al. (1964)								
HXH, BXB	30.2		163.8					
BXH, HXB	33.4		189.9					
(BXH) X H, (BXH) X B	32.6		179.1					
Two-breed cross – purebred	3.2[c]		26.1[c]					
Crossbred sire – purebred	2.4[c]		15.3[c]					

[a]Breed of sire is designated by first symbol of cross except the F_1 sires represent reciprocals in the reports of Gaines et al. (1966) and Vogt et al. (1967). A=Angus, B=Brahman, H=Hereford, PH=Polled Hereford, S=Shorthorn and SG=Santa Gertrudis.

[b]All differences are P>.10.

[c]The two vertical values do not differ significantly from a 2:1 ratio according to X^2 test.

Source: Neville et al. (1985)

Summary

While crossbred bulls have an advantage in earlier age at puberty, larger scrotal circumference and in sperm concentration when compared to the average of the parental purebred bulls (Thrift and Aaron, 1987), this does not necessarily result in a greater pregnancy or weaning rate. It could be postulated that the crossbred bull might best be used under extensive and/or restrictive environmental conditions that detract from use of straightbred bulls. Also, the use of crossbred sires could be recommended when additive effects need to be averaged. For example, many producers use American breed bulls for a touch of "ear" inheritance yet do not want to use purebred Bos indicus bulls in order to minimize the additive inheritance that could detract in other aspects.

There appears to be no added incentive in using crossbred bulls on crossbred cows to make maximum use of heterotic effects. However, there is certainly no reason that crossbred bulls cannot be used. They will apparently be intermediate to average parental breed performance on preweaning traits of their progeny and some heterotic loss is expected with less heterozygosity due to genetic recombination. There appears to be no evidence that large, important epistatic effects are observed in preweaning and growth traits. It is noteworthy that crossbred bulls may excel in individual performance due to large, heterotic effects but they will possess breeding values relative to the additive gene effects inherited from their purebred parents. Some breeders using crossbred bulls may be somewhat surprised that progeny from crossbred bulls will not be more variable. This relates to quantitative traits and not qualitative traits, such as color. Crossbred bulls have probably been used on crossbred cows because if affords easier management than controlled crossbreeding and allows for replacement heifer selection with a consistent breed composition. The composite breed is easier to manage than systematic crossbreeding and yields a portion of the benefits realized from controlled crossbreeding. The crossbred bull cannot be independently separated and evaluated without reference to the breed type of cow. For the commercial cattleman, there are circumstances where crossbred bulls can be recommended but selected purebred bulls on crossbred cows will normally yield the superior result.

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USING CROSSBRED BULLS IN A PRODUCTION SYSTEM[1]

W. L. Reynolds

Crossbred sires have been used in beef production systems for many years so the concept of their use is not a recent development. In past years, however, scientists have favored the use of purebred sires to improve herds and little information has been developed on the use of crossbred sires.

The purpose of this paper is to describe some of the past uses and present ways that crossbred sires can be used by the industry.

Brinks (1986) listed the potential benefits of crossbred sires as: 1) heterosis; 2) breed complementarity; 3) biological type-resource complementarity; and 4) livestock-grass management complementarity.

Heterosis. The benefits from heterosis in females are well known and documented. Using crossbred bulls is one method to retain high levels of heterosis in breeding females and their offspring. Crossbred sires can be used as effectively as purebred sires in maintaining high levels of heterozygosity in progeny in crossing systems. Crossbred males have been shown to have earlier sexual maturity as shown by increased testicle size, sperm concentration, semen volume and general reproductive fitness (Bellows et al., 1964; Thrift and Aaron, 1986). Examination of 6 years' data at the Fort Keogh Livestock and Range Research Station indicated pregnancy rates of cows bred to crossbred bulls was 3 percentage points higher than pregnancy rates of cows bred to straightbred bulls. The advantage of the crossbred sire was consistent in 5 of 6 years studied.

Breed complementarity. Crossbred sires can be used to increase the number of alternatives for utilizing additive breed effects and have been used extensively in upgrading programs. Introduction of the continental breeds to Canada and the United States initiated programs to combine the growth rate and other characteristics with the British breeds. Bulls that were 50% continental and 50% British were used extensively in breeding programs and, when available, 75% continental-25% British bulls were used and the population gradually upgraded. Some breed associations recognized 7/8 continental or higher females as purebreds and 15/16 continental males as purebreds. Some associations also retain the Fullblood Classification to distinguish cattle obtained in the upgrading process from cattle whose entire ancestry can be traced to Europe.

In 1932, a systematic program was initiated at the Iberia Livestock Station, Jeanerette, LA to incorporate the desirable genes of two breeds, the Brahman and the Angus, to produce the Brahman-Angus. The Africander and the Angus were also mated together to produce the Africander-Angus. A simplified version of the breeding plan shown by Baker and Black (1950) to obtain the

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5/8 Angus-3/8 Brahman is shown in table 1. The breeding plan for the Africander-Angus was very similar and many of the same foundation cows were used in each composite.

TABLE 1. MATING PLANS USED TO PRODUCE BRAHMAN-ANGUS, Iberia Livestock Station

Sire:	Brahman (B)	Angus
Dam:	Angus (A)	1/2 B x 1/2 A
Progeny	1/2 B x 1/2 A	3/4 A x 1/4 B
Sire	3/4 A x 1/4 B	1/2 B x 1/2 A
Dam	1/2 B x 1/2 A	3/4 A x 1/4 B
Progeny	5/8 A x 3/8 B	5/8 A x 3/8 B

The number of sires used on each composite was small and, over the years, these populations became inbred. These two crosses developed into two different populations as shown in table 2. In the 1960's, the Brahman-Angus were higher in growth rate than the Africander-Angus while the Africander-Angus were higher than the Brahman-Angus in reproductive traits.

The results in table 2 illustrate that breeds and individual sires and dams used in specific breeding programs should be carefully selected.

TABLE 2. COMPARISON OF PERFORMANCE TRAITS OF BRAHMAN-ANGUS AND AFRICANDER-ANGUS, 1960-1963

Item	Brahman-Angus	Africander-Angus
Pregnancy rate, %	70.0	83.6
Calf survival rate, %	85.6	91.6
Calf birth weight, pounds	64	68
Calf, 205-day weight, pounds	415	380

Biological type-resource complementarity. Biological types of cattle in terms of mature size, level of milk production and some other traits need to be matched with feed resources. Crossbred sires can be useful in these breeding programs.

In beef cattle, a certain percentage of dairy blood may be desirable to promote milk production, growth rate and also marbling in the carcass. Two composites were developed and have been compared at the Fort Keogh Livestock and Range Research Station (Urick et al., 1986). A beef composite was composed of crosses of Angus, Charolais and Hereford and compared to a beef-dairy composite composed of these three breeds plus Brown Swiss. The average percentage of Angus, Charolais, Hereford and Brown Swiss was 23, 20, 24 and 34%, respectively, in the beef-dairy composite.

Results of 9-years' data showed the beef-dairy composite had slightly heavier birth weights, calf growth and slightly higher postweaning growth rate than the beef composite. The beef-dairy composite has had further development and are now recognized as the CASH composite.

TABLE 3. COMPARISON OF ECONOMIC TRAITS OF BEEF COMPOSITE AND BEEF-DAIRY COMPOSITE AT THE FORT KEOGH LIVESTOCK AND RANGE RESEARCH STATION

Item	Beef composite	Beef-dairy composite
Breeds involved	Angus, Hereford and Charolais	Angus, Hereford, Charolais, and Brown Swiss
Pregnancy rate		
Yearling heifers, %	86	88
Lactating cows, %	92	90
Birth weight, pounds	83	88
200-day weight, pounds	467	486
Feedlot gain, males, pounds (202 days)	2.83	2.90

Harsh environments. There are a number of areas where crossbred bulls might be used to a good advantage. For example: The southwest where bulls must travel long distances to obtain feed and water. The British-Zebu crossbred bulls would be expected to be of value. In the rough mountain ranges of the western United States, crossbred bulls should be more vigorous than straightbred bulls; the straightbred Brahman bulls are not well adapted to the Northern Great Plains because of cold weather. However at the Fort Keogh Livestock and Range Research Station, most of the heat check bulls are presently Brahman-European breed crosses because of personal preference of the herdsmen and handlers. Along the Gulf Coast area, Zebu-breed bulls are now widely used because they are more adaptable than the British-breed bulls to those environments. Cows bred to Zebu-breed bulls, however, usually have lower pregnancy rates than cows bred to British-breed bulls when the breeds are compared under less stressful conditions.

Livestock-Grass Management Complementarity. Proper forage management may require large groups of livestock be handled together. Crossbred or composite-breed sires allow the benefits of crossbreeding to be utilized while management costs are reduced.

Production of replacement heifers. A major disadvantage of systematic crossbreeding is the need to maintain different herds to obtain replacements. Options, of course, are to purchase replacement males and females. Straightbred males of known genetic background are generally in good supply but females, because of genetic-environmental interactions, are of most value if raised in the local environment.

Table 4 lists some genetic traits that are economically important in livestock production. It is doubtful some other producer will place the same emphasis or priority for selection on these traits.

TABLE 4. GENETIC TRAITS OF ECONOMIC IMPORTANCE IN BEEF CATTLE PRODUCTION

1. Growth rate and efficiency of gain
2. Birth weight
3. Calving difficulty and calf survival
4. Fertility, puberty, semen quality
5. Saleable product, carcass traits, live animals
6. Physical soundness and longevity
7. Vigor
8. Cow size, milk production and condition
9. Temperament
10. Preferences, color, horns, etc.

Three-Breed Beef Composite. The present three-breed beef composite being studied at the Fort Keogh Livestock and Range Research Station, Miles City, Montana, was derived from Charolais, Red Angus and Tarentaise.

Red Angus were chosen as the female component to provide highly fertile, medium-sized cows with a medium level of milk production and to produce calves that could be finished in the feedlot at a medium weight. Half of these cows were bred by artificial insemination (AI) to Charolais sires. Sire selection was determined from information published by artificial insemination companies or from breed associations. Statistics available and used were birth weight of calves, ease of calving scores, pre- and postweaning growth rate and mature size. Charolais bulls were polled and came from established American breeders. The other half of the cows were bred by AI to Tarentaise sires. The Tarentaise breed was chosen to contribute medium birth weight of calves, udder shape and teat placement, pre- and postweaning growth rate and medium size of mature cows. Most of the semen came from private individuals. Sires known to sire large birth weight calves were not used in the study. The mating plan is shown in table 5.

TABLE 5. MATING PLAN TO OBTAIN THREE-BREED CROSS OFFSPRING AT THE FORT KEOGH LIVESTOCK AND RANGE RESEARCH STATION, MILES CITY, MONTANA

	Breed of sire	Breed of dam
Formative stage	Tarentaise (T)	Red Angus (RA)
	Charolais	Red Angus (RA)
Intermediate stage	TRA	CRA
	CRA	TRA
Result	50% RA; 25% C; 25% T	

Preliminary results of reproductive traits are shown in table 6 and results of growth traits are shown in table 7. Cows were bred on a 45-day breeding season.

TABLE 6. REPRODUCTIVE PERFORMANCE OF CROSSBRED FEMALES MATED TO CROSSBRED BULLS (1981-1986)

Breed of sire Breed of dam	Tarentaise-Red Angus Charolais-Red Angus	Charolais-Red Angus Tarentaise-Red Angus	3-breed cross 3-breed cross
Yearling heifers			
Number	167	151	241
% pregnant	85	93	85
2-year-old			
Calving difficulty, %	29	36	23
Calf death loss, %	5.8	4.4	7.0
% pregnant	87	86	88
3-year-old or older			
Calving difficulty, %	1.5	1.4	--
Calf death loss, %	6.9	2.8	--
Pregnancy rate, %	92	95	94

TABLE 7. WEANING AND POSTWEANING PERFORMANCE OF CALVES FROM CROSSBRED SIRES AND CROSSBRED DAMS (1985 AND 1986; 2 YEARS)

Breed of sire Breed of dam	Tarentaise-Red Angus Charolais-Red Angus	Charolais-Red Angus Tarentaise-Red Angus	3-breed cross 3-breed cross
Birth wt., lb.	82	86	81
Actual ADG, lb.	1.98	2.04	1.86
200-d wt.[a], lb.	502	518	536
Postweaning growth rate (1 yr)			
Males			
ADG, 168 days, lbs.	3.19	3.29	3.24
Final wt., lbs.	1018	1036	1027
Females			
140-day test	---	---	1.59

[a] Adjusted by age of dam and sex to female base.

These data show the 3-breed crosses did not differ as dams from the first-cross dams in reproductive traits. There is also probably no difference in the growth rate of calves from first-cross and three-breed cross dams.

Problems encountered in using crossbred sires at the Fort Keogh Livestock and Range Research Station in specification programs were:

1. Availability of foundation bulls.
2. Abnormalities.
3. Temperament.
4. Color patterns.
5. Larger birth weights and more calving difficulty than anticipated.
6. Sale of bulls.
7. Number of years involved to obtain three-breed crosses.

Other Examples of Specification Programs. Some other examples of use of crossbred sires in research breeding programs that also have commercial value are at the U. S. Meat Animal Research Center (MARC) which has developed three composites to study heterosis retention in combinations of nine different breeds. These composites include:

MARC I	25% Charolais, 25% Brahman, 25% Limousin, 12.5% Hereford, 12.5% Angus
MARC II	25% Simmental, 25% Gelbvieh, 25% Hereford, 25% Angus
MARC III	25% Red Poll, 25% Hereford, 25% Pinzgauer, 25% Angus

These composites represent different biological types of cattle that could be utilized in different environments or to meet requirements of different production systems.

Composites are also being used in a unique breeding plan at the San Juan Research Center, Colorado State University, Hesperus, Colorado. The mating system is shown in table 8. This project involves crossing sires from three phenotypically similar but genetically diverse composites with Hereford cows. The sire breeds selected were MARC III (25% Angus, 25% Hereford, 25% Pinzgauer, 25% Red Poll), RX3 (25% Hereford, 25% Red Holstein, 50% Red Angus) and CASH (23% Angus, 23% Hereford, 20% Charolais, 34% Brown Swiss).

TABLE 8. MATING SYSTEM INVOLVING COMPOSITE SIRE BREEDS BY COLORADO STATE UNIVERSITY

Initial matings	Sire	CASH	RX3	
	Dam	Hereford (H)	Hereford (H)	
Intermediate stage		Yearling heifers	2+-year-old cows	
	Sire	MARC III	CASH	RX3
	Dam	CASH X H RX3 X H	RX3 X H	CASH X H
Resulting matings	Sire	MARC III	CASH	RX3
	Dam	All yearling offspring from all matings above.	All 2+-year-old cows to least-related composite from all matings above.	

Summary

Some of the following items should be considered before determining to use crossbred bulls and enter into a long-term developmental program.

1. Establish a systematic goal and determine the traits you wish to emphasize.

2. Make a detailed study of each breed that might be of interest and list economic characteristics.

3. Choose breeds that excel in traits to be emphasized.

4. Select breeds that are adaptable to the local environment.

5. Choose breeds that have shown a high degree of heterosis or do well in crossing systems.

6. Determine which breeds have been shown to complement or combine readily with each other.

7. Make a thorough search to establish if sufficient unrelated sires are available of each breed.

8. Esta'ılish a culling level and determine method of selection for traits.

9. Start with sufficient unrelated females.

10. Stabilize the nutrition supplied to the cow herd from year to year.

11. In small herds, choose same breeds as others in the area.

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The Packers Target

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Introduction

The fresh meat industry in the United States has historically been a commodity oriented industry. Fresh meat typically has been sold at retail as a commodity without any individual or company name identification. There have been short periods when name identification was tried but for a variety of reasons these programs did not survive and prosper. Currently, there is a resurgence of interest in the sales of fresh meat under brand-name labels. Establishing brand-names is an attempt to remove fresh meat from the commodity arena and to create consumer loyalty to a specific product name. If successful, this then enables the producer of that product to market it with a known profit margin. If brand-name production and marketing is successful, it will require product consistency and reliability. In order to ensure this, production methods and cattle types will become standardized to meet brand name product specifications. These production specifications, in all probability, will include breeding, feeding and management guidelines which, if used, will result in the production of a product which meets the required brand name carcass and meat specifications.

This shift to brand-name production is a result of the continuing pressure on the beef industry to produce a highly marketable product at a competitive price. Historically, beef has been produced and marketed based on an average value of the slaughter mix available in the market place. Prices of live cattle, and the product, are based on the average values, not on the value of each individual animal, carcass or cut. The cow-calf producer sells his calves on an average value of the entire crop, the feedlot on the average value of the pen of cattle, the packer on the average value of the carcasses or of his boxed product, and the retailer on the average retail yield of the product he purchases. Until now, the marketing system has allowed this merchandising on averages since typically what is available to a volume retailer is a boxed product that is made up of an average mix of all animals produced. Thus, the price incentive to produce genetically superior animals from the standpoint of carcass desirability has been limited to non-existent, since their identity is lost in this average product mix.

The shift to purchasing cattle to fit brand-name product specifications will result in higher prices being paid for superior animals and ultimately will result in greater and greater price discounts for inferior animals. These price signals will be transferred back through the beef production chain to the calf producer and will result in a significant shift in breeding and production practices. This shift will accelerate as more product is merchandised under brand labels.

Brand-Name Product Targets

Currently, there are several brand-name beef products being produced. From these, several types can be identified that a producer may want to choose from in order to target his production. A general classification of these brand-name products include the following:

1. High Quality Product - Product which attempts to assure maximum muscle palatability.
2. Retail Store Beef - Product with consistent palatability, little fat trim and minimal variance in cut size and weight.
3. Institutional Type Beef - Product with consistent palatability, minimal fat trim, greater tolerance in cut size and weight.
4. Lean (Lite) Beef - Product that emphasizes reduced fat levels.
5. Organic Beef - Product produced without the aid of growth stimulants and feed additives.

Producers should evaluate their cowherds and/or management systems and target the brand-name program which provides them with the greatest market potential. This will result in a shift in emphasis in the beef industry from simply producing a saleable product to one where it is determined what can be sold and then that product will be produced.

Major Brand-Name Markets

Some of the target markets mentioned above will make up relatively minor proportions of the total market, while others will command a major market share. Most producers by necessity will want to target their production towards those markets with the largest market shares. The markets most likely to command major shares of future sales will in all probability be: 1) Retail store beef, 2) High quality beef, and 3) Lean (Lite) beef. Of these, retail store beef will probably command the greatest market share.

A major shift in beef merchandising is currently in progress, in that a major packer is taking the next step beyond boxed beef, that being the cutting, packaging and selling of vacuum packaged retail cuts. Prior to this, packers have purchased cattle of USDA Choice, Yield Grade 3's or better and these were all fabricated and boxed in the same product line. It was at the retail level where this beef was then trimmed and sized for the retail package. This practice has created a very inefficient market since the value of trimmer cattle that yielded more retail product was not passed back to the producer. Instead, their identity was lost in the Yield Grade 3 or better box. In the developing system, the packer will be the individual who trims and sizes cuts for the retail package. Under this system, the identity of the carcasses providing maximum profitability will become evident and will quickly force the marketing system to identify true value. Thus, the producer/feeder of the most desirable cattle will be identified, and he will be financially rewarded either by receiving price premiums or by not receiving price discounts. Due financial pressure in the industry, this will result in a rapid shift in the type of cattle produced and the production systems under which they are produced.

Suggested carcass specifications for the targeted three major markets are shown in Tables 1, 2 and 3.

Table 1. Carcass specifications for retail store beef

Trait	Specifications
Carcass Weight	650-750 lb.
Fat Thickness	0.2" - 0.5"
Loin Eye Sizes	12.0 - 15.0 sq. in.
Maturity	Maximum of A plus
Quality	Choice minus (or days of feed)
Lean Color, Firmness, Texture	Normal for A maturity

Table 2. Carcass specifications for lean beef

Trait	Specifications
Carcass Weight	700-800 lb.
Fat Thickness	Maximum of 0.3"
Loin Eye Sizes	12.0 - 15.0 sq. in.
Maturity	Maximum of A plus
Quality	Minimum of Good minus
Lean Color, Firmness, Texture	Normal for A maturity

Table 3. Carcass specifications for quality beef

Trait	Specifications
Carcass Weight	650-850 lb.
Fat Thickness	Maximum of 0.8"
Loin Eye Sizes	12.0 - 15.0 sq. in.
Maturity	Maximum of B plus
Quality	Minimum Marbling - Modest
Lean Color, Firmness, Texture	Normal for A maturity

The specifications shown in Table 1 for retail store beef will result in the production of a product that optimizes palatability, retail product yield, and size of retail cuts. Table 2 identifies carcasses that will be promotable as a leaner product to meet the demands of that market segment. Table 3, on the other hand, shows a set of specifications that will allow full development of product palatability. The high priced cuts from these carcasses will primarily be utilized by the expensive restaurant trade. It should be noted that each set of carcass specifications specify a minimum as well as a maximum loin eye size. This reflects the need to standardize not only carcass weight but also carcass muscle sizes in order for the cuts produced to fit the size and weight requirements needed for modern packaging and portion control systems.

Cattle Types Available for Target Markets

The carcass retail store beef specifications shown in Table 1 can be translated into a set of live animal specifications. These must include those live animal characteristics relating to the carcass traits and includes live weight, animal age, frame and muscle scores (as identified in the USDA feeder grades), and animal ancestry as it relates to ability to marble during finishing. Live weights must be such that carcass weight specifications are met when dressing percentages are normal. Frame scores must be such that, at required live weights, animals have sufficient growth potential so as not to overfatten. However, they must also be small enough to allow adequate development of physiological maturity to facilitate fat and marbling development. Muscle scores must be used to insure sufficient carcass loin eye size and yet extreme muscle development should be avoided. Animal age at slaughter should be targeted at no more than 24 months. An example of a set of live animal specifications for retail store beef is shown in Table 4.

Table 4. Live animal specifications for retail store beef

Trait	Specifications
Live weight (assuming 60.5% minimum, 63.5% maximum dressing percentage)	1075-1175 lb.
Frame scores (USDA feeder grades)	Medium-typical, Medium-plus, Large-minus
Muscle scores (USDA feeder grades)	One-typical, minimum score; One-plus, preferred
Animal Age	Maximum at slaughter - 24 months
Quality	Ancestry such that marbling development is maximized.

It should be emphasized that these specifications must be met at slaughter end-point. This implies that feeder animal selection will dictate the length of feeding period necessary for a particular set of cattle to meet these specifications at slaughter. Suggested frame scores relate to those animals having the greatest potential of meeting the external fat and quality (marbling) specifications at the targeted weights. Animals in the upper one-half of USDA number 1 feeder muscling scores should meet minimum required loin eye sizes. If maximum age at slaughter is no more than 24 months, carcasses should easily qualify as A maturity under USDA meat grading standards. In order to maximize quality grade in selected cattle, it is suggeted that animals be selected from breeds, breed crosses and genetically known sire lines within breeds, that are known for their ability to develop marbling.

Producers who choose to use these guidelines in feeder calf production, selection and finishing should be able to produce slaughter cattle that will produce carcasses of which a high percentage will meet the retail store beef specifications.

Table 5 shows suggested live animal specifications for producers who choose to target the lean beef market. Feeder animals likely to meet these specifications can be of somewhat larger frame scores than those used for

Table 5. Live animal specifications for lean beef

Trait	Specifications
Live weight (assuming 61% minimum, 64% maximum dressing percentage)	1150-1250 lb.
Frame scores (USDA feeder grades)	Medium-plus, Large-minus Large-typical
Muscle scores (USDA feeder grades)	One-typical
Animal Age	Maximum at slaughter - 24 months
Quality	Ancestry such that development of higher degrees of marbling not probable (slight to small)

retail beef, thus minimizing fat development at heavier weights. Due the heavier weights and larger frame scores, muscle scores of one-typical will be preferred over one-plus to avoid producing loin eyes sizes which exceed the maximum allowed in the carcass specifications. Marbling development above low choice (small marbling) will not be desirable in this target market due the desire to market a certifiable lean product. Maximum suggested slaughter age remains at 24 months.

Table 6 lists the live animal specifications for a high quality beef. The emphasis here shifts to the production of a highly palatable product. Due this, these specifications allow for greater variation in animal types, weights and ages, than do those for retail or lean beef. It should be emphasized, that even though greater tolerance for fat is allowed in these specifications, producers should still attempt to identify animals that will meet the quality levels necessary while still minimizing waste fat. The primary differences in the specifications for quality versus retail or lean beef, other than allowed fatness, are greater tolerances for weight and age. Marbling tends not to fully develop in many cattle until they are older and they reach heavier weights. Due the greater allowable fat, production costs for these cattle will be greater than those for the other two target markets discussed.

