PROCEEDINGS

BEEF IMPROVEMENT FEDERATION

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THE

CONTINENTAL HOTEL

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PROCEEDINGS BEEF IMPROVEMENT FEDERATION

IMPACT CONFERENCE

Edited by Frank H. Baker

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THE BIF CHALLENGE

D. D. Bennett
President

It is a distinct pleasure for me to welcome you to the symposium entitled "New Concepts from Research" and to the Annual Meeting of Beef Improvement Federation.

As we look down the program it appears that program coordinator Larry Cundiff and his committee should be highly commended for their depth of both subject matter and personnel drawn together for this symposium.---The subject titles, I think most of us will agree, focus on some of the major problems in beef improvement today.

The first section of the symposium deals with greater refinement of information. Certainly as we compare the accuracy of performance information and breeding values in beef cattle with accuracy of production information in other businesses or even breeding values in other species we must ask ourselves a very basic question--how good is our information????

It is probably obvious to those of you who direct programs and extension people who work directly with breeders and ranchers that we need to improve the accuracy of input information. But, also, we need to constantly challenge adjustments, subjective grades used and reevaluate methods of measurement. Perhaps we need a new look to progeny testing programs--possibly involving pools of test cows under member organization or federation control.

Following a reevaluation and updating, beef improvement recommendations need to become crystalized for a period to give member organizations an opportunity to become aligned and settled. This was brought out by Curtice Mast in the Virginia report of the state beef cattle improvement reports recently published.

As we go into our evaluation systems and breeding values, I, as a breeder hope we set values that will keep a cowman in business under all kinds of range conditions. I trust that we will not over balance our selection pressure on one or two traits.

Let us just take a minute to refer to traits of varrying heritability but none the less very important.

1st. FERTILITY: We need a cow that will conceive to one service--calve every 12 months or gain a month when asked. She should do this even when feeding conditions are not optimum. A cow needs to go into production at 2 years of age and maintain her productivity until her mouth breaks or about 10 years of age. A healthy herd should wean a 95% calf crop annually.

Bull fertility is equally important. Bulls need to be capable of producing freezable semen at a year of age and go into service as a long yearling. It is important that they be active, virile breeders that go out and spread out over the range. They need to be sound of structure and free from prepuce and scrotal problems.

2nd. MOTHERING ABILITY: A cow needs to have a live calf every year without assistance. Milk adequately under range conditions and maintain abundant milk supply until weaning. Yet we need to guard against problem udders while improving milk supply. Rising labor costs dictate that the cow must be self sufficient apart from her nutritional needs.

3rd. IN TERMS OF GROWTH RATE we need a calf or better yet a calf crop that will weigh at least 600 pounds at weaning; capable of going directly into the feedlot and make efficient profitable gains. Further we need acceptable carcass merit--this steer needs to reach 1050 to 1150 pounds at 12-14 months of age, grade choice and have a yield grade 1 or 2 carcass.

A portion of our cattle today will meet the above qualifications. It is obvious we need to select those that will and multiply them. Our program here today deals with refining our selection systems to better identify the most productive and profitable individuals. The presentation by Will Butts, James Brown and C. J. Brown will contain information that may have an impact on selection criteria or goals in the near future. Dr. Brinks will discuss methods of estimating breeding value. This is an important consideration since the purpose of a sire evaluation program or records of individual performance is to estimate breeding value or transmitting ability. Breeding value ultimately determines whether the impact any bull or heifer has on the herd or breed is favorable or not.

It is gratifying to see the progress we've made in sophistication of programs and the unification of member organizations through B.I.F. However, a recent BIF publication entitled "Roundup of Member Activities" (the report by Frank Baker of the history and development of beef and dairy performance programs in the U.S.) brought out a rather alarming fact. L. A. Maddox in the Texas State BCIA report brought out, and it was apparent in the member organization reports, that we only have a fraction of our cattle population on a testing program.

Traditionally, there has been a great lag period between the time research discoveries and recommendations are made and the time they have an impact on the industry in terms of application. For example R.O.P. research was initiated at the Miles City U.S. Research Livestock Experiment Station in the 1930's and results were reported in the early 1940's, yet R.O.P. programs did not have an impact on the industry until the last decade. To keep pace with increasing costs of production, etc., this lag period must be shortened. The lag period is shorter in competitive species and crops like poultry, swine, etc. and in cereal grains.

It is apparent that greater and more active participation in performance and progeny testing is imperative to the industry progress.

As mentioned BIF has been very effective in unification of performance programs. Just how effective we are in achieving acceptable participation in the area of beef improvement depends on reaching the commercial industry. The key here may be through closer alignment of BIF member organizations with the state and national cattlemens organizations.

Just in passing I would like to mention how effective the computer cow game discussed at the last annual meeting has been in educating and stimulating interest in breeders, county agents, college students and vo ag groups around the country.

In the last part of our program considerations involved in the development of National Sire Evaluation Program will be discussed by three scientists that have been working hard in this area for the past year. We hope ideas presented will have an impact on the beef industry in the near future.

Beef Improvement Federation has past being a new organization on the scene--we must now act to have a lasting effect. We must meet continuing and lasting needs of the industry.

THE INFLUENCE OF DEVELOPMENT PATTERN ON MAINTENANCE COSTS OF BEEF COWS

C. J. Brown and J. E. Brown

In recent years, much emphasis in breeding programs have been directed toward increasing weight for age of beef cattle. Heavier weights at immature ages are generally accepted in the industry as being desirable. Related popular discussion topics are centered around the question of what the most desirable size of cow is to produce market weight steers with the most rapid growth rate and most desirable carcass. Neglected or omitted in many such discussions are the relevant questions concerning the cost of cow maintenance. Evaluation of cow maintenance costs are difficult and expensive to determine directly. Lifetime weight-age curves developed in some of our recent research have been used to indirectly estimate energy requirements for maintenance and growth of cows having different patterns of growth in reaching maturity. The purpose of this presentation is to illustrate how different development patterns of cows may influence costs of production.

Four cows having different patterns of development were chosen for the purposes of illustration. In the first comparison, illustrated in figure 1, two cows of near the same mature weight but with different rates of maturity are shown. In the second comparison, illustrated in figure 2, two cows with different mature weights and different rates of maturity are shown. Different development patterns such as illustrated here result in different energy requirements. These energy requirements may be estimated from equations used by the National Research Council to determine energy requirements of beef cattle. (NRC Pub. #4 1970). These equations estimate net energy for maintenance, $NE_m = W^{0.75}$, and net energy for gain, $NE_g = (0.05603 \text{ gain} + 0.01265 \text{ gain}^2) W^{0.75}$. Energy requirements for maintenance and growth were caluclated on a daily basis and accumulated to arrive at the total energy requirement for different ages and weights of interest. It was assumed that the cost of a megacalorie of net energy was .03 cents which would be the approximate cost based on the current price of corn.

In Table 1, the comparison of cows 1 and 2 which have near the same mature weight illustrate the difference in maintenance costs that can result from different rates of maturity. Note that the earliest maturing cow cost more to maintain at all ages up to 5 years. By 5 years, there was a cumulative difference of $68.00 in cost of development in favor of the slower maturing cow. Note, however, that the cost to reach the same weight was greater for the slower maturing cow at all weights. It cost $38.00 more to develop the slower maturing heifer to a 600 pound weight which is a commonly acceptable weight to breed heifers. After reaching maturity of near the same weight, the annual cost of maintenance of these two cows would be similar but, during the period of development, cumulative maintenance costs differ greatly because of different rates of maturity.

In Table 1, comparison of cows 3 and 4 provide an interesting contrast in the cost of development. Cow 3 is an early maturing cow of small mature weight and cow 4 is a late maturing cow with large mature weight. At all ages, up to 5 years of age, cow 3 had greater cumulative costs of development. At all weights, cow 4 had greater cumulative costs. At 5 years of age, cow 3, the smaller cow, had cost $34.00 more to develop to that point because of her more rapid early development. At maturity, the annual cost of maintenance was $23.00 per year greater for cow 4 which was about 400 pounds heavier than cow 3. Additional cost comparisons that were typical of curves of Hereford and Angus cows were discussed.

Table 1. Comparisons of Costs for Maintenance and Growth of Cows with Different Growth Patterns

Cow No.	Mature Weight	Rate of Maturing	Cost Comparisons (Dollars)									
			Constant Ages					Constant Wts.			Yearly Maint. At Maturity	Cost to Attain 50% Maturity
			1	2	3	4	5	400	600	800		
1	945	.1060	70	151	230	309	387	21	49	105	$ 78.84	30
2	901	.0484	41	102	172	245	319	34	87	218	$ 76.65	44
3	893	.0885	60	134	212	288	365	24	58	138	$ 77.00	30
4	1292	.0230	36	94	166	246	331	40	94	184	$100.40	111

Figure 1. Growth Patterns Illustrating Different Rates of Maturity

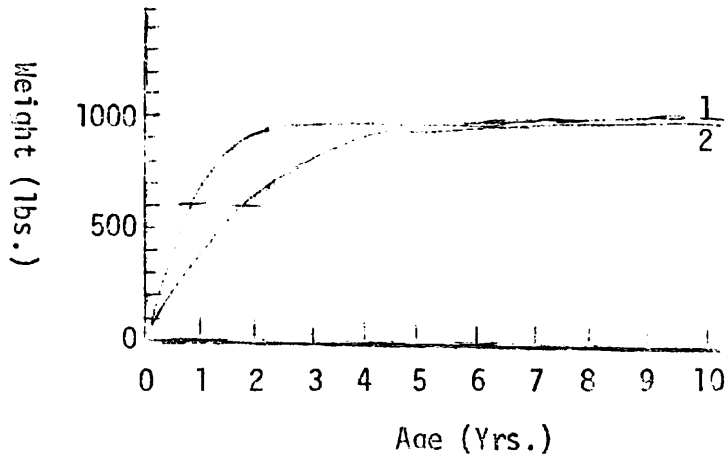
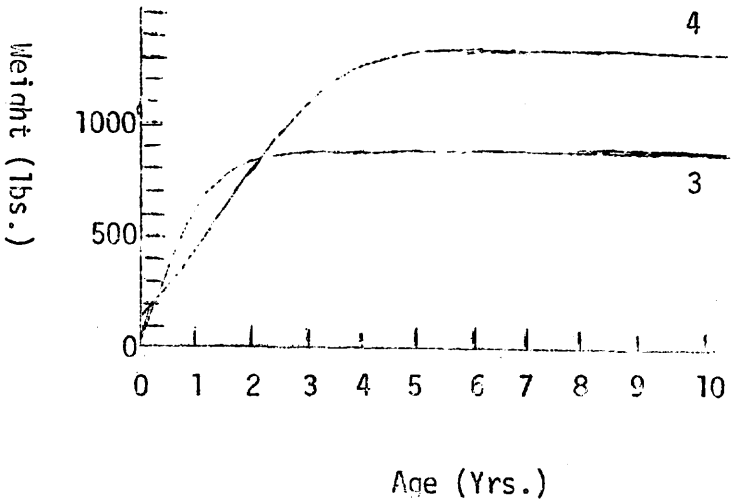


Figure 2. Growth Patterns Illustrating Different Rates of Maturity and Mature Size



POSSIBILITIES FOR MULTI-STATE BEEF IMPROVEMENT PROGRAMS

Talk made by A. L. Eller, Jr., Extension Specialist, Animal Science,
In Charge of Virginia Beef Cattle Improvement Programs
At The
Beef Improvement Federation Annual Convention
April 9, 1971
Kansas City, Missouri

It is certainly a privilege for me to have the opportunity to stand before this august gathering of the foremost thinkers of the day in beef cattle improvement. I am inclined to agree with the person at this convention whom I heard comment that perhaps this gathering represents the most brain-power ever put together at any point in the area of beef cattle improvement.

I would like to philosophize with you in discussing the possibilities that exist for multi-state beef cattle improvement programs as I will be operating with less than complete knowledge of the existing situations in all of our fifty states. It does appear at this point in time as if the Beef Improvement Federation should definitely concern itself with this aspect of the recordation and use of beef cattle performance records.

I think it would be wise if we looked at the present status that exists in the average state where performance testing work is being done either by or with the strong cooperation of the land grant university and the state Cooperative Extension Service. Until recently each state was pretty much doing its own thing insofar as the methods used in collecting and reporting the performance data on beef cattle in their own state program. BIF has made a very favorable input into correcting this situation and we now see most states having made the decision to go with the uniform procedures developed and promulgated by the BIF.

In many instances states which are processing their own beef cattle improvement records do not know what their actual overall costs or their computing costs are. This was forcefully brought out in the committee meeting yesterday on computer systems and requirements. In fact, many of the breed associations involved in performance record keeping do not know what their costs are that must be charged to the performance testing segment of their business. Some states do know their exact costs however, and some breed associations and other institutions know their exact costs and almost with out exception, in these programs where volume is relatively low, inefficiencies are pointed out in the fact that costs are relatively high per record.

It might be a bit dangerous for me to guess at what the present mood of our land grant universities and state Extension services regarding the financial support of state beef cattle performance testing programs are. I think that in all cases the land grant universities and the Extension Services are wholeheartedly behind the educational endeavor and see it as one of the real necessary programs in their state. However, I suspect that as more land grant universities and Extension Services must put the sharp pencil to their endeavors, that they will question whether or not the performance testing program through the computing phase should continue to be underwritten with tax payer dollars. In fact, this situation has already occurred in some states who are now in the process of making a transition to having their computing work done elsewhere than the computer center housed at the land grant university. So, as we move into the future, I believe that more of these performance records will be collected in the states and that more of the computing work will be done in centers that can develop large volume outside the state.

What has our experience been up to now insofar as standardization across state lines and possibilities for multi-state beef improvement programs? The BIF committee that is now called The Computer Systems and Requirements Committee which I have been privileged to chair was formally called BIF Records Standardization Committee, and this has been quite an active committee and a very successful committee to this point. This committee met in Knoxville, Tennessee in the fall of 1970 and spent a day and a half addressing itself to the standardization of calf and yearling input forms from which forms that met the requirements of the many breed and state associations were developed. Also this committee developed a standard coding system that is recommended for the industry and will be passed on by the BIF Board of Directors. Members of this quite active committee included: J. W. Patterson, Extension, North Carolina; Bill Brown, Extension, Kentucky; Richard Deese, Extension, Alabama; M. K. Cook, Extension, Georgia; Haley Jamison, Extension, Tennessee; Jack Richey, American Polled Hereford Association; Glenn Butts, Performance Registry International; Art Linton, American Hereford Association; Stanley Anderson, American Angus Association; Bill Durfey, American International Charolais Association; and Will Butts, Jr., U.S.D.A.

Now as an outgrowth of this work that was geared primarily to the southern region, four states, including Virginia, North Carolina, Georgia, and Alabama, have ordered forms that were developed for use in their state programs. So we have made inroads in the direction of multi-state programs and I think after the BIF meeting this year and as we look into the future, if the correspondence I get means anything, we will see quite a lot more of this type activity.

Now with regards to the area of multi-state computing work, we might ask the question "What has been done?" The answer would be quite simply, "not very much really" yet there is quite a strong indication that much of this may be done in the future. In fact, we now know of several state BCIA's who are negotiating contracts with others outside their states to handle the electronic computations of their records.

Who offers the service to these state BCIA's? Well, frankly there are several organizations who have said that they have the capabilities and are ready for the business. Some of these are breed associations. Others are Performance Registry International and then there are a number of private computer centers around the country that are looking for this business. I doubt really if any of these organizations are fully ready, however, for a large chunk of the BCIA business being shifted to their operation.

One of the major reasons why many small performance organizations must consider going to a larger computerized system for handling their records is simply the extremely high cost of programming. This is probably worse in the state university than in other places since hardware changes are rather constant and often in most land grant universities. This entails a complete rewrite of existing programs when hardware changes.

