

THE U.S. BEEF INDUSTRY A PREVIEW

by Dr. Robert A. Long



... I submit to you that we sometimes put a great deal of selection emphasis on factors other than reproduction, growth, composition and longevity-selection emphasis that in my opinion has absolutely no effect on productivity of beef cattle."

What can one say to leaders of the beef cattle industry from throughout the world? You have done a good job; built a great breed of cattle; and I respect you for having done so. However, when one attempts to predict the future you know there will be change—a needed change because of changing conditions. Therefore, current ways of doing things must change and persons suggesting change are usually not well received. So, I temper my remarks by claiming faith in and love for Angus cattle. My suggestions for change in our industry are an expression of sincere concern for the future of our breed.

Predict the future? An impossible task. The future of the beef industry and the Angus breed in particular depends in large measure upon you, the Angus breeders of this country and the world. No, I cannot foresee the future. But I believe I can predict the response of the cattle. Cattle are predictable, people are not.

Therefore, I will attempt to predict what will happen to the cattle if people proceed in a certain way.

First, we always have an incentive for our actions. Of course, pride in our accomplishments and recognition by our peers is important to all of us. However, the beef cattle industry is a business with which we hope to provide for ourselves and our families—so money and profit are major incentives. As breeders of purebred Angus cattle we have breeding stock to sell; so we are continually seeking a source of superior genetic material. This never-ending search for superiority in our own herd and throughout the breed is known as performance selection.

Accurate performance selection works. Its proper use in breeding programs (both purebred and commercial) brings progress. It will be even more important in the future.

However, accuracy is the key here, and I fear our industry is performance selecting by using criteria that do not—and I repeat—do not measure performance.

Only four criteria for productivity

There are four major criteria which should be used in measuring the productivity of beef cattle. In order of their importance they are: (1) reproductive efficiency, (2) growth rate per unit of feed, (3) composition and (4) longevity. Let us examine these individually.

Reproductive efficiency. Superior females must mature sexually, cycle, conceive and calve without assistance on their second birthday and every 12 months thereafter. Then they must provide that calf with milk and protection and bring it home at 7 or 8 months of age at a heavy weight. Reproduction is a trait of low heritability which dictates that, if lost, it will require many generations for replacement.

Growth rate per unit of feed. Calves must grow rapidly and efficiently on pasture and in the feedlot. Efficiency of feed utilization is important in breeding herds and feedlots alike. Work at Oklahoma State University and the USDA's experiment station at Clay Center, Neb., has compared several breeds as to requirements for maintenance. They found any breed whose selection has been for milk production is less efficient in either the breeding herd or in the feedlot than those selected for beef. Your association has appropriately emphasized this fact in national advertising but I am compelled to call the attention of Angus breeders to the following fact: the frame size, composition, and pedigrees of the Angus cattle that were so efficient in the Clay Center tests are not the same as the Angus cattle many of you are currently selecting. Think about it.

The following article is the presentation given by Dr. Robert Long at the recent Angus Horizons Conference held Sept. 17 in St. Joseph. Long, a professor of animal science at Texas Tech University in Lubbock, is a longtime friend and associate of the Angus breed. His remarks not only delved into the future of the industry but also highlighted important breeding principles of today.

Composition. The composition of the increase in weight is of great importance. Do the carcasses furnish a high percentage of lean, tender, flavorful muscle? Or, are they fat and tough? No performance selection program is complete without consideration of composition.

Longevity. A major disadvantage of beef cattle production is the low rate of reproduction. Cows do not produce litters. Therefore, the brood cow with longevity reduces production costs.

Obsessed with frame size

These four factors—reproduction, growth rate, composition and longevity—are the only considerations in evaluating beef cattle. Unfortunately, we are using others which do not measure performance.

A case in point is our obsession with frame size. Purebred breeders talk more about the height of their cattle than they do about their grandchildren; commercial breeders sort bulls by measuring their height; steer jockeys and steer judges live by height; college professors write articles and make speeches about the adjustment of height for differences in sex and age; and finally, universities sponsor performance testing stations that use height as a criterion. There are three major problems with this desire to increase the height of cattle;

1. Height at the withers or hips is not an accurate measure of skeletal size. Measurements across movable joints are not accurate since slope of shoulder, angle at the stifle and hock can affect such measurements greatly. (See figures I, II and III.)

2. Skeletal size is not a measure of potential for reproductive efficiency, growth rate or carcass desirability. In fact, selection for increased length of the long bones, or length of leg, is selection for late sexual maturity.