Table 6. Live animal specifications for quality beef

Trait	Specifications
Live weight (assuming 61% minimum, 64% maximum dressing percentage)	1065-1325 lb.
Frame scores (USDA feeder grades)	Medium-typical, Medium-plus, Large-minus
Muscle scores (USDA feeder grades)	One-typical, preferred
Animal Age	Maximum at slaughter - 36 months
Quality	Ancestry of breeds (sire lines within breeds) superior for marbling development.

As the change occurs from packers selling boxed beef to that of selling branded beef, there will be an ever greater demand for cattle that meet these specifications. As these become a larger share of the market, cattle that will not meet these specifications will become more difficult to market and will thus be subject to increasingly larger discounts in price.

Changes in Grading

As packers become retailers, there will be less need for government grading. The primary purpose of grading is to identify the values of carcasses and their resulting cuts for purposes of merchandising. If the packer becomes the entity who fabricates these into retail cuts, his need for carcass and cut value identity is greatly reduced. The packer who sells a branded retail product, by necessity, will have his own quality assurance program to ensure product integrity. Individual packer specifications will, in most cases, be more specific than the broad government grades. This will eliminate the need for, and use of, government applied standards. Why should a packer pay to have a carcass yield graded, if in fact, he is his own customer and is the one who trims the excess fat prior to retailing the product? When packers become confident that product palatability can be assured by specifying animal age, rations fed, length of feeding and genetically assured tenderness the need for quality grading is also eliminated.

Expected Trends

Due the rapidly changing nature of fresh beef merchandising, several trends can be anticipated. Some, but not necessarily all include:

1) Fewer breeds of beef cattle being used.
2) Increased emphasis on use of carcass traits in breeding animal selection.

3) Reduced market outlets for non-specification animals at increasing price discounts.
4) Increasing levels of marketing by contractual integration.
5) Reduced use of and reliance on USDA grading for merchandising purposes.

These trends create considerable opportunity and danger to producers. Those that will be successful in the future will be those that correctly target these future trends and adapt their production systems to meet tomorrows anticipated targets today.

THE COMMERCIAL PRODUCER'S TARGET

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The biggest handicap we have in the beef industry is - tradition. This is especially true for those of us in the cow/calf sector who habitually think in terms of the past as we ride across our "Marlboro" mountain. With this kind of resistance to change it is easy to understand why the beef industry has been labeled as being in a mature state. I believe the beef industry as we know it today may only be in its infancy for those who are willing to accept change and look into the future. Utilizing the technology and means available today, we should be able to mate, produce, process, and serve the consumer the specified product desired.

To do all this, we at the grass roots level are going to have to broaden our horizons and view points. What is our objective, our product, and our market? First, let's remember that any beef animal has but one of two destinations - the dead pile or the consumers' dinner plate - and that includes cows, bulls, steers, and show stock as well. Secondly, as cow/calf producers we must accomplish our objective by means of utilizing low quality feed sources and converting them into an animal that can be finished and processed, as well as command top dollar from the consumer. All this must be accomplished efficiently in order to return an optimum net profit.

In our own operation, we like to keep the following formula in mind - pounds of beef/cow/acre divided by time and costs resulting in optimum net profit. The one thing that we must remember as cow/calf operators is that due to our high fixed costs and type of raw product produced, we are production oriented producers rather than margin oriented processors as are the feedlots, packers, etc. Consequently, it is imperative that we look at both resources utilized and products thereof and derive at a means to accomplish our objective.

As we work to equalize the balance beam between resources and end product, let's first review our proposed general specifications for a beef animal - high quality, youthful, 1050-1250 lb live weight, 650-800 lb carcass weight, .2-.5 inches of external fat and rib eye area of 12-15 sq in. The other side of the balance beam will be our environmental resources, including: weather, terrain, feedstuff, labor force, facilities, and management capabilities. If optimum profits are to be obtained, we must, through genetics and technology, produce beef animals from our resources in an orderly and timely fashion that will fit the specificiations of our consumers.

Maybe at this point we should also back up and individually determine how far we are willing to take these animals down the pipeline and start putting the puzzle together from the beginning.

First of all, the environmental resources will be our determining factor as to the type and size of cattle we should attempt to efficiently produce. Secondly, is the progeny of this breeding program terminally destined to the finished product under a retained ownership plan or are we limited to the weanling, feeder, or breeding stock (F1 heifers) markets? These questions will need to be answered in order to determine what balance should be utilized between performance and maternal traits in the breeding program. For those focusing on retained ownership through the finishing phase, carcass specifications will have a greater influence in our choice of a breeding program. Once again, however, we must remind ourselves to select a niche in this window of specifications that is cost effectively approachable within the means of our environmental resources.

There certainly appears to be more justification than ever before for producing a specified product in the beef industry even though the averages and number games have been played heavily in recent years. Granted there will continue to be those who profit at the expense of others through upgrading and value buying of mismanaged cattle due to a lack of vertical intergration in our industry; however, as full time cow/calf operators, producing misfits for such entrepreneurs is not a profitable means of fully capitalizing on investments and resources. Through retained ownership of specification type beef animals we should be able to realize the greatest net return possible.

Even though the odds in the market cycle favor retained ownership over cashing in at weaning time, there has still been that risk factor of the market price at the end of the line. With the evolvement of branded beef programs, we should see some additional opportunities for risk spreading by way of contract producing and forward pricing in addition to the futures board. This in turn should give the commercial producer a greater opportunity of being a price maker rather than just a price taker. In order to do this successfully one must know the cost of production to recognize his potential profit goal. We may also need to develop more than one plan, possibly partnership arrangements, in order to provide adequate cash flow, and level out income and manage additional risk. These kinds of changes in ones program will need to involve the cooperation and assistance of the banker and accountant as well.

As commercial operators we will need more projected performance information on the seedstock purchased. Maternal and terminal performance traits and carcass data will all be vitally important to complete a breeding program rather than just show ring standings. Standardization of this information across breeds would certainly be beneficial to those of us in a systematic crossbreeding program if we are to produce with consistancy and predictability. This type of information will not only help produce the specification product, but economically produce it from our resources.

Specification production will require more detailed management and a change in our everyday thinking and handling of cattle. Regardless, profit is the name of the game, whether it be by producing specification animals or managing misfits.

In summary, from a commercial cow/calf operator's point of view, timely production of beef animals to meet certain specifications within our environmental resources by means of adapting the appropriate genetics and technology will be our key to profitability in the new beef industry of tomorrow.

GENETIC MODIFICATION OF BEEF CARCASSES[1]

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Introduction

Historically, when steers were finished on pasture, propensity to finish at a young age was desirable, particularly when market requirements for fatness were great. However, propensity to fatten became a handicap as we shifted to increased use of concentrate feeds in diets of growing-finishing cattle. Consequently, yield grades were added to the USDA grading system to reflect variation in carcass value associated with differences in yield of retail product. Recently, consumer pressure to reduce caloric and fat content of beef and other red meats has intensified because coronary heart disease is believed to be associated with elevated blood-cholesterol levels (CAST, 1985; ASAS, 1986). Cholesterol levels are, in turn, associated with dietary-fat intake. Dietary control of the type and amount of fat consumed is strongly recommended by members of the medical profession in an attempt to regulate blood-cholesterol levels. The purpose of this paper will be to examine genetic variation among and within breeds in the amount and distribution of fat and lean in beef carcasses and to evaluate opportunities to genetically change fat and caloric content of retail product in cattle.

Germ Plasm Evaluation Program

Most of my comments will be based on results from the Germ Plasm Evaluation (GPE) Program at the Roman L. Hruska U.S. Meat Animal Research Center (MARC). The GPE program is presently in the fourth cycle (table 1). Topcross performance of 26 different sire breeds have been or are being evaluated in calves out of Hereford and Angus dams or calves out of F_1 cross dams. These F_1 cross dams were bred to Devon and Holstein sires in Cycle I and to Santa Gertrudis and Brangus sires in Cycle II. To date, complete data are available only from Cycles I, II and III. Thus, this review will include data from twenty sire breeds involved in the first three cycles of the program. In all three cycles, Hereford-Angus reciprocal crosses have been produced using semen from the same sires throughout. Data presented were pooled over Cycles I, II and III by adding the average differences between Hereford-Angus reciprocal crosses (HAx) and other breed groups (2-way and 3-way F_1 crosses) within each cycle to the average of Hereford-Angus reciprocal crosses (HAx) over the three cycles. Data will be presented for nineteen F_1 crosses (2-way and 3-way) grouped into seven biological types based on relative differences (X lowest, XXXXXX highest) in growth rate and mature size, lean to fat ratio, age at puberty and milk production (table 2). The carcass and meat data, obtained in cooperation with Kansas State University under the direction of Dr. Michael E. Dikeman, are presented for 15 F_1 crosses out of Hereford and Angus dams (Koch et al., 1976, 1979, 1982).[1]

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[1] Presented at 1987 Beef Improvement Federation Annual Convention, April 29 - May 1, 1987, Wichita, Kansas.

TABLE 1. SIRE BREEDS USED IN GERM PLASM EVALUATION PROGRAM

Cycle I (1970-72)	Cycle II (1973-74)	Cycle III (1975-76)	Cycle IV (1986-90)
F1 crosses from Hereford or Angus dams (Phase 2)			
Hereford	Hereford	Hereford	Hereford[a]
Angus	Angus	Angus	Angus[a]
Jersey	Red Poll	Brahman	Longhorn
S. Devon	Brown Swiss	Sahiwal	Salers
Limousin	Gelbvieh	Pinzgauer	Galloway
Simmental	Maine Anjou	Tarentaise	Nellore
Charolais	Chianina		Shorthorn
			Piemontese
			Charolais
			Gelbvieh
			Pinzgauer
3-way crosses out of F1 dams (Phase 3)			
Hereford	Hereford		
Angus	Angus		
Brahman	Brangus		
Devon	Santa Gertrudis		
Holstein			

[a] Hereford and Angus sires, originally sampled in 1969, 1970 and 1971, have been used throughout the program. In Cycle IV, a new sample of Hereford and Angus sires produced after 1982 are being used and compared to the original Hereford and Angus sires.

Genetic Variation Between and Within Breeds

Retail Product

The genetic variation that exists in proportions of muscle and fat of beef carcasses is vast and under a high degree of genetic control. Heritability estimates for weight of retail product (closely trimmed-boneless steaks, roasts and lean trim) and for percentage of retail product (percentage of carcass weight) in steers compared at the same age are presented in table 3. The variation observed among steers of the same breed which are fed and managed under uniform conditions and compared at the same slaughter age is highly heritable.

Significant genetic variation exists between and within breeds for retail product percentage when comparisons are made at the same age (figure 1) or weight. In figure 1, F_1 cross means for percentage of retail product at 458 days of age are shown on the lower horizontal axis. The spacing on the vertical axis is arbitrary but the ranking from the bottom to top reflects increasing increments of mature size. Steers sired by bulls of breeds with large mature size produced a significantly higher percentage of retail product than steers sired by breeds of small mature size. Differences have been doubled in the upper horizontal scale to reflect variation among pure breeds

TABLE 2. BREED CROSSES GROUPED INTO SIX BIOLOGICAL TYPES ON THE BASIS OF FOUR MAJOR CRITERIA[a]

Breed group	Growth Rate & Mature Size	Lean to Fat Ratio	Age at Puberty	Milk Production
Jersey	X	X	X	XXXXX
Hereford-Angus	XX	XX	XXX	XX
Red Poll	XX	XX	XX	XXX
Devon	XX	XX	XXX	XX
South Devon	XXX	XXX	XX	XXX
Tarentaise	XXX	XXX	XX	XXX
Pinzgauer	XXX	XXX	XX	XXX
Brangus	XXX	XX	XXXX	XX
Santa Gertrudis	XXX	XX	XXXX	XX
Sahiwal	XX	XXX	XXXXX	XXX
Brahman	XXXX	XXX	XXXXX	XXX
Brown Swiss	XXXX	XXXX	XX	XXXX
Gelbvieh	XXXX	XXXX	XX	XXXX
Holstein	XXXX	XXXX	XX	XXXXXX
Simmental	XXXXX	XXXX	XXX	XXXX
Maine Anjou	XXXXX	XXXX	XXX	XXX
Limousin	XXX	XXXXX	XXXX	X
Charolais	XXXXX	XXXXX	XXXX	X
Chianina	XXXXX	XXXXX	XXXX	X

[a] Increasing number of X's indicate relatively higher levels of performance and older age at puberty.

TABLE 3. HERITABILITY ESTIMATES FOR RETAIL PRODUCT YIELDS

Source	Retail product weight	Retail product percentage
Cundiff et al., (1964)		.40[a]
Swiger et al. (1965)	.65	.24
Cundiff et al., (1969,1971)	.64	.28
Dinkel and Busch (1973)	.38	.66[a]
Koch (1978)	.38	
Benyshek (1981)	.55	.49[a]
Koch et al. (1982)	.58	.63
Average	.53	.45

[a] Cutability: Estimated percentage of retail product from the round, loin, rib and chuck.

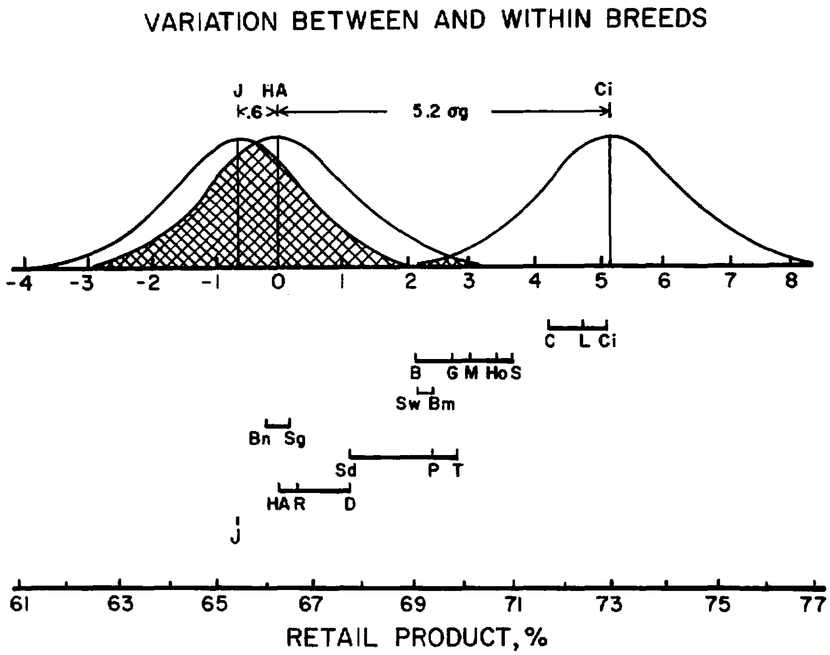

Figure 1. Breed group means (F_1 crosses, lower axis) and genetic variation between and within breeds (σ_g, standard deviation in breeding value, upper axis) for retail product percentage at 458 days.

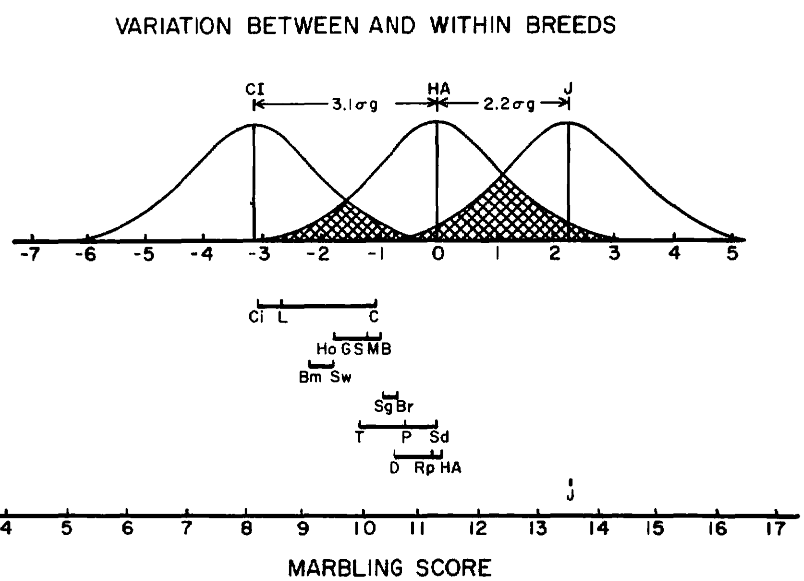

Figure 2. Breed group means (F_1 crosses, lower axis) and genetic variation between and within breeds (σ_g, standard deviation in breeding value, upper axis) for marbling score.

relative to a standard deviation change in breeding value $[\sigma g = \sqrt{(\sigma^2 p)(h^2)}]$ within pure breeds. Frequency curves, shown for Jerseys, the average of Herefords and Angus, and Chianinas, reflect the distribution expected for breeding values of individual animals within pure breeds. The breeding value of the leanest Jersey is not expected to equal that of the fattest Chianina and the leanest Hereford and Angus would only equal the fattest Chianina in genetic potential for percentage of retail product at 458 days. The range for mean differences between breeds is estimated to be about 5.2 σ_g (standard deviations in breeding value) between Chianina and Hereford or Angus steers and 5.8 σ_g between Chianina and Jersey steers. Genetic variation, both between and within breeds is important for percentage of retail product. When both between and within breed genetic variation are considered, the range in breeding value from the smallest Jersey steers to the heaviest Chianina steers is estimated to be about 30%.

Caloric Density of Retail Cuts

At the last Beef Improvement Federation Convention, data from the GPE program were used to estimate grams of protein and grams of fat in retail-trimmed and totally-trimmed retail product and to estimate caloric content of an average 100 gram (3.5 oz) uncooked portion of retail product (Cundiff, 1986). Breed group means for calories originating from the lean, intra-muscular fat, and inter-muscular fat components of 100 gram (3.5 oz) uncooked portions of retail product are presented in table 4. Inter-muscular fat (averaging 20.6% over all breeds) accounted for a much greater proportion of total fat in the retail product than intra-muscular fat (averaging 4.0%). Variation among breeds was important for both percentage of intra-muscular fat (range 2.6 percentage units) and for percentage of inter-muscular fat (range of 3.2%).

TABLE 4. BREED GROUP (F_1 CROSS) MEANS FOR CALORIC CONTENT OF RETAIL PRODUCT, 100 g (3.5 OZ) UNCOOKED PORTION (Cundiff,1986)

Breed group	Lean protein kcal	intra-musc. fat kcal	inter-musc. fat kcal	Total kcal	Lean & intra-musc. fat only kcal
Jersey-X	79	46	180	305	125
Hereford-Angus-X	81	42	172	294	123
Red Poll-X	80	40	177	297	120
South Devon-X	82	39	167	287	121
Tarentaise-X	84	33	159	276	117
Pinzgauer-X	83	39	160	281	122
Sahiwal-X	84	30	161	275	114
Brahman-X	84	30	164	276	113
Brown Swiss-X	83	32	164	280	116
Gelbvieh-X	84	33	160	277	117
Simmental-X	84	33	156	273	117
Maine Anjou-X	83	32	164	280	115
Limousin-X	86	26	154	266	111
Charolais-X	84	33	156	274	117
Chianina-X	86	25	155	265	111
Range (R)	7	21	26	40	14

On the average, a 100 gram portion of uncooked retail product containing a total of 280 kcal, would have 83 kcal originate from protein (29.7%), 34 kcal originate from intra-muscular fat (12.2%) and 163 kcal originate from inter-muscular fat (58.3%). As is often recommended (e.g., ASAS, 1986), fat content of retail product is markedly reduced by total trimming of visible fat. Caloric content of totally-trimmed portions (lean and intra-muscular fat only) contained an average of 117 kcal. For totally-trimmed retail product, the range among F_1 breed groups was 14 kcal (111 for Chianina crosses to 125 kcal for Jersey crosses). Since topcross comparisons estimate only half of the difference between breeds, estimates of the range between F_1 crosses can be doubled to estimate the range between pure breeds--28 kcal or from about 99 kcal for Chianina to 127 kcal for Jersey steers.

The dairy processing and brewery industries have developed and effectively marketed products with a similar range in caloric content to that found between Chianina and Jersey steers. The caloric content of one cup (8 fluid oz.) servings of milk range from 100 kcal for low fat milk (1.0% fat, or 120 kcal for 2.0% fat) to 150 kcal for regular milk (3.5% fat). Thus, milk with 2% fat content contains 20% fewer calories per one cup serving than milk with 3.5% fat. Similarly, caloric content of totally-trimmed retail product from purebred Chianina steers is about 22% lower than that from purebred Jersey steers. Caloric content of beer (12 fluid oz.) ranges from about 110 kcal for light beer to about 150 kcal for regular beer. Similar ranges can be achieved in beef products by fabrication and marketing of totally-trimmed retail cuts. Fat contains 225 kcal per oz, lean meat with a slight amount of marbling contains about 37 kcal per ounce, and totally-trimmed retail product containing a moderate level of marbling contains 44 kcal per ounce. Thus, the key to production of low calorie beef products is total trimming. Total trimming will favor production of carcasses with a higher percentage of retail product and less fat trim. Cattle with the greatest genetic potential for retail product growth and reduced fat trim levels also excel in feed efficiency from weaning to slaughter at age or weight end points.

Marbling (USDA Quality Grade)

In addition to cutability as reflected by USDA yield grades, USDA quality grade is also considered in the USDA dual grading system. Degree of marbling (numerous deposits of fat interspersed in muscle) in the twelfth rib cross-section of the rib eye muscle is currently the primary determinant of USDA quality grade. Traditionally, marbling has been emphasized because it was believed to be associated with palatability characteristics of meat. Some studies have shown a positive relationship between marbling and palatability characteristics, especially sensory panel ratings for tenderness or Warner-Bratzler shear force, while others have shown a very low or nonexistent relationship (Smith et al., 1984).

Campion et al. (1975) found that taste panel tenderness tended to improve about 1 tastepanel score as marbling increased the full range from practically devoid to slightly abundant (table 5). Marbling accounted for only 10% of the variation in tenderness. Thus, the standard deviation and range in tenderness among cattle with the same marbling score was still almost as large as that found among cattle not grouped by marbling level. The standard deviation in tenderness scores did tend to be smaller at high levels of marbling (moderate and slightly abundant) than at intermediate (small and modest) or low degrees of marbling (traces and slight).

TABLE 5. TASTE PANEL TENDERNESS (MEAN ± STAND. DEV.) WITHIN DIFFERENT DEGREES OF MARBLING (Campion, Crouse and Dikeman, 1975)

Marbling	Number	Mean	Standard deviation
Slightly Abundant	13	7.8	.56
Moderate	35	7.7	.60
Modest	95	7.3	.87
Small	180	7.3	.85
Slight	134	7.1	.78
Traces	27	7.0	.83

TABLE 6. HERITABILITY ESTIMATES FOR MARBLING

Source	Heritability
Shelby et al. (1963)	.17[a]
Cundiff et al., (1964)	.62[a]
Swiger et al. (1965)	.32[a]
Cundiff et al., (1971)	.31
Dinkel and Busch (1973)	.31
Koch (1978)	.34
Benyshek (1981)	.56
Koch et al. (1982)	.40
Average	.38

[a] USDA quality grade reported instead of marbling.

TABLE 6. GENETIC CORRELATION ESTIMATES BETWEEN RETAIL PRODUCT YIELD AND MARBLING

Source	Correlation
Cundiff et al., (1964)	-.80[a]
Swiger et al. (1965)	-.85[b]
Cundiff et al., (1971)	-.89[c]
Koch et al. (1982)	-.37[c]
Weighted average	-.53
Unweighted average	-.73

[a] Cutability and USDA quality grade.
[b] Retail product, % and USDA quality grade.
[c] Retail product, % and marbling.

Heritability estimates for marbling are summarized in table 6. Most estimates of heritability for marbling are moderate to high, like other carcass characteristics associated with proportion of lean and fat. The average estimate is .38.

Significant genetic variation exists between and within breeds for propensity to deposit marbling (figure 2). Again, the range for differences between breeds is about equal to the range for breeding value of individual animals within breeds for Marbling. It is much easier, of course, to use variation among breeds than within breeds for marbling because of the difficulty of measuring marbling levels in live bulls and heifers used for breeding and because breed differences are so highly heritable. Heritability of breed differences is very high, provided the breed means are estimated with an adequate sample to average out errors of sampling individual animals within breeds. The tendency for progeny from individual animals to regress to their own breed group mean is much greater than any tendency to regress to the mean of all cattle. Since both between and within breed genetic variance are important, both between and within breed selection should be utilized in breeding for improved carcass characteristics.

Genetic Antagonism (Retail product and Marbling)

Unfortunately, breeds that rank highest for retail product percentage rank lowest for marbling (figures 1, 2 and 3). Similarly, high negative genetic correlations have been found within breeds between marbling and retail product percentage (table 7). Thus, only limited opportunity exists from between breed selection or from within breed selection for genetically increasing marbling without increasing fat trim and reducing retail product percentage.