Now we must look at the point and ask ourselves when we talk about this multi-state approach, "Are autonomous state associations valuable?" My reaction is that, "Yes, they are very valuable and must be continued." It is certainly important that state BCIA's and even sub-state BCIA's act as the grassroots organizations to get the educational job done, to keep interest among breeders, and to develop a closeness with the industry at the grassroots level. Therefore, it appears that state BCIA's should not be disbanded or conglomerated into larger units covering many states, but that they should maintain their autonomy and if there is any segment that needs to be thrown into a multi-state situation, it would be the computing part or the records handling, the actual data handling end of the operation. It would appear that the BCIA interest is on the wane if you

count heads at the BIF convention. I think, however, that this is not the case. It simply is a matter that many state BCIA's have not become as involved as they should have and also that their funds for paying the expenses of their people to the BIF meeting are not to be compared with national breed associations and other organizations who are also memebers. We need, however, to improve this interest in our national performance testing organization on the part of our state people. When we ask ourselves the question, "Does this apparent need for stronger state associations put the damper on the multi-state approach?", my answer to you is a very emphatic "No!".

Earlier I mentioned that most of our computer centers and records handling at state universities and other institutions where volume was relatively small are apparently quite inefficient. You say to me, "How do you know they are inefficient?" Well, I invite your attention for a moment to look at what our counterparts in the dairy industry are doing, at least through one of the regional dairy records processing centers that I am acquainted with, namely the one that handles all the records for the 12 southern states. They are currently handling 400,000 cows per year which, as you know, entails the handling of these cows and their records monthly at a cost of 9¢ per cow per month or $1.08 per cow per year. With the summaries that they are turning out, these records are quite a lot more sophisticated and more voluminous than would beef cow records be for even the most detailed record keeper. This same processing center handles the beef cattle performance records for one of the southern states which has 13,000 cows enrolled and their actual computing costs for a 12 month period are $1,249.22. I think these figures point out the fact that when you deal in volume and specialize to get this type work done, efficiencies are increased. In addition to this, this central records system has a guiding board which has representatives from each of the 12 states who sit down regularly to assess the business aspect as well as the record handling itself. They make whatever changes are needed, thus uniformity is reflected in all the records in those 12 states.

So when we get to summarizing what I have attempted to say, I think we can build a case for the multi-state approach. These points come to mind as those that we can call advantages for moving in this direction.

1. Cost. There is no question but what computer costs can be cut down markedly in most instances and sophistication of programming can be increased, spreading the cost of additional programming over a lot more volume than has been possible for most of our systems in the past.

2. Service. With a computer center doing primarily performance record keeping, the rapidity and service aspect can be quite a lot greater than in smaller units which sometimes have to take the back seat to other things that are going on at the university or other business installation.

3. Uniformity. This is a key advantage and if the multi-state approach is to work then the whole process must be uniform for all those involved in it. This makes standardization and the approach BIF has taken a very colossal step in this whole evolvement.

4. More sophisticated programming is possible. These advantages have already been brought out in the cost advantage above.

5. Educational people such as Extension specialists can be freed of details of programming and record processing to get the needed educational job done.

6. More brain-power can be brought to bear on the whole process where the multi-state approach is put into effect. All the good thinking of the specialists and breeders involved are definitely superior to that that can be found in most states or other smaller institutions.

7. There is an educational advantage that evolves brought about by standardization. This type of approach will make performance records better understood throughout the country and if they are better understood, they will be better used.

8. Last of all, this approach perhaps means survival and growth, or shrinking and dying for many of our state groups.

In the final analysis, I would like to suggest that the BIF organization and particularly its board of directors think strongly about the implications of the multi-state or a cross-industry approach to programming and electronic computer use. I believe this is one of the big hurdles that must be crossed as the performance movement grows in the next three to five years. It needs our attention and thinking and proper direction in its development.

BEEF CARCASS DATA SERVICE

W. E. Tyler, Chief Standardization Branch Livestock Div. C. & M.S. USDA

For several years, we have offered a beef carcass evaluation service to assist producers in obtaining carcass data on quality and yield grade factors. Several breed associations, university experiment stations, feed manufacturing companies, performance testing organizations--as well as numerous commercial and purebred producers--have used this service regularly. We believe this service has made a substantial contribution toward improving the genetic potential of breeding stock and has been an important tool for improving feeding programs and management practices. However, its use and benefits to individuals have been limited. Therefore, we are planning a new service which will be easier to use and more readily available to a larger segment of the livestock and meat industry.

The purpose of this new service will be to provide, on a large-scale basis, carcass data which can be used to produce higher quality meat-type cattle--more economically--to produce cattle that combine thick muscling with high-quality lean and a minimum of external fat. This new service, called the "Beef Carcass Data Service," is being designed especially to provide carcass data to persons who may not own the chilled carcass but who were financially interested in the live animal at some point during its development.

Currently, we are field testing this service in Illinois, and plans are being made to conduct tests in other states in the near future. We are interested in obtaining additional information on such important factors as the percentage of beef cattle ear-tagged at the producer level, tag retention, etc. Cattle identified with the official USDA ear tag go through normal marketing channels. Only a few of these cattle have been sold for slaughter to date. Therefore, we have had limited experience with the system. We hope that the results of the current tests--and others contemplated during the coming year--will provide adequate information, on which we can launch a national program with confidence.

Positive identification of the live animal through to its carcass is of vital importance to the Beef Carcass Data Service. In fact, the success of this service depends on the adequacy of the positive identification system used and the confidence that breeders and feeders have in the system. We believe we have an ear tag which, if not intentionally removed by someone unaware of its purpose, would have a good chance of staying on the animal until slaughter. Also, the size, color, and tag shape are designed for easy recognition by the meat inspector when the live animal enters the slaughter area. Briefly, this is how the Beef Carcass Data Service has been planned:

Step One--Purchase of the Official Ear Tag

The livestock owner may order the specially designed and numbered ear tags (bright orange shield shaped figure 1) from one of a number of sources--for example, his breed association, farmers' organization, State Department of Agriculture, or directly from the Livestock Division, Consumer and Marketing Service, USDA. The Livestock Division will maintain a file of ear tag serial numbers and the corresponding purchaser's name and address. The ear tags, costing 30 cents each, will be distributed only in blocks of 20, but they need not be used at the same time. The owner may choose to identify one or several animals in different lots over a period of months.

Step Two--Official Identification of the Animal

The selected animal will be identified for the beef carcass data service when the official tag is affixed to the ear.

Young calves tagged for this service probably will not be slaughtered for several months. Thus, owners who tag calves and sell them to be finished out should not expect return of the data form before the animal reaches normal slaughter age. Tag owners should keep in mind the possibility of ear tags being lost--purchase of a tag does not guarantee receipt of data on every animal identified for this service. However, the minimal cost of ear tags, plus the fact that the charge for this service is not made until the data form is received, makes negligible the financial risk of losing ear tags.

Step Three--Transfer of Ear Tag to the Carcass

When a tagged animal is slaughtered, the USDA meat inspector will remove the tag and affix it to the carcass. He also will notify the local USDA meat grader,

who records the data for the chilled carcass. The meat grader will forward the carcass data form to the USDA office of records, which in turn will mail the data form to the ear-tag owner, or to the State agency, farmers' organization, or breed association through which the tag was purchased. The agency or association then would mail the form to the ear-tag owner. A $1.20 fee will be charged the ear-tag purchaser when he receives the carcass data form.

Step Four--Beef Carcass Data Report

The carcass data forwarded to each ear-tag owner gives complete information on quality and yield development of the carcass. An example of this report format and data is shown in Figure 2.

(Quality data will be recorded to nearest + or - determination.) USDA will charge the tag purchaser directly for ear-tag orders and the data report. Therefore, if a State or association purchases ear tags to supply breeders and feeders in a State, the State or association will be responsible for keeping records to identify the user of each tag.

SPECIAL NOTE

Purchase of ear tags does not guarantee that data will be received on each animal tagged. There are numerous opportunities between tagging the live animal and evaluation of the carcass for identification to be lost.

RECOMMENDATION

We recommend that the Beef Improvement Federation go on record as supporting the adoption of this Beef Carcass Data Service currently being tested as a pilot program by our Division of the USDA's Consumer and Marketing Service.

This pilot program will be completed by late summer or early fall and the results will be evaluated to determine the overall effectiveness and acceptability of such a service. At that time, a decision will be made on whether or not the service will be adopted and be made available to cattlemen on a nationwide basis.

The Beef Carcass Data Service will provide cattlemen and other financially interested parties with a valuable service that until now has not been available. This unique service can provide participating producers, feeders, etc., with information on important value-determining characteristics of the carcasses their cattle produce. This information can help cattlemen more effectively evaluate breeding, feeding, and management programs. This could ultimately result in economically significant improvements in the production of beef high in both quality and cutability.

FIGURE 1. EAR TAG

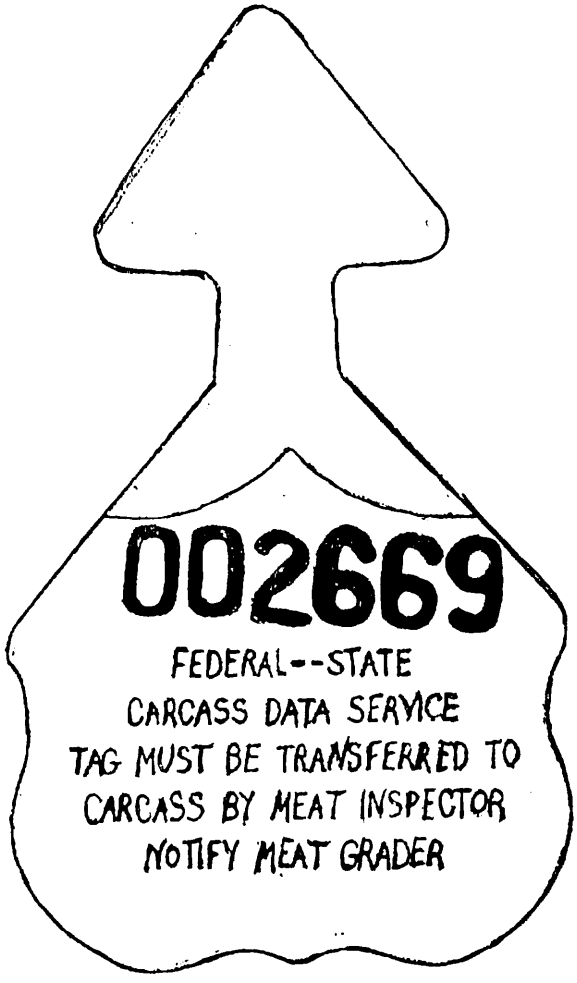
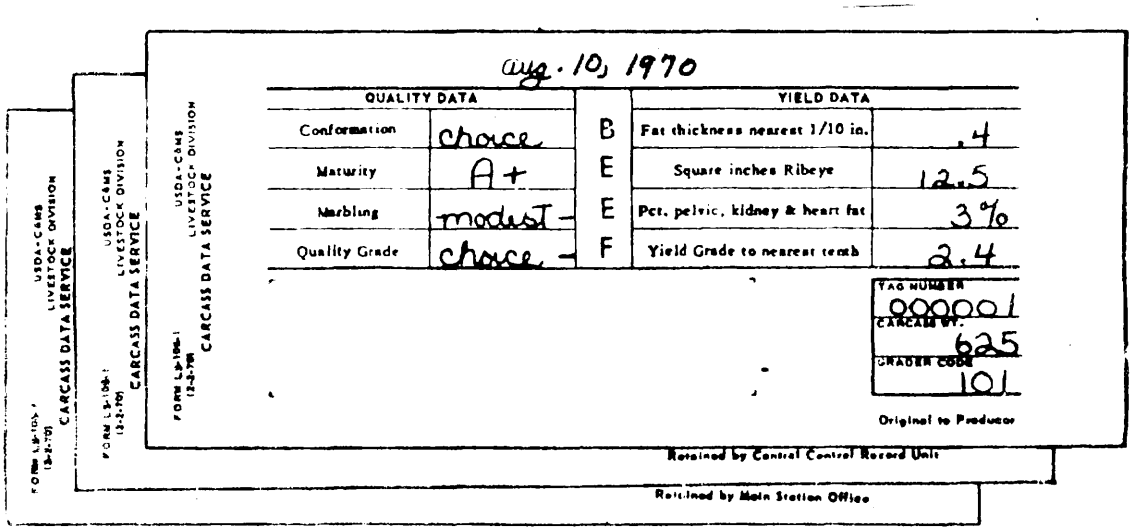


FIGURE 2. BEEF CARCASS DATA CARD



PREDICTING BREEDING VALUES OF YOUNG BEEF BULLS*

J. S. Brinks

An accurate estimate of the genetic worth of potential herdsires is important because the selection and use of the best bulls at an early age results in maximum genetic progress in beef production. Large numbers of performance records are becoming available due to the increasing emphasis on record-keeping by beef producers. These records can be utilized to estimate the relative genetic merit of animals from which the selection of breeding stock is made.

The breeding value of an individual animal for a single trait is the sum of the average effects of all genes which affect that trait. The most widely used method of estimating the breeding value of a bull utilizes progeny of the bull and is estimated as twice the difference between the bull's progeny mean and the overall population mean for a specific trait. On young bulls when progeny information is not as yet available, the bull's breeding value can be estimated as heritability times the bull's deviation in performance from the overall population mean. The above two methods are sometimes combined and may also include information from relatives on the trait in question.

In our Colorado breeding project we have recently completed a study dealing with the estimation of breeding values of young bulls before progeny information is available. We are estimating breeding values of yearling bulls for weaning weight, post-weaning average daily gain, adjusted yearling weight, and maternal ability as measured by "Most Probable Producing Ability" (MPPA) of cows. The objective of the study is to compare the relative accuracy of four methods utilizing data as follows:

1. The bull's performance in a single trait.
2. The bull's performance in the trait and in genetically correlated traits.
3. The bull's performance in a single trait and the performance of relatives in the same trait.
4. The combination of 2 and 3 (all available information).

The traits which provide information on growth and maternal ability, and from which the added information is gained are: weaning weight, 18 month weight, and MPPA in females and weaning weight, average daily gain, feed efficiency and adjusted yearling weight in males. The types of relatives include: the individual animal, sire, dam, male and female paternal half-sib groups and male and female maternal half-sib groups.

However, in the example today only weaning weight in both sexes and average daily gain and feed efficiency in bulls are being considered. The traits and types of relatives used are summarized in table 1. The parameters used were the heritability estimates from Petty and Cartwright (1966) and the genetic and phenotypic correlations were taken from Colorado data (table 2).

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* The information for this presentation was obtained from the Ph.D. dissertation of Dr. Warren Mangus.

METHOD I.

The breeding value of a bull for a specific trait can be estimated from the deviation of its phenotype from the population mean by $\hat{A} = h^2 (P-\bar{P})$. The correlation between breeding value and phenotypic value (accuracy) is h, the square root of heritability. In this study the four methods are being compared in standard measure rather than actual units and therefore the equation for Method 1 becomes $\hat{A} = h \left(\frac{p-\bar{p}}{\sigma p}\right)$

Table 1. Designation of Relatives and Traits Used in Subsequent Tables.

Relation	
Individual bull	B
Sire	S
Dam	D
Male paternal half-sib average	PB
Male maternal half-sib average	MB
Traits	
Weaning Weight	W
Average daily gain	G
Feed efficiency	F

Table 2. Parameters Used.

					Intraclass r	
Trait	h^2	r with	rg	rp	PHS	MHS
Weaning weight	.32	ADG	.639	.328	.080	.440
ADG	.54	EFF	-.577	-.529	.135	.135
Feed effic.	.47	Wng.Wt.	-.058	-.015	.118	.118

METHOD II.

The use of genetically correlated traits measured on the same individual can be used to improve the accuracy of breeding value estimates for a single trait. Having the phenotypic correlations among the traits (left hand side of the equations) and the correlations between the traits and breeding value (right hand side of the equation) being estimated, one can solve simultaneous equations which yield the relative emphasis to be placed on each trait in predicting a specific breeding value. This is much like the selection index except that one is predicting a specific breeding value rather than net merit made up of several important traits. The values in parenthesis on the right hand side of the equations correspond to the correlations between the trait and the breeding value being predicted in terms of heritability and genetic correlation values.

