Dairy Guidelines

COOPERATIVE EXTENSION SERVICE, V.P.I., BLACKSBURG, VIRGINIA

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY LIBRARIES

Dairy Sire Selection

James R. Nichols, Head
Dairy Science Department

Dairymen, commercial and purebred, are in business to make money. Selection of the best available bulls can help do this - How?

By selecting herd sires from among a large group of available progeny proven superior bulls. Such bulls are available.

For example, 889 bulls with over 250,000 tested daughters are included in the May, 1966 DHIA Sire Summary (ARS 44-179).

The milking daughters of slightly over 1/2 of these bulls produced in excess of their herdmates. Dairymen using the better group of bulls, therefore, made wise choices of sires and were selling more milk per cow. Intelligent choice of the right bulls is essential for all dairymen who plan to milk the resulting female offspring. Commercial and purebred breeders alike must practice wise sire selection. Study the following table:

		Differences Among Dairy Sires*			
	Total	Sires Increasing Production		Sires Decreasing Production	
	No. of		Predicted		Predicted
Breed	Sires	No.	Difference**	No.	Difference**
Ayrshire	32	26	+2,186	6	- 313
Guernsey	147	82	+1,496	65	-1,003
Holstein	528	270	+1,940	258	-2,059
Jersey	121	64	+1,187	57	- 812
Swiss	49	22	+1,615	27	-1,384

*Source: USDA-ARS
**Our best estimate of the breeding merit of dairy sires calculated on a + or - deviation from herdmates.

What does this table tell us? There are still tremendous differences among dairy sires today. Farmers who fail to capitalize on this are missing a real opportunity to sell more milk per cow. To illustrate, let's take a closer look at the Holstein data. Among these bulls there were 150 whose progeny averaged 290 lbs. less milk than their herdmates. There were also 102 whose progeny averaged 655 lbs. more milk than herdmates. The difference here was a whopping 945 lbs. of milk per daughter or $47.25 for $5 milk. Multiply this by the number of cows in the herd, and it becomes obvious what sire selection can mean. Carrying this example just one step further, there were 51,151 tested daughters of the group of 150 minus-herdmate bulls and 54,784 tested daughters of the 102 plus-herdmate bulls. In a single

305-day lactation, therefore, daughters of the minus bulls produced 48,337,695 lbs. less than the daughters of the plus bulls. This is a lot of milk and a lot of lost dollars ($2,416,884) resulting from faulty sire selection.

Recognizing, then, that there are big differences among bulls, how can we choose the good ones? Fortunately, we have more good tools today for this task than ever before. If we understand these tools and use them properly, our chances for successful sire selection should greatly improve.

We should first ask ourselves what we want the bull to do. We should have long since gotten away from the "cow freshener" idea, and should now demand much more of our dairy sires. The purpose of the dairy sire must be to improve the genetic capabilities of his progeny. His offspring should be genetically superior to their dams and herdmates. Superior in what way? We all know that a truly superior animal has many desirable characteristics such as a good udder, feet and legs, but, let's confine our discussion here to milk production alone. Milk production is the single most important thing in the breeding program for purebred and commercial dairymen alike. After all, the great majority of our income comes from milk sales. Only a relatively few dairymen realize a significant income from the sale of breeding stock. We will consider other aspects of the breeding program in another DAIRY GUIDELINE.

What are the tools for dairy sire selection? Keep in mind that the fundamental purpose of the dairy sire is to sire better animals. We do not need him for anything else; not to look at, not to kill, not to feed, not to show, and certainly not to listen to! Three methods of sire selection are available to us. They are:

Individuality: The bull himself, his type or looks--what we think we see.

Ancestry: His pedigree or parentage--what we think he ought to be.

Progeny: His offspring - the acid test--what he actually is.

Individuality

No one has yet been able to look at a bull and accurately determine the milk producing capabilities of his offspring. There is almost no practical relationship between a bull's type (body conformation), or show record, and the production of his daughters. We may, of course, observe certain physical defects and diseases which affect his breeding value. Little reliance can be placed on physical appearance of the bull, however, in predicting milk production.