Table 8 shows expected change in marbling (M) and retail product percentage (R) per standard deviation of selection for three indexes: 1) marbling alone, 2) equal emphasis (in standard deviation units) on marbling and retail product percentage , and 3) retail product percentage alone. At the rates shown in table 8, it would take about 8 generations (40 years) to change marbling levels from the level observed in Chianina to that observed in Angus from selection for marbling alone. In the meantime, most of the advantage of Chianina over Angus in cutability would disappear. By the same token, it would take about 7 generations or 35 years of selection for retail product percentage to change retail product percentage of Angus to that of Chianina and most of the advantage of Angus in marbling would be lost.

If both marbling and retail product percentage are emphasized, some change can be expected in both traits, at least for a few generations; however, the rates of change will be very slow in each trait. Assuming a selection differential of one standard deviation, which compares closely to that imposed under experimental situations for growth traits, response to selection for marbling and retail product percentage would be expected to change marbling by 1 degree (e.g., small to modest) in 7.1 generations (about 35 years) while retail product percentage would change 5 percent in 7.1 generations.

Marbling and palatability

Concern with the antagonism between marbling and retail product percentage is justified to the extent that a certain amount of marbling is required to ensure

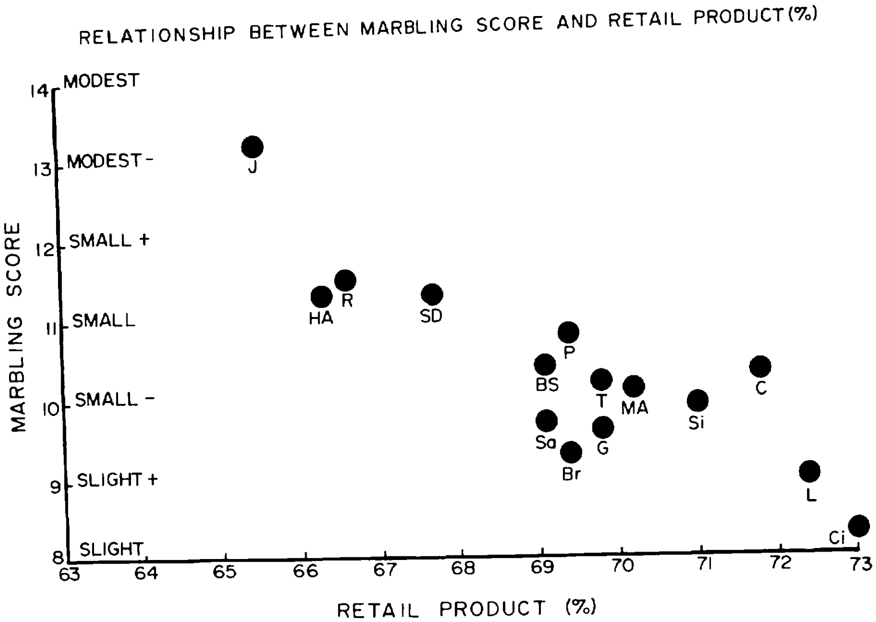

Figure 3. Breed group means for retail product percentage versus marbling score at 458 days of age.

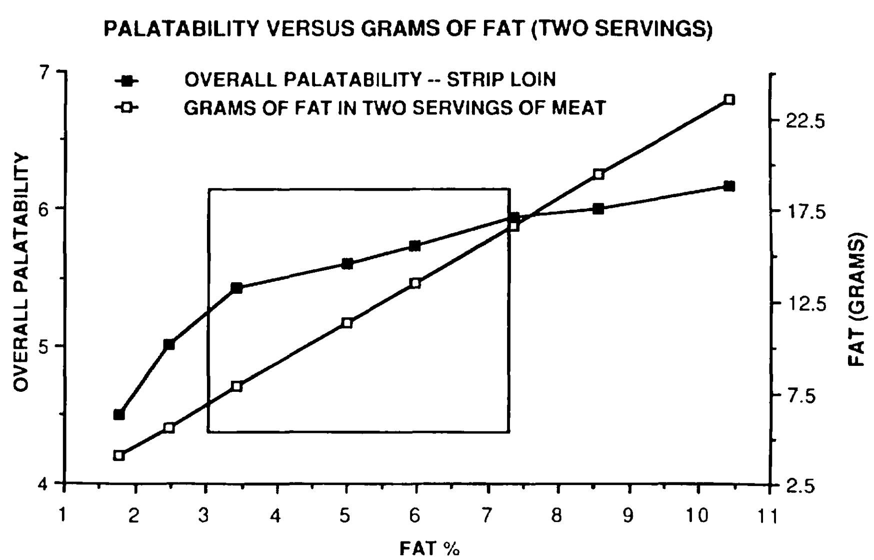

Figure 4. Relationship between palatability and fat content of beef (Savell and Cross, 1986).

TABLE 8. EXPECTED CHANGE IN MARBLING (M) AND RETAIL PRODUCT (R) PER STANDARD DEVIATION OF SELECTION FOR DIFFERENT INDEXES[a]

	Expected change (dG)			
	Marbling		Retail product	
Index	1/3 deg.	σg[b]	%	σg[b]
M alone	1.08	.50	-.78	-.48
M and R	.42	.26	.70	.32
R alone	-.61	-.37	1.57	.71

[a] Assuming weighted average parameter estimates (Cundiff et al., 1964; Swiger et al., 1965; Cundiff et al., 1971; Koch et al. 1982).
[b] σg = standard deviation in breeding value within a breed.

TABLE 9. BREED GROUP MEANS FOR FACTORS IDENTIFIED WITH MEAT QUALITY

Breed crosses	Marbling[a]	Percent USDA Choice	Warner-Bratzler shear[b] (lb)	Sensory panel scores[c] Flavor	Juiciness	Tenderness
Chianina-X	8.3	24	7.9	7.3	7.2	6.9
Limousin-X	9.0	37	7.7	7.4	7.3	6.9
Brahman-X	9.3	40	8.4	7.2	6.9	6.5
Gelbvieh-X	9.6	43	7.8	7.4	7.2	6.9
Sahiwal-X	9.7	44	9.1	7.1	7.0	5.8
Simmental-X	9.9	60	7.8	7.3	7.3	6.8
Maine-Anjou-X	10.1	54	7.5	7.3	7.2	7.1
Tarentaise-X	10.2	60	8.1	7.3	7.0	6.7
Charolais-X	10.3	63	7.2	7.4	7.3	7.3
Brown Swiss-X	10.4	61	7.7	7.4	7.2	7.2
Pinzgauer-X	10.8	60	7.4	7.4	7.2	7.1
South Devon-X	11.3	76	6.8	7.3	7.4	7.4
Hereford-Angus-X	11.3	76	7.3	7.3	7.3	7.3
Red Poll-X	11.5	68	7.4	7.4	7.1	7.3
Jersey-X	13.2	85	6.8	7.5	7.5	7.4

[a] Marbling: 8 = slight, 11 = small, 14 = modest, 17 = moderate.
[b] Shear force required for a 1 in core of cooked steak.
[c] Taste panel scores: 2 = undesirable, 5 = acceptable, 7 = moderately desirable, 9 = extremely desirable.

palatability of the retail product. Sensory panel evaluations of uniformly cooked 10th rib steaks from about 1,230 steers produced in the GPE program are summarized in table 9. High levels of acceptance were found for steaks from all Bos taurus breed groups when the steers were fed and managed alike and slaughtered at 14 to 16 months of age. Average taste panel scores and Warner-Bratzler shear determinations for tenderness did tend to improve as marbling increased when comparisons were at the same age, but the change was very small. In this experiment, the lowest mean level of marbling was slight (slight- = 3.2% intra-muscular fat). Although, breed groups differed significantly in average marbling scores and in percentage of carcasses that had adequate marbling to grade USDA Choice or better, average sensory panel evaluations of flavor and juiciness were acceptable for all Bos taurus breed groups.

Results from this study are supported by reports from Texas A&M indicating that the minimum fat level needed to assure acceptable palatability is 3% for cuts from the rib and loin (figure 4, Savell and Cross, 1986). They also recommend a maximum allowable fat level of 7.3% to provide for consumption of two 4 oz servings of beef daily without exceeding dietary guidelines of the American Heart Association for fat in the diet.

Caloric content of totally-trimmed beef varies depending on the level of intramuscular fat (marbling) in the lean. Composition and estimates of caloric content in one oz portions of uncooked l. dorsi muscle with different USDA quality grades/degrees of marbling are shown in table 10 (derived from Campion et al., 1975). Muscle with a slight degree of marbling (USDA good quality grade) is about 3.7% fat and contains about 41 kcal per ounce. Muscle with a small degree of marbling (USDA low Choice quality grade) is about 5.2% fat and contains about 43 kcal per oz. Muscle from carcasses grading USDA Choice range

TABLE 10. COMPOSITION AND CALORIC CONTENT OF L. DORSI (RIB EYE) MUSCLE WITH DIFFERENT DEGREES OF MARBLING (1 OZ UNCOOKED PORTION)

Quality grade	Marbling	Chem. Fat[a] %	Chem. Fat[a] kcal	Protein[b] %	Protein[b] kcal	Total kcal
	Fat free	0	0	27.0	31.5	31.5
Standard	Practically devoid	.7	1.9	26.8	31.3	33.1
Standard	Traces	2.2	5.8	26.4	30.7	40.0
Good	Slight	3.7	9.8	26.0	30.2	41.1
Choice	Small	5.2	13.7	25.6	29.6	43.4
Choice	Modest	6.7	17.8	25.2	29.1	46.8
Choice	Moderate	8.2	21.7	24.8	28.5	50.2
Prime	Slightly abundant	9.7	25.7	24.4	27.9	53.6
Prime	Moderately abundant	11.2	29.7	24.0	27.4	57.1
Prime	Abundant	12.7	33.7	23.6	26.8	60.5

[a]Chemical fat, % = -.3 + .5(M) where M = 5 for traces, 8 for slight, ..., and 17 for moderate degrees of marbling (Campion et al., 1975) and fat contains 9.3 kcal per gram (Ganong, 1977).

[b]Lean is 27% protein (NAS, 1967) and protein contains 4.1 kcal per gram (Ganong, 1977).

from about 4.7 to 9.3% fat and contain about 41 to 51 kcal per ounce. Muscle from carcasses in the USDA Prime grade range from about 9.2 to 12.7% fat and contain 52 to 60 kcal per oz. Similar relationships between marbling and chemical fat content of beef muscle have been found by Texas workers (Savell and Cross, 1986). Muscle containing from about 3% (slight-) to about 7.3% (modest+) marbling falls within the range considered acceptable by the American Heart Association, referred to as the "window of acceptability" (figure 4) by Texas A&M workers (Savell and Cross, 1986).

Trade-offs

Even though steers of some breeds exceed those of other breeds in carcass and muscle leanness (low intra-muscular fat), it does not necessarily follow that we should hastily replace those breeds with relatively high levels of fat trim and marbling with those that excel in carcass and muscle leanness. Breeds that excel in retail product growth from birth to market ages also 1) sire progeny with heavier birth weights, greater calving difficulty, reduced calf survival and reduced rebreeding in dams; 2) produce carcasses with lower marbling but very acceptable meat tenderness; 3) tend to be older at puberty; and 4) generally have heavier mature weight. Heavier mature weight increases output per cow, but also increases nutrient requirements for maintenance. Thus, differences in output tend to be offset by input differences for maintenance and lactation so that differences in life cycle efficiency are generally small. These trade-offs were discussed at the last Beef Improvement Federation Convention (Cundiff, 1986). It was concluded that use of crossbreeding systems that exploit complementarity by terminal crossing of sire breeds noted for lean tissue growth efficiency with crossbred cows of small to medium size, propensity to deposit optimal marbling (i.e., crosses with which exceed 3% fat in the muscle) and optimum milk production provide the most effective means of managing trade-offs that result from genetic antagonisms.

Conclusions

The variation that exists in biological traits of economic importance to beef production, including carcass and muscle leanness, is vast and under a high degree of genetic control. Genetic variation found between breeds is of comparable magnitude to that found within breeds for most growth and carcass traits. Thus, significant genetic change can result from selection between and within breeds.

Between breed differences are more easily exploited than genetic variation within breeds because they are more highly heritable. Also, use of genetic variation within breeds is complicated by difficulties of estimating carcass characteristics in live animals used for breeding or by the increased generation interval and other costs associated with progeny testing.

The genetic variation between and within breeds can be used to provide an array of beef products that differ widely in fat and caloric content. Cattle with the greatest retail product growth potential produce carcasses with lower levels of marbling and totally-trimmed retail cuts with lower fat and caloric content. These cattle are especially well suited for marketing opportunities for low fat or low-caloric beef. Other cattle with greater propensity to deposit inter- and intra-muscular fat are more well suited for market targets requiring high levels of marbling.

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The Role of Breed Associations in Modifying Carcass Traits

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Introduction

As the beef industry focuses attention on improving carcass traits, how can breed associations help to bring about change? Breed associations can increase awareness among breeders of the economic importance of carcass traits, the opportunity to make change through selection, as well as the expected response to selection in other important and related traits. A breed association can also help to bring about change by providing an effective data reporting and evaluation system which provides a basis for accurately comparing the genetic merit of sires within the breed.

This report will examine carcass programs offered by the American Simmental Association and the degree of breed participation in those programs.

Carcass Contests

Since 1971, ASA has sponsored Retail-Value-Per-Day-of-Age Contests which evaluate the feeding and carcass performance of Simmental and Simbrah sired calves. These contests include at least 30 progeny of an ASA registered sire entered by seedstock and commercial producers alike.

ASA's Retail-Value-Per-Day-of-Age Contests have provided an excellent opportunity to evaluate and promote economically important traits in an arena that has significance to the entire industry. Since the inception of the program, a total of 102 approved contests involving over 4,000 head of cattle have been conducted in 22 different states. Eight contests are planned for 1987.

USDA Carcass Tags

Since 1971, ASA has provided USDA carcass data tags to its member breeders at no cost to aid them in collecting carcass performance information. Each year approximately 1,000 data tags are distributed upon request to approximately 25 different breeders.

Unfortunately, the USDA carcass tag program has not proved to be a reliable means of collecting carcass data. Consequently, it has had limited use by breeders. Better cooperation among producers, feeders and packers could improve its overall effectiveness. However, it is more likely that future carcass data will be obtained through more direct reporting systems.

Carcass Records

Since 1971, carcass data reporting forms have been a part of ASA's herd performance record system, The Herd Handler.

Carcass traits have been included in national sire evaluation programs since 1974. To date, approximately 45 breeders have reported over 8,000 progeny records that have provided comparisons among 370 sires. Most of these progeny records were reported in the 1970's, when Simmental breeders were involved in upgrading programs and producing a by-product of half and three-quarter blood Simmental steers. Unfortunately, only about 200 records are now being reported each year and these are coming from fewer than five breeders. Obviously, this is an unacceptable level of participation for meaningful genetic evaluation to occur.

Summary

Breed associations can play a significant role in influencing genetic change in carcass traits. Thus far, such influence has been limited because of limited breeder interest in collecting carcass data. With appropriate market incentives and improved data reporting systems the opportunities for making real genetic change should improve.

CERTIFIED ANGUS BEEF

John Crouch
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Certified Angus Beef is a non-profit subsidiary of the American Angus Association with headquarters in West Salem, Ohio. I think it is safe to say that the Certified Angus Beef program is the forerunner of the many branded beef products we see on the market today. Just for a few minutes I thought it would be fun to review the history of Certified Angus Beef and relate to you some of the difficulties encountered along the way.

The idea of Certified Angus Beef was conceived in the early 1970's by three gentlemen in the state of Ohio with the original idea of promoting the consistency of carcass qualities of the Angus breed. The idea of such a program was presented to the board of directors of the American Angus Association and an Angus beef selection committee was appointed by president Gilman Stewart. After a year's study involving various personnel from the meat industry, the original guidelines were adopted by the American Angus Association board of directors in early 1978. At the same time, Mick Colvin was appointed Certified Angus Beef Director.

The first Certified Angus Beef plant, Val Decker Packing Company, was opened in mid-1978 in the state of Ohio. After operating for two weeks, a USDA Under Secretary had the packing plant closed down and confiscated the Certified Angus Beef logo, under the premise that the product was not Angus beef. Six months later, in April 1978, USDA overruled the decision of the Under Secretary, and the plant was reopened. Total sales of Certified Angus Beef in 1979 amounted to 7000 pounds; 450,000 in 1980 and 478,000 pounds in 1981. However, in 1982 Certified Angus Beef experienced a setback in that only 340,000 pounds were sold. It seemed as though a problem was breaking into the food service industry. A major step was taken in 1982 with the retention of a food service specialist from the University of Miami. Shortly thereafter National Packing Company in Liberal, Kansas, one of the largest independent packers in the United States, was brought into the program. With the assistance of the food service specialist, Certified Angus Beef was introduced into the white tablecloth restaurant trade in the eastern United States, and subsequently was featured in Marriott Hotels. Certified Angus Beef sales increased in 1983 to 2.4 million pounds; 1984 sales were 10.9 million pounds; and 1985 saw 16 million pounds sold. Certified Angus Beef sales in 1986 surpassed 29 million pounds, with a retail value of over $100 million. Projected sales for 1987 are 40 million pounds.

In order for an animal to qualify for the Certified Angus Beef program several specifications must be met. Visual specifications include the animal being predominantly black in color with beef characteristics, with no evidence of "hump". Prior to slaughter, animals are inspected by trained personnel and those meeting the visual specifications are marked. The animals are then slaughtered and the mark is transferred from the hide to the shank. After slaughter the animal is placed in the cooler for at least 24 hours, inspected by a USDA inspector, and graded by a USDA grader. The following carcass specifications must be met to qualify for Certified Angus Beef: (1) yield grade 3 or less; (2) upper 2/3 of choice grade or higher; (3) A maturity (30 months or less); (4) lean in "fine" texture range; (5) marbling in "fine to medium" texture range; (6) slightly dark red or lighter in color; and (7) lean must be firm with no softness. After those carcasses qualifying under these rigid guidelines are rolled Certified Angus Beef, they are broken, boxed, and shipped throughout the world.

Certified Angus Beef presently includes 19 packers, 11 retail distributors, 38 food service distributors, and is sold in over 900 restaurants in the United States and foreign countries. Without question, the success of the Certified Angus Beef program can be directly related to quality control and to the consistent high quality of the product.

Contrary to some lines of thought the American Angus Association feels there are tremendous genetic differences in carcass merit. Testing procedures for carcass traits began with designed Sire Evaluation in 1974 and involved the evaluation of at least 10 cattle from each test sire. Expected Progeny Differences (EPD) were calculated for percent cutability, USDA grade, and retail yield. A study of this procedure revealed that there was a better way to express carcass characteristics. With the help of Drs. Doyle Wilson and Gene Rouse of Iowa State University, Angus carcass data was reanalyzed, separated into two weight categories (heavy and light) and EPD were calculated for fat thickness, marbling and loin eye area. Suddenly these new EPD sparked new interest in carcass values and the newly organized Certified Angus Feeder program. Initially Certified Angus Feeders will employ the services of a full time manager who will implement testing procedures for carcass value.

Now, for a bit of philosophy. It seems as though the industry is on a binge to genetically design the ideal carcass... choice, yield grade one, weighing from 650 to 750 pounds. In our designing process we must always remember the beef cow that produces this carcass as she will ultimately govern these characteristics if she functions under normal conditions. Regardless of the end product the beef cow must first (1) conceive as a yearling; (2) give unassisted birth to a normal healthy calf as a two-year-old; (3) repeat the reproductive process each year; (4) wean a calf in the top 80% of the calf crop by weight; (5) leave a superior replacement female in the herd; and (6) return a profit to her owner.

INTRODUCTION - VIDEO TAPE ON EVALUATING GENETIC INFLUENCE ON CARCASS TRAITS

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This video tape looks at the variation in carcass traits between four sire groups. These four sire groups make up a pen of 107 steers that were handled as a contemporary group from their AI conception to carcass. Steers were calved in a 60 day period. The dams of all the steers were straight bred Angus so there was no crossbreeding in any of the steers. All steers were killed on the same day.

One of the older branded beef programs is Certified Angus Beef. On a national average only 22% to 25% of the Angus that visually qualify for this branded beef program meet the carcass specifications. These four sire groups had CAB acceptance percentages from 17 to 67%. This would seem to indicate that by progeny testing sires and then using those superior sires in a breeding program, carcass traits could be dramatically improved.

The four sires that produced these 107 steers were selected because they had high EPD's for growth. Since these sires were all Angus it might be assumed that all would sire steers that would marble quickly. This was not the case. There is a big difference in the way sire groups marbled.

I have heard the statement that carcass quality depends on when an animal is killed. Sire A with 47 steers proves this statement wrong. In this sire's progeny group he had 14 steers that were yield grade 4. That says that those steers were too fat. However 6 of those 14 yield grade 4 steers were still in a good grade which says those steers were killed too soon. There was not a "right" time to kill those steers. This paradox was not seen in any of the other sire groups.

There is some research that indicates that back fat is a trait that is not necessarily correlated to marbling. This carcass data substantiates this. Sire A's progeny have the most backfat but the least marbling of any of the sire groups.

This carcass test indicates that even in the same breed when just four sires were evaluated that were significant carcass trait differences were found. This seems to indicate that significant genetic change in carcass traits can be attained by progeny testing sires and then using that data to improve the carcasses produced by the beef industry.

EVALUATING GENETIC INFLUENCE ON CARCASS TRAITS

Larry Corah and Dell Allen
Kansas State University

Henry Gardiner
Gardiner Angus Ranch

The following is the text from a video tape entitled "Evaluating Genetic Influence on Carcass Traits" which was shown during the 1987 Beef Improvement Federation Meetings. Dr. Larry Corah of Kansas State University was the moderator and began the tape with this introduction:

The focus and philosophy of the beef cattle industry is changing from that of simply selling what we produce, to one of producing what we can sell. The demand in the marketplace for beef products is changing and has resulted in a consuming public that is represented by a number of consumer segments, each with its own needs and desires.

An on-going study sponsored by the National Livestock and Meat Board identified five primary consumer segments for beef and other red meats. These segments, which are based on consumer attitudes are:

1) Meat Lovers - consumers that feel a main meal must include meat primarily because it is better tasting.

2) Creative Cooks - consumers who exhibit a high level of commitment to red meat and enjoy taking time to prepare their meals.

3) Price Driven - consumers who consider cost first when purchasing food.

4) Active Lifestyle - consumers whose buying decisions are governed by convenience.

5) Health Oriented Consumers - consumers who express concern regarding health related issues such as fat, salt and cholesterol.

Because of these different consumer segments, this has given rise to the branded beef concept, such as Excel, Certified Angus Beef and various Lean Beef programs, whose aim is to target their products to one or more of these consumer groups. Branded beef programs require a consistent supply of raw products and consequently, typically have a rigid set of specifications dependent on the branded program's target. This demand for a consistent product will probably cause carcass specifications to narrow, making genetic predictability essential. Identification of sires, whose progeny excel in carcass traits will be essential to allow the production of cattle whose carcasses will meet the specifications demanded by the various brand name programs.

The following questions were asked by Dr. Corah to Mr. Henry Gardiner of Gardiner Angus Ranch, Ashland, KS. Henry, has been noted in the beef cattle industry as a purebred producer who has been extremely interested in collecting carcass data.

1) "Henry, as we look at the program that you have followed, why did you begin evaluating sires for carcass traits?"

In the 1960's and 1970's, I was desperate to find within our breed, cattle that were genetic changers or sires that were genetic changers. Our cattle at that time were so small that our sons get the giggles every time they look at a picture of cattle from that era. I spent a lot of very frustrating years trying to improve those cattle and didn't make a lot of genetic change. I remember during those 20 frustrating years, asking myself "Is it possible to use genetics to improve beef cattle?" and I always answered my own question by saying, "Well if dairy cattle producers did it, then certainly we should be able to do it in the beef cattle industry, if we use the right animals." We had to find out who those right animals were. As part of the search for those breed improvers we have evaluated about 60 sires since 1970.

2) "When did you begin to see the benefits of this sire evaluation program?"

It wasn't until about ten years ago that we came up with a program that seemed to work very successfully.

Table 1. Gardiner Angus Ranch Weaning Weights

Year	Avg. Weaning Weight (10 mo)
1970	508 lb.
1980	526 lb.

From 1970 to 1980 (table 1), we made almost no progress in our weaning weights as monitored by our commercial herd or our progeny test herds, and then in 1980 the American Angus Association came out with a complete list of widely used sires and their EPD's for birth, weaning and yearling weights, and milking ability. By utilizing this data, beginning in 1981, in the last five years the weaning weights of our calves have averaged 200 pounds heavier than weaning weights from the 1960's and 1970's (table 2).