Example of estimating A_1 from 3 traits:

$$B_1 r_{p_1 p_1} + B_2 r_{p_1 p_2} + B_3 r_{p_1 p_3} = r A_1 P_1 (h_1)$$

$$B_1 r_{p_1 p_2} + B_2 r_{p_2 p_2} + B_3 r_{p_2 p_3} = r A_1 P_2 (h_2 r_{g_1 g_2})$$

$$B_1 r_{p_1 p_3} + B_2 r_{p_2 p_3} + B_3 r_{p_3 p_3} = r A_1 P_3 (h_3 r_{g_1 g_3})$$

Solving, one obtains weighting values to be placed on the three traits:

$$\hat{A}_1 = B_1 \left(\frac{P_1 - \bar{P}_1}{\sigma P_1} \right) + B_2 \left(\frac{P_2 - \bar{P}_2}{\sigma P_2} \right) + B_3 \left(\frac{P_3 - \bar{P}_3}{\sigma P_3} \right)$$

Using the same procedure, $\hat{A}_2$ and $\hat{A}_3$ can be estimated.

The actual values for the above equations when predicting the breeding values of bulls for weaning weight using the bulls' own performance in weaning weight, post weaning daily gain and feed efficiency are as follows:

$$B_1 (1.0) + B_2 (.328) + B_3 (-.015) = .5656$$

$$B_1 (.328) + B_2 (1.0) + B_3 (-.529) = .4695$$

$$B_1 (-.015) + B_2 (-.529) + B_3 (1.0) = -.0398$$

Solving these equations one obtains the following prediction equation for weaning weight:

$$\hat{A}_1 = .4265 \left(\frac{W - \bar{W}}{\sigma W} \right) + .4332 \left(\frac{ADG - \bar{ADG}}{\sigma ADG} \right) + .1957 \left(\frac{E - \bar{E}}{\sigma E} \right)$$

The equation predicting the breeding value for ADG was:

$$\hat{A}_2 = .1421 \left(\frac{W-\bar{W}}{\sigma W}\right) + .6666 \left(\frac{ADG - \bar{ADG}}{\sigma ADG}\right) - .0407 \left(\frac{E-\bar{E}}{\sigma E}\right)$$

METHOD III.

Quite often performance information for a specific trait is available on the sire, dam and paternal and maternal half-sibs. Although half-sibs are related only .25, a large number of half-sib records can greatly increase the accuracy of breeding value estimates, especially when the trait in question is moderately or lowly heritable. Again, phenotypic correlations among the various types of relatives is required along with the correlations between the phenotype of the various types of relatives with the breeding values of the bulls being estimated.

In the example used here, the bulls' own adjusted weaning weight along with the adjusted weaning weights of the sire, dam, 15 paternal half-sibs and 6 maternal half-sibs were used to predict the bulls' breeding value for weaning weight. Solution of the appropriate equations yielded the following equation:

$$\hat{A}_1 = .3661 \left(\frac{B-\bar{B}}{\sigma W}\right) + .1129 \left(\frac{S-\bar{S}}{\sigma W}\right) + .1737 \left(\frac{D-\bar{D}}{\sigma W}\right) + .2411 \left(\frac{\bar{PHS}-\bar{M}}{\sigma W}\right) + .2010 \left(\frac{\bar{MHS}-\bar{M}}{\sigma W}\right)$$

METHOD IV.

Method 4 uses all available information and is a combination of Methods 2 and 3, ie. own performance for trait and correlated traits, and relatives performance for trait and correlated traits. Using this method, one can obtain an estimated breeding value for maternal ability, (MPPA) of bulls even though the trait is not measured in bulls directly.

Again, phenotypic correlations among the types of information need to be obtained along with correlations of the types of information with the breeding values of the bulls for the trait being estimated. The procedures are the same as in methods 2 and 3 except a few additional types of correlations need to be obtained. The phenotypic correlations among the types of information (left hand side) are listed in table 3 along with the correlations of the types of information with the breeding value for weaning weight (right hand sides). The symbolism used is the same as that listed in table 1. The solution to these equations is listed in table 4 for the comparison of the four methods.

Comparisons of Methods

A comparison of the four methods is presented in table 4. Two comparisons are presented within Method 2; the first using the bulls' own performance in weaning weight and average daily gain and the second also includes feed efficiency.

The multiple correlation coefficient (R) is used to determine the relative accuracy of the various methods since it is proportional to the expected genetic gain from the various methods of estimating breeding values. All the weighting factors are presented in standard measures so one can immediately compare the relative emphasis to be placed on each type of information.

Table 3. Phenotypic Correlations Between Correlated Traits of Related Animals For Randombred Bull.

	B-W	B-G	B-F	S-W	S-G	S-F	D-W	PB-W	PB-G	PB-F	MB-W	MB-G	MB-F	$r_{A_1P_i}$
B-W	1.0	0.3280	-.0150	0.1600	0.1328	-.0113	0.1600	0.3708	0.2010	-.0142	0.3195	0.2361	-.0136	= 0.5656
B-G		1.0	-.5290	0.1328	0.2700	-.1453	0.1328	0.2231	0.4930	-.2715	0.1506	0.6506	-.3503	= 0.4695
B-F			1.0	-.0113	-.1453	0.2350	-.0113	-.0167	-.2630	0.4768	-.0098	-.3455	0.6421	= -.0398
S-W				1.0	0.3280	-.0150	0.0	0.4314	0.2693	-.0235	0.0365	0.0680	-.0058	= 0.2828
S-G					1.0	-.5290	0.0	0.2756	0.5475	-.2944	0.0303	0.1383	-.0755	= 0.2348
S-F						1.0	0.0	-.0303	-.2947	0.4918	-.0026	-.0744	0.1221	= -.0199
D-W							1.0	0.0270	0.0337	-.0029	0.2190	0.2041	-.0175	= 0.2828
PB-W								1.0	0.1348	-.0073	0.1123	0.1258	-.0097	= 0.4528
PB-G									1.0	-.2807	0.0190	0.3227	-.0696	= 0.2381
PB-F										1.0	-.0009	-.0709	0.3115	= -.0208
MB-W											1.0	0.1383	-.0073	= 0.3872
MB-G												1.0	-.4222	= 0.1804
MB-F													1.0	= -.0155

Table 4. Comparison of Methods for Estimating Breeding Values for Weaning Wt.

Method 1	Method 2	Method 2	Method 3	Method 4
Bulls Wn. Wt. (.5656)	Bulls Wn. Wt. (.4612)	Bulls Wn. Wt. (.4255)	Bulls Wn. Wt. (.3661)	Bulls Wn. Wt. (.2819)
	Bulls ADG (.3182)	Bulls ADG (.4332)	Sires Wn. Wt. (.1129)	Bull ADG (.5443)
		Bulls Eff. (.1957)	Dams Wn. Wt. (.1737)	Bull Eff. (.1736)
			PHS Wn. Wt. (.2411)	Sire Wn. Wt. (.0855)
			MHS Wn. Wt. (.2010)	Sire ADG (.0610)
				Sire Eff. (.0126)
				Dam Wn. Wt. (.1808)
PHS = 16 for Wn. Wt. and 8 for ADG and Eff.				PHS Wn. Wt. (.1902)
MHS = 6 for Wn. Wt. and 3 for ADG and Eff.				PHS ADG (-.0213)
				PHS Eff. (.0582)
				MHS Wn. Wt. (.1923)
				MHS ADG (-.2988)
				MHS Eff. (-.0682)
R (accuracy) for weaning weight:				
.57	.64	.66	.69	.77
R for ADG:				
.73	.75	.75	.77	.80

In predicting the breeding value of a bull for weaning weight much can be gained by using both his weaning weight and daily gain performance over using weaning weight only (.57 vs .64). Little can be gained by also including feed efficiency performance (.64 vs .66). Using weaning weight information on the sire, dam, 16 PHS and 6 MMS is more accurate than using his own weaning weight and daily gain (5% over both and 12% over weaning weight alone). Using all available information is the most accurate as expected and is much better than using only the bulls weaning weight (.57 vs .77).

The accuracy values (R) for predicting the breeding values for average daily gain are also listed in table 4. It can be seen that using only the bulls' performance is quite accurate (R=.73) since daily gain is more highly heritable. However, using all information yields an R value of .80 as compared to .73 using only daily gain performance.

In the above example only the breeding values for weaning weight and daily gain have been obtained. We will also be predicting breeding value of adjusted yearling weight and maternal ability of yearling bulls using the same methodology and including information on yearling weight and Most Probable Producing Ability of females.

Summary

Purebred breeders should use outstanding young bulls in their herds before progeny information is available. It is important the selection of these young bulls be as accurate as possible to maximize genetic progress. To be as accurate as possible, we should utilize all available information that adds to the prediction accuracy. The information presented indicates that we can be much more accurate in predicting the breeding values of young bulls for weaning weight by simply including information on correlated traits and also by including information on relatives. The gain in accuracy is less when predicting breeding values for daily gain.

Since large numbers of records are available in many herds, we should utilize all of this information to increase the accuracy of the selection of young bulls.

WHAT IS THE MEANING OF HEAVY WEIGHTS AND FAST GAINS?

J. E. Brown and C. J. Brown
University of Arkansas, Fayetteville, Arkansas

Complete weight-age curves of 288 Hereford (H) and 296 Angus (A) females were used to establish the genetic and phenotypic relationships among mature weight, earliness of maturing, monthly gains and immature weights from birth to maturity.

The growth patterns of the A females were more variable than the H female growth patterns. The growth patterns of 18 H and A bulls showed identical relationships between weights and gains to the growth patterns of the females. The major distinction between the growth patterns of the males and females was the extension of the linear growth phase in the males.

Early maturing females within the two breeds were characterized by lighter weights to 4 months, larger early gains to 16 months, and smaller mature weights than late maturing heifers. Late maturing females were heavier from birth to 4 months, lighter than early maturing heifers from 4 to 24 months, faster gaining from 16 months to maturity and heavier at maturity than early maturing females.

The genetic correlations among weights and gains were not the same for the two breeds. The figures from these data indicate that selection of A heifers on 12 months weight would gradually decrease mature weight and increase rate of maturing in the breeding herd, but it would increase mature weight and decrease rate of maturing in the H population. Selection emphasis on rapid gains from 8-12 months would increase earliness of maturing in both populations but would result in a gradual decline in mature weight of the H group and perhaps a very gradual increase in mature weight of the A.

The exact ages at which large weights and gains can be interpreted as indicative of early maturing cattle and when they indicate late maturing animals will be different for different breeds, sexes, managements and environments. However, there are average ages and circumstances before which and after which weights and gains reverse their meaning in terms of projecting mature weight or earliness of maturing of an individual.

Gains and weights do not always measure the same aspects of growth potential, i.e. large gains are not synonymous with heavy weights at all ages. The relationship of weight to gain depends upon the period of growth involved. In the A female, the genetic correlation of weights prior to 5 months to weights after 5 months was negative indicating the possible existence of antagonisms in those selection programs involving weights at widely separated ages.

These results imply that present methods of performance testing will not effect the same response in the growth patterns of the various breed groups, nor of individual growth patterns within breeds. Present testing methods highlight individual comparisons rather than individual evaluation and in view of the diversity among and within present breed groups for earliness of maturing most individual comparisons are emphasizing the effect of physiological age rather than genetic potentials for gain, efficiency, marbling, etc. A more conservative approach in the evaluation of performance would appear to be thorough interpretation of the individuals performance and leave the decision regarding the usefulness of the performance to the buyer. It is unlikely that one performance standard will satisfy all the diverse needs of the beef cattle industry.

IMPLICATIONS OF GROWTH CURVE RESEARCH ON SELECTION GOALS IN CATTLE

Will T. Butts
USDA, ARS
Knoxville, Tennessee

Beef improvement programs have been outstandingly successful in establishing selection goals based on economically important traits. Rate of gain or evidences of the trait are generally accepted as the primary goals of selection in the industry today. The growing popularity of crossbreeding, the increasing acceptance of dairy and/or exotic breeds in commercial production programs and the rather recent changes in show ring standards are further evidence that the industry currently associates growth rate and, to some extent, mature size with overall production efficiency. The "head sale" for a beef production system based on performance has been made. However, a number of fundamental questions in beef cattle breeding have been raised by this industry movement. Is rate of gain, per se, a reliable measure of total herd or farm efficiency? Can the breeding value of young beef animals be more accurately predicted? What are the consequences of changing a particular breed through effective selection for rate of gain? Is it possible to breed animals which grow rapidly to market weights but do not become large at maturity? It is to this class of questions that the study of growth curves is addressed.

Of particular interest to students of growth curves is the considerable variation in shape of curves among animals within breeds and among breeds. Examples range from animals which grow very rapidly to light mature weights to those which grow at a more moderate rate to extremely heavy mature weights. An extreme case of the latter type of growth curve are cows which are still increasing in weight at 10 to 12 years of age.

Past research has demonstrated conclusively that rate of gain is highly related to cost of gain if only time or weight constant intervals are considered. However, in the total beef production system, nutritional demands for herd maintenance are much greater than are postweaning feedlot requirements of slaughter animals. It has been estimated that, of the total feed energy represented in a slaughter steer, 70 to 80 percent had already been consumed when the steer was weaned. Hence, in considering industry efficiency, it is important that selection criteria be consistent with efficiency in both segments of the production cycle. At least part of the reason for the growing popularity of certain extremely large breeds for crossing on cows of smaller breeds is that slaughter animals are produced which are genetically larger than the herd which is maintained to produce them. In effect, the desirable segments of two different growth curves have been combined into one system for more efficient total production. The desirable rapid early gains, which generate the income from beef production, have been retained; while the higher maintenance requirements of equivalently large mature animals, which is a major factor in the cost of production, have been avoided.

Should the observed variation among animals within breeds in shape of growth curve be found to respond to selection, the same principles can be applied to improve overall efficiency of straightbred operations. Primary emphasis in present growth curve research is aimed at estimating the genetic component of observed variation and in comparing curves of different shapes from the standpoint of product produced and production efficiency.

A further promise extended by growth curve research is the opportunity for improving the prediction of breeding value in young animals. Many animals exhibit similar weights and gains through yearling ages yet mature at different rates and to widely differing mature weights. Intuitively, it would seem that consideration of shape of growth curve in addition to rate of gain might well improve estimates of breeding value. Current work is investigating a number of techniques for testing this general hypothesis.

In summary, study of beef cattle growth curves appears to offer an excellent mechanism for defining selection goals which are consistent with increased efficiency in the total beef production system. Further it holds some promise in improving the effectiveness of selection toward such goals.

REPORT OF EXECUTIVE SECRETARY

Frank H. Baker

The potential of BIF as a developing force on the beef industry scene can best be illustrated by calling attention to the widespread use of the "Computer Cow Game" featured at last year's meeting. Several BIF member organizations have incorporated this educational device into their program for serving their cattlemen members during the past year. Your reception of this year's program suggests that ideas that have been featured here in the "Impact Conference" will truly have great impact in the year ahead. I suggest that we give special attention to the National Sire Evaluation Program by developing a series of regional discussions or symposia on the program.

This year's meeting and conference included about 150 people representing organizations or agencies from 32 states, Canada and Australia. The Research Symposium was extremely well attended and received. The board of directors should consider sponsoring a Research Symposium again next year.

The committees were restructured and given new charges this year. I am much impressed with the committee activity that produced the reports which you heard earlier this morning. We hope those of you who desire special committee assignments for yourself or a representative of your organization will inform me or Dixon Hubbard. The proceedings of this year's conference and meeting will include a listing of upcoming conferences or meetings sponsored by member organizations.