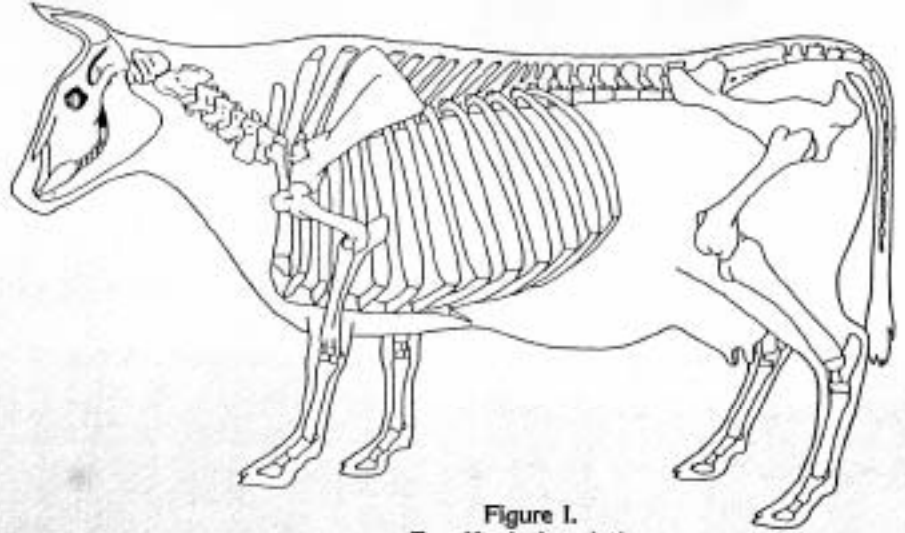


Figure I.
Too Much Angulation

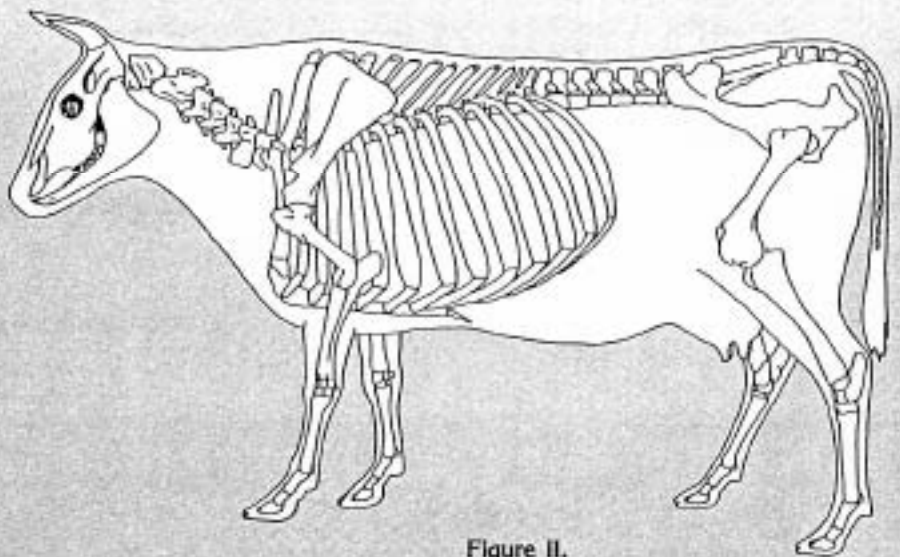


Figure II.
Correct Angulation

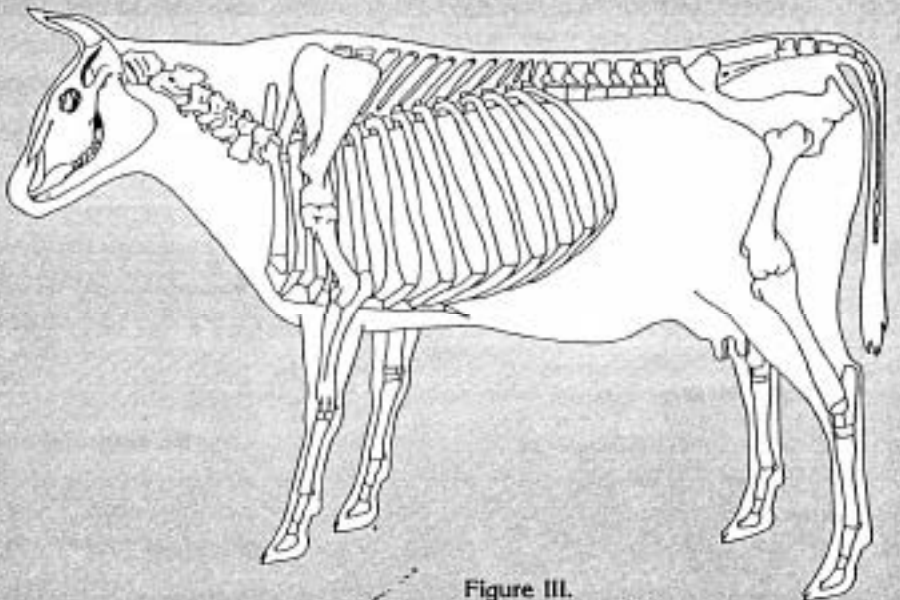


Figure III.
Not Enough Angulation—Stilted

3. Skeletal size (frame size) is not a measure of carcass composition or yield of edible portion.

I want you to look at the data from three steers in table 1. Their weight is very different but their skeletons (frame size) are practically identical. Now examine the dissection data in table 2. Not only were their skeletons identical in linear measurements, but their skeletons weighed the same. However, here the similarity stops. Note the tremendous difference in muscle, both in total weight and as a percentage of the carcass of the #1 steer. This gives a muscle:bone ratio of just twice as much for the heavily muscled steer as is the case with the thinly muscled one. Fat varies only a little in this

Steer #	1	2	3
Live Weight (lb.)	1,450	1,300	1,005
Length of Sody (inches)	60.23	60.23	59.84
Rump Length (inches)	20.07	20.07	20.47
Height Withers (inches)	51.96	51.57	52.36
Height Hips (inches)	53.54	53.14	53.93

case, but keep in mind that it would be easy to put together a large group of steers with identical skeletons that vary widely in fat and muscle composition. Table 3 lists the conventional carcass measurements. This

table makes two major points:

1. The yield grade formula ranked these three steers essentially the same, which is obviously in error. This is because the formula was constructed with conventional British breeds which did not offer the range in muscling we have here. It under evaluates the heavily muscled #1 steer, over evaluates the thinly muscled #3 steer and does a good job on #2

2. The frame size or skeletal size of these steers had nothing to do with the desirability of their carcasses.

I would hope that your conclusion would be something like mine which simply stated is: Why anyone would use frame size in the evaluation of cattle for slaughter is beyond me. Yet, that is exactly what takes place in the majority of steer shows in this country-they put the tall ones up. Think what this means. The cattle are shown by weight and most of them have been fed and managed in such a way that they are not excessively fat. Therefore, placing the tallbig-framed steers up in class and the small framed ones down means selection was against muscle or meat. This makes no sense at all in the beef production business. Placing tall ones of the same weight on top of the class further complicates the situation. Large-framed cattle mature later, which decreases the chances of the large-framed steer making the choice grade.