Table 2. Gardiner Angus Ranch Weaning Weights

Year	Avg. Weaning Weight (10 Mo.)
1980	526 lb.
1981	661 lb.
1982	723 lb.
1983	706 lb.
1984	736 lb.
1985	705 lb.
1986	786 lb.

We think it is pretty obvious to us that we can add another 100 pounds to that weaning weight in the next five years.

3) "Has there been any benefits for you as a producer from selecting sires for carcass traits?"

No, there really has not been up to now that we can put into our pocket. I think there are several reasons for this. Obviously, the packers have not paid very much premium for superior carcasses and as a result we as breeders have not done a very good job of analyzing sires for their ability to sire superior carcasses. I think this is probably going to change and I think when it does change, we as breeders are going to have to have a better breeding program to consistently use superior sires for carcass traits.

4) "Why do you continue to collect carcass data?"

I thought it was important anyway to monitor the carcass end-product of our production. I really expected the carcass traits to deteriorate as we increased the carcass size (the carcass quality to deteriorate). It has not deteriorated as much as I had expected it to. But, now I think we have a challenge as breeders to improve our carcasses. We need more marbling, more muscling and less outside fat cover.

5) "To illustrate this point, at your operation you followed the progeny of four sires from conception through slaughter and carcass data collection. How was this whole evaluation conducted on these four sires at your operation?"

We have a progeny test herd of about 250 cows that we artificially inseminated to the four bulls we were evaluating during a 50 day AI breeding period. Three of these bulls (Sires A, B and C; table 3) were proven superior sires for growth and one of these sires (Sire D; table 3) was a young bull that we were evaluating.

Table 3. 1986 Angus Sire Evaluation Data

	EPD (lb)	
Sire	Weaning Weight	Yearling Weight
A	+35.8	+72.7
B	+32.7	+55.4
C	+36.6	+73.9
D	+16.9	+35.8

This evaluation was from conception through carcass. The steer calves which were evaluated were weaned off of the progeny test cows at 10 months of age. They came off the cows weighing 786 pounds, were in the feedlot here at our house for seven days where they were given their shots, and the bawl was taken out of them, and they learned how to eat out of a trough. They were then shipped 100 miles to the Brookover Feedlot in Garden City, Kansas, where they went on feed for 114 days. During that 114 day period, the pen of 107 steers gained an average of 3.59 lb/day for the total period and the cost of gain was $38.69 a hundred or 38.69¢ per pound.

I think it is interesting to look at the differences we saw in the sire groups that we had in those 107 steers. One of our better sires was Sire B who had the highest gaining group of steers in the feedlot (table 4). Sire B had 24 calves that gained an average of 3.70 lbs/day during 114 days on feed. They graded 91% Choice at kill time and 58% of those steer carcasses qualified for the Certified Angus Beef (CAB) program. Only 20 to 25% of the visually acceptable cattle that are killed on a national basis will have carcasses which qualify for CAB. So on this particular sire, compared to the national average, almost three times as many carcasses qualified for CAB.

Another sire we evaluated (Sire A; table 4) had 47 calves and they gained almost the same; 3.67 lbs/day in 114 days. Sixty-eight percent of those steers graded Choice, but only 17% qualified for CAB. Now this seems to me very low; but it is very close to the national average for carcasses qualifying for CAB on a national basis.

A third bull (Sire C; table 4) had 24 calves which gained 3.58 lbs/day with 79% grading Choice, but only 25% qualifying for CAB.

Our fourth bull (Sire D; table 4) had 12 calves in the test. They gained a little less at 3.41 lbs/day, but 100% of those steers graded Choice and 67% or 8 out of 12 of those calves qualified for CAB.

Table 4. Progeny Performance and Carcass Data by Sire Group

Sire Group	No. of Steers	ADG (lb/day)	% Choice	% Certified Angus Beef
A	47	3.67	68	17
B	24	3.70	91	58
C	24	3.58	79	25
D	12	3.41	100	67

6) "Henry, you have talked a lot about the Certified Angus Beef program. What is the Certified Angus Beef program?"

Certified Angus Beef is one of the larger and older branded beef programs in the United States. It is about eight or nine years old now and the specifications for Certified Angus Beef is that cattle must be predominantly black without any ear or hump, and their carcasses must grade Yield Grade 3 or leaner and have an Average Choice or higher Quality Grade and be A maturity.

7) "Henry, as you illustrated the differences that exist in carcass traits between sire groups, there certainly seems to be an obvious influence of sire on how the progeny's carcasses qualified for the Certified Angus Beef program."

I think this is the exciting and encouraging part about this test that we just completed, the fact that there are sire differences. From the inheritance traits and tables that I have seen, these carcass traits are probably about 25 to 40% heritable, therefore if we have these dramatic differences that we have had in these four sires, then we can utilize carcass information in breeding the cattle of the future that will fit into the various branded beef programs.

After the session with Henry Gardiner was over Dr. Corah continued by asking the following questions to Dr. Dell Allen who is a Meat Scientist at Kansas State University.

1) "Dell, let's discuss in more detail sire selection from the perspective of improving carcass desirability. What are the economically important carcass traits in the beef industry today?"

Historically the economic traits that have contributed to carcass desirability have been tied to USDA grading. For the past 50 years due the fact that it is an older grade, Quality Grade has tended to dictate price premiums or price advantages more so than the others. Here in the last few years, obviously, Yield Grade has come more into play. Thus, when carcasses are evaluated, basically the traits that have been concentrated on are those traits that contribute to or make up Quality Grade and Yield Grade. These traits are in the case of Quality Grade, marbling and age or physiological maturity of the carcass. In addition, the Yield Grade factors are carcass weight, carcass fat thickness, loin eye size, and percent kidney, heart and pelvic fat.

2) "How are the carcasses out of different sires evaluated or compared?"

Usually it entails the carcasses from the different progeny groups being evaluated either on an age constant basis or on a compositional endpoint basis or both.

3) "Earlier we compared four sires at the Henry Gardiner operation. Did those four sires meet that criteria?"

I think they very definitely met it as far as an age standpoint is concerned. All 107 steers came from the same ranch and the same commercial cowherd and were handled basically the same during their calf stage as well as their preconditioning stage. These steers were handled also in a similar manner as far as the feeding stage is concerned, as all steers were put in the feedlot and fed the same length of time. So from an age standpoint, definitely they were the same in terms of being able to compare one sire to another.

4) "Were there differences in the compositional endpoint of the progeny of those four sires?"

When we look at the compositional endpoint, I think we ought to take them one at a time and if we look at the averages from the standpoint of external fatness which many people use as a measure of compositional endpoint in carcasses, I think we do see some differences there between the sires (table 5).

Table 5. Carcass Fat Thickness by Sire Group

Sire Group	Fat Thickness
A	.63 in.
B	.57 in.
C	.48 in.
D	.58 in.

Progeny of Sire A had .63 inches of outside fat, Sire B had .57, Sire D had .58. I would say for all practical purposes that these three sires' progeny are the same compositionally from the standpoint of external fatness. If we look at progeny of Sire C, however, they only had .48 inches of outside fat cover. They are probably slightly different in that they are not as advanced compositionally in terms of external fatness.

5) "Dell, what about using Yield Grade as a compositional endpoint?"

Basically, again we see some differences (table 6) with Sire A steers being the farthest along compositionally with a Yield Grade of 3.70. Sire B and Sire D steers are alike from a Yield Grade standpoint. Again, Sire C steers seem to be the least far along compositionally from a Yield Grade standpoint, having an average Yield Grade of 2.96.

Table 6. Carcass Yield Grade by Sire Group

Sire Group	Yield Grade
A	3.70
B	3.27
C	2.96
D	3.31

6) "What were the differences in marbling scores by sire, if we use marbling as a compositional endpoint?"

If you look at the marbling scores across the sires (table 7), Sire A steers had the lowest marbling score with a 4.87 which is a slight plus as far as marbling score is concerned. Again if you look at the progeny group that has the highest degree of marbling, you have Sire D steers with a 5.83 which is in the high part of the small plus degree of marbling.

Table 7. Carcass Marbling Scores by Sire Group

Sire Group	Marbling
A	4.87 slight +
B	5.67 small +
C	5.04 small -
D	5.83 small +

I think the interesting thing here is that if we look at the compositional endpoints that many people will use, we tend to presume that the cattle that are the fattest will also have the highest marbling degrees. As we look at these particular sire groups (table 8) we can see that the sire group (Sire A steers had .63 inches of outside fat and a marbing score of 4.87) that is farthest along from an external fat thickness standpoint, also has the lowest marbling scores. So, I think that this just points out that these compositional endpoints are not necessarily measuring the same thing.

Table 8. Carcass Traits by Sire Group

Sire Group	Fat Thickness	Marbling
A	.63 in.	4.87
B	.57 in.	5.67
C	.48 in.	5.04
D	.58 in.	5.83

7) **"Is there potential for selecting carcass desirability among these four sires?"**

I think very definitely. If I were a breeder, for example, and were looking at this carcass data across these four sires (table 9), I think I would look at Sire A with a great deal of suspect from the standpoint of wanting him in my breeding program if I am selecting for carcass desirability. In this situation you have a sire that is siring progeny that have the greatest amount of outside fat cover of these four sires and yet has the lowest marbling scores. Again, relating that to the economics of the industry right now, you are getting paid for producing a Choice carcass with minimal Yield Grade and here is a sire that is not doing that for you. He is in fact going the other way. So, looking at him from a sire selection standpoint, I would probably be reluctant to use him a great deal.

If I wanted to select a sire that was going to produce say maximum amount of Choice cattle with very acceptable Yield Grades, I would look very seriously at Sire D. Here is a case where this sire has an average marbling score across his progeny of a modest plus and yet his Yield Grade is a very respectable 3.31.

Table 9. Carcass Traits by Sire Group

Sire Group	Fat Thickness	Yield Grade	Marbling
A	.63 in.	3.70	4.87
B	.57 in.	3.27	5.67
C	.48 in.	2.96	5.04
D	.58 in.	3.31	5.83

8) "Dell, we talked about how the carcasses of the progeny of these four sires would fit the Certified Angus Beef program. Would they fit other brand name beef programs?"

Looking at these sires from the standpoint of targeting a brand name beef program much like what Excel is currently doing, what I would want to find there is the sire whose progeny have a very minimal Yield Grade, in other words the lowest Yield Grades possible, but will still have a fairly high percentage of Choice cattle. I think that highlights Sire C as offering definite potential. His progeny have a Yield Grade just slightly under 3.0, which is very acceptable from a cutability standpoint, yet they are grading Choice at a fairly high percentage (79%) and I think that type of a bull or a bull from that type of a program would very definitely have the potential to fit in a crossbreeding program where you can mate him with some cows that might improve his cutability slightly more.

Dr. Corah — "It appears that the beef cattle industry can identify sires with the genetic capability of producing progeny whose carcasses will meet the various specifications required by brand name beef programs."

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This 19 minute VHS tape has excellent visuals to accompany the script and may be purchased for $25.00 which includes shipping (make checks payable to KSU Extension Animal Science). It can be ordered by writing to Dr. Larry Corah, Department of Animal Science and Industry, Weber Hall, Kansas State University, Manhattan, KS 66506 or by call (913) 532-6131.

SIMULATION OF BEEF PRODUCTION FOR DIFFERENT MARKETS

Gary L. Bennett and Ralph N. Arnold

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Agricultural Research Service
Roman L. Hruska U.S. Meat Animal Research Center
Clay Center, Nebraska 68933

Systems simulation is best used to find out what happens when several things can be changed at the same time. Beef production depends on management decisions such as the length of time that animals should be backgrounded before being put into the feedlot, the length of time in the feedlot and the type of feed, as well as on the type of animal. It may be unproductive to change only the animal or only time on feed. Simulation of beef production is particularly valuable when the "rules" have changed such as is happening now with the redefinition of beef carcass merit. In such a situation, traditional and recommended practices of the past can be misleading.

An important aspect of simulating slaughter beef production is the mathematical model (i.e., equations) used to predict intake and conversion of intake to growth of different tissues. Several models are now being evaluated at the U.S. Meat Animal Research Center for their ability to predict intake and growth. Results of using one of these models are shown in Table 1 for two mature sizes and two management schemes. One management scheme put nine-month-old steers directly into the feedlot on a high-energy grain diet for seven months. The other management scheme backgrounded steers on a high roughage diet for six months followed by seven months in the feedlot. The model predicts that large animals reach the same fatness at heavier weights than small animals, and that backgrounded animals reach the same fatness at heavier weights than animals put directly into the feedlot. Although not shown in Table 1, the model also predicts that high-energy grain diets in the feedlot produce slightly fatter carcasses than lower-energy silage diets.

Currently in the beef industry, factors determining carcass value are being reconsidered. It seems likely that past and future value of carcass weight can be related to one or more of the following carcass attributes: retail yield, quality, and size. Retail yield decreases as carcass fatness increases. Thus when value is associated with retail weight rather than carcass weight, leaner carcasses will be preferred. Quality has been associated with marbling which is directly related to fatness. In

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Presented to the Systems Committee at the BIF meeting in Wichita, Kansas on April 30, 1987.

the future, desired amounts of marbling (and carcass fat) may be set for different markets and carcasses discounted for having either less or greater fatness. Another alternative to determining quality suggested by research is to set a minimum time in the feedlot and a maximum age at slaughter. If a target weight is important to carcass value then carcasses of that weight will have greater value than either lighter or heavier carcasses.

TABLE 1. Simulated carcass weight, empty body fat % and feed:gain ratio for two mature weights (small = SM, large = LRG) and two management systems

	Backgrounding + Feedlot						Feedlot Only					
Age (mo)	Carc. Wt.		Fat %		Feed:Gain		Carc. Wt.		Fat %		Feed:Gain	
	SM	LRG	SM	LRG	SM	LRG	SM	LRG	SM	LRG	SM	LRG
9	225	395	9	9			225	395	9	9		
10	246	429	10	9	13	12	264	448	15	13	6.2	5.7
11	268	465	10	9	14	12	302	501	20	16	6.4	5.9
12	291	501	11	10	14	13	340	553	24	18	6.6	6.1
13	314	540	12	11	15	13	379	607	27	20	6.8	6.1
14	337	579	13	11	16	14	416	659	30	21	7.0	6.5
15	361	618	14	12	17	15	456	709	32	23	7.4	6.9
16	407	680	20	16	7.4	7.0	494	758	34	25	7.7	7.2
17	451	737	25	20	7.7	7.4						
18	493	792	28	22	8.0	7.7						
19	534	843	31	24	8.3	8.1						
20	574	893	34	26	8.6	8.4						
21	612	940	37	28	8.9	8.8						
22	650	985	39	29	9.2	9.2						

In order to compare how different methods of evaluating the carcass affect the production system for different sizes of cattle, costs of producing value-adjusted carcass weight from steers were compared. Costs included were purchase costs of 9-month-old steers, daily costs, feed costs and interest. Months in the background phase were allowed to range from 0 to 6. Months in the feedlot phase were allowed to range from 2 to 7 and energy density of the feed was allowed to range from the equivalent of primarily corn silage to primarily corn grain. Two possible production situations are assumed, (1) a flexible situation where steers are permitted to go into the background phase if that is optimal, or (2) a less flexible situation where 9-month-old steers go directly into the feedlot. Small differences in the cost of producing value-adjusted carcass weight may not be real because of the approximations used, however, trends in the results should be realistic.

Table 2 shows the results of valuing all carcass weight equally, regardless of its fat content or the size of carcass. It was optimal to feed grain diets for seven months and increase the time in the background phase as the size of animal increased. Cost of producing carcass weight was equal for the different sizes when each size was allowed an optimal period of backgrounding but increased with size when steers were required to go directly into the feedlot. Carcasses produced were heavy and tended to be relatively fat.

TABLE 2. Relative costs of producing carcass weight

Size	Length (months) Back-ground	Feedlot	Feed	Carcass weight	Fat %	Cost
Small	4	7	grain	650	35	100%
Medium	5	7	grain	785	32	100
Large	6	7	grain	930	30	100
Small	0	7	grain	540	32	101
Medium	0	7	grain	625	28	102
Large	0	7	grain	715	26	103

Table 3 shows the results of valuing carcasses for their retail weight. When backgrounding was allowed, costs were reduced by near maximum time in the backgrounding phase and minimum time in the feedlot. Silage minimized costs for all sizes of cattle. Large cattle were more efficient than were smaller cattle. When steers were put directly into the feedlot, larger cattle were fed longer than smaller cattle. Carcasses from different size cattle were similar in fat content and much leaner than those that were optimally produced for carcass weight.

Table 4 shows the results of valuing the carcass for its retail weight but also for specification of marbling equivalent to that produced by a carcass with 25% fat. Retail product value was adjusted for marbling by multiplying retail product by 1.0 if fat % = 25, .985 if fat % = 23 or 27, .94 if fat % = 21 or 29, etc. All sizes of animals produced carcasses near the preferred carcass fatness to reduce costs per value-adjusted product. Smaller animals tended to spend less time in the feedlot. When allowed to background, corn was the cost efficient feed, but when steers were put directly into the feedlot, silage was the more efficient feed. Larger animals tended to be more cost efficient than smaller animals.

TABLE 3. Relative costs of producing retail yield

Size	Length (months) Back-ground	Feedlot	Feed	Carcass weight	Fat %	Cost
Small	5	2	silage	460	20	105%
Medium	6	2	silage	580	19	102
Large	6	2	silage	675	18	100
Small	0	5	silage	435	24	110
Medium	0	6	silage	555	23	107
Large	0	7	silage	685	22	104

TABLE 4. Relative costs of producing retail yield preferring marbling equivalent to 25% fat

Size	Length (months) Back-ground	Feedlot	Feed	Carcass weight	Fat %	Cost
Small	6	2	grain	500	23	105%
Medium	6	3	grain	645	24	102
Large	5	4	grain	760	24	100
Small	0	5	silage	435	24	110
Medium	0	7	silage	595	24	107
Large	0	7	mixed	700	24	104

Table 5 shows the effect of increasing the preferred marbling to an equivalent of 32% fat. In this case, grain is the most cost-efficient feed. There is little difference in cost when backgrounding is allowed to increase with steer size. When steers go directly into the feedlot, small animals are preferred because the 7-month feedlot limitation does not allow the larger animals to become fat enough.

A preference for 600 lb carcass weights as well as marbling equivalent to 25% fat was added by valuing 500 and 700 lb carcasses at 98%, 400 and 800 lb carcasses at 92%, etc. This favored small and medium size animals (Table 6). Heavier preferred carcass weights would tend to favor larger animals. Assigning carcass value on both marbling and weight resulted in quite different feeds and feeding lengths for small and large size animals.

TABLE 5. Relative costs of producing retail yield preferring marbling equivalent to 32% fat

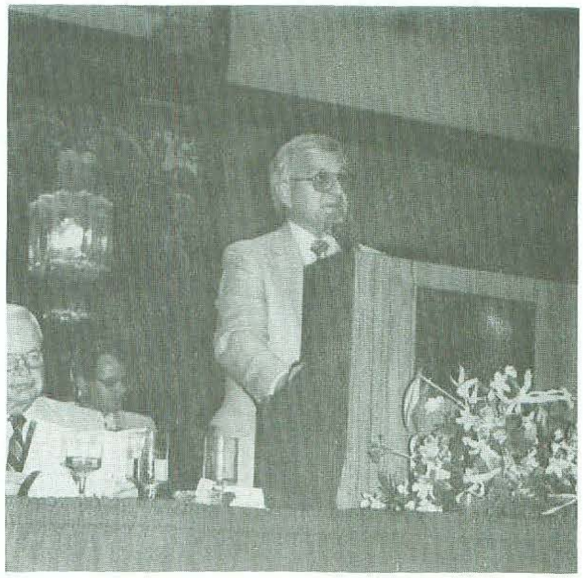
Size	Length (months) Back-ground	Feedlot	Feed	Carcass weight	Fat %	Cost
Small	0	7	grain	540	32	102%
Medium	3	7	grain	725	30	101
Large	6	7	grain	930	30	100
Small	0	7	grain	540	32	102
Medium	0	7	grain	625	28	104
Large	0	7	grain	715	26	112

TABLE 6. Relative costs of producing retail yield preferring 600 lb carcasses and marbling equivalent to 25% fat

Size	Length (months) Back-ground	Feedlot	Feed	Carcass weight	Fat %	Cost
Small	6	3	mixed	535	25	104%
Medium	6	3	grain	645	24	100
Large	2	5	grain	700	24	101
Small	0	6	silage	475	26	109
Medium	0	7	silage	595	24	102
Large	0	7	grain	670	24	101

Perhaps the most striking result of these predictions is the large effect that different methods of valuing the carcass have on optimal management and the carcasses produced from those management systems. For instance, when producers are paid only for carcass weight, they will produce much fatter carcasses than when they are paid for retail weight. Differences among steer size were generally less when a range of management options were allowed than when the management system was less flexible, as illustrated above by the feedlot only management system.

Work at MARC is continuing to try to improve predictions of these simulation models. The results presented here illustrate the power of simulation to address an important issue in beef production.



CHARGING THE BIF COMMITTEES - Dr. Dixon Hubbard

NATIONAL SIRE EVALUATION COMMITTEE MEETING

April 30, 1987
Wichita, Kansas

Chairman Larry Cundiff called the meeting to order at 2:25 p.m. Rich Benson demonstrated the use of the APHA sire finder that uses the sire evaluation results to list sires that meet defined criteria.

A motion was made by Richard Whitman to change the committee name and it was seconded. After discussion, the name selected was BIF Genetic Prediction Committee. Motion passed.

A short synopsis of the second genetic prediction was presented after the proceedings published by Winrock International and the U.S. Beef Performance Data Bank Report Update were handed out. Larry Cundiff gave an overview, Larry Benysheck reviewed the RAM prediction procedure, Dick Quaas discussed base, grouping, and accuracy, Doyle Wilson suggested how interum EPD's could be predicted between national evaluations, and Larry Cundiff talked about traits that might be included in genetic predictions.

Here Larry Cundiff opened the discussion of traits to be considered. There were few questions and little discussion.

A motion was made and seconded that the committee begin a revision of the guidelines, pages 9-1 to 9-19, circulate the revision, and present a final draft at the 1988 annual meeting for approval of the BIF board in the fall of 1988. Motion passed.

Larry Cundiff closed the meeting at 3:45 p.m. and all participants got coffee. There were some 57 participants.

Richard Willham
Secretary

SYSTEMS COMMITTEE REPORT

The Systems Committee meeting was called to order by Chairman Jim Gibb on Thursday, April 30, 1987. The first presentation titled "Simulation of Beef Production for Different Markets" was presented by Dr. Gary Bennett, U.S. Meat Animal Research Center, Clay Center, Neb. Gary's paper focused on the use of simulation to predict the optimum combination of breed types, management systems and resources to meet various market specifications. A complete summary of Gary's presentation is included on the pages that follow.

A second presentation was made by Dr. Danny Sims, Kansas State University Area Livestock Specialist, on the development and use of the BEEFpro Integrated Management program. Danny and Dr. Terry Goehring demonstrated the many features of the BEEFpro program, revealing how it can be used to assist producers in analyzing available information for more accurate decision making in various aspects of their operations. Included in the program is a means of preparing a cost return budget for the beef enterprise, evaluation of current management and recommendations for changes in management. One of the more valuable aspects of the program is the opportunity it provides for producers and extension specialists to discuss the program inputs and results one on one. The program "SHELL" will be shared with other universities via a "Sharing Agreement" developed at Kansas State University. Any questions about the BEEFpro program should be directed to Dr. Danny Sims, Northeast Area Livestock Office, 1515 College Ave., Manhattan, Kan. 66502, phone (913) 532-5833.

Dr. Rick Bourden, Colorado State University, presented a summary of on-going simulation research at CSU. The main thrust of the CSU research is evaluating how the range environment and beef production system interacts as a whole deterministic unit. Merging the animal and range models represents a major breakthrough in the use of simulation and systems analysis to address long term effects on the range. Future research will also evaluate the impact of different breeding value levels on the beef production/range environment system.

Respectfully submitted,

Jim Gibb, Chairman

CENTRAL TEST COMMITTEE MINUTES

April 30, 1987

The meeting was called to order by Charles McPeake at 2:17 p.m.

Garth Boyd, KSU, discussed bull serving capacity testing and showed a video produced by KSU.

Dr. Eldon Leighton presented research on feed conversion at Wye foundation.

Dr. Keith Zoellner reported on the use of EPD's in bull test reports and discussed a survey of formats used by different breeds. Dr. Larry Bennyshek explained procedures used in national animal evaluation. He reported the results of simulation studies. Exclusion of test station data does not appear to have a great effect on accuracy of yearling EPD's.

Several members of the committee wish to use EPD's in central test reports. The motion was made that EPD's be made available upon request by breed associations for test station use in reports and catalogs.