The definition of membership requirements for associate members seems restrictive and has presented some problems to the board of directors since the beginning of the BIF. A change in this definition in the by-laws requires six months notice to all member organizations. I believe we should encourage the board of directors to offer a proposed amendment to the by-laws to clarify this definition. I would like for the definition to provide a basis for associate membership for national or international organizations or firms that provide breeders or cattlemen in two or more states or provinces a service for the purpose of beef cattle improvement. I will offer a motion to this affect at the completion of this report.

The 1970 Roundup of Member Activities was prepared in an effort to strengthen and improve communications among all who are concerned with beef cattle improvement programs. Hopefully the resume of activities of organizations provides ideas for use of others. We anticipate preparing a similar report at the end of this year. for release in January or February of 1972.

A BIF information brochure was prepared this year for the use of member organizations in creating a more complete understanding of BIF throughout the beef industry. Anyone wishing copies of the brochure for distribution should contact me.

I am indebted to most of you for the special assistance you have given me during the year and particularly the committee chairmen in making this conference a success. Special thanks are due Jim Gosey, Nebraska Extension Specialist; Larry Cundiff, USDA; Dixon Hubbard, USDA; Bob deBaca, Iowa State; President Doug Bennett; and Vice President Dave Nichols. Back home in Nebraska three secretaries, Virginia Marcussen, Vicky Kobes and Mary Prester are due special thanks for their excellent work on BIF material particularly preparing the proceedings of meetings.

The future will be as good as we make it. The limits will be our vision and vigor.

REPORT OF ELECTION OF DIRECTORS

Caucuses of the interest groups were held in accordance with the by-laws. The following directors were elected:

R. A. Long--Route 2, Box 42B, Rhinebeck, New York 12572, New York Cattlemen's Association, "Northeast BCIA Term" expiring 1972.

Martin Jorgenson--Ideal, South Dakota 57541, South Dakota Livestock Production Records Association, "at-large BCIA Term" expiring 1974.

Max Hammond--Barton, Florida 33830, Florida Beef Improvement Association, "at-large BCIA Term" expiring 1974.

Louis C. Chesnut--4314 South Scott, Spokane, Washington 99200, Washington Cattlemen's Association Beef Improvement Program, "at-large Term" expiring 1974.

Waldo Forges--Beckton Stock Farm, Route 2, Sheridan, Wyoming 82801, Wyoming Beef Performance Association, "at-large BCIA Term" expiring 1973.

Stanley Anderson--American Angus Association, 3201 Frederick Boulevard, St. Joseph, Missouri 64506, "Cattle Breed Registry Association Term" expiring 1974.

Other Directors whose terms did not expire are:

D. D. Bennett--Box 352, Hermiston, Oregon 97838, Oregon Beef Improvement of Oregon Cattlemen's Association, "Western BCIA Term" expires 1972.

J. Dave Nichols--Anita, Iowa 50020, Iowa Beef Improvement Association, "North Central BCIA Term" expires 1973.

Mack Maples--Elkmont, Alabama 35620, Alabama Beef Improvement Association, "Southern BCIA Term" expires 1973.

Bill Durfey--American International Charolais Association, 1610 Old Spanish Trail, Houston, Texas 77025, "Cattle Breed Registry Association Term" expires 1972.

Art Linton--American Hereford Association, Hereford Drive, Kansas City, Missouri 64105, "Cattle Breed Registry Association Term" expires 1972.

C. D. Swaffar--American Shorthorn Association, 8288 Hascall Street, Omaha, Nebraska 68124, "Cattle Breed Registry Association Term" expires 1972.

Raymond Meyer--Red Angus Association of America, Sorum, South Dakota 57654, "Cattle Breed Registry Association Term" expires 1973.

Jack Richey--American Polled Hereford Association, 4700 E. 63rd Street, Kansas City, Missouri 64130, "Cattle Breed Registry Association Term" expires 1973.

Clarence Burch--Performance Registry International, Mill Creek, Oklahoma 74856, Indefinite term in "permanent directorship assigned to PRI in by-laws."

Harry Herman--National Association of Animal Breeders, 512 Cherry Street, Columbia, Missouri 65201, Indefinite "other organizations term" assigned under the by-laws.

Burton Eller--American National Cattlemen's Association, 1540 Emerson Street, Denver, Colorado 80218, Indefinite "other organizations term" assigned under the by-laws.

Ex Officio Directors

Dixon Hubbard--Extension Service, USDA, Washington, D. C. 20250

Everett Warwick--ASRD, Agricultural Research Service, USDA, Beltsville, Maryland 20705

Don Nicholson--Livestock Division, Department of Agriculture of Canada, Ottawa, Canada

Robert deBaca--Animal Science Department, Iowa State University, Ames, Iowa 50010

Frank H. Baker--Animal Science Department, University of Nebraska, Lincoln, Nebraska 68503

SUMMARY OF ACTION BY THE BOARD OF DIRECTORS

Mid-Year Meeting in Denver, Colorado, September 18, 1970.

1. Approved a plan for the development of an information brochure about the purposes and membership of the Federation.
2. Approved a plan for preparation of a publication reporting the activities of member organizations.
3. Reaffirmed the role of BIF as:
   A. Being responsive in solving beef improvement problems brought by member organizations.
   B. Seeking solutions to industry problems associated with beef improvement.
   C. Being agressive through definition of assignments to committees.
   D. Moving forward at a rate that maintains interest of all member organizations.
4. Approved the Program Coordinator's plan for reorganization of committees.
5. Approved BIF involvement in the preparation of a beef improvement movie by Oregon State University without cost to BIF.
6. Approved dates of April 7, 8, and 9, 1971 for the Annual Meeting.

Annual Meeting at Kansas City, April 7, 8, and 9, 1971.

1. Accepted the invitation of Omaha, Nebraska for the site of the Annual Meeting in April, 1972 (date to be set depending on facilities).
2. Adopted the National Sire Evaluation Committee Report for recommended implementation by BIF members.
3. Asked the Secretary to develop a plan for a series of lectures, discussions and symposia to help the entire beef industry understand the National Sire Evaluation Program.
4. Approved a plan for revision of the BIF Publication entitled "Guidelines for Uniform Beef Improvement Programs" and joint release of the new publication with the Extension Service, U. S. Department of Agriculture in the fall of 1971.
5. Approved the submission of a proposed amendment to by-law 3 section 1b. for action by the general membership at the 1972 meeting. Section 1b. now reads:

   "Associate (non-voting) members of this Federation will consist of those national organizations that are not actively conducting performance programs but which have a principal interest in beef cattle and those public agencies which have a direct interest in beef cattle."

   The proposed amendment would add the following wording to this definition of associate membership, "and those national or international firms or organizations which provide cattle breeders of two or more states or provinces with a service or services directly related to beef cattle improvement".

6. Approved BIF support to encouragement and/or assistance to the Consumer and Marketing Service, USDA in expanding the Experimental Beef Carcass Data Information Service to a permanent service for the beef industry in all states.
7. Approved a letter of commendation to the U.S. Department of Agriculture for the assistance of its staff members to BIF programs.
8. Accepted the reports of all BIF committees.
9. Elected the following officers:

President	-	D. D. Bennett
Vice President	-	J. Dave Nichols
Executive Secretary	-	Frank H. Baker
Treasurer	-	C. D. Swaffar
Director of Publicity	-	Robert deBaca
Program Coordinator	-	Dixon Hubbard

BEEF IMPROVEMENT ANNOUNCEMENTS LISTED BY MEMBERS

APRIL 23 - Beef Progeny Testing Field Day
Umatilla Branch Experiment Station
Hermiston, Oregon

MAY 7 - Breeder-Buyer Program
Durango, Colorado

MAY 8 - San Juan Basin Branch Station Bull Sale
Hesperus, Colorado
Sponsored by C.S.U. & San Juan Basin Hereford Assn.
100 bulls for sale following 140 day test--
Inbred Herefords, Angus, Charolais & Crossbreds.
Contact Dr. J. S. Brinks
Colorado State University
Department of Animal Science
Ft. Collins, Colorado 80521

MAY 14 - 13th Annual Beef Cattle Day
Withycombe Hall
Oregon State University
Corvallis, Oregon

JUNE 3 (3pm-6pm) - Beef Cattle Improvement Field Day
Sponsored by Minnesota Beef Cattle Improvement Assn.
MBCIA Central Bull Testing Station
Lake Benton, Minnesota

4 - Bull Sale
MBCIA Central Bull Testing Station
Lake Benton, Minnesota

JUNE 10 - Beef Cattle Evaluation Conference
Univ. of Minnesota St. Paul Campus
Sponsored by Univ. of Minnesota, Minn. Shorthorn Assn., & Minn. Beef Cattle Improvement Assn.

JUNE 18 & 19 - Beef Expo

Sterling, Colorado
Ted Hadden - In Charge
c/o First Security Natl. Bank
140 day steer test
Beef Cattle Judges Clinic with the two-day program. Anyone judging beef cattle at county, state or regional shows are invited. Purpose - arrive at more uniform judging standards. On hoof - carcass evaluation.

JUNE 22-24 - National Beef Symposium
University of Wisconsin
Madison, Wisconsin
Co-sponsors--Univ. of Wisconsin & Am. National Cattleman.

American Angus Association

JULY 16 & 17 - National Junior Heifer Show
Nashville, Tennessee

AUG. 9 & 10 - National Angus Futurity
Lexington, Kentucky

SEPT. 19-21 - 1971 PRI Annual Meeting
Rapid City, South Dakota

DEC. 13-15 - Second Beef Cow Symposium
Cheyenne, Wyoming
Co-sponsors--Univ. of Wyoming
Colorado State Univ.
South Dakota State Univ.
Univ. of Nebraska
Purpose - For cow-calf producer and feed industry people interested in nutrition, economics and marketing, reproduction, genetics.
Contact Dr. C. O. Schoonover
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REPORT OF FARM AND RANCH TESTING COMMITTEE

Ray Meyer, Chairman

The BIF Farm and Ranch Testing Committee recommend the following revisions in the BIF guidelines.

1) In addition to present recommendations concerning final weight to be used in computing 365 day weight it is further recommended that the average age of a sex-management group be at least 365 days.

2) A new management code is recommended to provide for early weaning of heifer calves. Records of heifers in this management code should not be adjusted for age of dam.

3) To establish a uniform procedure for computing age of dam the following classification is recommended.

Age	Class
1 yr. - 9 mos. to 2 yrs. - 9 mos.	2
2 yr. - 9 mos. to 3 yrs. - 9 mos.	3
3 yr. - 9 mos. to 4 yrs. - 9 mos.	4
etc.	

4) To adjust yearling weight ratio for selection on weaning weight (or culling of lighter calves at weaning) the following formula is recommended for computing yearling weight ratio:

$$\frac{W + P}{\bar{W}_u + \bar{P}_s}$$

Where: W = adjusted 205 day weight

P = the 160 day post weaning gain of the individual (or 160 x Post weaning average daily gain)

$\bar{W}_u$ = the average 205 day adjusted weight of all calves weaned

$\bar{P}_s$ = the average 160 day post weaning gain of all calves tested in a contemporary sex-management group

$$\frac{\bar{W}ug + \bar{P}sg}{\bar{W}u + \bar{P}u}$$

Where $\bar{W}ug$ = the sire progeny group average for 205 day adjusted weight

$\bar{P}sg$ = the average 160 post weaning gain for the sire group average

and $\bar{W}u$ and $\bar{P}u$ are the same as before.

The committee considered the matter of recording cow weight and cow efficiency. It is recommended that cow weights be taken at weaning and that the committee study the matter of reporting cow efficiency prior to making a recommendation. A special committee will be appointed to study conformation scores consisting of Art Linton, Chairman; Stanley Anderson, Gary Rickets, William McReynolds and Robert Long.

PERFORMANCE PEDIGREE COMMITTEE REPORT

Attendance:
Bill Pope, Chairman
L. A. Nelson, Secretary
C. R. Acord
Clarence Burch
C. J. Christians
Charles Koch
Art Linton
Curtis Mast
Paul Miller
Robert Rumler
Lyle Springer
Julius Todd
Don Vaniman
W. W. Wharton
K. O. Zoellner

The committee considered the performance pedigree recommendations outlined on pages 30-31 in "Guidelines for Uniform Beef Improvement Programs." There was general agreement with the objectives and use of performance pedigrees as published in the 1970 Report; however, this committee recommends some revision of the minimum performance data as follows:

A. Animal's individual record.

1. List the number of contemporaries, which would help establish the predictive accuracy or value of the weights and ratios.

2. Since conformation scores are subjective measurements, omit weaning and yearling conformation scores and conformation ratios from performance pedigrees; however, conformation scores and conformation ratios are encouraged on weaning and yearling summaries.

B. Progeny of each individual in pedigree.

List the number of contemporaries at weaning and yearling age for both sons and daughters.

C. Progeny carcass information.

1. Number of steers, heifers or bulls.
2. Average carcass weight.
3. Average fat thickness
4. Average loin eye area
5. Average marbling score
6. Average cutability percent
7. Average USDA quality grade to 1/3
8. Average lbs. of trimmed retail cuts/day of age.

Additional consideration:

The committee recommends the inclusion of breeding values for individuals when the techniques and information for specific traits are available.

COMPUTER SYSTEMS AND REQUIREMENTS

Committee Members: A. L. Eller, Jr., Chairman, VPI
Bill Durfey, Secretary, AICA
Stan Anderson, AAA
Will Butts, Jr., ARS
Glenn Butts, PRI
M. K. Cook, U. of Ga.
Richard Deese, Auburn
Haley Jamison, U. of Tenn.
Bernard Jones, Curtiss
Art Linton, AHA
J. W. Patterson, N.C. State
Jack Richey, APHA
Bill Swoope, Miss. State
Julius Todd, RAA

1. The committee unanimously agreed that all BIF Committee activities and BIF Member Organizations continue to reemphasize the importance of all performance records to be MORE DESCRIPTIVE and LESS COMPETITIVE. Descriptive records provide us with a means of better evaluating the true genetic value of individuals. In many cases, performance records are used purely as a promotional gimmick.

2. The committee recommends the collection of cow weights and cow condition scores at the time that calves are weaned. In view of discussions of research presented at the symposium April 7, the committee feels that mature cow weight and composition data is important and can be very useful information. This committee does not make a specific recommendation as to how to utilize this data. It should be printed out on weaning summaries in whatever manner that may be preferred by the respective organization.

PRI currently uses this information to compute a factor termed as Cow Efficiency Rating which is a ratio of calf weight to cow weight. Some may prefer to simply print the weight and composition score.

3. The committee recommends a column be available in input and output forms for reporting calving difficulty score. The Farm and Ranch Testing Committee should consider and make some recommendation on the scoring system and codes for calving difficulty.

This area of reproduction data is recognized as needing an improved uniform system for use. This committee sets this area as a goal for the future year.

4. Will Butts reported on the results of a recent survey of performance test record processing systems. The committee is continuing to collect as much background information as possible. Efficiency and cost of available data processing service continues to be of concern, but no specific recommendations are being made at this time. The committee is very concerned about future implications of central performance data processing. The feeling that fewer computer centers will be utilized makes the matter of standardization very imperative.

5. A standard set of input forms for weaning and yearling information have been designed and are in print. Five states in the Southeastern area are currently using these forms and they are available to other organizations.

6. The following are uniform code designations that resulted from a special meeting of this committee in Knoxville, Tennessee in October 1970, and in our meeting in Kansas City, April 8, 1971. These codes have already been put into use by several organizations. The state and county codes are the codes currently used by DHIA. The system of coding breeds is a four digit code that has been in use by PRI for the last three years.

UNIFORM CODES FOR DATA REPORTING

I. BREED:

1. System - Suggest the same system as is currently being used by PRI which involves the use of 4 numerals or letters or combinations that will explain 1/2 to 15/16 blood animals and straight breds. The first numeral or letter is that of the sire, the second is that of the sire of the dam, the third is the sire of the granddam and the fourth is the sire of the great granddam. This system assumes purebred sires.