What is the value of frame size?

Skeletal growth or bone formation on growing animals takes priority for nutrients over fat deposition and even maximum muscle growth. Therefore, regardless of plane of nutrition, if we compare animals at the same age, their frame size has, probably increased according to genetic potential and is a good measure of what their mature frame size will be. When compared at the same age, the larger the frame the larger it will be at maturity and the longer it will take to reach that point.

Also, we know that as an animal approaches maturity, he begins to deposit fat in the muscle, which is the marbling that puts him in the choice grade. This is the very basis for the new USDA feeder grades which separate cattle into large, medium and small frame sizes. If cattle of the same age are sorted into uniform frame size groups, each frame size will reach the choice grade after a different length of time on feed. The larger the frame size, the longer the feeding period required to grade choice.

Of course, this same principle works on

**Table 2. Muscle:Bone Relationships Among Slaughter Steers
Dissection Data**

Steer ^a	1	2	3
Lbs. of Bone	64	68	67
% Bone	13.1%	16%	23%
Lbs. of Muscle	320	262	168
% Muscle	66%	63%	59%
Lbs. of Fat	104	81	53
% Fat	21%	19%	18%
Muscle:Bone	5.01	3.88	2.52
Muscle:Bone (IM Fat Included)	5.16	3.94	2.61

**Table 3. Muscle:Bone Relationships Among Slaughter Steers
Carcass Measurements**

Steer ^a	1	2	3
Carcass Weight	976	820	570
Dress Percent	67%	64%	57%
Maturity	A ⁷⁰	A ⁷⁰	A ⁷⁰
Marbling	Small ⁸⁰	Slight ⁸⁰	Slight ⁸⁰
Quality Grade	Ch	Gd+	Gd
Fat Thickness (inches)	.3	.3	.12
Rib Eye Area (square inches)	18.1	14.3	9.9
%KHP	3.0%	2.5%	2.5%
Yield Grade	1.8	2.3	2.3

breeding cattle and if they are compared at the same age and are of the same sex, the larger-framed animals will be larger at maturity and likewise require longer to reach maturity. Therefore, if your only goal is size at maturity, go for frame size. Remember, frame size tells you nothing about the composition of the carcass, growth rate or reproductive efficiency.

There are many other factors we need to consider as to their effects upon reproduction, growth, composition and overall productivity. We could discuss muscling, soundness of structure and sex character. However, we do not have time for a course in growth and development or live animal evaluation. (Although, I believe that every beef cattle breeder needs both.)