Pedigree

Pedigrees are more reliable than body conformation but they have serious limitations too. For young bulls this is, of course, all we have, and certain general principles of pedigree evaluation should be adhered to. For example, with today's widespread use of artificial insemination, we can more accurately appraise a young bull if he is sired by a top AI proven sire and is out of a top cow that is also sired by a top AI proven sire. However, despite all the trouble we go to in studying a young bull's pedigree, we are often disappointed with the final outcome. Many mistakes have been and are still made using this method of sire selection. Sire selection by pedigree is usually much more accurate for dairy cattle, however, than for other types of livestock because of the large amount of information available through AI and supported by many research studies.

Progeny test is the acid test or final true measure of a bull's worth. Research has greatly increased the accuracy of this method and high-speed electronic data computers have provided AI studs with some of the most sophisticated and reliable

tools ever available to livestock breeders. We have gradually evolved through many different types of progeny tests beginning with straight daughter averages, then to daughter-dam comparisons, and now to the herdmate comparison concept. The latter has been refined several times, and the currently accepted PREDICTED DIFFERENCE is the most accurate method yet devised for evaluating the genetic merit of a dairy sire.

Let's look at different forms of progeny tests and try to understand their strengths and weaknesses.

Straight daughter average: Any dairyman knows that this is greatly influenced by such factors as feed, management, disease, milking practices, days open and days carried calf. Even when adjusted for age, length of lactation and times milked, it is still greatly influenced by the year, location, and dairyman, and is not the most accurate way to evaluate cattle. It may, however, be a good indication if made in many different herds and under many different kinds of environmental conditions such as are found in AI. It is good information to have but needs to be supplemented with additional data to be accurately evaluated.

Daughter-dam proof: The false assumption which is often still made is that observed differences should be attributed to the influence of the sire. This obviously is wrong since the records of the dams are usually made several years prior to their daughters. Most of our herds are producing far in excess of what they did a few years ago. We generally give the bull credit for doing something here which we did ourselves. Take a brief look at the way Virginia DHIA herd averages have increased during the past few years.

Increases in DHIA Herd Averages in Virginia

Year	1950	1955	1961	1962	1963	1964	1965
Average	8,174	8,867	10,377	10,764	11,034	11,772	11,834

It is not surprising, therefore, that a bull whose daughters were tested in 1965 produced in excess of their dams whose records were made in 1961. They certainly should. Such a bull though, would have a very attractive daughter-dam proof. When adjustments are made for age and when it is possible to milk the daughters and dams concurrently, more reliance can be placed in this kind of proof. This situation, however, is rare.

A natural daughter-dam proof and an AI daughter-dam proof are quite different. It is a big mistake to expect a significant natural proof (made in one or a few herds) to follow through in your own herd or in AI, because the same situation simply does not exist. Studies have shown that carefully selected young sires, when used in artificial breeding, do as well as or better than naturally proven bulls. The fact that a bull was proven in just one or two herds does not, however, mean that he is not a good bull, nor does the fact that a bull is without a proof mean he isn't a good one. The point is we just don't know yet, and most dairymen cannot afford to take a chance on an unknown quantity when good bulls of known superiority are available.

Daughter-Herdmate Comparisons: This concept is a most important one to understand. It is simply a comparison of the daughters of a bull to daughters of other bulls which are similarly fed, housed, managed, and may be considered to be "contemporaries" of the daughters of the bull in question. The contemporary herdmate comparison is effective in removing environmental influences known to affect production such as herd, year, and season of calving. The primary purpose of the USDA Sire Summary is to use the daughter-herdmate differences in evaluating

bulls on the basis of estimated breeding value or transmitting ability for milk yield. Generally a dairyman should breed about 80% of his herd to plus AI herdmate proven bulls and the remaining to carefully selected young bulls awaiting proof. Or he may want to breed the remaining 20% to a naturally proven bull. The important thing here is that he breed the majority of his cows to the first category of bulls.

<u>Predicted difference</u>: This is used in the USDA-DHIA Sire Summaries. It is the final estimate of the breeding merit of an AI sire and has been calculated to remove known effects arising from herd, year, season of freshening and numbers of daughters. It is compared to the regional herd-year-season breed average.

Accuracy of Different Kinds of Proofs

Which method of sire evaluation is the most accurate? The following table lists the AI daughter-herdmate difference as the most accurate. It is, if it really does represent a random (unselected) group of daughters, and if the number is large enough (50 or more) to represent a true sample of the bull's progeny.

Relative Accuracy of Different Proofs

First - AI Daughter-Herdmate Difference (AI Proof)

Second - AI Daughter-Dam Difference (AI Proof)

Third - Non AI Daughter-Herdmate Difference (Natural Proof)

Fourth - Non AI Daughter-Dam Difference (Natural Proof

The following table from Cornell ranks the kinds and amounts of information from the most reliable to the least reliable.