2. Breeds Included and Coding Recommended:

1. Angus	I. (open)
2. Hereford	J. Jersey
3. Shorthorn	K. Murray Grey
4. Red Angus	L. Limousin
5. Brahman	M. Maine Anjou
6. Santa Gertrudis	N. Charbray
7. Charolais	O. (not to be used)
8. Brangus	P. (open)
9. Polled Hereford	Q. (last to be used)
10. Devon	R. Red Polled
A. Simmental	S. Brown Swiss
B. Beef Master	T. Texas Long Horn
C. Highlander	U. Guernsey
D. South Devon	V. (open)
E. Red Brangus	W. (open)
F. Milking Shorthorn	X. Unknown
G. Galloway	Y. (open)
H. Holstein	Z. (open)

3. Example of use:

1222 = 1/2 Angus x 1/2 Hereford
1122 = 3/4 Angus x 1/4 Hereford
1112 = 7/8 Angus x 1/8 Hereford
1111 = 15/16 Angus or Straightbred (Purebred)

II. SEX:

1. Single birth (or twins where only 1 is raised on dam)

(1) Bull
(2) Heifer
(3) Steer
(4) Heifer born twin to bull

III. CONFORMATION SCORE:

17	+	14	+	11	+	8	+	5	Common
16	Fancy	13	Choice	10	Good	7	Medium	4	Double Muscle
15	-	12	-	9	-	6	-	3	Dwarf

IV. MANAGEMENT CODE:

1. Weaning

1. Dam only
2. Dam and creep feed (6 weeks or longer)
3. Irregulars

Equal Groups

4. same as 2
5. same as 1
6. same as 2
7. same as 1
8. same as 2
9. same as 1

2. Post Weaning

a. Age at end of test
   1. 12 months (365 day weight)
   2. 15 months (452 day weight)
   3. 18 months (550 day weight)

b. Feed Levels
   4. Fitted
   5. Full Fed
   6. Intermediate Feeding
   7. Roughage and/or Pasture

Example of use

14 = Fitted 12 months animal
25 = Full Fed 15 months animal
37 = Pasture Fed 18 months animal

V. CONDITION SCORE:

17	Extremely	14		11		8		5	
16	Fat	13	Fat	10	Average	7	Below Average	4	Thin
15		12		9		6		3	

VI. PROPOSED STATE CODE NUMBERS FOR BEEF PERFORMANCE TESTING PROGRAMS:

(same as DHIA uses)

STATE CODE NUMBERS (USDA - DHIA)

11 Maine
12 New Hampshire
13 Vermont
14 Massachusetts
15 Rhode Island
16 Connecticut
21 New York
22 New Jersey
23 Pennsylvania
31 Ohio
32 Indiana
33 Illinois
55 North Carolina
56 South Carolina
57 Georgia
58 Florida
61 Kentucky
63 Tennessee
64 Alabama
65 Mississippi
71 Arkansas
72 Louisiana
73 Oklahoma
74 Texas
81 Montana
34 Michigan
35 Wisconsin
41 Minnesota
42 Iowa
43 Missouri
45 North Dakota
46 South Dakota
47 Nebraska
48 Kansas
50 Delaware
51 Maryland
52 Virginia
54 West Virginia
82 Idaho
83 Wyoming
84 Colorado
85 New Mexico
86 Arizona
87 Utah
88 Nevada
91 Washington
92 Oregon
93 California
94 Puerto Rico
95 Hawaii

VII. COUNTY CODES:

Each state designate - Recommend use of USDA - DHIA codes already set up.

VIII. HERD CODES:

Each state designate.

COMMENTS CODES

CALF CODES

C0 Twin calf - raised on foster dam
C1 Twin calf - raised on own dam as a twin
C2 Calf sick
C3 Calf sold prior to weaning
C4 Not weighed
C5 Calf weighed under 160 days of age
C6 Calf weighed over 250 days of age
C7 Calf died at calving
C8 Calf died due to disease
C9 Calf died for other reason

DAM CODES

D0 Cow died - at calving
D1 Cow died - disease
D2 Cow died - other reason
D3 Cow failed to calve
D4 Cow aborted
D5 Cow sold - for breeding use
D6 Cow sold - Because of age
D7 Cow sold - physical defect
D8 Cow sold - poor fertility
D9 Cow sold - inferior calves

SIRE CODES

S1 Sire owned by another breeder
S2 Sire unknown
S3 Unfertile bull

TEMPERAMENT CODES

T1 Satisfactory temperament
T2 Fair temperament
T3 Poor temperament

GRADER

G1 Official BCIA Grader
G2 Extension Specialist
G3 Extension Agent, Ag. Inst., other Prof. worker
G4 Another breeder
G5 Breeder himself

REPORT OF RECORD UTILIZATION COMMITTEE

R. L. Willham, Chairman

The charge of this committee is to devise ways and means of increasing and improving the utilization of records. Records are of no value unless they are used to advantage. There are at least four ordered steps in the accomplishment of the charge. These steps are listed as follows:

1. Develop a set of guidelines for performance programs offered to the beef industry by BIF member organizations so that the programs offer records that can be best utilized by the participants.

2. Develop means to promote the enrollment and continued participation of cattlemen in performance programs.

3. Develop pamphlets and brochures on performance record use for all segments of the beef industry including allied industry.

4. Promote record utilization throughout the beef industry using the educational pamphlets and brochures as well as through the many forms of the news media.

After a brief statement concerning the nature of a record and performance programs, each of these steps will be examined.

A performance record is a written measure of the performance of an individual made during some specified test or set of conditions. The Beef Improvement Federation has done much to standardize the particular tests and specify the relevant measures of performance for the test. The widely accepted 205 day, age of dam adjusted, weaning weight; 140 day gain test conducted in central bull tests; and the adjusted yearling weight are examples of performance tests and resulting performance records.

Most BIF organizations have collected a set of such tests and resulting records into a performance program which is offered to the participants. The usual program is a system involving the measurement, adjustment, and summarization of weaning weights by calf crop. Feedlot tests to obtain yearling weights and slaughter tests for the evaluation of carcass merit have been added to most performance programs. These programs are primarily geared to the needs of breeding stock producers. Theoretically, if they participated thoroughly and made desired genetic change by using the performance records in selection, the beef industry would prosper and improve. But actually participation has been minimal and use of records for selection near nill. Why? Idealism and the purse have not been attached to each other. If performance records are useful, they must reflect this in the bank. Performance records are an economic asset throughout the entire beef industry. Today such records do not exist in a volume necessary, are not utilized effectively by those who have them, and are not understood by the industry participants for their economic advantage.

Organizations within BIF need to consider designing specific programs developed to generate profitable record systems for other segments of the beef industry other than the traditional breeding stock herds. Attempts have been made in this area such as feeder calf programs in which a sample of the product offered for sale is tested and in feedlot business analyses in which the value of genetic potential for gain can be dramatically demonstrated. In these areas lie the opportunity to utilize economic records.

The essence of record use is SELECTION in the broad sense. That is, records must be used in decision making of the enterprise or they are simply an expense, and a large expense at times. In the breeding stock breeding program, records must be used in selecting parents in order to make genetic change. In commercial breeding programs, records must be used in selection of parent stock both within the program and in evaluation of breeding herd programs from which to obtain the breeding stock. Also in both programs these records, properly evaluated, can be aids in many management decisions. This is not genetic selection, but is selection among alternatives just the same. In commercial feeding enterprises, records are necessary in evaluating sources of stock and in determining optimum management. Specification in terms of economically important records not just groundless advertisement, is becoming the rule in all segments of the beef industry. The development of a PERFORMANCE REPUTATION is the key to tomorrows success.

Guidelines for Performance Programs

What follows is a list of simple guidelines for a complete Breeding Stock program:

1. Each calf crop starts with the mating decisions a year prior to the birth of the calf crop. A complete breeding stock program should have convenient forms to record matings planned and matings made as well as date of breeding if these are known. At the conclusion of a pregnancy exam or after breeding these breeding records can be sent to the organization office where these records could constitute the prelist for birth and weaning data the following year. Such a system would provide an easy way to keep up with the reproductive performance of the cow herd. Further they would provide information for a breed association in registration and thus eliminate the need for the breeder to fill out separate forms. This would tie performance to registration procedure in a useful way.

2. Each performance program should be designed to be simple for the participant, breeder, or better yet the customer. To be simple requires that worksheets be prelisted in some useful sequence, that previous weights be given if applicable, that the sheets be of a convenient size for easy writing, that the paper be of high enough quality to withstand a reasonable amount of moisture, that the space for recording the weight or measure be large enough for cold fingers and that turning pages to find particular animals be facilitated. The prelisting will save customer effort and assure an accounting of the animals being tested. Much of the time performance programs have been developed with the data flow being the primary consideration. The breeder, not the program system, is the customer. Using carbons on the farm needs to be avoided whenever possible. With the advent of copy machines, hand copying of records by the breeder is obsolete and besides errors are generated. Records can be sent in, copied and sent back in a relatively short period of time. The less desk work required of the customer, the greater will be the participation. If the cowman liked desk work, instead of livestock and the outdoors, he would have a desk job!

3. Each performance program needs to be designed such that the adjusted and analyzed records are available to the breeder at the time they can be used in selection and in other decision making. Adjusted weaning weights are of little value after the replacements have been selected and the culls disposed of. Dam summaries are nice to have after the pregnancy exam and culling prior to the dry period, but are of so much more value if they are available when the selections are made. Probably this speed is not necessary. The general rule for record processing is "raw data in processed data out as soon as physically possible." Often less than a complete calf crop is sent for processing. These contemporary groups should be processed rather than when the complete calf crop is completed. Such procedure should encourage the customer to bunch his calf crop as much as possible in order to compare more individuals accurately within contemporary groups. Record summaries need to be sent to the customer when they can be used. Dam summaries need to be available when cows are culled and this may need to be on breeder request. Sire summaries should be available especially for yearling and carcass data before sires are selected to go into the breeding season. To miss carcass data, due to lag time, on a group of sires means another year added to the already long generation interval.

4. Each performance program needs to be designed so that all the available information on a trait, for a particular set of individuals to be compared, is utilized. The records on close relatives exist in the data sets for herds and can easily be used to provide the customer with all the information available from the performance organization. Provided the data sets are properly stored, the average performance of paternal and maternal half sibs can be combined with the individual's own record of performance to better rank the contemporary individuals based on their estimated breeding value. When progeny are available this average can be used also. Obviously this takes programming skill to sort through the data finding the relevant records and to compute breeding values using multiple regression techniques. But with todays computers such a task is very quick. For the breeder to do this is a physical impossibility. Thus, the performance organization can provide a service that is impossible for the breeder to do. Ranking of individuals on their estimated breeding value using all available information for a trait will increase the accuracy of selection.

As an example, at weaning the bull and heifer calves could be ranked separately based on their weight and the average weight of their paternal and maternal half sibs. From this selection worksheet (a current ranking to be used) a breeder could make his tentative heifer selections and decisions on what bull calves to feed. Along with this ranking, the cows just weaned could be ranked on their record, the average record of their paternal and maternal sibs, and the average record of their progeny. The MPPA uses only progeny information. Then the selection worksheet could be used as an aid in culling the cow herd. After the yearling test, the procedure could be repeated using all available information for yearling weight. This selection worksheet would be useful in selecting young bulls and, if one were made on all sires, in comparing the young bulls with current herd sires. Such a selection worksheet available before breeding would materially aid in selection accuracy of the bulls.

The use of this procedure is dependent on having the majority of each calf crop contemporary since to account for environmental differences the deviations or ratio deviations must be used in the estimation procedure. Also to assure that records from several years can be combined into meaningful estimates, the management and program in the herd must be as consistent as possible over years.

5. The honesty and accuracy of the cowman in keeping records is the very backbone of the system. Our beef industry is built on this. Although certification of weights by a disinterested party helps verify the program, it is not essential. The breeding stock breeder sells breeding values and that's how the calves of his stock performs for the buyer. When his stock don't perform for others, free enterprise solves the problem. Probably we should encourage seedstock breeders getting disinterested parties to help them.

6. More abbreviated performance programs need to be developed for the large commercial producer. This will involve a sampling procedure (quality control) in which a sample of calves, or the product he offers for sale, if fed out and the gain and carcass information obtained. This allows the commercial producer to access what breeding stock he needs and to compare between sources, if possible, as well as develop a sound performance reputation. The small commercial producer can best compete by keeping more detailed records with cow identification.

7. Sound feedlot record programs need development so that genetic groups, sources of cattle, and programs of feeding can be compared. These programs need not be elaborate, but should include a sample of animals evaluated on the rail. In this way the feedlot operator generates his performance reputation.

8. Performance programs need to adapt quickly to a unified sire evaluation program when such develops. Since sire selection is the key to genetic change in the beef industry, this is imperative. Adoption of uniform testing programs for performance of individual bulls and for uniform progeny evaluation will be necessary.

9. All cattle in herds should be involved in the programs.

Performance Program Participation

Record utilization at present suffers because not enough herds are participating or are continuing to participate. Several guidelines are proposed as follows to encourage participation:

1. Development by each performance organization of a clear concise write up of procedures to follow in enrolling and continuing to participate is essential. A simple review with the new breeder in mind, not the data flow, can help a lot. The organization can develop a calendar of record keeping to help the breeder plan his program. The order involves calving, yearling, breeding, weaning, etc. Note that three calf crops are involved in any one calendar year. First, last years crop must be evaluated as yearlings, second, this years crop must be born and weaned, and third next years crop must be bred for. This is the form of the breeding program. Calving twice a year compounds the problem and calving the year around presents near insurmountable problems unless the management is artificial to assure some uniformity. Real effort needs to be expanded in this area to develop a simple procedure that gets the message across and does not scare breeders off. Uncluttered forms will help and fairly uniform, over organizations, input and output forms would aid in explanation.

2. To become acquainted with a set of records and what they can be used for, would be a significant aid in interesting new participants in a performance program. While obtaining enough back log of records to be useful, is the time a lot of breeders quit. If they could practice on a dummy set of records already computed for them, they could see selection operate (learn genetic principles) as well as become better acquainted with the forms and procedures. Such a tool is available in the computer cow game. It could be played in groups of say 50 new breeders just enrolling in a program. They could be asked to participate in the game over say 5 calf crops to see just how a performance program can be made to work for them. Also breeders already keeping records might want to try out several selection schemes to find out which might be the more successful before they launched their new lifetime program. This could be done by having three or four simulation herds at once. The opportunities to educate customers using the computer cow game are limitless.

3. Educational material in depth needs to be developed by the Federation and specifically by the member organizations on just how to use records in selection and in the entire process of beef production. The sights for such material needs to be both for the experienced record cowman and for the novice. They will not be of the same content. For an organization to serve its customers, requires it to challenge all. No breeder today is utilizing his records for selection at near maximum potential.

4. There should be cooperation between all performance programs operating in a state.

5. Need an indepth book on beef breeding principles.

Educational Material Development

The entire beef industry has need for knowledge concerning the use that can be made of records in the development of a specification product by the industry. This committee along with the ones involved in education need to write pamphlets and brochures on record use for the entire beef industry. To some segments such a writing will need to explain the system of performance records and what can be learned about the participants and their cattle from examination of their breeding programs. For other segments, such a writing must involve suggestions for their participation in performance record systems. What follows is a list of particular segments that might utilize such written information:

1. To cattle feeders both corporates and individuals. Questions such as how to buy on performance records, what to expect from extra gaining ability, etc., could be answered. This segment is most important because of the reflection back to the cow-calf man and then to the breeding stock supplier.

2. To feed companies for incorporation into their cattle feeding programs using their feed. This is a real source of distribution.

3. To livestock bank loan officers. A well done brochure on the dollars and cents of performance records in cattle herds would be received with great interest in banking organizations. And we need the capital.

4. To breeding stock herds especially through their various breed associations. Such writing could include an evaluation of breed needs in a crossbred commercial industry and such topics.

5. To commercial cow-calf operators through the state and national cattlemen's organizations. Sire selection for commercial production would be the item to stress or utilizing crossbred vigor in a designed program would be of value.