Sire evaluation program works

Your American Angus Assn. has given you the most progressive and sophisticated program in our industry for evaluating seed stock. The Angus sire evaluation program can help your program-it works.

It concerns me greatly that many prominent breeders (and even an occasional Association staff member) would ignore the sire summary and use (or recommend the extensive use of) a young, untried bull without performance records on himself or his ancestors because they think he is a "great one" that is in "good hands" and will be a "hot one" on the "show road" next year.

My point is simply that accurate performance testing is a sophisticated and complex business requiring a great deal of detail and knowledge. Performance testing will become more important in the future. In the year 2000 a few purebred cattle will sell for

a great deal of money. The rest will sell for commercial prices and the number of purebred breeders will decrease.

This reduction in numbers will result from increased use of artificial insemination, embryo transfer, embryo splitting and genetic engineering involving actual manipulation of genetic material. Exciting, isn't it? However the more proficient we become in increasing reproductive efficiency in a few animals, the more important the accuracy of their selection becomes.

An example is the recent work reported from Clay Center. They took the same kind of embryos and placed half of them in Brown Swiss cows and half in Hereford cows. The calves were weaned as soon as they had received colostrum and reared on the same diet. The surprising results showed a large difference in growth rate in the case of the calves from Brown Swiss recipient cows. The amazing thing is that the birth weights were the same, but growth after birth was different. Think what this means to purebred associations in the registration of embryo transfer calves. This work is being continued and may change our thinking in this area.

Crossbreeding must be with a plan

Now let's assume we have identified superior individuals in our various breeds. What will we do with them? The evidence supporting crossbreeding as the way to utilize heterosis in our production programs is overwhelming. In the year 2000, most commercial herds will use crossbreeding. However, they will be crossing superior individuals representing breeds which are best suited for a specific purpose.

Crossbreeding? Of course, but not just crossing for the sake of crossing. A good straightbred commercial herd can be far superior to a crossbred one if the genetic material that went into the cross was inferior. We must cross superior purebred strains (preferably inbred) of performance selected cattle with emphasis on maternal traits and use them as mother cows. Then we use a terminal cross sire whose own performance was superior in growth and carcass traits. That's crossbreeding with a plan for a purpose. I predict we will do more and more of this in our production programs. This will dictate a demand for superior inbred strains of breeds selected for

fertility, calving ease and mothering ability under range conditions and other strains selected for growth rate and carcass. Remember, I did not say mature size or height-I said growth rate and carcass desirability.

Improve meat tenderness by selection

Before we leave the subject of breeding and genetics we should touch on tenderness. I believe that this is a very important characteristic to have in our product. In fact, I'm pleased that our quality standards were not changed as recently proposed. However, I think we can place less emphasis on marbling in the future if we select for tenderness. Many in our industry want to legislate changes, but I submit that the cattle don't read the congressional register.

We can improve the cutability of our cattle by selection, and rapidly, since it is a highly heritable trait. Similarly, we can improve tenderness in our cattle by selection. The University of Tennessee has reported extreme differences in tenderness among strains within breeds when compared at the same age and under the same nutritional regimen. The data in these areas suggest we could increase our efficiency of production by 10 percent without additional inputs-just by intelligent selection of germ plasm. I predict we will be doing this in the future.

Sophisticated business from producer to consumer

The beef production business will be an ever more sophisticated one. I visualize (whether we like it or not) larger operations under sophisticated management. They will use superior inbred strains of breeding stock of known combining ability in crossbreeding programs. The programs will be so detailed in specifications that they will include the

individual sire of the cattle and predetermined sex. The contract will not only specify the genetic background of the cattle but their age and time and place of delivery. These cattle will be contracted for slaughter at a certain time with predetermined dockage or premium for quality and cutability.

Their carcasses will be prepared for the retail display case at the packing house. They will be packaged boneless, in uniform individual servings. The cuts will lose their identity as to porterhouse or sirloin and will be referred to as steaks for broiling together with instructions for preparation. Some packages will already be broiled and only require heating. Some will continue to be cross sections of complete muscles while others will be lean pieces from various sites which have been "chopped and formed" into uniform shapes and sizes. They may be frozen or perhaps indefinitely preserved by radiation or other methods.

Future is sound

The overall future of our industry is sound. Cattle are ruminants, they utilize cellulose from roughages and crop residue of all types. People, pigs and chickens cannot. This is our guarantee of a place in the food production business for the next 100 years.

With a product that is the most nutritious, the most satisfying and the most prestigious in the world and with a breed that contains the germ plasm for the most efficient production of that product we have nothing to fear.

Treat your Angus cattle alike, compare them at the same age, under the same conditions. Measure their productivity accurately and record it.

Use those records in your sire and replacement selection and your herd will take care of you, your children and their children for the next 100 years.

AJ