Reliability of Different Kinds and Amounts of Information*

Relative Accuracy	Kind of Information	Amount of Information
99%	Single AI records	1,000 daughters
87%	Single AI records	100 daughters
89%	Two or more AI records	100 daughters
77%	Single AI record	50 daughters
57%	Single AI record	20 daughters
37%	Natural Herdmate Proof	40 daughters
17%	Natural Daughter-Dam Proof	40 daughters
17%	Sons of AI plus proven sires, AI paternal sisters, plus cows own record	

*Relative accuracy of original proofs or information and a later proof on 1,000 daughters in AI, from Carter, 1964.

Several interesting points are apparent from this study. They include:

1. Adding a second record per daughter does not greatly increase the accuracy of the proof and would greatly delay the availability of the proof. In other words, we can use first lactation records (if sufficient in number and if properly evaluated) to evaluate a dairy sire. In practice we are almost forced to evaluate them on the basis of the first records of their daughters, anyway.

2. We can do just as good a job (and in many cases better) of selecting bulls based on pedigrees as on natural daughter-dam proofs.

3. We need at least 100 records in AI to get a reliable estimate of a bull's transmitting ability.

<u>Should bulls whose proofs are below herd average be used?</u> Dairymen, particularly good purebred breeders, often question the wisdom of breeding their herd to a bull with an AI proof below this herd average. This is a very good question, and on the surface, one would agree that such a practice would be a serious mistake. However, one must recognize that production averages reflect both GENETIC ABILITY and ENVIRONMENTAL OPPORTUNITY. The herd average is a good measure of the dairyman. He can affect it greatly by many management decisions. We all know that a bull's daughters shall produce in a similar manner to their herdmates because of similar environments. Therefore, a bull's daughter average within one herd is not usually a good indication of what many daughters will do in many different herds under many different environmental conditions. For example, let's examine the following proofs.

Sire	Avg. Pounds of Milk	Daus. Over Herdmates
A	16,610	+ 811
B	14,475	+ 841
C	12,580	+ 438

One quick glance would indicate that A is the best proof and that this is the bull to use. All 3 averages, however, are for the <u>same</u> <u>bull</u>. The difference is in the opportunity given the animals to produce. The following table clearly points out that top AI proven bulls <u>do</u> <u>improve</u> <u>production</u> <u>at</u> <u>high</u> <u>levels</u> even though the average of all their daughters may appear to be low.

Good AI Bulls Increase Production in High and Low Producing Herds

Herdmate Average Pounds	Daus. Number	Daus. Average Pounds	Daus. Over Herdmates
16,610	12	17,421	+ 811
14,475	212	15,216	+ 841
12,580	203	13,018	+ 438
10,419	15	12,399	+1980
13,525	442	14,170	+.645

Reference: From Gaunt (March, 1965).

Summary

Dairymen are in business to make money.

Intelligent Sire Selection <u>will</u> make dairymen money.

Good tools are available to make sire selection more accurate.

A thorough understanding of these tools is essential. Maximum use of the best available information will speed progress.

Big differences do exist among dairy sires available to all Virginia dairymen.

It is essential to select the right bulls.

Selection emphasis should first be placed on milk production.

The real value of a dairy sire comes in his ability to sire higher producing off-spring.

Progeny tested bulls are more reliable than pedigree selected bulls.

An AI proof is a much more reliable estimate of a bull's transmitting ability than a natural proof.

AI Daughter-Herdmate Comparisons are our most accurate method of sire evaluation.

Breed most (70 to 80%) of the herd to AI plus herdmate proven bulls. The remainder can be mated to carefully selected young dairy sires awaiting proof or to carefully evaluated bulls with natural proofs.

Do not breed dairy cattle to beef bulls.

Keep accurate breeding and production records.

Know and be able to positively identify the sire and dam of every animal born in the herd.

Additional DAIRY GUIDELINES on dairy cattle breeding should be helpful to you.

Ask your extension agent, dairy fieldman, Vo Ag Instructor, or Extension Dairy Specialist at VPI for copies.

A list of available AI and Non AI proven bulls is published in DAIRY GUIDELINES. It should provide helpful information of interest to all dairymen. Keep your copies current as they are updated by VPI.