The motion carried.

Charles McPeake was elected as President and Ronnie Silcox was elected as Secretary.

It was announced that a microcomputer program for bull tests is available through the University of Georgia.

The meeting adjourned at 5:12 p.m.

Respectfully submitted,

Ronnie Silcox

MINUTES OF BEEF IMPROVEMENT FEDERATION
BOARD OF DIRECTORS MEETING
APRIL 29 & MAY 1, 1987
WICHITA AIRPORT HILTON
WICHITA, KANSAS

The BIF Board of Directors held two directors meetings in conjunction with the 1987 Annual Convention at the Wichita Airport Hilton in Wichita, Kansas. The first meeting was held on Wednesday, April 29 from 8:30 to 10:30 a.m. The second meeting was held on Friday, May 1 from 6:00 to 7:00 a.m.

Attending the board meeting were Harvey Lemmon, President; Bob Dickinson, Vice-President; Roger L. McCraw, Executive Director; Daryl Strohbehn, Ron Bolze and Doug Hixon, Regional Secretaries; Henry Gardiner, Craig Ludwig, Jack Chase, Bruce Howard, Glenn Butts, Darrell Wilkes, Keith Vandervelde, Roy Wallace, Wayne Vandervert, Jim Gibb, Rich Whitman, Bill Warren, John Crouch, Larry Cundiff, Dixon Hubbard, Frank Baker, and Marvin Nichols and Jim Leachman, new directors.

Also in attendance were A. L. Eller, Jr., Past-Executive Director; Ron Parker and Bobby Rankin, New Mexico State University; and Eldon Hans, USDA-FES.

Directors not in attendance were Al Smith, Steve Wolfe and Leonard Wulf.

The following items of business were transacted:

1. Call to order and clear the agenda. The meeting was called to order by President Harvey Lemmon at 8:40 a.m. The agenda was cleared.

2. Minutes of the mid-year board meeting held on October 30-31, 1986 in Kansas City were distributed to each director by Executive Director McCraw who suggested they be studied and voted on at the Friday morning meeting. Frank Baker moved they be accepted as circulated. Motion was seconded by John Crouch and passed.

3. Treasurer's Report - R. L. McCraw provided copies of the treasurer's report for the calendar year 1986 and for 1987 from January 1 to April 17. Copies of these reports are attached. Total cash in checking account, money market account and certificates of deposit on January 1, 1986 was $48,639.04.

   Total cash in these accounts on December 31, 1986 was $42,160.52. The report showed income for 1986 of $16,421.17 and disbursement of $22,899.69. As of April 17, 1987, the report showed total cash in checking accounts and money market account of $46,860.19. For the year 1987 to April 17, total income has been $7,047.83 and total expenses have been $2,348.16.

   Bob Dickinson moved acceptance of the treasurer's report which was seconded by Frank Baker and carried.

4. Membership Report - McCraw distributed copies of the membership report. As of April 27, 1987, the report showed that 25 state organizations, 17 national breed associations, and 9 other category members have paid dues. There is a total of 51 members.
   He stated that a second notice had recently been sent to those who had not yet paid dues for 1987.

5. Convention Site for 1988 - Drs. Ron Parker and Bobby Rankin of New Mexico State University were present and discussed plans for the 1988 Convention to be held in Albequerque, New Mexico. They indicated that they have not decided on the meeting facility they will use. They are not planning a tour in connection with the convention. New Mexico Cattle Growers' Association and Farm Bureau have been lined up as sponsors for the convention.
   Ron Parker stated that they would have to schedule the convention sometime after spring classes have ended. He suggested the dates of May 11-13, 1988. A motion accepting this suggestion was offered, seconded by John Crouch and carried.
   Parker indicated that they would need to set up a checking account to handle local finances in connection with the convention. Frank Baker moved that Parker be authorized to open a local checking account and that $2000 of BIF funds be forwarded to the account. Bob Dickinson seconded and the motion was approved.

6. Workshop for Extension Specialists - Dr. Baker reported that the idea of having a training workshop for beef extension specialists (on use of genetic evaluation data) originated at the Genetic Prediction Conference held in March. There was a consensus that such a workshop would be beneficial. Holding the workshop on May 11 preceding the convention was discussed. Following discussion, President Lemmon recommended that details be worked out at mid-year board meeting.

7. Recognition of 20th Anniversary. Dr. Baker noted that the next convention would mark the 20th Anniversary of BIF. He suggested that special recognition of this event should be considered. He proposed inviting all former officers to attend the banquet. Further action was postponed until mid-year board meeting.

8. Genetic Prediction Conference. Dr. Baker reported that the second Genetic Prediction Conference held March 10-11 in Kansas City was very successful. He had a limited number of copies of the proceedings to distribute at the Sire Evaluation Committee meeting.

9. Report on Roundtable in Honor of Frank Baker. Dr. Larry Cundiff reported that the Roundtable and Banquet in honor of Frank Baker on having his portrait hung in the Saddle and Sirloin Club gallery was well attended and was a fitting tribute to Dr. Baker. Richard Willham did a splendid job in organizing and conducting this event. It was held on November 16, 1986 at the Kentucky Fair and Exposition Center in Louisville, Kentucky. BIF sponsorship was appreciated.

10. Standing Committee Plans for the Convention. McCraw provided a copy of the agenda for the committee meetings to each director and provided Bob Dickinson with copies to be placed at the registration

desk to be picked up by those in attendance.

Each committee chairman reviewed the plans for his committee meeting with McCraw reporting on Central Test Committee for the chairman, Charles McPeake.

McCraw asked each committee chairman to get a report on committee activities during the meeting to him by Thursday evening, April 30.

11. Future BIF Conventions. President Lemmon called on McCraw to report on offers to host future conventions. McCraw stated that Tennessee had earlier extended an invitation to host the 1989 convention. However, in recent conversations, David Kirkpatrick had expressed reservations about their being able to host the convention due to circumstances that have developed. Kirkpatrick agreed to provide McCraw a definite answer in July, 1987 after the Tennessee BCIA meeting is held. McCraw requested that Bruce Howard solicit invitations from states during the luncheon on Thursday.

Howard indicated that some Canadian groups may be interested in hosting a future meeting, if that would be agreeable with the board. No objections were expressed.

12. Revised List of Test Stations and BCIA's was announced by Dixon Hubbard. He indicated that he and Eldon Hans had revised these publications and had brought copies to McCraw for mailing to BIF members. McCraw indicated that they would be distributed later in conjunction with other mailings.

13. Resolution to State Extension Directors. Frank Baker indicated that there was a need to communicate the importance of extension involvement in performance testing and genetic evaluation to State Directors of Extension. Baker had agreed to handle this task on behalf of all commodity groups involved in performance testing work. The communication would extend appreciation to the state extension services for past support and express a need for continued support in the future. In response to questions, Dixon Hubbard indicated that with tighter budgets, some directors think we have done all we need to do in the area of performance testing. He felt there was a need for those involved with performance testing in all species to make a unified effort to communicate the importance of extension involvement.

Baker stated that he would need a letter from the Executive Director on behalf of BIF expressing the board's support and endorsement.

John Crouch moved that BIF support the Baker proposal and that the Executive Director provide a letter to Baker. This motion was seconded by Bob Dickinson and passed. McCraw indicated that he would provide the letter to Baker when needed.

14. Catalog of BIF Materials. Daryl Strohbehn reported that he was still working on this listing, but he has not had time to complete it. He stated that he hoped to have a complete listing for the board to consider at the mid-year meeting.

Daryl also indicated that he was in the process of contacting authors about revising some of the fact sheets. He also indicated that some new fact sheets may be needed.

15. Awards for Performance Classes of National Judging Contests. Lemmon reported that Bob Whitenburg, chairman of the 4-H contest, Harlan Ritchie, chairman of the university contest, and several students had sent letters of appreciation for the support provided to these contests by BIF. McCraw indicated that he thought our support of these contests had been very worthwhile.

    A motion that BIF continue to provide plaques for these classes was offered by John Crouch, seconded, and it carried.

16. Site License for P.T. Software from TSA. McCraw indicated that Daryl Strohbehn and others had reported that the site license agreement sent out earlier was unclear. This agreement involved the use and distribution of the performance testing package developed by Triangle Software Associates. The original agreement did not make it clear that a state extension service or state BCIA could buy the package for $87.00 and process records for producers. It should have made it clear that these groups only need the site license at a cost of $1500 if they will be distributing the program to their county offices or clientele.

    McCraw stated that he had called Ray Kimsey and that the intended arrangement was as described above. He further stated that the license fee could be paid in installments as the program is distributed rather than having to be paid in advance.

17. Mid-year Board Meeting. Jim Leachman moved that the mid-year board meeting be held on November 5 and 6, 1987, in Kansas City. The program committee will meet on the morning of November 5. The board will meet on the afternoon of November 5 and the morning of November 6. The motion was seconded and passed.

18. Data Bank Project Update. Frank Baker reported on an update of the 1984 Data Bank Study by Winrock International. He distributed copies of the report, "1986 U. S. Beef Performance Databank Report Update," to board members.

19. Revision of By-Laws. At the mid-year board meeting in 1986, By-Law 9, Section 1, was revised to reflect a new fee-structure. A committee of Roy Wallace, Doug Hixon, Richard Whitman and Frank Baker, chairman, was appointed by President Lemmon to review the by-laws.

    Chairman Baker reported the committee's recommendations as follows:

    (1) Add "or customers" to the last line of By-Law (BL) 3, Section (S) 1a.
    (2) Delete BL3, S1e
    (3) Delete the last sentence of BL3, S2.
    (4) Delete BL7, S1c
    (5) Change BL7, S2b as follows:
        --remove seat on the board for Performance Registry International;
        --reduce the number of seats for state or provincial beef cattle improvement associations from 8 to 6;
        --add three seats for AI organizations or firms.
    (6) Change "his" in the third line of BL7, S2c, to "the successful completion of his or her".

(7) Change the first sentence of BL7, S2e to read, "Members of each interest group (cattle breed registry associations, AI firms, and other national organizations) will select their own representative(s) to the Executive Board from among their Federation representatives."
(8) Delete the last line of BL7, S2e.
(9) Correct the spelling of "Election" in BL8, S1b.
(10) Change "He" to "The president" in line 5 of BL8, S2a.
(11) Change "He" to "The vice-president" in line 4 of BL8, S2b.
(12) Delete BL10, S2.

There was much discussion concerning the changes that have occurred in PRI and in the relative influence of breed associations compared to state BCIA's. In response to the recommendation that the seat delegated to PRI be withdrawn, Glenn Butts requested that the minutes show that, with respect to PRI directors and stockholders, "One group has no objection. The other group welcomes your suggestion."

Several concerns were expressed about reducing the representation from BCIA's and having three seats on the board for representatives of AI firms.

Rich Whitman moved that these recommendations be sent back to the Constitution and By-Laws Review Committee with instructions to re-evaluate the representation of state BCIA's and AI firms.

After discussion about the need to take action on some of the proposed changes, Whitman withdrew his motion.

Whitman then moved that the board accept the proposed revisions of the by-laws except those dealing with representation on the board, i.e., BL7, S2b and that these be acted on later when there is more time for discussion. Doug Hixon seconded the motion and it carried.

Bob Dickinson moved that "performance programs" in BL3, S1a, be changed to "genetic improvement programs and sevices". The motion was seconded and passed.

Baker moved that line 5 of BL8, S1a, "..., also elected for one year,..." be changed to "..., appointed by the board of directors,...". This motion was seconded and approved.

Baker moved that the board consist of six representatives from breed associations, eight from BCIA's, three from AI and ET firms, and one representative from the National Cattlemen's Association. His motion was seconded. John Crouch moved to table the previous motion till the mid-year board meeting. Henry Gardiner seconded. The motion carried.

20. Election of Officers. Henry Gardiner, Chairman of the Nominating Committee, reported the following nominations: President--Bob Dickinson; Vice-President--Jack Chase. President Lemmon opened the floor for other nominations. John Crouch moved that nominations be closed and the above slate be elected by unanimous vote. Seconded and carried.

21. Program Committee for 1988 Convention. The president appointed the following committee: Jack Chase--chairman, Ron Parker, Bobby Rankin, Keith Vandervelde and Wayne Vanderwert. He charged this committee to plan a program to recommend to the BIF Board at the mid-year board meeting.

22. Performance Testing Workshop Committee. The president appointed the following committee: Jim Gibb--chairman, John Crouch, Frank Baker, Ron Bolze, Daryl Strohbehn, and Doug Hixon. This committee was charged with planning for the training workshop for extension specialists to be held in conjunction with the 1988 BIF Convention. The committee will report to the board at its mid-year meeting.

23. Awards at 1987 Convention. The following awards were presented:
    Seedstock Producer of the Year--Henry Gardiner, Kansas
    Commercial Producer of the Year--Rodney Oliphant, Kansas
    Continuing Service Awards--Bill Borror, California
    --Jim Gibb, Am. Polled Hereford Assoc.
    --Daryl Strohbehn, Iowa State University
    Ambassador Award--Chester Peterson, Simmental Shield
    Pioneer Awards--Glenn Burrows, New Mexico
    --Carlton Corbin, Oklahoma
    --Murray Corbin, Oklahoma
    --Max Deets, Kansas

Respectfully submitted,

Roger L. McCraw

Roger L. McCraw
BIF Executive Director

BEEF IMPROVEMENT FEDERATION
FINANCIAL STATUS - CALENDAR YEAR 1986

by
Roger L. McCraw

Assets	1-1-86	12-31-86
Checking Account	$ 252.38	$ 1,471.36
Money Market Account	8,386.66	689.16
Certificates of Deposit	40,000.00	40,000.00
	$48,639.04	$42,160.52

1986 BIF Income

Interest	$ 4,161.11
Proceedings	407.50
Guidelines	666.00
Dues	9,790.44
*1986 BIF Conv.	1,396.12
	$16,421.17

*Includes coffee break sponsors (2 @ $276.08) and check from Kentucky BCA ($843.96)

1986 BIF EXPENSES

Postage	$ 1,545.71
Printing	
Programs and certificates	347.00
Guidelines	5,718.00
Checks	9.68
Proceedings	2,696.10
Salary and Taxes (Office Sec.)	2,741.07
Convention Speakers	
Norman Parrish	793.36
John Pollak	708.00
B. D. Van Stavern	104.43
Larry Benyshek	77.29
R. G. Saacke	193.67
James S. Brinks	324.44
Larry Cundiff	189.07
Tom Price	588.75
Danny Simms	436.00
Don Lunstra	664.14
Harold Gonyou	136.12
Convention Plaques	686.89
Office Supplies	586.16
Executive Director Travel	
A. L. Eller, Jr.	286.95
R. L. McCraw	92.40
Director Travel (Ron Bolze-Mid-Yr. Board Mtg.)	653.07
Iowa State Univ. - Fact Sheets	220.00
Univ. of NB-Third World Cong.	1,000.00
Corporation Registration	5.00
Legal Fees (Colorado law firm)	45.00
Iowa State Univ. - Baker Fund	1,200.00
Checking Account-service charge	2.60
Plaques (Nat'l Livestock Judging Contests - Louisville)	97.85
Holiday Inn - Mid-yr Brd. Mtg.	750.94
	$22,899.69

BEEF IMPROVEMENT FEDERATION

FINANCIAL STATUS - JANUARY 1, 1987 - APRIL 17, 1987

Assets

Checking Account	$ 4,794.44
Money Market	40,065.75
Transfer to Wichita Acct.	2,000.00
	$46,860.19

1987 BIF Income

Dues	$5,972.58
Proceedings	46.83
Guidelines	48.00
Coffee Break Sponsors (AI organizations)	600.00
Interest	380.42*
	$7,047.83

*Interest on CD's was reinvested during latter part of 1986 and until January 11, 1987 and is not included

1987 BIF Expenses

Salary and Taxes (Office Sec.)	$ 453.33
Office supplies	25.99
Postage	767.43
Exec. Dir. Travel - Mid-Yr. Board Mtg.	567.04
Fees for transferring CD's, etc.	25.00
BIF Convention Programs	507.70
Service Charge on Checking Acct.	.67
TOTAL EXPENSES	$2,348.16

PAID

BIF MEMBER ORGANIZATIONS AND AMOUNT FOR DUES - 1987

AS OF APRIL 27, 1987

State BCIA'S	DUES
Alabama	$100.00
California	$100.00
Florida	$100.00
Georgia	$100.00
Illinois	$100.00
Indiana	$100.00
Iowa	$100.00
Kentucky	$100.00
Minnesota	$100.00
Mississippi	$100.00
Missouri	$100.00
New Mexico	$100.00
New York	$100.00
North Carolina	$100.00
North Dakota	$100.00
Oklahoma	$100.00
Oregon	$100.00
South Carolina	$100.00
South Dakota	$100.00
Tennessee	$100.00
Texas	$100.00
Virginia	$100.00
Washington	$100.00
Wisconsin	$100.00
Wyoming	$100.00
Breed Associations	
American Angus	$500.00
American Brahman Breeders	$300.00
American Chianina Assoc.	$200.00
American Gelbvieh Assoc.	$200.00
American Hereford Assoc.	$500.00
American Salers Assoc.	$200.00
American Simmental Assoc.	$300.00
The Simmentaler Cattle Breeders Society of Southern Africa	$100.00
American Shorthorn Assoc.	$200.00
American Polled Hereford	$500.00
American Tarentaise	$100.00
American Red Poll	$100.00
International Brangus Breeders	$300.00
North American Limousin	$300.00
Red Angus Assoc.	$200.00
Beefmaster Breeders Universal	$300.00
Canadian Charolais Assoc.	$200.00

Others	DUES
Nat'l. Assoc. of An. Breeders	$100.00
Ontario Beef Cattle Perf. Assoc.	$100.00
Am. Breeders Service	$100.00
NOBA, Inc.	$100.00
Select Sires, Inc.	$100.00
Manitoba Agriculture Beef Program of An. Industry Branch	$100.00
Beefbooster Cattle Limited	$100.00
Agricultural Canada, Regional Development Branch	$100.00
Northeast Kentucky BIF	$100.00

BIF MEMBERS WHO HAVE NOT PAID MEMBERSHIP DUES FOR 1987

Hawaii BCIA - $100.00
Idaho BCIA - $100.00
Kansas BCIA _ $100.00
Montana BCIA - $100.00
Ohio BCIA - $100.00
Pennsylvania BCIA - $100.00
West Virginia BCIA - $100.00

Am.-International Charolais - $300.00
Canadian Hereford Assoc. - $100.00
Santa Gertrudis Breeders Intern. - $300.00
Performance Records Int'l., Inc. - $100.00
Nat'l. Cattlemen's Assoc. - $100.00
21st Century Genetics - $100.00

United States Department of Agriculture | Extension Service | Agriculture | Washington, D.C. 20250

LISTING OF STATE BEEF CATTLE IMPROVEMENT ASSOCIATIONS

ALABAMA	ALABAMA BCIA (1964) Robert L. McGuire Head, Extension Animal Science 215 Animal Science Bldg Auburn University Auburn University, AL 36849	205/826-4377
ALASKA	NO BCIA	
ARIZONA	ARIZONA CATTLE GROWER ASSOCIATION (19??) Tommie Martin 5025 East Washington - Suite 110 Phoenix, AZ 85034	602/267-1129
ARKANSAS	NO BCIA	
CALIFORNIA	CALIFORNIA BCIA (1959) Barbara Cowley 2711 Laurel Drive Sacramento, CA 95864	916/481-0266
COLORADO	COLORADO BCIA (1982) 108A Dept of Animal Sciences Colorado State University Ft. Collins, CO 80523	303/491-6903
CONNECTICUT	CONNECTICUT BCIA (19??) Louis A. Malkus Extension Livestock Specialist University of Connecticut Storrs, CT 06268	203/486-2636
DELAWARE	DELMARVA BEEF CATTLEMEN'S ASSOCIATION (1984) Richard Barczewski Cooperative Extension Service RD 1 Box 658 Dover, DE 19901	302/697-4000
FLORIDA	FLORIDA BCIA (1960) Robert S. Sand, Secretary 231 Animal Science Bldg #459 University of Florida Gainesville, FL 32611	904/392-1916
GEORGIA	GEORGIA BULL TEST COMMITTEE (19??) Georgia Cattlemen's Association P.O. Box 7608 Macon, GA 31209	912/474-6560

HAWAII	HAWAII BCIA (1966) James C. Nolan, Jr., Advisor University of Hawaii 1800 East West Road Honolulu, HI 96822	808/948-7090
IDAHO	NO BCIA	
ILLINOIS	ILLINOIS BEEF IMPROVEMENT FEDERATION (Performance Testing started 1955) Doug Parrett Extension Livestock Specialist 110 Stock Pavilion 1402 W. Pennsylvania Ave. Urbana, IL 61801	217/333-2647
INDIANA	INDIANA BEEF PERFORMANCE TESTING PROGRAM (1964) L. A. Nelson Animal Sciences Department Lilly Hall of Life Sciences Purdue University West Lafayette, IN 47907	317/494-4834
IOWA	IOWA CATTLEMEN'S ASSOCIATION (1960) BEEF PERFORMANCE SUBCOMMITTEE Scott Hansen and Jan Gustoff 123 Airport Road Ames, IA 50010	515/233-3270
KANSAS	KANSAS BEEF IMPROVEMENT COMMITTEE (1968) Keith Zoellner Extension Beef Cattle Specialist Weber Hall Kansas State University Manhattan, KS 66506	913/532-6131
KENTUCKY	KENTUCKY BCIA (1958) Carla Gale Nichols 803 Ag Science Center South University of Kentucky Lexington, KY 40546	606/257-7514
LOUISIANA	LOUISIANA BCIA (1961) John S. Sullivan, Jr. Extension Beef Cattle Specialist Knapp Hall Louisiana State University Baton Rouge, LA 70803	504/388-2219
MAINE	NO BCIA	

MARYLAND	MARYLAND BCIA (1955) William A. Curry Extension Livestock Specialist Animal Science Center, Room 0131 University of Maryland College Park, MD 20742	301/454-7825
MASSACHUSETTS	NO BCIA	
MICHIGAN	MICHIGAN BCIA (1967) William T. Magee Dept of Animal Science 102 Anthony Hall Michigan State University East Lansing, MI 48824	517/355-0327
MINNESOTA	MINNESOTA BEEF CATTLE IMPROVEMENT ASSOCIATION (1968) Charles J. Christians, Supervisor 101 Peters Hall University of Minnesota St. Paul, MN 55108	612/373-1166
MISSISSIPPI	MISSISSIPPI BCIA (1959) William M. Swoope Extension Livestock Specialist Mississippi State University Box 5446 Mississippi State, MS 39762	601/325-3515
MISSOURI	MISSOURI BEEF CATTLE IMPROVEMENT ASSOCIATION, INC. (1958) John W. Massey Extension Beef Cattle Specialist S111 Animal Science Center, Room S132A University of Missouri Columbia, MO 65211	314/882-7250
MONTANA	MONTANA BEEF PERFORMANCE ASSOCIATION (1956) Dale Veseth Secretary-Manager 405 Linfield Hall Montana State University Bozeman, MT 59717-22	406/994-2591
NEBRASKA	BEEF IMPROVEMENT COMMITTEE OF NEBRASKA STOCK GROWERS ASSOCIATION (1961) Jim Gosey Extension Beef Cattle Specialist Marvel Baker Hall University of Nebraska Lincoln, NE 68583	402/472-6417

NEVADA	NO BCIA	
NEW HAMPSHIRE	NEW HAMPSHIRE BEEF CATTLE PRODUCTION TESTING PROGRAM (1984) F. Carlton Ernst Extension Livestock Specialist Room 218 Kendall Hall University of New Hampshire Durham, NH 03824	603/862-2131
NEW JERSEY	NO BCIA	
NEW MEXICO	NEW MEXICO BEEF CATTLE PERFORMANCE ASSOCIATION (1956) Ron Parker Extension Beef Cattle Specialist New Mexico State University Box 3AE Las Cruces, NM 88003	505/646-1709
NEW YORK	NEW YORK BCIA (1940's) William M. Greene Extension Beef Cattle Specialist Cornell University Ithaca, NY 14853	607/256-7712
NORTH CAROLINA	NORTH CAROLINA BCIA (1959) Roger L. McCraw Extension Beef Cattle Specialist North Carolina State University Box 7621 Raleigh, NC 27695-7621	919/737-2761
NORTH DAKOTA	NORTH DAKOTA BEEF CATTLE IMPROVEMENT ASSOC, INC. (1963) Kris A. Ringwall Extension Livestock Specialist NDSU Research and Extension Center Fargo, ND 58102	701/237-7646
OHIO	BUCKEYE BEEF IMPROVEMENT FEDERATION (1961) Ronald P. Bolze, Jr. Animal Science Department Ohio State University 2029 Fyffe Road Columbus, OH 43210-1095	614/422-6791
OKLAHOMA	NO BCIA	