6. The publishing houses especially the breed organs desperately need some guidelines on what constitutes proper advertisement of records and what does not.

7. The business world as a source of volume capital needs an introduction to performance records and their use in evaluating a proposed deal.

8. To the packing, processing and retail industries. Such a pamphlet could reflect the use of records in developing for their industries a specification product.

9. To the livestock extension activities. This could include 4-H and FFA. A concise statement about performance records and their use in the entire beef industry would be beneficial.

10. To livestock marketing agencies. Such writing could consider economic aspects of buying and selling based on performance records as the start for performance reputations.

Actually the first objective of such material development would be to simply take a long hard look at the potential for the use of performance records in all segments of the giant beef industry. They are many. The second objective is to get the developed material read and acted upon by leaders of the beef industry. Either one or both of the objectives will be difficult but should be worth the effort.

The need exists to help organize merchandising mechanisms between cow-calf man and feeders.

Promotion of Record Utilization

Once several brochures have been developed, these need to be circulated through a concentrated promotion program. Such a program needs to be organized and must utilize every means possible to get the information into the hands of the men of leadership in the various segments of the beef industry. To utilize their own groups or organizations to get the information out would be profitable. These publications must be simple, well illustrated, and yet get the basic information to the reader.

The news media and farm press is another avenue available for an organized promotion effort. They have more than supported us in the past in the Performance movement. To promote through the news media requires that the information be "news" and that is not easy. There are many human interest stories waiting for the writing. Such stories involve the particular development by a breeder of a performance reputation worthy of note. These "how it came about" stories are the keys to interesting other breeders in becoming involved in performance. They are better promoters than any "how to do it - step by step" brochure!

Additional Idea

A committee should be established to consider in detail feeder calf programs and feedlot programs.

MARKETS AND MARKETING COMMITTEE

Dave Nichols, Chairman
L. A. Maddox, Acting Secy.

The committee met with the Central Testing Committee and heard a report on a proposed Western Regional Beef Marketing Project by Bill Gorman of New Mexico. The Committee recommended that the study of this proposal be continued and if possible be put into operation.

The committee also recommends that producers when marketing their performance tested cattle:

1. Make potential buyers aware of their own performance testing program.
2. Show potential buyers all the facts and only facts.
3. Use only BIF recommended descriptions of beef cattle performance.
4. Help potential buyers become aware of his opportunities with performance tested cattle.

The committee's last recommendation was that the Directors of BIF study the possibility of combining this committee with the Advertising Committee.

REPORT CENTRAL TESTING COMMITTEE

L. V. Cundiff, Acting Chairman

The Central Test Committee met jointly with the Market and Marketing Committee to discuss the Western Regional Beef Marketing Project presented by Dr. William Gorman, Department of Agriculture Economics, New Mexico State University. The objectives of this project are to study the feasibility of and procedures for developing a marketing-pricing system based on herd-sample tests. Dr. Gorman focused attention on a vast number of considerations including herd sampling procedures, required ranch information, growing and finishing program, ownership and control of test facilities, test end points, data to be included, and an eventual index-reflecting value.

This index potentially could reward the producer of profitable feeder calves and provide incentive to strive for genetic improvement. Considerable discussion was generated by Dr. Gorman's report, including matters relating to economy of production in the full-life cycle and the relationship of herd sample tests to National Sire Evaluation. The only action taken by the committee was unanimous support and interest in the project with the expectation that results of the project will be useful in developing guidelines to the industry in this area.

The committee felt that the present recommendations for Central Bull Testing were generally appropriate.

The committee recommended that the use of measures of body composition, especially fatness, be emphasized in Central Bull tests.

The committee voted not to include estimates of rib-eye on the live animal.

The committee voted to appoint a sub-working committee to work out and develop recommended guidelines for a sire-progeny Central Tests. It was recommended that participants in this committee should involve breed associations, BCIA, and research personnel involved in size-progeny group tests.

It was the committee's consensus that 365-day yearling weight should be emphasized more than gain on test in Central Bull tests.

CARCASS EVALUATION COMMITTEE

C. O. Schoonover, Chairman

The product, beef, is the end-point of all beef cattle improvement programs and activities. Quality of product and quantity of edible portion are the basic factors of carcass merit. However, the relative value of quality and the relative value of quantity are subject to change as market demands change.

Carcass evaluation is the technique by which the components of quality and the components of quantity are measured. The methods recommended in this publication are those chosen because of their wide use and ease of application. However, a unified approach to beef carcass evaluation dictates that the methods and techniques recommended here be used as a base.

These are guidelines which may be used in any county or state beef carcass contest.

The objectives are:

1. To identify the type of a carcass that is useful to all segments of the industry from the producer to the consumer.

2. To help identify breeding animals which are producing the desirable carcasses.

3. To help individuals identify the live animal characteristics which are related to carcass merit.

BASIC FACTORS OF CARCASS MERIT

Quality refers to the overall palatability of the edible portion of the carcass. The USDA Quality Grade (conformation excluded) is recommended as the base for quality evaluation.

The USDA Quality Grades are Prime, Choice, Good, Standard, Commercial, Utility, Cutter, and Canner. The grades are determined by visually evaluating certain carcass characteristics. These characteristics (excluding conformation) are:

Maturity
Marbling
Texture of lean
Color of lean
Firmness of lean

Once determined, the final grade should be reported by one third of a grade. It is often desirable to independently record the score for one or more of the characteristics which make up the grade.

Many people are particularly interested in the degree of marbling. If so, they should make sure that the marbling score is recorded. In sire evaluation programs, it is recommended that the score for all components of the quality grade be recorded. Low choice quality is recommended as a minimum goal in sire evaluation programs and carcass contests.

Warner-Bratzler shear test and taste panel test are both desirable. Since these techniques are time-consuming and costly, their use will be restricted.

Quantity is the amount of salable meat the carcass will yield.

It is recommended that USDA Yield Grade be used as a basis for evaluation of carcass quantity.

There are five USDA Yield Grades numbered 1 through 5. Yield Grade 1 carcasses have the highest yields of retail cuts; Yield Grade 5 the lowest. The USDA Yield Grades are based on four factors:

1. Hot carcass weight
2. Ribeye area at the 12th rib
3. Fat thickness at the 12th rib
4. Estimated percent kidney, pelvic, and heart fat.

The Yield Grade can be expressed in whole numbers from 1 to 5 or in tenths of the grade. For example, a carcass is a Yield Grade 2.0 whether it is a 2.0 or a 2.9. A 3.9 Yield grade indicates that a carcass is one-tenth better than a 4.0; however, it is still a Yield Grade 3.0. Yield Grades should be expressed to a tenth of a grade. The Yield Grade can also be expressed as a percentage. This percentage estimates the percent trimmed boneless retail cuts from the round, loin, rib, and chuck.

This percentage figure is commonly referred to as cutability. Various cutability figures correspond to Yield Grades for example:

Yield Grade	Cutability (Percent)
1.0	54.6
1.5	53.5
2.0	52.3
2.5	51.2
3.0	50.0
3.5	48.9
4.0	47.7
4.5	46.6
5.0	45.4
5.5	44.3

The formula for calculating percent cutability is:

Percent cutability = 51.34 - 5.784 (single thickness of fat over longissimus dorsi in inches) - .462 (estimated percent kidney, pelvic, and heart fat) + 0.740 (area longissiumus dorsi in square inches) - 0.0093 (Hot carcass weight in pounds).

Pre-slaughter growth rate is an important part of all performance programs. However, measures of growth rate prior to slaughter do not measure the composition of the gain. In order to measure the composition of the carcass in terms of growth rate, it should be expressed as pounds of trimmed retail cuts (cutability) per day of age. Example:

Pounds of trimmed retail cuts per day of age = carcass weight x cutability (in percent) ÷ age in days. For example:

600 pound carcass
52.3 percent cutability (Yield Grade 2)
365 days of age

OR

600 x 52.3 = 314 ÷ 365 = .86 pounds of trimmed retail cuts per day of age.

600 pound carcass
50.0 percent cutability (Yield Grade 3)
365 days of age

600 x 50.0 = 300 ÷ 365 = .82 pounds of trimmed retail cuts per day of age.

USING CARCASS EVALUATION

Not all producers will need complete carcass data. Feeders evaluating their buying and management practices may need only the raw quality and yield grades. Commercial producers checking their breeding programs may need the quality grade by thirds and the yield grade by tenths. In sire evaluation programs and other more sophisticated programs, the user should consider the recording and use of complete data, i.e., all components of both the quality and yield grade.

OBTAINING CARCASS EVALUATION

Persons desiring carcass data should plan in advance. Identification of the cattle to be slaughtered is a must if individual data are desired. Although many research and Extension personnel are qualified and can collect carcass data, their services are not always available. In most cases if requested data can be collected by the USDA Grading Services.

USDA'S CARCASS EVALUATION SERVICE

This service is provided on a fee basis and may be requested from any USDA Meat Grading Office. The fee will vary depending upon the amount of information requested and expenses incurred by the grader, such as travel.

After the carcass is chilled, the grader records the information requested for each animal on a USDA form which is forwarded to the producer or feeder requesting the service. A copy of the form follows.

Note: Persons planning to use this service should contact the grading service well in advance of the time the cattle are to be slaughtered. They should also alert the packer of their intentions to have the cattle evaluated and request his cooperation.

DISTRICT OFFICES

EASTERN

	Address	Telephone
Georgia	1718 Peachtree St. NW, Room 204 Atlanta, Ga. 30309	404-526-5159
New Jersey	970 Broad St. Room 901 Newark, N. J. 07102	201-645-3951
Ohio	Livestock Exchange Bldg. Room 23 Cleveland, Ohio 44102	216-631-5535
Pennsylvania	604-C U. S. Customs House Philadelphia, Pa. 19106	215-597-4535
Tennessee	465 W. Trigg Ave. Memphis, Tenn. 38106	901-948-2815
Virginia	203 N. Governor St. Room 407-C Richmond, Va. 23219	703-770-3934

CENTRAL

Illinois	Room 522 Livestock Exchange Bldg. Chicago, Ill. 60609	312-YA3-6520
Illinois	PO Box 38 29 Livestock Exchange Bldg. National Stockyards Illinois 62701	618-622-4717
Iowa	225 Livestock Exchange Bldg. Sioux City, Iowa 51107	712-252-3287
Michigan	6750 Dix Avenue Room 204 Detroit, Mich. 48209	313-841-2050
Minnesota	Box 27 Post Office Bldg. South St. Paul, Minn. 55075	612-451-6877

Missouri	760 Livestock Exchange Bldg. Kansas City, Mo. 64102	816-842-3808
CENTRAL		
Nebraska	609 Livestock Exchange Bldg. Omaha, Nebraska 68107	402-731-2015
WESTERN		
California	4747 Eastern Ave. Bldg. 7, Section A Los Angeles, Calif. 90201	213-268-1392
California	630 Sansome St. Room 745 San Francisco, Calif. 94111	415-556-5816
Colorado	403 Livestock Exchange Bldg. Denver, Colo. 80216	303-837-4089
Oklahoma	Room 232 Livestock Exchange Bldg. Okla. City, Okla. 73108	405-232-5425
Oregon	217 Livestock Exchange Bldg. N. Portland, Oreg. 97043	503-226-3683
Texas	229 Livestock Exchange Bldg. Ft. Worth, Tex. 76106	817-624-2714
Utah	200 Livestock Exchange Bldg. Ogden, Utah 84402	801-399-6211

CARCASS CONTESTS

Carcass contests are the show window of carcass evaluation. Presently there are many different procedures used. It is recommended that carcass contests be based on specific procedures as recommended by the American Meat Science Association.

HELPFUL PUBLICATIONS AND MATERIALS

For those interested in beef carcass evaluation there are other sources of information. Several of these are listed here.

USDA Publications

Beef Carcass Yield Grade Finder

This handy slide rule is useful in determining the yield grade by tenths. On the back is a conversion table showing the percent cutability for each tenth of a yield grade.

Official Standards for Grades of Carcass Beef

This is the official standard by which carcass beef is graded. It covers both the quality and yield grades.

USDA Yield Grades for Beef, Marketing Bulletin No. 45

This bulletin explains in everyday language how the yield grades work and shows some economic differences between yield grades.

The above publications may be obtained by writing to:

United States Department of Agriculture
Consumer and Marketing Service
Livestock Division
Standardization Branch
Washington, D. C. 20250

Beef Carcass Contest Judging

The following information should be collected for quality beef carcass contests:

1. Age (desirable if can be obtained)
2. Hot carcass weight*
3. USDA quality grade
   a. Conformation
   b. Maturity
   c. Marbling
4. USDA estimated cutability percent
   a. Hot carcass weight
   b. Fat thickness over rib eye
   c. Rib eye area
   d. Estimated percent kidney, pelvic and heart fat.

* Champion carcasses should weigh within a 550 to 750 pound weight range.

LS Instruction 918(MG)-1
Rev. 5
Exhibit F

G 15

GRADING METHODS AND PROCEDURES 1/

FORM LS 106
(3-1-66)

BEEF CARCASS EVALUATION REPORT

U. S. DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
LIVESTOCK DIVISION

USDA NO.	OTHER IDENTIFICATION	BREED *(As supplied by owner)*	MEAT GRADING CERTIFICATE NO

NAME OF PRODUCER	NAME OF PACKER

1 QUALITY GRADE _____ BY THIRDS

A. CONFORMATION, MARBLING, AND MATURITY FACTORS

CONFORMATION	DEGREE OF MARBLING	MATURITY (APPROXIMATE AGE SHOWN) *(Circle one)*
		A *(Under 30 mos.)* **B** *(30 to 48 mos.)* **C D E** *(Over 48 mos.)*

B. OTHER FACTORS

TEXTURE OF MARBLING *(Check one)*

☐ FINE ☐ MEDIUM ☐ COARSE

COLOR OF LEAN *(Check one)*

☐ VERY LIGHT CHERRY RED ☐ CHERRY RED ☐ SLIGHTLY DARK RED ☐ MODERATELY DARK RED ☐ DARK RED ☐ VERY DARK RED ☐ BLACK

FIRMNESS OF LEAN *(Check one)*

☐ VERY FIRM ☐ FIRM ☐ MODERATELY FIRM ☐ SLIGHTLY SOFT ☐ SOFT ☐ VERY SOFT ☐ EXTREMELY SOFT

TEXTURE OF LEAN *(Check one)*

☐ VERY FINE ☐ FINE ☐ MODERATELY FINE ☐ SLIGHTLY FINE ☐ SLIGHTLY COARSE ☐ COARSE ☐ VERY COARSE

2 YIELD GRADE _____ BY TENTHS

YIELD FACTORS

CARCASS WEIGHT *(From packer's hot wt. tag)*	FAT THICKNESS *(Inches, nearest 1/10 in.)*		RIB EYE AREA *(from Grid)*	KIDNEY, PELVIC AND HEART FAT *(As percent of carcass weight)*
_____ LB.	_____ IN. ACTUAL	_____ IN. ADJUSTED	_____ SQ. IN. BY TENTHS	_____ PCT. ESTIMATED

_____ (DATE)

_____ (SIGNATURE OF GRADER)

1/ This form is being revised into a more condensed version.

12/2/66

To aid in placing, each one-third of a grade change in USDA quality grade may be considered to have the same effect as 0.8% change in yield of boneless retail cuts. However, the advisability of giving credit for a quality grade above USDA low Prime is questionable. Also if certain placings are very close and difficult to make with objective measurements, subjective evaluation should be used. Therefore, it is imperative that a qualified person or persons be responsible for interpreting the data obtained as well as determining the final ranking of the carcasses in a quality beef contest.

* It is recommended that all cattle entered in carcass contests have temporary incisions.

REPORT OF ADVERTISING COMMITTEE

List of Members:

Acord, Clair
Baker, Frank
Bassford, Forrest
de Baca, Robert
Elings, Jim
Forbes, Sally
Hubbard, Dixon
Lilley, Roy
Long, Bob
Nolan, Jim
Patton, Mack
Purdy, Hermann
Walker, Hayes
Goff, Dick

Advertising is a means of representing or selling a product to a potential user or buyer. It represents an operating expense to the beef cattle breeder for which he expects a substantial return. Within a democratic society the breeder has the right to use his own system of merchandising his product.