OREGON	BEEF CATTLE IMPROVEMENT COMMITTEE OF OREGON CATTLEMEN'S ASSOCIATION (1959) Steve Wolfe Route 1, Box 135 Wallowa, OR 97885	(Office) 503/886-9121 (Home) 503/886-3575
PENNSYLVANIA	PENNSYLVANIA BCIA (1957) Extension Livestock Specialist 324 W. L. Henning Building Pennsylvania State University University Park, PA 16802	814/863-3670
PUERTO RICO	NO SUBMISSION	
RHODE ISLAND	NO BCIA	
SOUTH CAROLINA	SOUTH CAROLINA BCIA (1960's) Harold Hupp Extension Beef Cattle Specialist 140 P&AS Building Clemson University Clemson, SC 29631	803/656-5161
SOUTH DAKOTA	SOUTH DAKOTA BCIA (1956) David Whittington Executive Secretary Extension Livestock Specialist 801 San Francisco Street Rapid City, SD 57701	605/394-2236
TENNESSEE	TENNESSEE BCIA (1956) David Kirkpatrick Extension Beef Cattle Specialist University of Tennessee Box 1071 Knoxville, TN 37901	615/974-7294
TEXAS	NO BCIA	
UTAH	UTAH BCIA (1969) Nyle J. Matthews Extension Livestock Specialist 250 North Main Richfield, UT 84701	801/896-4609
VERMONT	VERMONT BCIA (1983) Paul F. Saenger Extension Livestock Specialist Carrigan Hall University of Vermont Burlington, VT 05705	802/656-2070

VIRGIN ISLANDS	VIRGIN ISLANDS BCIA (1977) P. Kofi Boateng Extension Livestock Specialist College of the Virgin Islands P.O. Box "L", Kingshill St. Croix, VI 00850	809/778-0246
VIRGINIA	VIRGINIA BCIA (1955) A. L. Eller, Jr. Extension Animal Scientist 302 Animal Sciences Building Virginia Polytechnic Institute and State University Blacksburg, VA 24061	703/961-5252
WASHINGTON	WASHINGTON BCIA (1968) William E. McReynolds Extension Beef Cattle Specialist 121 Clark Hall Washington State University Pullman, WA 99163	509/335-2922
WEST VIRGINIA	WEST VIRGINIA BEEF CATTLE PERFORMANCE TESTING PROGRAM (1960) Wayne R. Wagner Extension Livestock Specialist G022 Ag Science Building Box 6108 Morgantown, WV 26506	304/293-3392
WISCONSIN	WISCONSIN BEEF IMPROVEMENT ASSOCIATION (1953) Ellie Larson, President Route 1, 3427 Bohn Road Mt. Horeb, WI 53527	608/437-5660
WYOMING	WYOMING BEEF CATTLE IMPROVEMENT ASSOCIATION (1984) Doug L. Hixon, Extension Specialist Executive Secretary University of Wyoming Box 3684, University Station Laramie, WY 82071	307/766-3100

COMPILED BY:	DIXON D. HUBBARD, Staff Leader Livestock and Veterinary Sciences USDA-Extension Service, Ag Programs Room 3334-South Building Washington, D.C. 20250	202/447-2677

4/84:Updated 04/87

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NAMES, ADDRESSES, AND CONTACT PERSONS FOR BULL TESTING STATIONS

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
ALABAMA	Auburn University Bull Test	Robert L. McGuire, Head Extension Animal Science 215 Animal Science Building Auburn University Auburn University, AL 36849 PHONE: 205/826-4377	1951	96	70
	North Alabama BCIA Bull Test	SAME AS ABOVE	1973	50	35
	BCIA Grazing Test	SAME AS ABOVE	1979	90	65
ALASKA	NO TEST STATION				
ARIZONA	NO TEST STATION				
ARKANSAS	Univ of AR Bull Test Station	A. Hayden Brown Department of Animal Science University of Arkansas Fayetteville, AR 72701 PHONE: 501/575-4855	1962	59	No sale
	Univ of AR Bull Test Station	W. C. Loe Southwest Research & Extension Ctr Route 3, Box 258 Hope, AR 71801 PHONE: 501/777-9702	1962	84	No sale
	Univ of AR Bull Test Station	James A. Horsby Southeast Research & Extension Ctr Box 3508, UAM Monticello, AR 71655 PHONE: 501/367-3471	1977	53	No sale

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
CALIFORNIA	CBCIA "On Ranch" Bull Test	Steven L. Berry, D.V.M. Extension Animal Scientist University of California Davis, CA 95616 PHONE: 916/752-1279	1981	459	0
	Cal Poly Bull Test	Frank Fox Department of Animal Science Cal Poly State University San Luis Obispo, CA 93401 PHONE: 805/546-2619	1957	297	105
	Bovine Test Center	Jerry Maltby 11900 28 Mile Road Oakdale, CA 95361 PHONE: 209/847-6403	1979	550	235*
	West Hills College	Bill Dale West Hills College 300 Cherry Lane Coalinga, CA 93210 PHONE: 209/935-0801	1980	46	0**
COLORADO	Northeast Colorado Bull Test Station	Dixie Fagerlin Box 328 Holyoke, CO 80734 PHONE: 303/854-2878	1976	260	120
	Southeast Colorado Bull Test Station	George Ellicott Area Extension Livestock Spec County Courthouse Eads, CO 81036 PHONE: 303/438-5321	1973	130	90

* 235 Total = 200 Private
175 Sale
**No sale -- private treaty.

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
COLORADO (Continued)	4-Corners Bull Test Assn	Al Denham 18683 State Hwy 140 Hesperus, CO 81326 PHONE: 303/385-4574	1949	266	127
	Western Colorado Bull Test Association	Herman Soderquist Area Extension Livestock Specialist Courthouse Annex 5th & Palmer Delta, CO 81416 PHONE: 303/874-3519	1981	91	60
CONNECTICUT	NO TEST STATION				
DELAWARE	NO TEST STATION				
FLORIDA	NO TEST STATION				
GEORGIA	North Georgia Bull Evaluation Center	Rick Hardin P.O. Box 95 Calhoun, GA 30701 PHONE: 404/629-7341	1969	129	76
	Tifton Bull Evaluation Station	Robert Stewart Extension Beef Cattle Specialist Rural Development Center Box 1209 Tifton, GA 31793 PHONE: 912/386-3407	1957	140	99
	'Rollins Beef Research Center	Luther Miller Berry College Mount Berry, GA 30149 PHONE: 404/232-5374 x-2360	1974	95	65
GEORGIA (Continued)	Georgia Pasture Fed Bull Test	Ronnie Silcox Extension Beef Cattle Specialist Landrum Box 8112 Statesboro, GA 304603 PHONE: 912/681-5630	1980	74	50
HAWAII	BCIA Test Station	Extension Beef Cattle Specialist University of Hawaii 1800 East West Road Honolulu, HI 96822 PHONE: 808/948-7090	1979	133*	No sale
IDAHO	Northwest Bull Test Station	Jim White Caldwell, ID 83605 PHONE: 208/722-6517	1983	318	140
ILLINOIS	Beef Evaluation Station	Gary Daniel, Manager Dept of Animal Industries Southern Illinois University Carbondale, IL 62901 PHONE: 618/453-3725 or 453-2079	1974	72	54
	Beef Evaluation Station	Loren Robinson Dept of Agriculture Western Illinois University Macomb, IL 61455 PHONE: 309/298-1080	1971	72	54

*133 Total = 120 On Ranch Testing Program
= 13 On Station

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
INDIANA	Indiana Beef Evaluation Pgm	Larry A. Nelson, Coordinator Department of Animal Sciences Lilly Hall Purdue University West Lafayette, IN 47907 PHONE: 317/494-4834	1976	247	129
IOWA	Adair Bull Evaluation Sta Charlie Van Meter, Manager RR #2, Box 233 Adair, IA 50002 PHONE: 515/747-3543	Scott Hansen or Jan Gustoff Iowa Cattlemen's Association 123 Airport Road Ames, IA 50010 PHONE: 515/233-3270	1985	100	70
	Creston Bull Evaluation Sta Bill Ehm, Manager RR #2, Box 205 Creston, IA 50801 PHONE 515/782-5239	SAME AS ABOVE	1985	100	65
KANSAS	Kansas Bull Test - Beloit	Willard Olson Extension Assistant Weber Hall Kansas State University Manhattan, KS 66506 PHONE: 913/532-6131	1970	604	291
	Kansas Bull Test - Potwin	SAME AS ABOVE	1982	461	223
	Silver Key Bull Test	Larry Stucky Route #1 McPherson, KS 67460 PHONE:	1974	32	No sale
KANSAS (Continued)	Colby Bull Test	Danny Simms Area Extension Livestock Spec KSU Extension Service 170 West Fourth Colby, KS 67701 PHONE: 913/462-3971	1981	142	87
KENTUCKY	Central Bull Test Station	Carla C. Nichols Extension Beef Cattle Specialist 803 Ag Science South University of Kentucky Lexington, KY 40546 PHONE: 606/257-7514	1969	134	99
LOUISIANA	Bull Testing Station at Alexandria	John E. Pontif Dean Lee Ag Center LSUA LeCompte, LA 71346 PHONE: 318/473-6520	1956	255	65
MAINE	NO TEST STATION				
MARYLAND	NO TEST STATION				
MASSACHUSETTS	NO TEST STATION				
MICHIGAN	West Michigan Centennial Bull Test Station	Richard Crissman 585 - 36th Street, S.W. Grand Rapids, MI 49509 PHONE: 616/534-4927	1974	0	No sale
MINNESOTA	Minnesota Bull Test Station	C. J. Christians Extension Livestock Specialist University of Minnesota 1404 Gortner Avenue St. Paul, MN 55108 PHONE: 612/373-1166	1968	133	78

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
MINNESOTA (Continued)	St. Croix Valley Bull Test Station*	Dewey Wachholz Animal Science Department University of Wisconsin River Falls, WI 54022 PHONE: 712/425-3809	1978	76	40
	Rolling V Central Test Sta	Dick Vrieze Route 3, Box 77 Spring Valley, MN 55975 PHONE: 507/846-2387	1984	25	20
MISSISSIPPI	Hinds Bull Test	Billie Banes, Manager Hinds Junior College Raymond, MS 39154 PHONE: 601/857-3351	1982	46	29
	Walthall County Forage Bull Test	W. M. Swoope Extension Livestock Specialist Box 5446 Mississippi State, MS 39762 PHONE: 601/325-3515	1985	26	22
MISSOURI	North Missouri Center RFD #1 Spickard, MO 64679	Jerry Lipsey S111 Animal Science Ctr Rm S134 University of Missouri Columbia, MO 65211 PHONE: 314/882-2618	1970	60	**
	Central Testing Station Columbia, MO 65211	SAME AS ABOVE	1960	157	**

* Run in conjunction with Wisconsin.
**Combine bull sale at both stations = selling 70.

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
MONTANA	Rainbow Test Center	Don Burnham 2515 Canyon Ferry Road Helena, MT 59601 PHONE: 406/442 4702	1982	200	100
	All Breed Center	Phil Eidel 437 U.S. Hwy 89 Great Falls, MT 59401 PHONE: 406/965 3267	1975	600	450
	Treasure State Test	Russ Pepper Simms, MT 59477 PHONE: 406/264-5694	1977	250	100
	Midland Bull Test Station	Leo McDonnell, Jr. Columbus, MT 59019 PHONE: 406/322-5597	1963	600	380
NEBRASKA	Western Nebraska Bull Test Station	Jim Gosey Extension Beef Cattle Spec Marvel Baker Hall University of Nebraska--Lincoln Lincoln, NE 68583 PHONE: 402/472 6417	1961	320	140
NEVADA	University Main Station Field Lab	Don Albert Main Station Field Lab Kimlick & Boynton Lane Reno, NV 89502 PHONE: 702/784 4910	1968	0	0
NEW HAMPSHIRE	NO TEST STATION				
NEW JERSEY	NO TEST STATION				

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
NEW MEXICO	Tucumcari Bull Test	Ron Parker Extension Beef Cattle Spec New Mexico State University Box 3AE Las Cruces, NM 88003 PHONE: 505/646-1709	1961	133	85
NEW YORK	Cornell University Bull Test Station	William Greene Extension Beef Cattle Specialist Morrison Hall Cornell University Ithaca, NY 14853 PHONE: 607/256-7712	1977	85	48
NORTH CAROLINA	Butner, NC Station	Roger L. McCraw Extension Beef Cattle Specialist North Carolina State University Box 7621 Raleigh, NC 27695-7621 PHONE: 919/737-2761	1984	116	69
	Salisbury, NC Station	SAME AS ABOVE	1973	89	61
	Waynesville, NC Station	SAME AS ABOVE	1980	48	32
NORTH DAKOTA	NO TEST STATION				
OHIO	Ohio Bull Test Station	Lorin Sanford District Specialist Animal Industry 16714 SR 215 Caldwell, OH 43724 PHONE: 614/732-2381	1969	205	141
OKLAHOMA	Oklahoma BEEF, Inc.	Charles A. McPeake Extension Beef Cattle Specialist 201 Animal Science Bldg Oklahoma State University Stillwater, OK 74078 PHONE: 405/624-6060	1973	550	200
	Gelbievh Test Station	Les Hutchens 119 West Hartman Stillwater, OK 74074 PHONE: 405/377-8037	1982	100	60
	Noble Foundation	Clay Wright Ardmore, OK 73402 PHONE: 405/223-5810	1983	100	35
	Simmental Test El Reno, OK	Gary Harding Conners State College Warner, OK 74469 PHONE: 918/463-2931	1980	70	50
	Conners State College	Gary Harding Conners State College Warner, OK 74469 PHONE: 918/463-2931	1962	85	60
	Panhandle State Univ Test	Jerry Martin Goodwell, OK 73939 PHONE: 405/349-2611	1952	90	70
OREGON	NO TEST STATION				

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
PENNSYLVANIA	Pennsylvania Meat Animal Evaluation Station	Glenn D. Eberly, Director 651 Fox Hollow Road University Park, PA 16803 PHONE: 814/238-2527	1973	88	51
PUERTO RICO	NO SUBMISSION				
RHODE ISLAND	NO TEST STATION				
SOUTH CAROLINA	Clemson Univ Gain Test	Harold Hupp Extension Beef Cattle Specialist 140 P&AS Bldg. Clemson University Clemson, SC 29631 PHONE: 803/656-5161	1969	60	36
	Edisto Forage Bull Test	Larry Olson Area Extension Livestock Spec Edisto Research Station Blackville, SC 29817 PHONE: 803/284-3344	1982	65	40
SOUTH DAKOTA	Top Notch Test Center	Forrest Ireland Kadoka, SD 57543 PHONE: 605/837-2578	1982	86	60
TENNESSEE	Univ of TN Bull Test Station Middle Tennessee Expt Station Spring Hill, TN	David Kirkpatrick Extension Beef Cattle Specialist University of Tennessee P.O. Box 1071 Knoxville, TN 37901 PHONE: 615/974-7294	1971	82	64

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
TEXAS	Livestock Performance Center	Homer Higdon P. O. Box 520 Castroville, TX 78009 PHONE: 512/677-8820	1982	875	1,000
	Sul Ross Beef Eval Center	SRSU Box C110 Alpine, TX 79832 PHONE:	1981	0*	0
	Cooke County College PHONE: 817/665-5115	Cooke County College Box 815 Gainesville, TX 76240 PHONE: 817/668-7731 x-253	1972	155	No sale**
	Luling Foundation	Archie Abrameit, Manager Drawer 31 Luling, TX 78648 PHONE: 512/875-2438	1963	114	30
	Lone Star Testing Center	Sam Massey Box 518 Wickett, TX 79788 PHONE: 915/943-2217	1973	150 (1985-86)	100 (1985-86)
	Central Texas College	Raiford Williams Agricultural Department Hwy 190 West Killeen, TX 76541 PHONE: 817/526-1285 or 526-1245	1975	0***	0***

* This bull test program was not in operation for the last reporting period; planned to start operations in 1985; received no input for this reporting period.

** No sales conducted -- private treaty.

***The facility was closed most of the year for the last reporting period. Received no input this reporting period.

STATE	NAME OF STATION	CONTACT AND ADDRESS	ESTABLISHED	BULLS TESTED IN LAST COMPLETE YEAR OF TESTING	NUMBER OF BULLS SOLD
TEXAS (Continued)	Stephen F. Austin State University Station	Dr. Joe Gotti Agricultural Department Stephen F. Austin State Univ Box 13000 Nacogdoches, TX 75962 PHONE: 409/569-3705	1982	47	No sale
UTAH	Utah Beef Improvement Association Test Station	Nyle J. Matthews Extension Livestock Specialist Utah State University 250 North Main Richfield, UT 84701 PHONE: 801/896-4609	1969	151	78
VERMONT	NO TEST STATION				
VIRGIN ISLANDS	NO TEST STATION				
VIRGINIA	Culpeper Agricultural Enterprises P.O. Box 658 Culpeper, VA 22701 Bobby Pace, Manager PHONE: 703/547-2188	A. L. Eller, Jr. Extension Animal Scientist 302 Animal Science Building Virginia Polytechnic Institute and State University Blacksburg, VA 24061 PHONE: 703/961-5252	1958	202	140
	Red House Bull Eval Center Red House, VA 23963 James Bennett, Manager PHONE: 804/376-3567	SAME AS ABOVE	1972	255	127
	Southwest Bull Test Station Route 2, Box 177 Wytheville, VA 24382 Jack Poole, Manager PHONE: 703/228-4807	SAME AS ABOVE	1979	137	89
WASHINGTON	NO TEST STATION				
WEST VIRGINIA	West Virginia Bull Test Sta	Wayne R. Wagner Extension Livestock Specialist G022 Agricultural Science Bldg West Virginia University Box 6108 Morgantown, WV 26506-6108 PHONE: 304/293-3392	1966	281	145
WISCONSIN	Wisconsin Beef Improvement Association	Ellie Larson, President Route 1, 3427 Bohn Road Mt. Horeb, WI 53527 PHONE: 608/437-5660	1957	120	80
WYOMING	Wyoming Bull Test Station	Doug L. Hixon Extension Beef Cattle Spec. University of Wyoming P.O. Box 3684 University Station Laramie, WY 82071	1985	80	50
		GRAND TOTAL		12,751	6,834

COMPILED BY DIXON D. HUBBARD, Staff Leader 202/447-2677
Livestock and Veterinary Sciences
USDA-Extension Service, Ag Programs
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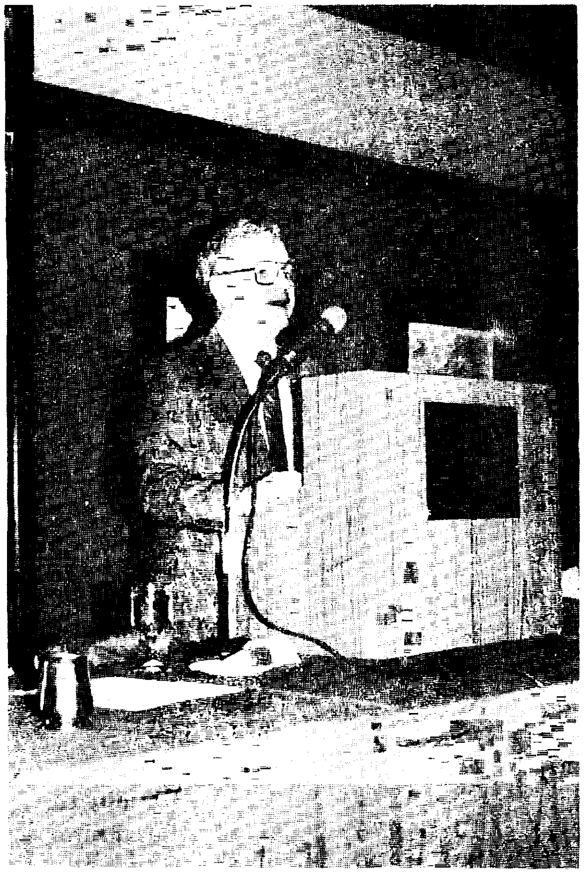
Washington, D.C. 20250



1987 AWARDS BANQUET

Jerry Peterson - M.C., Mgr. Circle E Feedlot, Inc., Potwin Kansas

BIF AWARDS PROGRAM

The Commercial Producer Honor Roll of Excellence

Chan Cooper	MT	1972	Odd Osteross	ND	1978
Alfred B. Cobb, Jr.	MT	1972	Charles M. Jarecki	MT	1978
Lyle Eivens	IA	1972	Jimmy G. McDonnal	NC	1978
Broadbent Brothers	KY	1972	Victor Arnaud	MO	1978
Jess Kilgore	MT	1972	Ron & Malcolm McGregor	IA	1978
Clifford Ouse	MN	1973	Otto Uhrig	NE	1978
Pat Wilson	FL	1973	Arnold Wyffels	MN	1978
John Glaus	SD	1973	Bert Hawkins	OR	1978
Sig Peterson	ND	1973	Mose Tucker	AL	1978
Max Kiner	WA	1973	Dean Haddock	KS	1978
Donald Schott	MT	1973	Myron Hoeckle	ND	1979
Stephen Garst	IA	1973	Harold & Wesley Arnold	SD	1979
J. K. Sexton	CA	1973	Ralph Neill	IA	1979
Elmer Maddox	OK	1973	Morris Kuschel	MN	1979
Marshall McGregor	MO	1974	Bert Hawkins	OR	1979
Lloyd Mygard	ND	1974	Dick Coon	WA	1979
Dave Matti	MT	1974	Jerry Northcutt	MO	1979
Eldon Wiese	MN	1974	Steve McDonnell	MT	1979
Lloyd DeBruycker	MT	1974	Doug Vandermyde	IL	1979
Gene Rambo	CA	1974	Norman, Denton & Calvin		
Jim Wolf	NE	1974	Thompson	SD	1979
Henry Gardiner	KS	1974	Jess Kilgore	MT	1980
Johnson Brothers	SD	1974	Robert & Lloyd Simon	IL	1980
John Blankers	MN	1975	Lee Eaton	MT	1980
Paul Burdett	MT	1975	Leo & Eddie Grubl	SD	1980
Oscar Burroughs	CA	1975	Roger Winn, Jr.	VA	1980
John R. Dahl	ND	1975	Gordon McLean	ND	1980
Eugene Duckworth	MO	1975	Ed Disterhaupt	MN	1980
Gene Gates	KS	1975	Thad Snow	CAN	1980
V. A. Hills	KS	1975	Oren & Jerry Raburn	OR	1980
Robert D. Keefer	MT	1975	Bill Lee	KS	1980
Kenneth E. Leistritz	NE	1975	Paul Moyer	MO	1980
Ron Baker	OR	1976	G. W. Campbell	IL	1981
Dick Boyle	ID	1976	J. J. Feldmann	IA	1981
James D. Hackworth	MO	1976	Henry Gardiner	KS	1981
John Hilgendorf	MN	1976	Dan L. Weppler	MT	1981
Kahua Ranch	HI	1976	Harvey P. Wehri	ND	1981
Milton Mallery	CA	1976	Dannie O'Connell	SD	1981
Robert Rawson	IA	1976	Wesley & Harold Arnold	SD	1981
Wm. A. Stegner	ND	1976	Jim Russel & Rick Turner	MO	1981
U.S. Range Exp. Sta.	MT	1976	Oren & Jerry Raburn	OR	1981
John Blankers	MN	1977	Orin Lamport	SD	1981
Maynard Crees	KS	1977	Leonard Wulf	MN	1981
Ray Franz	MT	1977	Wm. H. Romersberger	IL	1982
Forrest H. Ireland	SD	1977	Marvin & Donald Stoker	IA	1982
John A. Jameson	IL	1977	Sam Hands	KS	1982
Leo Knoblauch	MN	1977	Larry Campbell	KY	1982
Jack Pierce	ID	1977	Lloyd Atchison	CAN	1982
Mary & Stephen Garst	IA	1977	Earl Schmidt	MN	1982
Milton Krueger	MO	1982	Leonard Fawcett	SD	1984
Carl Odegard	MT	1982	Fred & Lee Kummerfeld	WY	1984