In general, advertising presentations and formats are and have been well done in relation to the purpose for which they have been intended. Basically, those persons who have most used and supported the advertising media generally have been less oriented toward performance evaluation than are the representatives to Beef Improvement Federation or many people that are performance testing.

When performance data are used in advertising, they should be accurately and concisely presented. This is the purpose for developing guidelines for using performance data in advertising beef cattle.

The Advertising subcommittee recommends that data presented in advertising be:

1. Brief -- too many records cause confusion rather than clarification.
2. Authenticated -- the source of data authentication lends credibility to record use.
3. Pertinent -- data which are useful in decision-making should be encouraged; other types of data tend to detract from usefulness of advertising.
4. Current -- data used should be up to date, not antiquated.
5. Complete -- data used should be a complete reflection of what it is meant to describe. Partial data or distortion of data to look good should be discouraged.

The subcommittee suggests that Beef Improvement Federation consider doing the following:

1. Draft a suggested data presentation format for using records for young breeding animals, produce-of-dam records, sire-progeny summaries and carcass data in advertising.
2. Send to publishers in the advertising media a copy of BIF guidelines dealing with advertising.
3. Encourage members to develop brochures for their breeder suggesting formats for using performance data in advertising.
4. Suggest that publishers and their advertising representatives provide performance format forms to prospective advertisers for use in makeup.
5. Encourage standardized records such as the use of 205-day and 365-day adjusted weights, cutability data, and weight ratios and number of contemporaries.
6. Mature weights, if used, should not be substituted for standard BIF records. If such weights are presented, the age of the animal should be stated.
7. Furnish a list of examples of data uses, phrases, etc., which are misleading or superfluous and should be discouraged such as:
   (a) "During a 60-day test this bull gained 5#/day."
   (b) "Sonoray rib eye at 2165 lbs. was _____."
   (c) "Weight of this bull at 23 months and 5 days was ____."
   (d) "Calf weighed 363 lbs. at 4 months and 19 days."
   (e) "The last 3 calves by this sire weighed 628 lbs."
   (f) "This bull weighed 1,300 lbs. at 14 months."
   (g) "One calf sired by this bull weighed 1,220 at 14 months."

MAGAZINE AND CATALOG ADVERTISING:

The following are possible layouts for incorporating performance records with pedigree, footnotes, etc., into advertising in trade journals or sale catalogs.

ANIMAL BEING ADVERTISED:

Format 1: Suggested data presentation in advertising young breed animals.

		205 Day Adj. Data			Weight per day of age or 365 Day Adj. Data on Bull Progeny		
	No.*	Weight	Ratio	Grade	No.*	Weight	Ratio
INDIVIDUAL'S RECORD (CREEP: yes or no)							
SIRE'S PROGENY RECORD							
DAM'S PRODUCE RECORD							

* No. of contemporary test mates on individual records and total number tested in progeny records.

Format 2: Suggested data presentation in advertising sires for sale or reference.

		205 Day Adj. Data			Weight per day of age or 365 Day Adj. Data on Bull Progeny		
	No.*	Weight	Ratio	Grade	No.*	Weight	Ratio
INDIVIDUAL'S RECORD (CREEP: yes or no)							
PROGENY RECORD							
PROGENY CARCASS DATA	No.*	Ribeye Adj.**	Carcass W/DA	Fat Thick-ness	Cut-ability	% Choice or Higher	Carcass Weight

* No. of contemporary test mates on individual records and total number tested in progeny records.
** Adj. by regression: RA = REA - (WT - 600) * .001)

Format 3: Suggested data presentation in advertising individual dams.

		205 Day Adj. Data			Weight per day of age or 365 Days Adj. Data on Bull Progeny		
	No. Calves	Weight	Ratio	Grade	No.	Weight	Ratio
PRODUCE RECORD							

INFORMATION ON CALVES CONSIGNED

	Name of Bull Calf	Reg.	Birth Date Mo. Da. Yr.		Tattoo

BREED	CONSIGNOR NAME AND ADDRESS	LOT

Sex	Check if Purebred	Percent if Not Purebred	Check if Polled	205 Day Wt.	205 Day Wt. Ratio	Weaning Grade	365 Day Wt.	Yearling Wt. Ratio

PEDIGREE

Sire Name

SIRE

REG. _____

PROGENY RECORD

NO. CALVES _____ AVE 205 WT _____ 205 WT RATIO _____ AVE GRADE _____

NO. BULLS _____ AVE 365 WT _____ AVE 365 RATIO _____

PROGENY CARCASS DATA	No.*	Ribeye Adj.	Carcass W/DA	Fat Thickness	Cutability	% Choice or Higher	Carcass Weight

GRAND SIRE REG. _____

GRAND DAM REG. _____

DAM

REG. _____

PROGENY RECORD

NO. CALVES _____ AVE 205 WT _____ 205 WT RATIO _____ AVE GRADE _____

NO. BULLS _____ AVE 365 WT _____ AVE 365 RATIO _____

GRAND SIRE REG. _____

GRAND DAM REG. _____

Do not write in this space (1-3) (4-5) (6-8) (9) (10-11)	Name of Bull Calf (13-42)	Reg. (43-52)	Birth Date (53-58) Mo. Da. Yr.	205 wt. (59-62)	Tattoo (63-67)
4					

BREED	CONSIGNOR NAME AND ADDRESS	LOT

Sex	Check if Purebred	Percent if Not Purebred	Check if Polled	205 Day Wt.	205 Day Wt. Ratio	Weaning Grade	365 Day Wt.	Yearling Wt. Ratio

Do not write in this space ___ ___ --- 3

PEDIGREE

Sire Name (13-42)

SIRE

REG. (43-52) _____

PROGENY RECORD

NO. CALVES _____ AVE 205 WT _____ 205 WT RATIO _____ AVE GRADE _____

NO. BULLS _____ AVE 365 WT _____ AVE 365 RATIO _____

PROGENY CARCASS DATA	No.*	Ribeye Adj.	Carcass W/DA	Fat Thickness	Cutability	% Choice or Higher	Carcass Weight

GRAND SIRE REG. _____

GRAND DAM REG. _____

DAM

REG. _____

PROGENY RECORD

NO. CALVES _____ AVE 205 WT _____ 205 WT RATIO _____ AVE GRADE _____

NO. BULLS _____ AVE 365 WT _____ AVE 365 RATIO _____

GRAND SIRE REG. _____

GRAND DAM REG. _____

REPORT OF THE RECOGNITIONS COMMITTEE

Members of the committee are Robert C. deBaca, Chairman, Carroll Schoonover, Acting Secretary, Bobby Rankin, Secretary, Frank H. Baker, Burton Eller, Dixon Hubbard, Roy Lilley, Bob Purdy, Pete Swaffar and Ray Woodward.

Those of the committee who were present at the Annual Meeting in Kansas City met and offered the following suggestions to Beef Improvement Federation. It is the feeling of this committee that certain industry recognitions for excellence in achievement are worthwhile and forthcoming.

The committee suggests the following awards for recognitions for the consideration of the board of directors:

1. A continuing service award to be made by the Board of Directors. The nominations of people to receive these may come from any level of the industry. Final selections are to be made by the Board of Directors. There is no restriction on the number of award winners per year.

2. The Beef Performance Man of the Year.
   Category 1. To be a commercial breeder.
   Category 2. To be a seed stock producer.

One nomination will be accepted in each category from each active member organization of Beef Improvement Federation. This man will be the Beef Performance Man of the Year within his nominating entity and should receive publicity and acclaim through said entity.

Nominees should be actively engaged in beef cattle production and should demonstrate significant achievement through the use of Beef Improvement practices.

Material to be supplied by nominator include the following (forms will be provided).

A. Copies of the biography of the nominee.
B. Picture of the nominee.
C. A minimum of three letters of support indicating the man's achievement.
D. Copies of information of the following:
   1. Extent of acceptance and application of his concepts, recommended techniques, programs, etc.
   2. The influence of his projects, programs and the like on the beef cattle industry and the welfare of the beef industry.
   3. Qualities of leadership demonstrated by his ability to influence others, to act and adopt improved practices.
E. The nominating entity should finance the trip of the nominee to the Beef Improvement Federation Annual Meeting if he is the National Winner.

3. Beef Improvement Federation Organization of the Year Award

This award is limited to active member affiliates of the Beef Improvement Federation.

Nominations will be received and judged on the basis of the Annual Beef Improvement Federation roundup of member activities.

It is recommended that the Board of Directors appoint a separate committee to judge the Beef Performance Man of the Year Awards and the Beef Improvement Federation Organization of the Year Award.

It was proposed that each committee include:
One BCIA director of BIF.
One breed organization representative.
One Animal Science Department Head.
One allied industry executive.
One BCI president.

It was further recommended that December 1 of each year be the deadline for the nominations for the Performance Man of the Years Awards and that said nominations should be filed with the secretary in quintuplicate. The committee should finalize selections by March 1.

BEEF IMPROVEMENT FEDERATION

GUIDELINES for A NATIONAL SIRE EVALUATION PROGRAM [1/]

I. INTRODUCTION

A. Purpose and Scope

The purpose of a National Sire Evaluation Program is to provide breeders with information on "Expected Progeny Differences" between bulls. "Expected Progeny Difference" is the best estimate possible from available data of the difference between the average of a large sample of a bull's progeny from representative cows as compared to progeny of base reference sires when bred to similar cows. The expectation is that information on "Expected Progeny Differences" will aid breeders in making decisions on selection of bulls best suited to accomplishment of specific objectives for the herd. A secondary purpose is to enable breed associations or other sponsoring organizations to determine the direction and magnitude of genetic changes in a breed over time.

Focus of the program should be on measurable characters related to the economic production of quality beef.

A National Sire Evaluation Program for any breed should be planned and conducted by an organization not having direct interests in any specific animal under test. Breed associations may sponsor programs or they may be sponsored by private or public organizations with interests in more than one breed. It is in the interests of all concerned that there not be more than one program per breed. Regardless of whether the sponsoring organization is conducting programs for only one breed or for several, each program should be nation-wide with "Expected Progeny Differences" and related information to be on a within-breed basis.

B. Summary of Program

Beef Improvement Federation guidelines for A National Sire Evaluation Program include as a first step the encouragement of herd performance testing as a means of identifying bulls with desired performance characters. Records of individuals ranking high within herds in 205-day weaning weight and 365-day weight will be published for use by other breeders primarily as an aid in making decisions relative to within-herd selections for progeny testing, use in purebred herds or for commercial use. Possibilities for meaningful between-herd comparisons will be very limited in the early stages of a program. Later, as ties are established between herd sires and the reference sires used in progeny testing programs, between-herd comparisons of greater validity will become possible.

[1/] Report of National Sire Evaluation Committee adopted by Beef Improvement Federation Board of Directors, April 9, 1971, Kansas City, Missouri.

Two procedures for progeny testing are outlined. The first is for within-herd use. It does not provide for comparisons with sires in other herds. The other involves use of designated reference sires in either single-herd or multiple-herd tests. This procedure permits breed-wide comparisons of bulls under progeny test.

Emphasis in these guidelines is on principles which will permit individual breeds to adapt the program to their specific needs. Traits for which procedures are outlined include 205-day weaning weight, 365-day or 550-day yearling weight, carcass weight per day of age, carcass yield of preferred retail cuts expressed both as a percentage of carcass weight and per day of age, carcass quality grade, cow maternal qualities and progeny testing for deleterious recessive genes. Progeny testing can be sequential with individual breeders and/or sponsoring groups to select the traits to be evaluated in specific programs. Programs need not be limited to traits discussed in these guidelines. The program calls for publication of results and calculation of Expected Progeny Differences for 365-day weight, USDA carcass quality grade and carcass yield of preferred retail cuts per day of age.

II. INDIVIDUAL BULL PERFORMANCE EVALUATION

In a National Sire Evaluation Program, widespread programs of within-herd performance testing in the purebred herds of a breed are a prerequisite. These records identify high ranking individuals within herds, i.e., potential candidates for progeny testing or for immediate use in seedstock herds. In addition to individual performance records, all available information on sire, dam and sibs should be utilized to estimate "Expected Progeny Differences" with maximum accuracy possible from the data. Initially, between-herd comparisons will be of limited value due to lack of knowledge of genetic differences between herds. Also, there will be few direct ties with other herds.

As the program progresses, the progeny test program (involving reference sires) will develop information on genetic differences between herds and will also involve direct and indirect ties with other herds. These things, together with within-herd performance records will increase validity of between-herd comparisons.

Procedures with some background material for evaluating and publishing individual evaluations are:

A. Weaning weight

Weaning weight is included as part of the report on a bull as an aid in evaluation (1) since it is a part of yearling weight, and (2) as an early indication of the possible maternal performance of his daughters. Weaning weight will be evaluated by BIF procedures and expressed as 205-day weight. Emphasis for weaning weight will be on ratio of the individual bull's 205-day weight to the average of his contemporaries in the same herd.

B. Yearling weight and carcass yield

Yearling weight combines in a meaningful way the growth of an animal over at least two distinct management regimes. It should be evaluated and expressed by BIF procedures as either 365-or 550-day weight. Post-weaning tests may be conducted according to BIF procedures either in herd of origin or in a central bull test. Breeders with fewer than 10 contemporary bull calves in their own herds should arrange to test collectively with other breeders in order to participate in A National Sire Evaluation Program.

Methods for estimating carcass yield of live animals are not considered sufficiently accurate nor consistent from location to location to justify their inclusion in individual evaluations at this time. However, when and if technology permits, live animal evaluation of potential carcass yield should be incorporated for each bull at the conclusion of the post-weaning test.

Publication of individual performance records is optional. If the breeder elects to publish, material to be published will include:

1. Identification

Breeder, owner, sire, dam, birth date, age of dam, state in which raised, state in which post-weaning test conducted and whether post-weaning test was a single-herd or central test.

2. 205-day weight information

Adjusted 205-day weight.

Ratio of adjusted 205-day weight to average of contemporaries.

Number and averages of contemporaries.

3. 365- or 550-day weight information

Ratio of adjusted 365- or 550-day weight to averages of contemporaries from same herd.

If post-weaning test in a central test, ratios as above to average of all animals in test.

Number and average of contemporaries from same herd.

If tested in central test, number and average of all animals in test.

When programs have advanced to the point that "Expected Progeny Differences" based on progeny are available for sires of performance tested bulls then "Expected Progeny Differences" shall be calculated for them and presented with prediction errors for 365-day weight, USDA carcass quality grade and carcass yield of preferred retail cuts per day of age.

III. PROGENY TESTING FOR GROWTH AND CARCASS CHARACTERS

Generally speaking, progeny testing cannot be justified if it is solely for the purpose of choosing among bulls evaluated for growth in the same herd. However, progeny testing is the only accurate means now available for comparing bulls which are not contemporaries. It is the only method for evaluating carcasses.

Progeny tests can be designed to provide any desired level of prediction error (Appendix 1). Numbers of females in test herds are usually a limiting factor. Thus, decisions which will optimize use of test herds must be made between numbers of bulls to be tested and prediction error of individuals tested.

General Rules for Progeny Tests

1. All progeny tests shall be planned in advance and plans approved by the sponsoring organization.

2. The sponsoring organization must develop appropriate procedures for determining that cows within group (group defined as cows of a given breed or cross managed as a single herd or unit) are randomly allotted within age to the bulls under test, that cows are bred as planned, that birth dates are promptly and accurately recorded, that progeny are managed either uniformly or in a stratified fashion so that all sire groups are represented in each management situation or adequate ties provided, and that records are taken as prescribed.