Raymond Josephson	ND	1982
Clarence Reutter	SD	1982
Leonard Bergen	CAN	1983
Kent Brunner	KS	1983
Tom Chrystal	IA	1983
John Freitag	WI	1983
Eddie Hamilton	KY	1983
Bill Jones	MT	1983
Harry & Rick Kline	IL	1983
Charlie Kopp	OR	1983
Duwayne Olson	SD	1983
Ralph Pederson	SD	1983
Ernest & Helen Schaller	MO	1983
Al Smith	VA	1983
John Spencer	CA	1983
Bud Wishard	MN	1983
Bob & Sharon Beck	OR	1984
Norman Coyner & Sons	VA	1984
Franklyn Esser	MO	1984
Gary Johnson	KS	1986
Ralph G. Lovelady	AL	1986
Ramon H. Oliver	KY	1986
Kay Richardson	FL	1986
Mr. & Mrs. Clyde Watts	NC	1986
David & Bev Lischka	CAN	1986
Edgar Lewis	MT	1984
Boyd Mahrt	CA	1984
Don Moch	ND	1984
Neil Moffat	CAN	1984
William H. Moss, Jr.	GA	1984
Dennis P. Solvie	MN	1984
Robert P. Stewart	KS	1984
Charlie Stokes	NC	1984
Milton Wendland	AL	1985
Bob & Sheri Schmidt	MN	1985
Delmer & Joyce Nelson	IL	1985
Harley Brockel	SD	1985
Kent Brunner	KS	1985
Glenn Harvey	OR	1985
John Maino	CA	1985
Ernie Reeves	VA	1985
John E. Rouse	WY	1985
George & Thelma Boucher	CAN	1985
Kenneth Bentz	OR	1986
Dennis & Nancy Daly	WY	1986
Carl & Fran Dobitz	SD	1986
Charles Fariss	VA	1986
David J. Forster	CA	1986
Danny Geersen	SD	1986

1987

Oscar Bradford	AL	1987
R. J. Mawer	CAN	1987
Rodney G. Oliphant	KS	1987
David A. Reed	OR	1987
Jerry Adamson	NE	1987
Gene Adams	GA	1987
Hugh & Pauline Maize	SD	1987
P. T. McIntire & Sons	VA	1987
Frank Disterhaupt	MN	1987

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 Crame	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
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 & 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 & Joann James	IA	1979
Leo Schuster Family	MN	1979
Bill Wolfe	OR	1979
Jack Ragsdale	KY	1979
Floyd Mette	MO	1979
Glenn & David Gibb	IL	1979
Peg Allen	MT	1979
Frank & 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

M. D. Shepherd	ND	1976
Lowellyn Tewksbury	ND	1976
Charlie Richards	IA	1980
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 Denown	MT	1981
Dwight Houff	VA	1981
G. W. Cornwell	IA	1981
Bob & Gloria Thomas	OR	1981
Roy Beeby	OK	1981
Herman Schaefer	IL	1981
Myron Aultfather	MN	1981
Jack Ragsdale	KY	1981
W. B. Williams	IL	1982
Garold Parks	IA	1982
David A. Breiner	KS	1982
Joseph S. Bray	KY	1982
Clare Geddes	CAN	1982
Howard Krog	MN	1982
Harlin Hecht	MN	1982
Willard Kottwitz	MO	1982
Larry Leonhardt	MT	1982
Frankie Flint	NM	1982
Gary & Gerald Carlson	ND	1982
Bob Thomas	OR	1982
Orville Stangl	SD	1982
C. Ancel Armstrong	KS	1983
Bill Borror	CA	1983
Charles E. Boyd	KY	1983
John Bruner	SD	1983
Leness Hall	WA	1983
Ric Hoyt	OR	1983
E. A. Keithley	MO	1983
J. Earl Kindig	MO	1983
Jake Larson	ND	1983
Harvey Lemmon	GA	1983
Frank Myatt	IA	1983
Gerald E. Hoffman	SD	1986
Delton W. Hubert	KS	1986
Dick & Ellie Larson	WI	1986
Leonard Lodden	ND	1986
Ralph McDanolds	VA	1986
Roy D. McPhee	CA	1986
W. D. Morris & James Pipkin	MO	1986
Clarence Van Dyke	MT	1986
John H. Wood	SC	1986
Evin & Verne Dunn	CAN	1986

Blythe Gardner	UT	1980
Richard McLaughlin	IL	1980
Stanley Nesemeier	IL	1983
Russ Pepper	MT	1983
Robert H. Schafer	MN	1983
Alex Stauffer	WI	1983
D. John & Lebert Shultz	MO	1983
Phillip A. Abrahamson	MN	1984
Rob Bieber	SD	1984
Jerry Chappell	VA	1984
Charles W. Druin	KY	1984
Jack Farmer	CA	1984
John B. Green	LA	1984
Ric Hoyt	OR	1984
Fred H. Johnson	OH	1984
Earl Kindig	VA	1984
Glen Klippenstein	MO	1984
A. Harvey Lemmon	GA	1984
Lawrence Meyer	IL	1984
Donn & Sylvia Mitchell	CAN	1984
Lee Nichols	IA	1984
Clair K. Parcel	KS	1984
Joe C. Powell	NC	1984
Floyd Richard	ND	1984
Robert L. Sitz	MT	1984
Ric Hoyt	OR	1985
J. Newbill Miller	VA	1985
George B. Halterman	WV	1985
Davis McGehee	KY	1985
Glenn L. Brinkman	TX	1985
Gordon Booth	WY	1985
Earl Schafer	MN	1985
Marvin Knowles	CA	1985
Fred Killam	IL	1985
Tom Perrier	KS	1985
Don W. Schoene	MO	1985
Everett & Ron Batho & Families	CAN	1985
Bernard F. Pedretti	WI	1985
Arnold Wienk	SD	1985
R. C. Price	AL	1985
Clifford & Bruce Betzold	IL	1986
Glenn L. Brinkman	KS	1986
Jack & Gini Chase	WY	1986
Henry & Jeannette Chitty	FL	1986
Lawrence H. Graham	KY	1986
A. Lloyd Grau	NM	1986
Mathew Warren Hall	AL	1986
Richard J. Putnam	NC	1986
Robert J. Steward & Patrick C. Morrissey	OR	1986
Leonard Wulf	MN	1986

1987

Charles & Wynder Smith	GA	1987	Harold E. Pate	AL	1987
Lyall Edgerton	CAN	1987	Forrest Byergo	MO	1987
Tommy Branderberger	TX	1987	Clayton Canning	CAN	1987
Henry Gardiner	KS	1987	James Bush	SD	1987
Gary Klein	ND	1987	Robert J. Steward & Patrick C. Morrissey	OR	1987
Ivan & Frank Rincker	IL	1987	Eldon & Richard Wiese	MN	1987
Larry D. Leonhardt	WY	1987			

Commercial Producer of the Year

Chan Cooper	MT	1972	Bert Hawkins	OR	1979
Pat Wilson	FL	1973	Jeff Kilgore	MT	1980
Lloyd Nygard	ND	1974	Henry Gardiner	KS	1981
Gene Gates	KS	1975	Sam Hands	KS	1982
Ron Baker	OR	1976	Al Smith	VA	1983
Steve & Mary Garst	IA	1977	Bob & Sharon Beck	OR	1984
Mose Tucker	AL	1978	Glenn Harvey	OR	1985
			Charles Fariss	VA	1986

1987

Rodney G. Oliphant KS 1987

Seedstock Breeder of the Year

John Crowe	CA	1972	Jim Wolf	NE	1979
Mrs. R. W. Jones	GA	1973	Bill Wolfe	OR	1980
Carlton Corbin	OK	1974	Bob Dickinson	KS	1981
Leslie J. Holden	MR	1975	A. F. "Frankie" Flint	NM	1982
Jack Cooper	MT	1975	Bill Borror	CA	1983
Jorgensen Brothers	SD	1976	Lee Nichols	IA	1984
Glenn Burrows	NM	1977	Ric Hoyt	OR	1985
James D. Bennett	VA	1978	Leonard Lodoen	ND	1986

1987

Henry Gardiner KS 1987

Ambassador Award

Warren Kester Beef Magazine MN 1986

1987

Chester Peterson Simmental Shield KS

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	Research	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. Curtis 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. L. 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
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
Mr. & Mrs. Percy Powers	Texas		1982
Gordon Dickerson	Nebraska		1982
Jim Elings	California		1983
Jim Sanders	Nevada		1983
Ben Kettle	Colorado		1983
Carroll O. Schoonover	Univ. of Wyoming		1983
W. Dean Frischknecht	Oregon State Univ.		1983
Bill Graham	Georgia		1984
Max Hammond	Florida		1984
Thomas J. Marlowe	VPI&SU		1984
Mick Crandell	South Dakota State Univ.		1985

Mel Kirkiede	North Dakota State Univ.	1985
Charles R. Henderson	Cornell University (Retired)	1986
Everett J. Warwick	USDA-ARS (Retired)	1986

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Glenn Burrows	New Mexico	1987
Carlton Corbin	Oklahoma	1987
Murray Corbin	Oklahoma	1987
Max Deets	Kansas	1987

Continuing Service Awards

Clarence Burch	Oklahoma	1972	C. K. Allen	Am. Angus Assn.	1979
F. R. Carpenter	Colorado	1973	Wm. Durfey	NAAB	1979
E. J. Warwick	ARS-USDA, Wash,DC	1973	Glenn Butts	PRI	1980
Robert De Baca	Iowa State	1973	Jim Gosey	Univ. Neb.	1980
Frank H. Baker	Okla. State	1974	Mark Keffeler	South Dakota	1981
D. D. Bennett	Oregon	1974	J. D. Mankin	Idaho	1982
Richard Willham	Iowa State	1974	Art Linton	Montana	1983
Larry V. Cundiff	RLHUSMARC	1975	James Bennett	Virginia	1984
Dixon D. Hubbard	USDA-FES, Wash,DC	1975	M. K. Cook	Univ. of GA	1984
J. David Nichols	Iowa	1975	Craig Ludwig	Am. Hereford	1984
A. L. Eller, Jr.	VPI&SU	1976		Assn.	1984
Ray Meyer	South Dakota	1976	Jim Glenn	IBIA	1985
Don Vaniman	Montana	1977	Dick Spader	Am. Angus Assn.	1985
Lloyd Schmitt	Montana	1977	Roy Wallace	Select Sires	1985
Martin Jorgensen	South Dakota	1978	Larry Benyshek	Univ. of GA	1986
James S. Brinks	Col. State	1978	Ken W. Ellis	Univ. of CA Davis	1986
Paul D. Miller	Am. Breeding Svc., WI	1978	Earl Peterson	Am. Simm. Assn.	1986

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Bill Borror	California	1987	Jim Gibb	Am. Polled Hereford Assn.	1987
Daryl Strohbehn	Iowa State	1987			

Organizations of the Year

Beef Improvement Committee, Oregon Cattlemen's Association	1972
South Dakota Livestock Production Records Association	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 Association (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 Association	1978
The Iowa Beef Improvement Association (BCIA)	1979

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1987 BIF COMMERCIAL PRODUCER OF THE YEAR NOMINEES

1. **GENE ADAMS** - Gene Adams Farms, Norman Park, Georgia. Nominated by Georgia Cattlemen's Association. Forty years in commercial cattle business with 200 F-1 Brahman X Hereford cows and 50 Herefords. The Herefords are kept to produce F-1 replacement heifers. The F-1 Brahman X Hereford cows are bred to Angus bulls. All cows are bred naturally to performance tested sires. Calves are born December thru March. Calves are sold as yearling feeders directly off the farm. Fifteen years of performance testing have led to a 7 percent increase in calf crop and a 170 pound increase in weaning weight. Served as President of Tift County Cattlemen's Association, Georgia Commercial Cattleman of the Year Award, February 1987, 1973 Man of the Year in Soil and Water Conservation from Colquitt County, Master Farm Family of Colquitt County 1964, Baldwin College Master Farmer 1954.

2. **JERRY ADAMSON** - Rocking J Ranch, Cody, Nebraska. Nominated by American Chianina Association. Has been in cattle business for twenty-one years. Cow herd has more than doubled and grown from a straight-breed English breed herd to an English crossbreeding program to the present multi-breed cross breeding program. The 1650 cow herd has used performance records to select herd bulls for seventeen years and has culled the cow herd on performance for twenty years. Calves are born in spring and fall. Steer calves are sold at weaning to a feeder that markets branded beef. Heifers are wintered, part are retained as replacements, part are finished at a commercial feedlot. Natural sires come from central test stations. AI is used to improve performance. Weaning weights have increased 145 pounds in twenty years. Chairman of Board of the American Chianina Association, President of Sandhills Cattle Association, member Board of Directors National Cattlemen's Association, 1955 Nebraska Stock Growers Association Youth of the Year, 1974 Valentine Jaycees top rancher in Cherry County, 1974 Jaycees Nebraska Outstanding Young Rancher in Livestock Breeding, 1976 4-H Leader Award in beef, 1984 Knight of Ak-Sar-Ben Agriculture Achievement Award.

3. **OSCAR BRADFORD** - Greenview Farm, Cullman, Alabama. Nominated by Alabama Beef Cattle Improvement Association. Thirty-two years in commercial cattle business. One-hundred and forty cow herd is 90% straight bred Angus. Top cows are bred to Angus bulls - remaining herd are bred to Simmental, Limousin, and Beefmaster. Calves are dropped October thru December. All cows are bred naturally to performance tested sires. Fifty percent of calves are fed and sold as finished cattle, twenty percent sold as F-1 replacement females and thirty percent retained as herd replacements. Director of the Alabama Beef Cattle Improvement Association, the Alabama Angus Association and the Alabama Cattlemen's Association. Member of the Cullman County Extension Council, the Auburn Legislative Committee, Farm Family of the Year 1983.

4. **FRANK DISTERHAUPT** - Pillager, Minnesota. Nominated by Minnesota Beef Cattle Improvement Association. Through the use of superior performance tested Angus sires, the herd has been upgraded to one of the top commercial Angus herds in Minnesota. All roughage and grain is produced on the ranch. All calves are sold as feeders and have brought top prices in the Minnesota Cattlemen's Association feeder calf sales, South Dakota feeder sales, and by private treaty. Calves do not receive creep feed because of its cost and the philosophy that roughage should be converted to fast calf growth and milk production. Cows are culled for productivity as measured by conception rate and calf weaning weights. The cow herd's conception rate has increased by 20 percent and the calves' weaning weight by 220 pounds over the past 23 years. He has served as an officer of the Minnesota Cattlemen's Association and was recognized as the 1986 Minnesota Commercial Beef Performance Man of the Year.

5. **STEVE HENSHAW** - Green Ridge Farm, Sturgis, Kentucky. Nominated by the Kentucky Beef Cattle Association. Commercial cattle business 17 years with 75 commercial cows. Uses cross breeding with Angus and Simmental. Has used performance records and sire summaries to select herd bulls and cull cow herd for 17 years. Uses natural service primarily with limited AI. Calves March thru April. Weaning weights have increased over 200 pounds with a 90%-95% calf crop. Calving season has been reduced to sixty days. Served as Director of the Kentucky Beef Cattle Association, Director of the Union County Beef Cattle Association, Director of Soil Conservation District Board, Director of the Union County ASC, Director of the Farm Bureau and featured in Kentucky Cattlemen Magazine.

6. **P. T. MCINTIRE & SONS** - White Post, Virginia. Nominated by Virginia Beef Cattle Improvement Association. Commercial cattle business for 37 years. Operates 530 cow herd - 130 registered Angus. Market the produce of their commercial operation in three or four segments. Weaned calves, including a very successful club calf sale each fall - yearling feeder cattle and finished cattle. Angus bulls via AI on the seedstock herd produce all of the bulls for the commercial herd with the exception of some 3/4 Chianina cross bulls that are also produced in their breeding system. Their excellent use of performance testing procedures for the past 16 years has increased weaning and yearling weights over 100 pounds. P. T. has served as President of the Virginia Cattlemen's Association and managed the feeder cattle sales at Winchester for a long period of time. He was honored as the Virginia Cattle Industry Cattleman of the Year in 1980. Doug has served as President of Virginia Angus Association and has served on the Board of the Virginia Beef Cattle Improvement Association as well as other committees of this organization and has been recipient of the Clark County Young Farmer of the Year Award.

7. **HUGH & PAULINE MAIZE** - Maize Gelbvieh, Lebanon, South Dakota. Nominated by South Dakota Beef Cattle Improvement Association. Twenty-six years in cattle business. Two-hundred and fifty crossbred brood cows. Handles 350 stockers annually. Hereford X Limousin cows are bred artificially to Gelbvieh sires to produce terminal cross. Calving season is March 20 thru May 20. Calves are marketed as yearling feeders. Performance records have been used to select herd bulls for six years and to cull the cow herd for fifteen. Total beef production has increased 29% over this period. Director of the South Dakota Beef Cattle Improvement Association, President of the Pottee County Livestock Association, South Dakota Rangeman of the Year 1982, South Dakota Beef Cattle Improvement Association Commercial Producer of the Year 1986.

8. **RODGER MAWER** - Spring Valley Limousin, Alexander, Manitoba. Nominated by Manitoba Agriculture, Winnipeg, Manitoba, Canada. Twenty-one years in commercial cattle business with 90 crossbred cows. Fifteen years on performance testing program. Their crossbred herd is Limousin, Angus and Angus-Simmental. In six years, weaning weight has increased 125 pounds for males and 80 pounds for females. Winner of 1986 Manitoba Beef Cattle Performance Award Commercial category. Spoke on R.O.P. at 1986 Beef Cattle Seminar. Served 2 years on board Manitoba Limousin Association, two years on Regional Development Board, Rivers, Manitoba.

9. **RODNEY OLIPHANT** - Oliphant Ranch, Offerle, Kansas. Nominated by Kansas Livestock Association Purebred Council. Seventeen years in cattle business, 525 commercial cows. Handles 2000 stocker calves annually. Cow herd is crossbred using Angus, Hereford, Simmental, Gelbvieh, Salers. Top cows are bred AI, natural sires come from central test stations. Calves spring and fall. Calves are fed on farm and sold as fat cattle. Has used performance records to select herd bulls for 8 years and to cull cow herd for 12 years. Weaning weight has increased 175 pounds and average daily gain .5 pounds per head per day on calves sold as fat cattle. Member of the

   Kansas Livestock Association, American Hereford Association, National Cutting Horse Association, Kansas Cutting Horse Association, American Quarter Horse Association, Kansas Quarter Horse Association, American Veterinary Medical Association, Kansas Veterinary Medical Association, American Association of Bovine Practitioners, American Association of Equine Practitioners, Society of Theriogenology Academy of Veterinary Feedlot Consultants.

10. **DAVID A. REED** - Reed Ranch, Burns, Oregon. Nominated by Oregon Cattlemen's Association Beef Improvement Committee, Corvallis, Oregon. Forty-six years in commercial business, 400 commercial cows, crossbreeding program using Red Angus, Polled Hereford, Polled Shorthorn. Calves February thru April. Markets calves as yearling feeders. All cows bred naturally to performance tested sires. Has used performance records to cull cow herd for thirty years. Weaning weights have increased 80 pounds, yearling weight 200 pounds over the last twenty years. Honored in 1965 as Grassman of the Year and in 1968 as Outstanding Young Farmer.

1987 BIF SEEDSTOCK PRODUCER OF THE YEAR NOMINEE

1. **TOMMY BRANDENBERGER** - Manager, Cuarenta Ranch, Muldoon, Texas. Nominated by Beefmaster Breeders Universal. Eleven years in seedstock business with 300 registered Beefmasters and 500 cow commercial herd. Has been on Beefmaster Breeders Universal's performance program for nine years. Increased percent calf crop by 21 percent, weaning weight of bull calves by 52 pounds, heifers 42 pounds and increased yearling weight of bulls by 271 pounds. Uses AI and embryo transfers to speed up genetic progress. Chairman of Fayette County Beef Cattle Committee, Chairman of the Beefmaster Breeders Universal Junior Programs Committee, member of Beefmaster Breeders Universal Breed Improvement Committee, 1986 Beefmaster Breeders Universal Breeder of the Year.

2. **THE JAMES BUSH FAMILY** - Bush Angus, Britton, South Dakota. Nominated by South Dakota Beef Cattle Improvement Association. Has been in seedstock business for sixty years. Cow herd of 105 Angus. Ninety percent of herd is bred AI to sires selected from National Sire Summary. Market breeding stock in their performance production sale. Has been on performance testing program for twenty-nine years. Uses computer to handle records. Ninety-eight percent calf crop, weaning weights have increased 240 pounds, yearling weights 310 pounds. President of the County Livestock Improvement Board, Outstanding Farmer Award Marshall County, President South Dakota Angus Association, named 1986 Seedstock Producer of the Year by South Dakota Beef Cattle Improvement Association.

3. **FORREST BYERGO** - Byergo's Angus, Barnard, Missouri. Nominated by Northwest Missouri Beef Improvement Association. Farm has been in seedstock business for thirty-eight years. Currently with 120 registered Angus cows. Fourteen years on Missouri BCIA and AHIR ten years. Sells forty-five bulls per year with 90% going to commercial herds. Uses AI and embryo transfer to improve genetically. Uses sire summaries to select sires. Has several bulls in National Sire Evaluation programs. Tests bulls on farm and at several central test stations. President Northwest Missouri Angus Association, President of Northwest Missouri Beef Improvement Association, Northwest Missouri Beef Improvement Association Seedstock Producer of the Year 1980, 1986 Missouri Beef Improvement Association Seedstock Producer of the Year.

4. **CLAYTON CANNING** - Prairielane Farms, Souris, Manitoba, Canada. Nominated by Canadian Advisory Board for Beef Cattle Improvement. Over forty years in seedstock business with 175 registered Angus. Spring calving. Seventy percent of herd is bred AI to sires selected from national sire summaries. Herd sires came from central test stations. Has consigned bulls to central test stations for over twenty years. Several Prairielane bulls are involved in National Sire Evaluation programs. Used performance records for 16 years. Increased weaning weight 93 pounds and yearling weight 170 pounds. Served two terms as President of Manitoba Angus Association, Director Manitoba Beef Cattle Performance Association. Leader Hartney 4-H Club, Director Souris Agriculture Society, 1980 winner Manitoba Premier Beef Producer Award, 1987 Canadian Beef Cattle Performance Award.

5. **BRUCE DAVIS** - Davista Angus Farm, Midway, Kentucky. Nominated by Kentucky Beef Cattle Association. Thirty-two years in registered Angus business. Uses National Sire Summaries and National Sire Evaluation data to select sires. Has consigned bulls to central test stations for twenty-five years having a number of top performing bulls. Committee member Kentucky Beef Cattle Association performance division. Board member Kentucky Angus Association, founder of Performance Source.

6. **LYALL EDGERTON** - Botany Angus Farm, Souris, Manitoba. Nominated by Manitoba Agriculture, Winnipeg, Manitoba, Canada. Herd consists of 65 Angus cows. Eleven years on performance testing program. Heifer weaning weights have increased 87 pounds, yearling weights 283 pounds, Bull weaning weights by 57 pounds and yearling weights 162 pounds. Uses performance tested bulls and limited AI. Regularly consigns bulls to central test stations. 4-H leader for 13 years, member Board of Directors Douglas Test Station, member Board of Directors Manitoba Aberdeen Angus Association, 1986 Manitoba Beef Cattle Performance Award Winner Purebred category.

7. **HENRY GARDINER** - Gardiner Angus Ranch, Ashland, Kansas. Nominated by Kansas Livestock Association Purebred Council. Seedstock business for 36 years. Two-hundred cow registered herd, 450 cow commercial herd. Breeds 100% of registered herd AI using high ranking bulls in the Angus sire evaluation report. Calves September 1 to November 10. Bulls are put on 100-day on-the-ranch feed test. Steer calves are fed in commercial feedlot. Ownership is retained until slaughter. Twenty-two years on performance testing program. Weaning weight has increased 200 pounds during this time. Member Board of Directors American Angus Association, Chairman of Angus Association Breed Improvement Committee, Director National Cattlemen's Association, President of Performance Registry International, President Kansas Angus Association, President of Beef Improvement Federation, 1981 BIF Commercial Breeder of the Year, 1985 Kansas State University Block & Bridle Outstanding Stockman, 1982 President Livestock and Meat Industry Council, PRI Commercial Breeder Award 1977.

8. **GARY KLEIN** - C-C Ranch, New Rockford, North Dakota. Nominated by North Dakota Beef Cattle Improvement Association. Fifteen years in seedstock business. Herd consists of 182 Tarentaise cows. Fourteen years on performance testing program. Breeds one-third of herd AI. Uses national sire summaries to select sires. Uses central tests to compare his bulls to other breeds. Bulls weaning weights have increased 189 pounds and yearling weights 218 pounds. Heifer weaning weights have increased 170 pounds and yearling weights 181 pounds. Winner 1986 North Dakota Top Seedstock Producer of the Year, President North Dakota Tarentaise Association North Dakota Purebred Council, Chairman of Performance Committee American Tarentaise Association, Vice President American Tarentaise Association 1981 through 1986, North Dakota Tarentaise Breeder of the Year, 1987 American Tarentaise Association Gold Trophy Breeder Award.