3. Meaningful progeny tests can be conducted only when two or more bulls are tested.

4. Deviations from any of the items listed in 2 (above) are serious and result in biased sire comparisons.

Two types of progeny test are possible, both are useful, and both should be part of a National Sire Evaluation Program. The first is termed a "Breeder Test" in which there are no ties to other herds or groups and progeny comparisons can be made only within the test. The second is termed a "Reference Sire Test" in which ties to other tests make comparisons on a national basis possible.

Breeders Test

Breeders may test as few (two minimum) or as many sires as they wish for the traits they designate. Bulls in this type of test are ranked by contemporary comparison. Bulls with progeny in different tests and with no ties to other tests cannot be compared. Each breeder is allowed to choose the number of progeny from each bull (hence, to determine the prediction error of the comparisons) and may have many progeny from some bulls and few from others.

The sponsoring organization will summarize and analyze results of these tests and return to breeder. Advantages of this test are that it may be entirely by natural service if desired and that if reference sire progeny are not wanted in a herd, none need be produced.

The principal disadvantage of the test is that comparisons can be made only among the bulls tested. No comparisons with bulls in other herds are possible. If the test is conducted in only one herd (as would usually be the case) the degree to which results apply generally will not be known. Because bulls used in some herds will be of substantially higher merit than bulls used in other herds, the sire values from breeder's tests cannot be used directly to rank bulls from different herds without bias. Direct use of these sire values would favor bulls compared in the same herd with poor bulls and discredit good bulls used in the same herd with other good bulls.

Sires will be evaluated by appropriate least squares procedures.

Reference Sire Test

The obvious solution to the principal problem of the "Breeder Test," namely, that comparisons cannot be made between tests, is to include in each

breeder's test one or more reference bulls; bulls who are also used in other herds and can link together the various breeders' bulls. The criterion for ranking breeders' bulls is the Expected Progeny Difference between breeders' bulls and the base reference sires. This provides an unbiased ranking of breeders' bulls (see Appendix 2). A national ranking requires that all sires be compared directly or indirectly with one or more sires designated by the sponsoring organizations as base reference sires. The criterion for ranking breeders' bulls on a national basis is:

(Breeder's bull - reference sires) + (Reference sires - all base reference sires)
(in breeder's herd) used in breeder's herd
(all other herds)

Prediction error is measured as the square root of the sum of the expected sampling variance of the comparison (see Appendix 1). If the reference sires have many contemporary progeny, this prediction error should not be appreciably more than a breeder test prediction error. This procedure for a national ranking of progeny tested bulls recognizes that unknown genetic and management differences between herds are large, yet allows unbiased ranking through carefully designed comparisons in either single-herd or multiple-herd tests. In a single-herd test, the disruption of breeder's management program is minimal as he can continue to breed most of his cows naturally if he desires, requiring only that a representative group of cows in each herd be mated artificially to reference sires.

Multiple-herd testing is to be preferred. It requires that bulls under test produce progeny in a number of herds in which reference sires also produce progeny. Multiple-herd testing provides information of more general applicability if genetic-environmental interactions should be important. Further, multiple-herd testing reduces chances for biases of a non-random nature to influence results.

Results will be analyzed and summarized by appropriate least square procedures (see Appendix 3).

Prediction errors of Expected Progeny Differences will depend upon numbers of progeny per tested sire and numbers from reference sires in the herd(s) when direct comparisons are made.

As more bulls are tested in either a single-herd or multiple-herd test, it is important to increase the number of progeny from reference sires. Tentative numbers to be required are:

No. Breeders' Bulls Being Tested	Required No. of Calves by Reference Sires
1	10
2	15
3	20
4	25
5	30
6	35
7 or more	40

A number of reference sires should be included in each test.

Distribution of semen by the sponsoring organization in units of five ampules is suggested.

Minimum number of progeny by each test bull shall not be specified. However, minimums of 10 to 15 are suggested for reasonable prediction error. Progeny records are regressed toward the breed average according to the formula $\frac{n}{n+\alpha}$ where n is number of progeny and α is σ_e^2/σ_s^2. This ratio is around 9 for yearling weight as an example. Thus, with small numbers of progeny, Expected Progeny Differences will be small with large prediction errors. Larger numbers will reduce prediction errors.

Both steers and heifers may be included in growth and carcass tests of progeny.

Use of central test stations for the post-weaning phases of progeny testing is recommended where possible. This will tend to broaden the basis for comparisons. It will also often simplify operational problems.

Information published for bulls progeny tested for growth and carcass yield in reference-sire tests should include necessary identification including reference to previously published information (if any) on own performance. Age and/or weight for slaughter shall be specified by the sponsoring organization. For progeny, evaluation shall be by BIF procedures and published information should include: location of herd(s) and feedlot(s) in which raised and fed, season of birth, average 365-day weight, average slaughter age, average slaughter weight, average carcass weight per day of age, average carcass yield of preferred retail cuts on both percentage and weight per day of age basis, average carcass quality grade and test averages for each of the foregoing. If feedlot and slaughter phases of the progeny test include other progenies of the same breed and cross from herds not included in the progeny test comparison , the average for these animals may be published as collateral information. Expected Progeny Differences should be published for 365-day weight, USDA carcass quality grade, and carcass yield of preferred retail cuts per day of age.

Reference Sire Program

For a breed to have a National Sire Evaluation Program requires cooperative effort on the part of individual breeders and the sponsoring organization to develop and conduct a sound reference sire system. The criteria for a reference bull is that he have a large number of progeny evaluated in a large number of herds such that a comparison made through this bull has a low prediction error. The necessity to cooperate with a bull stud in the collection, storage, and distribution of reference sire semen is obvious. The sponsoring organization must designate sires to be reference bulls at the outset and develop criteria for new reference sires. This program offers a unique opportunity to actually measure genetic change in the breed over time by comparing back to the initial reference sires.

The first set of reference sires and their successors shall be chosen by the sponsoring organization as representatives of bulls thought to be the best of the breed. Bulls designated as reference sires can be used immediately for this purpose through use extensive enough to provide at least 100 progeny by the end of the first breeding season. These 100 progeny must include comparisons with at least 5 progeny by each other reference sire or by a minimum of 10 reference sires whichever is lower.

When semen production permits, each reference sire should be used at least two years. This will permit calculating Expected Progeny Differences in progeny tested bulls relative to both the original or base reference sires and to current reference sires.

With small numbers of reference sires, adequate supplies of semen should be placed in storage to provide links to the original base reference sires in case of death or infertility.

IV. PROGENY TESTING FOR MATERNAL TRAITS

Daughters of bulls progeny tested for growth and carcass characters may be retained and evaluated for maternal traits either by breeding all to a single bull or by distributing at random to a number of sires. In a herd being used continually for progeny testing, these would be the bulls under test in subsequent years.

Primary evaluation would be on 205-day adjusted weight of progeny. Since heritability of maternal ability is lower (probably about .30) than for most growth and carcass traits, larger numbers will be required for comparable prediction errors.

V. PROGENY TESTING TO DETECT UNDESIRABLE RECESSIVE GENES.

Bulls may be progeny tested for undesirable recessive genes by two methods. Both test simultaneously for all recessives. The first of these is breeding by artificial insemination to a large cross section of the female population of the breed. The probability of detection of an undesirable recessive is related to the frequency of the gene in the population. Probability of detection equals $1 - (1 - 1/2\ q)^n$ where q is the gene frequency in the female population and n is the number of progeny. If a problem is detected by this procedure, and if the germ plasm is otherwise valuable, more intensive means of progeny testing sons of the carrier bull should be used. This approach allows a relatively short generation interval in bulls used in artificial insemination and will be effective in keeping undesirable genes at a low frequency.

The second method of evaluation involves breeding a sire to a group of his own daughters. The number of such matings determines the precision of the test. If a bull is a carrier, q will equal .25 in the formula given earlier and this formula will apply. The production of only normal offspring from 22 daughters gives a probability of 19 in 20 ($p<.05$) that the sire does not carry a specific recessive gene. From 35 daughters the probability is 99 in 100 ($p<.01$).

An organization sponsoring a sire-daughter test for the detection of undesirable recessive genes must adhere strictly to specific rules. These include individual identification of the daughters, pregnancy determination and reports to sponsoring organization of pregnancy status at least 140 days prior to expected parturition, observation of living calves by a disinterested party, and examination of late abortions and dead calves by competent veterinary or animal science personnel. The latter of necessity must involve preservation and transportation of dead calves.

Information to be published on this test should include identification and reference to previously published individual and progeny performance records. Items specifically related to this test should include number of daughters bred, number of normal calves produced and specific identification and description of abnormal calves. For sires producing only normal calves, the probability of freedom from undesirable recessive genes should be given.

It is suggested that an initial report be made when 10 normal calves ($p<.25$) have been born or when any abnormal calf has been produced.

Appendix 1. BIF Sire Evaluation Report

Prediction Error of Own Performance (Rec-Cont Ave.)

n	Std. Error
1	109
5	84
10	81
15	80
20	79
25	78
30	78
35	78
40	78
45	78
50	77

σ_E = 77 pounds

$SE = \sqrt{\sigma_E \frac{n+1}{n}}$

Predition Error of Expected Progeny Difference

N_B \ N_R	10	20	30	40	100
1	37	35	34	33	31
5	33	31	30	29	27
10	31	28	27	26	24
15	29	26	25	24	22
20	28	25	23	22	20
25	27	24	22	21	19
30	27	23	21	20	18
35	26	23	21	20	17
40	26	22	20	19	16
100	24	20	18	16	13

σ_e = 95 pounds $\quad \alpha = \sigma_e^2 / \sigma_s^2$

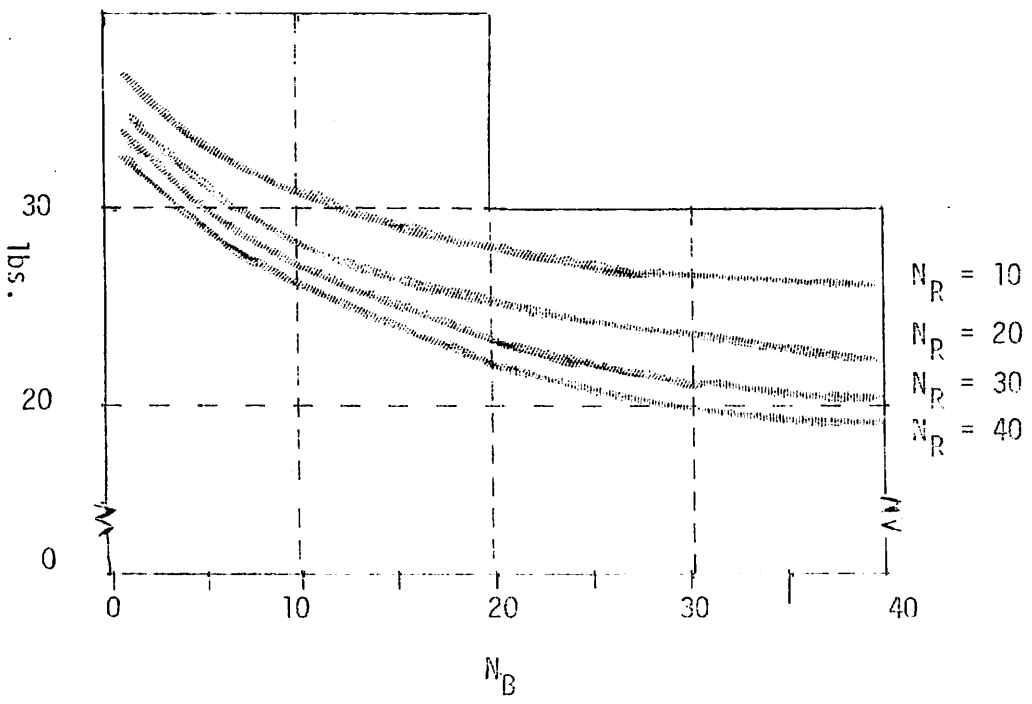
$$SE = \sigma_e \sqrt{\frac{1}{n_B+\alpha} + \frac{1}{n_R+\alpha}}$$

$\sigma_s^2 = \frac{1}{4}\sigma_A^2$, $\sigma_e^2 = 3/4\ \sigma_A^2 + \sigma_E^2$

N_R = number of progeny by reference sires

N_B = Number of progeny by breeders bull

Graph of Prediction Error of EPD



Appendix 2. Comparison of Dairy and Beef Progeny Test Procedures

Testing by randomization (dairy)

Randomization and experimental control are the techniques which allow unbiased comparisons to be made. Dairy breeders rely heavily on random distribution among herds of progeny of each sire to test their bulls by what they term the herdmate comparison or "predicted difference" system. Such total randomization is not necessary for unbiased ranking of sires and is not compatable with use of sires by natural service.

The theoretical basis of the herdmate comparison procedure assumes that each cow is subject to the same non-genetic influences as her herdmates except for random sampling variation. Hence, the difference in performance between a cow and her herdmates reflects genetic differences and random non-genetic influences.

The average superiority (or inferiority) of a bulls progeny compared with their herdmates is the criterion used for ranking bulls, and provides an unbiased ranking if no bulls are knowingly favored by comparing progeny with unrepresentative herdmates, by being mated to unrepresentative cows to produce progeny for testing, or by selecting which progeny are to be tested.

Representative mates and representative herdmates are most reliably obtained if each bull has only one progeny in each herd, the herds in which a bull has progeny are randomly distributed and matings within herds are chosen randomly. Accuracy is increased by testing more progeny and by distributing progeny among more herds under the direction of disinterested parties.

Designed comparisons are suggested for progeny testing beef sires so that bulls used naturally in a single herd can be accurately ranked. Comparisons of animals raised together are used to remove environmental biases, but reference sires (rather than randomization) are used as the basis for unbiased comparison.

In summary, dairy proofs rely on randomization whereas the proposed beef proof relies on experimental control to provide unbiased ranking of sires.

Appendix 3. Analysis Procedure

Ranking of sires will be computed for each herd as soon as possible after the records are received. National ranking of sires should be made two or three times annually, preferably soon after completion of most tests. The same analysis procedure will be used, but the herd test will produce within-herd ranking only whereas the second analysis will provide a national ranking.

Accuracy of ranking will be the theoretical standard deviation of prediction error. Estimated Progeny Differences will be obtained by fitting the model

$$Y_{ijkl} = T_i + G_j + S_{jk} + E_{ijkl}$$

where Y_{ijkl} is the performance record of the l^{th} progeny of the k^{th} sire of group j raised in treatment group i, T_i is the effect of common environment and maternal influence on progeny in treatment group i (treatment groups are pastures or feedlots under the same management but handled separately), G_j is the effect of genetic group j (reference sires often represent a different genetic group than the breeders bulls), and S_{jk} is the genetic influence of sire $_{jk}$. A solution for the above equation is obtained after adding σ^2_e/σ^2_s to the diagonal element of each S_{jk} equation, and setting the reference sire group effect equal to zero.

The above procedure essentially averages within group comparisons among sire progenies and adjusts for the number of progeny of each sire. The primary difference between the within-herd and national rankings is the data put into the program, the national analysis using all performance records and each herd analysis using only data from that herd.

Correlations among bulls tested together because they are linked to the national base by the same progeny of reference sires.

$\bar{X}_1$, $\bar{X}_2$, $\bar{X}_R$ are the EPD of two bulls and a reference sire from the same herd.

$$V(\bar{X}_1 - \bar{X}_R) = \sigma^2 \left(\frac{1}{n_1+\alpha} + \frac{1}{n_R+\alpha}\right)$$

$$V(\bar{X}_1 - \bar{X}) = \sigma^2 \left(\frac{1}{n_2+\alpha} + \frac{1}{n_R+\alpha}\right) \quad 1$$

$$COV(\bar{X}_1 - \bar{X}_R, \bar{X}_2 - \bar{X}_R) = \sigma^2 \left(\frac{1}{n_R+\alpha}\right)$$

$$\text{Correlation}(\bar{X}_1 - \bar{X}_R, \bar{X}_2 - \bar{X}_R) = \frac{n+\alpha}{n+n_R+2\alpha}$$

if n = number of progeny of bulls 1, 2

n_R = number of progeny of reference sires