9. **LARRY D. LEONHARDT** - Shoshone Angus, Cowley, Wyoming. Nominated by Wyoming Beef Cattle Improvement Association. Three hundred registered Angus cows. Twenty-one years on performance program. Calves mid-February through April. Sells 100 bulls annually, most going to commercial producers - at private treaty. Makes limited use of AI sires as selected from national sire summaries. Herd has been closed to outside females since 1971. Thirty-six Shoshone bred sires are listed in the 1986 Angus sire evaluation report. Director, Midland Empire Angus Association, Director Wyoming Beef Cattle Improvement Association, member Wye Advisory Panel, University of Maryland, 1982 Montana Angus Association Seedstock Producer of the Year.

10. **ROBERT J. STEWARD & PATRICK C. MORRISSEY** - Steward & Morrissey, Inc., Baker, Oregon. Sixteen years in the seedstock business with base herd of 250 registered Limousin cows. Sixteen years with records in North American Limousin Foundation program. Calves a split season fall and spring. Sells 175 bulls annually with 98% going to commercial breeders with full performance data. Mostly private treaty sales. All cows bred natural service, utilizing performance data to select herd sires. Several bulls owned are in Limousin National Sire Summary. Bob Steward has served as NALF Board member and Northwest Limousin Association board member. Pat Morrissey has served as Northwest Limousin Association board member. Patrick Morrissey received

special President's Award from Morgan Cattlemen's Association. Bob Steward received Oregon Department of Agriculture Distinguished Service Award and NALF Outstanding Service Award and Diamond Pioneer Career Agricultural Achievement Registry OSU.

11. **HAROLD E. PATE** - Pate Ranch, Burkeville, Alabama. Nominated by Alabama Beef Cattle Improvement Association. Twenty years in purebred business. One-hundred forty-four cows comprise three herds - Charolais, Simmental, Limousin. Used performance records for twenty-five years. AI sires selected from National Sire Summaries. Natural sires are all from central test stations. Has consigned bulls to central test stations for fifteen years producing several top gaining bulls. Board of Directors; Secretary and Treasurer, Vice-President and President of Alabama BCIA, Director of American International Charolais Association, Director of Alabama Simmental Association, 1977 Alabama Cattleman of the Year.

12. **IVAN & FRANK RINCKER** - Strasburg, Illinois. Nominated by Illinois Beef Association and Illinois Cooperative Extension Service. On Polled Hereford seedstock business for forty-five years with a herd of 100 cows. Calves spring and fall. Half herd bred AI to sires selected from National Sire Summary. Natural sires are selected according to performance records. All bull calves are tested either on the farm or at central test stations. Several Rincker bulls have been involved in National Sire Evaluation programs. Have kept performance records for twenty-one years. Over ninety percent calf crop. Increased weaning weights 91 pounds and yearling weights 200 pounds. Member of committee that started Illinois performance bull sale. Director of Illinois Hereford Association, President Illinois Hereford Association 1985, Chairman of Illinois Purebred Bull Council, Illinois Purebred Seedstock Award 1986.

13. **CHARLES & WYNDER SMITH** - W. P. Smith & Sons Farm, Wadley, Georgia. Nominated by Georgia Cattlemen's Association. Herds consist of 300 Angus and 300 Polled Herefords. Seventy-five percent of herd is bred AI. Embryo transfers are used to speed up genetic progress. Sixteen years in seedstock business. Five years on performance testing program. Use computer to manage cattle records. Weaning weights have increased by 50 pounds. Regularly consign bulls to central test stations. Member Board of Directors Georgia Angus Association. Member Georgia Cattlemen's Association, member National Cattlemen's Association. 1968 Man of the Year Briar Creek Soil Conservation District.

14. **ELDON & RICHARD WIESE** - Flying W Ranch, Pequot Lakes, Minnesota. Nominated by Minnesota Beef Cattle Improvement Association. Thirty-six years in the seedstock business with Angus and Hereford herds. National sire summaries are used to select AI sires. Spring calving season. Most bulls tested on the farm. Some tested through Minnesota central test station. Fourteen years on performance program. Calf crop percentage has increased 10 percent. Weaning weight has increased 200 pounds, yearling weight 300 pounds. Produce is marketed through on farm production sale. Eldon has been Director and President of the Minnesota Cattlemen's Association, Director of the Minnesota Beef Council and Minnesota Beef Cattle Improvement Association. Richard has been Director and Treasurer of the Minnesota Cattlemen's Association. Eldon has received the Minnesota BCIA Commercial Beef Performance Man of the Year Award and National BIF Commercial Cattlemen Award. Eldon and Richard were honored as 1986 MBCIA Purebred Beef Performance Men of the Year.

1987 BIF SEEDSTOCK PRODUCER OF THE YEAR

The Gardiner Family - Mark, Henry, Nan, Greg and Garth (l - r). Roger McCraw (l), BIF Executive Director and Harvey Lemmon (r), BIF President.

1987 BIF COMMERCIAL PRODUCER OF THE YEAR

The Oliphant Family - Rodney, Kay, Debra and David (l - r). Roger McCraw, BIF Executive Director (l) and Harvey Lemmon, BIF President (r).

BIF SEEDSTOCK PRODUCER OF THE YEAR

HENRY GARDINER

With credits to his name like Kansas Angus Association President, Performance Registry International President, Livestock and Meat Industry Council President, Beef Improvement Federation (BIF) President, BIF Commercial Producer of the Year in 1981, and comments like, "It's more fun to breed cattle now than it was 20 or 30 years ago," it's no wonder Henry Gardiner has been booked for 10 to 20 speaking engagements each year for the past 5 years. And his enthusiasm for the livestock industry has earned him the 1987 BIF Seedstock Producer of the Year Award.

Henry Gardiner is part owner and manager of Gardiner Angus Ranch, a 12,000 acre dryland ranch near Ashland, Kansas. His wife, Nan, their three sons and two full-time employees make up the labor force which oversees 5,000 cultivated acres, 7,000 acres of native grass, 250 registered Angus females and over 400 commercial females.

Their breeding program is 100% AI to high ranking bulls in the Angus sire evaluation report. Clean up bulls are used only on some commercial cows, and all calves are born in the fall.

Gardiner is continually testing his cattle and analyzing his records. He conducts a progeny test on his steers, collecting feedlot gain and carcass data which is then sent to the American Angus Association. And because carcass characteristics are becoming more important, he has also studied the heritability of carcass traits and has added that to his selection criteria.

A rather unique aspect of the Gardiner operation is the use of service capacity scores, which have been recorded on all bulls for the past two years and are provided, along with complete performance data, to buyers at the Gardiner's annual production sale.

The genetic improvement in the Gardiner Angus herd has been steady and outstanding. Their reputation for producing quality cattle has spread across the country, as is evidenced by their most recent sale. The bulls alone averaged $2,697, and the entire sale averaged $1,986 as buyers from ten states took home cattle from the Gardiner ranch.

While improving his own herd, Henry Gardiner has made invaluable contributions to the Angus breed and to the livestock industry.

BIF COMMERCIAL PRODUCER OF THE YEAR

RODNEY OLIPHANT

The Beef Improvement Federation's 1987 Commercial Producer of the Year is Rodney Oliphant, rancher and veterinarian from Offerle, Kansas. Oliphant entered the cattle business 17 years ago when he purchased 100 commercial Hereford cows and 320 acres from his father. His operation has since increased to include over 500 cows, 2,000 yearlings and 10,000 acres of farm and ranch land.

In 1976, Oliphant began crossbreeding, incorporating Simmental cattle into his Hereford herd, as well as experimenting with Salers and Gelbvieh. Angus were added into the program about six years ago. Currently 70% of his cow herd is Hereford-Simmental cross being bred to Angus bulls, and the rest are Angus-Hereford-Simmental cross being bred back to Simmental bulls.

Primarily a spring calving operation, most of the breeding is done by natural service, although Oliphant places his top 50 cows in an AI program using Gelbvieh, Salers, Simmental, Hereford and Angus bulls for the purpose of gaining direction for the breeding program in future years.

Oliphant has made improvements in sire selection, culling and herd health programs, has limited his breeding season to 60 days and uses a cost efficiency analysis to make decisions on feeding. He has seen his weaning weights increase nearly 150 lbs. in the past ten years. His goal now is to improve the quality of his cattle.

Dr. Oliphant has spoken to state livestock associations and veterinary medical associations on herd health and management programs. He belongs to and is active in several professional organizations and operates a busy two clinic veterinary practice employing three veterinarians. Dr. Oliphant also consults for ten large commercial feedyards and is active in numerous community and church activities.

<u>1987 BIF CONTINUING SERVICE AWARDEES</u>

Jim Gibb (l), Daryl Strohbehn (3rd from l), and Bill Borror (not pictured). Harvey Lemmon (2nd from l), BIF President and Roger McCraw (r), BIF Executive Director.

1987 BIF CONTINUING SERVICE AWARD

JIM GIBB

Dr. Jim Gibb, director of education and research for the American Polled Hereford Association, Kansas City, MO., has received the Continuing Service Award from the Beef Improvement Federation (BIF).

BIF made the presentation during the organization's annual meeting, April 29-30 and May 1, in Wichita, Kansas. The award recognized Gibb's long-time leadership and support of BIF and its principles of performance records in beef cattle breeding.

Gibb, 35, has directed APHA's performance program and educational activities since 1982. He was instrumental in starting the association's national sire summary and has guided the publication of six editions of the summary. He has given numerous presentations at conferences, extension meetings and field days throughout the U.S. and Canada. He presented an invited paper at the 9th World Hereford Conference in 1984 in New Zealand, and was co-author of an invited paper on beef cattle breeding systems at the World Genetics Conference in Lincoln, Neb., in 1986. The World Hereford Conference paper addresses the issue of embryo transfer and the extent of its use and potential for genetic change.

He has served as a director of BIF since 1982 and is currently serving as chairman of its Systems Committee. He's a member of the American Society of Animal Science and Alpha Zeta.

The honoree is a native of Illinois, where he received his undergraduate degree from the University of Illinois. He completed his Masters and Doctorate degrees at Colorado State University, where he coached the livestock judging team and was in charge of the teaching herds' performance records program. From 1979 to 1982 he was assistant professor of beef production and management in the Animal Science Department at the University of Illinois.

Gibb's primary responsibilities at APHA involve coordinating the breed's in-herd performance testing program (Guide Lines), young sire testing program, national sire evaluation and national cow evaluation and recognition. He works with Polled Hereford breeders in educational programs concerning performance testing and herd management and gives leadership to the APHA youth educational programs.

He and his wife Helen are the parents of one daughter, Melinda.

1987 BIF CONTINUING SERVICE AWARD

DARYL STROHBEHN

Dr. Daryl R. Strohbehn, Iowa State Extension Specialist, has received the Continuing Service Award from the Beef Improvement Federation (BIF).

The award was presented at the annual BIF Convention in Wichita, Kansas, April 29 thru May 1. The award recognized Dr. Strohbehn's long-time leadership and support of BIF and its principles of performance records in beef cattle breeding.

Dr. Strohbehn was born August 15, 1948 in Waterloo, Iowa. He was reared on a general livestock farm near Buckingham, Iowa and graduated from Geneseo High School in 1966. He attended Iowa State University and received the B.S. degree in Animal Science in 1970. He pursued his graduate studies in animal breeding at Michigan State University and received the M.S. in 1972, was awarded a Ph.D. degree 1974.

Following graduation, Dr. Strohbehn joined the Animal Science Department at Iowa State University as an assistant professor. He was promoted to associate professor in 1979 and to professor in 1985. Dr. Strohbehn serves as State Extension Specialist with major emphasis on genetic improvement in beef cattle and beef cattle production - management systems.

Dr. Strohbehn's major areas of program emphasis have been: beef cattle breeding and genetic improvement, beef cow nutrition, beef cow reproductive management and weaned calf nutrition and management. Additionally, Dr. Strohbehn has been a leader and an effective team member in the massive effort to develop methods and software to improve decision making in livestock production. He has done significant research in beef cattle production and marketing management and provided invaluable collaborative leadership in beef cattle breeding research in extension programs at Iowa State.

Dr. Strohbehn has served on the Board of Directors of the Iowa Beef Improvement Association and the Iowa Beef Breeds Council. He has served on the marketing committee and the Bull Test Sub-committee of the Iowa Cattleman's Association; the Iowa Winter Beef Expo Committee; the Education Committee of the Iowa Beef Improvement Association; the North Central Regional Specialist Review Committee on Reproductive Survey; advisor to the committee on the merger of the Iowa Cattleman's Association and the Iowa Beef Improvement Association; the Extension Committee on Policy Development for U.S. grazing lands. Additionally, he has served as Regional Secretary of the Beef Improvement Federation, as the reviewing committee chairman and editor of Beef Improvement Federation Fact Sheets, and on many other BIF committees.

Dr. Strohbehn is a member of the American Society of Animal Science, the Iowa Forage and Grassland Council, the Iowa Cattleman's Association, the Iowa Beef Improvement Association and Alpha Zeta honorary.

Dr. Strohbehn has been recognized with the Outstanding Extension Educator Award in 1980, the Dean's Citation for effective team work in 1983, and the Walnut Grove Livestock Service Award in 1984.

Dr. Strohbehn and his wife Cathy have two children, Kay and Garth.

1987 BIF CONTINUING SERVICE AWARD

BILL BORROR

Bill Borror of Tehama Angus Ranch in Gerber, CA was the recipient of a 1987 BIF Continuing Service Award. Bill has been a strong proponent of performance testing cattle and has kept performance records for 34 years. His seedstock cattle are in high demand and his reputation as an honest producer is unquestioned. Bill's production program continues to evolve as knowledge is gained and he has had 12 bulls that have been involved in National Sire Evaluation. In 1983 Bill received the BIF Seedstock Producer of the Year Award.

He is a strong believer in education and research and as such has spent many hours in service to the beef cattle industry. He was a charter member of the California Beef Cattle Improvement Association and has served on its board of directors and as its president. He hosts several college class tours of his ranch annually and always manages to spend time with these classes answering questions and sharing his wisdom.

Bill has served the beef cattle industry in several roles. He is a past president of BIF which he also served as a member of the board of directors, past president of both the Tehama County Cattlemen's Association and the Tehama County Farm Bureau. He was appointed by the Governor and currently serves as a member of the State Board of Food and Agriculture. He has also served the extension and research services of the University of California in several capacities.

Bill was among the first to use the computer in developing and maintaining records on his cattle. He developed a software record-keeping program for purebred cattle which he has marketed on a limited scale.

Because of his close cooperation with UC Davis, and his strong belief in education, he has provided each livestock farm advisor and specialist in Cooperative Extension a copy of his program. The program is used in many areas of the state to teach others the value and importance of performance record-keeping.

Bill's career is characterized by imaginative leadership and service to the beef cattle industry.

1987 BIF PIONEER AWARDEES

Glenn Burrows; Carlton Corbin and Mrs. Geneva Corbin; Murray Corbin and Mrs. Mattie Corbin; and Max Deets and Mrs. Marcelyn Deets. Harvey Lemmon (l), BIF President and Roger McCraw (r), BIF Executive Director.

1987 BIF PIONEER AWARD

GLENN BURROWS

Glenn Burrows received the honor of Seedstock Producer of the Year in 1977 from the Beef Improvement Federation. Now, ten years later, he still lives by his motto of "conserve the water, conserve the grass, and watch the cattle perform."

Glenn raises Polled Hereford cattle on his ranch South of Clayton, New Mexico, continuing a legacy his father started when he homesteaded there in 1904. Glenn got his first Hereford when he was six years old, and has been involved in beef cattle production ever since.

In 1933, he received a degree in Animal Husbandry from Oklahoma A & M and went to work for the Soil Conservation Service. But even during the thirty years he spent with the Soil Conservation Service, all his spare time and money went to the ranch. He and his wife, Missy, have worked on the ranch full time since 1960 when he retired from the Soil Conservation Service.

Glenn started keeping performance records on his herd of Clayton Numode Polled Herefords in 1951 when he started weighing every calf at weaning. He weighs replacement heifers at weaning, in the spring as yearlings, and again in the fall of their second year. Mature cows are weighed in the fall at weaning time.

Glenn boosts that his is one of the few herds of beef cattle in the country that has had weights taken on both the cows and calves continuously since 1955. Today his cattle have a reputation nationwide for performance, fertility and longevity. He was a pioneer in the establishment of the Tucumcari Bull Test and has tested bulls there every year since it started in 1961. He has also tested bulls at several other test stations as well as at home.

Glenn was one of several ranchers who organized the New Mexico Beef Cattle Performance Association in about 1956. He has been an active member of that organization ever since, and has held numerous offices over the years.

His line breeding and inbreeding programs have helped him further refine the economically important traits of his beef herd. In addition, these efforts have led him to develop a line of Polled Hereford cattle he guarantees will solve calving problems while still producing an acceptable beef animal. He calls this line his "Goober Numodes" and castrates any bull calf in that line that weighs over 62 pounds at birth.

One need only travel across the ranch one time to see that Glenn has put to practice all he learned while working with the Soil Conservation Service. He knows that no one can survive with a cow herd without range management. He has reseeded over 2000 acres of his land, and on his ranges many species of grasses flourish that his neighbors never see. Burrows says, "The good Lord gave us the cattle, the moisture, the soil and the grass. It's up to us to take care of it."

1987 BIF PIONEER AWARD

CARLTON CORBIN

A 1987 recipient of the Pioneer Award is Mr. Carlton W. Corbin. He is owner of Stoneybroke Ranch in Fittstown, Oklahoma.

He was born November 1, 1906 in Connerville Indian Territory and raised on a cattle ranch. Mr. Corbin started his formal education at Oklahoma State University where he received a B.S. in Animal Science. He then attended graduate school at Iowa State University. After graduate school he taught for 2 years at Washington State University. He then spent nine years with Producers Commission at Oklahoma City and Kansas City. He also started ranching in 1942 on a ranch called "Stoneybroke."

Mr. Corbin is known as one of the nation's foremost authorities on benefits of Performance Testing. He developed the Emulous line of high performing Angus breeding cattle and he bred the first certified meat sire. He is also a past president of PRI.

Carlton Corbin has been honored several times by Oklahoma State University, once as outstanding graduate of OSU's Animal Science Department and in 1975 he received the Master Breeder Award.

He and his wife Geneva have three children, Virginia, Carlton, Jr. and Mary.

1987 BIF PIONEER AWARD

MURRAY CORBIN

Murray Corbin, owner of the Tail N Ranch near Tishomingo, Oklahoma, was honored by the Beef Improvement Federation (BIF) as a Pioneer Award Winner.

BIF made the presentation during the organization's annual meeting, April 29 thru May 1, in Wichita, Kansas. The award recognized Mr. Corbin's contribution to beef cattle breeding and performance testing.

Mr. Corbin operates the Tail N Ranch with his son Bill and raises Angus cattle. From 1928 to 1933, Murray Corbin was partners in the Tail N Ranch with his brother Carlton. Carlton sold out to Murray and started his own ranch, Stoneybroke Ranch in Fittstown, Oklahoma. The Tail N Ranch cattle were known as big fast growing cattle with excellent carcasses and were composed of the Emulous strain of Angus cattle. In 1969 Murray Corbin sold his entire herd to Ankony Farm.

Mr. Corbin was raised on a cattle ranch and went to college at Oklahoma State University where he graduated in Economics. He was honored as a "Master Breeder" in 1972 by Oklahoma State University. He was also honored at the 1973 First Annual North American Performance Stock Show in Las Vegas, Nevada as the Breeder of the Year.

He and his wife Mattie May have 2 daughters and one son.

1987 BIF PIONEER AWARD

MAX DEETS

Max Deets, Beloit, Kansas, is the recipient of the Beef Improvement Federation's Pioneer Award for 1987. Deets, manager of Solomon Valley Feedlot, Inc. in Beloit, has a lifetime of experience in the livestock industry.

Following graduation from Kansas State University in 1951, he returned to the farm in Sumner County for a few years, then accepted the management position at Ecco Ranch near Buffalo, Kansas. From 1961 to 1969 he was self employed finishing cattle, performance testing bulls and conducting carcass evaluations for the Hereford and Angus Associations, as well as doing sire evaluation work for the Beef Improvement Federation.

Deets has been actively managing Solomon Valley Feedlot, Inc. since its development in 1970, and was involved in initiating the blueprinting and construction of the feedlot. He strives to maintain a people-oriented image in his feedlot, emphasizing the honest efforts of his employees. He regards his business as a "service organization" which is responsible for the care of other people's investments. He feels very strongly about being honest and keeping his customers well informed.

Deets realizes the need to be progressive in keeping up with the changes in the industry. He has played a very instrumental role in the development of the Beloit Bull Test, based at his feedlot since 1971. The 32nd test was recently completed, bringing the total number of bulls tested to more than 10,000. Deets supports the bull test because it is an educational tool that encourages the use of performance information.

Max Deets enjoys his work and applies his energies toward his family, his job and community work. He has been described as a man of "good judgement" who is "industry-minded." He is considered to be a "thoughtful, extremely fair individual who is deeply committed to working for the betterment of the industry."

1987 BIF AMBASSADOR AWARD

CHESTER PETERSON

Chester Peterson, Jr., publisher-editor of the Simmental Shield, Lindsborg, KS., has received the Ambassador Award from the Beef Improvement Federation (BIF) at its annual meeting April 29 thru May 1, in Wichita, Kansas. The award recognized Peterson's effort through written articles to inform and advocate the use of performance testing in the beef industry.

Peterson has been the publisher of the Simmental Shield for 14 years and is President of Sunshine Unlimited, Inc., an advertising agency. He is also an active free-lance writer-photographer with major specialities of agriculture, aviation, business, computers and travel.

He received his degrees at Kansas State University with a B.S. in Agriculture, a B.S. in Agricultural Journalism and an M.S. in Animal Breeding. He's a member of the National Writers Club, American Society of Magazine Photographers, American Ag Editors Association and Livestock Publications Council.

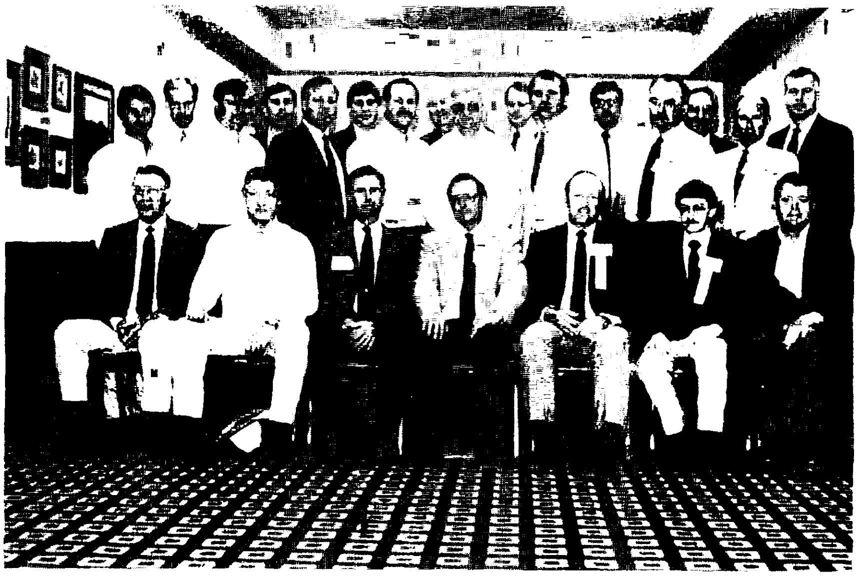
Peterson was Assistant Editor and later Associate Editor of Successful Farming. For nine years he worked as a free-lance writer-photographer covering the entire USA. He started and for 7 years published Kansas Business News.

The honoree wrote his first article on performance testing in the early 60's while with Successful Farming and estimates he has written more than 100 articles on a performance testing theme.

BIF President Harvey Lemmon (r) receives plaque in recognition of his leadership from President-elect Bob Dickinson (l).

NEW OFFICERS AND DIRECTORS

Marvin Nichols, At-Large Director; Jack Chase, Vice President; John Crouch, re-elected Director; Bob Dickinson, President; Roger McCraw, Executive Director; Jim Leachman, Western BCIA Director; Bill Warren, re-elected Director; Harvey Lemmon, Past President.



BIF BOARD OF DIRECTORS

Front Row (seated) - Bill Warren; Jim Leachman; Jack Chase, Vice-President; Bob Dickinson, President; Harvey Lemmon, Past President; Roger L. McCraw, Executive Directors; Marvin Nichols.

Second Row - Darrell Wilkes, NCA; Roy Wallace; Craig Ludwig; Daryl Strohbehn, Central Secretary; Dixon Hubbard, USDA-FES; Keith Vandervelde; Henry Gardiner; John Crouch; Richard Whitman.

Third Row - Jim Gibb; Doug Hixon, Western Secretary; Ron Bolze, Eastern Secretary; Frank Baker; Bruce Howard; Wayne Vanderwert; Larry Cundiff.

Not Pictured - Leonard Wulf.

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