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Dairy Guidelines

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A Practical Dairy Cattle Breeding Program

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Giving careful attention today to a practical breeding program is essential to insuring an improved herd for tomorrow. A balanced breeding program requires (a) intelligent sire selection, (b) a strict culling program, and (c) efficient reproduction. A good understanding of the fundamental principles is essential for success in all three. DAIRY GUIDELINES are available on each subject. In this particular GUIDELINE we want to consider some essential principles for a successful dairy cattle breeding program.

We do not have to be geneticists to breed outstanding herds of dairy cattle. Prerequisites to success are a genuine interest in dairy cattle and a sincere desire to breed better ones. This implies, of course, that being a good dairyman is necessary to becoming a good breeder. The importance of good herd management and the maintenance and use of good records cannot be emphasized too strongly.

Starting a breeding program which will influence the herd of tomorrow requires careful consideration of the kind of herd desired. What kind of cow do we want? Describe her and enumerate characteristics you want to "breed in." These would no doubt include some of the following:

Desirable Characteristics of Dairy Cows

High production	Regular breeder	Easy milker
Long life	Good disposition	Useful type
Rugged	Good appetite	Freedom from disease
Adequate size	Well attached udders	Strong feet and legs
Strength	Adequate fat test	Ease of calving

Perhaps you can name others, including a particularly favored color pattern or, at least, one that is eligible for registration. Many traits are desirable. Do we select (breed) for all these traits? Before we answer, we must ask: (1) Are they important? How Important? (2) Will they respond to selection? (3) What is their association with other traits?

The relative importance of the characteristics mentioned will depend on each individual situation. The strengths and weaknesses of the present herd must be appraised. The economic importance of the trait and the objectives of the breeder should be weighed. There are many others, and these may vary in relative importance as our herds change and as conditions dictate.

Response to Breeding

Response to breeding (or selection) is an important consideration and needs to be

better understood. A term used by geneticists to describe this response is "heritability" or "selectibility." It simply means the extent to which the trait may be changed (improved) through breeding. Highly heritable traits are, therefore, more easily changed by breeding.

Heredity and Environment

Two things affect the performance of all animals--environment and heredity. Most dairymen know that certain things are easily influenced by changing the environment. Improving the feeding program, for example, will increase production. The environment affects the expression of heredity by permitting or hindering animal performance. We can think of environment as giving cows the opportunity to produce and heredity as giving them the ability to produce. Both are essential and it is senseless to engage in any discussions of the relative importance of each. Two points should be made, however. We can change the environment today! We can give our cattle a better opportunity to perform by improving feeding and management programs. Most herds would respond suprisingly well to better management. We have "bred in" more genetic ability to produce than we are feeding or "managing out." Changes made to improve the environment are, however, not transmitted. They are temporary, whereas genetic progress is passed on to the next generation. In this sense, breeding changes are permanent and should represent progress rather than failure.

Traits which are very sensitive to environmental changes generally have low heritabilities. Characteristics not easily affected by environmental changes have higher heritabilities. Milk production has an average heritability, meaning that it is easily affected by environmental conditions, but is also "responsive" to breeding changes. The heritability estimate is an indication of the success or failure which breeding should have in changing a particular trait. Example: The herd average is 18,000 lbs. of milk, and the animals selected as parents for future offspring average 4,000 lbs. above the herd average. We would expect only 1,000 lbs. of that superiority to be transmitted to the offspring, since 25% is the heritability estimate for milk production.

18,000 lbs. milk (avg. production of selected dams)
<u>14,000</u> lbs. milk (herd avg.)
4,000 lbs. (difference)
<u>25%</u> (heritability of milk production)
1,000 (expected superiority to be transmitted)

Heritability Estimates

High	Average	Low
% Fat-----0.50	Milk Production----0.25	Services per Conception--0.05
% SNF (PLM)-----0.50	Rump-----0.32	Regularity of Estrus-----0.05
% Protein-----0.50	Slope of Udder----0.40	Calving Interval-----0.05
Rate of Milk Flow--0.50-0.65	Diameter of Teats--0.36	Udder Attachment-----0.05
Length of Teats-----0.75	Dairy Character----0.30	Udder Size and Shape-----0.08
	Final Type Score---0.25	

The above table illustrates expected response of several traits to selection. It would be almost hopeless, for example, to greatly improve reproductive efficiency by actually selecting for it. Most reproductive problems, contrary to common belief, are due to non-genetic factors which are primarily under man's control, such as poor heat detections, disease, sub-fertile bulls, and poor semen quality.

You cannot have your cake and eat it, too! There is a negative genetic correlation among some traits, which means that increases in one will normally be accompanied by decreases in the others. Usually, for example, there is a decrease in butterfat test with very large increases in milk production. We could not hope, therefore, to be very successful in trying to breed Holsteins for a 5% test without some loss in total production.

Place Breeding Emphasis On A Few Important Traits

Simultaneous selection for several traits reduces the intensity of selection for a single trait. If one selects 4 traits at the same time, only half as much selection pressure can be placed on any one of these compared to selection for just one. This assumes that there are no genetic correlations among the traits. It is, therefore, usually advisable to confine selection to a relatively few traits of maximum importance.

How Fast Can We Breed Better Cattle?

We must first define what we mean by "better." If we mean increased milk production alone, gains should be fairly rapid and quite noticeable. If, on the other hand, "better" means a combination of more milk, improved disposition, better udders, easier milkers and better feet and legs, gains would be much slower and more difficult to measure. Genetic progress does appear to be a practical goal, though, for all these traits. This means that they are compatible. Good type, production and workability may be combined in the same animal. This is very important; otherwise, we could not expect to someday breed an ideal cow. This will probably never be done, but certainly we can breed "better" ones.

What About Dairy Type?

The value of type in dairy cattle is considered in another GUIDELINE. We want to point out again, however, that good dairy type and high milk production are compatible but one does not necessarily indicate the other. Serious types of defects such as weakly attached, pendulous udders must be avoided in all breeding programs.

Breeding Systems-Bloodlines

The most important decision a breeder makes is the selection of herd sires, and not the system of mating used. Breeding systems are based on the degree of relationship of animals mated. Broadly speaking, there are two kinds; outbreeding and inbreeding. Variations of each include outcrossing and linebreeding. While many breeders still strongly subscribe to either of these systems, it must be emphasized that success and failure are common with each. The critical thing is "what goes in" and not how. Bulls of superior genetic merit should be used regardless of the mating system.

Farm names or prefixes are used for advertising purposes to identify animals with particular herds. While this may be important for the farm, it is not a good way to choose a herd sire. No one breeding establishment has a monopoly on all good sires. There are good and bad ones in most. Look deeper than this into the choice of sires. Fortunately, most of the AI organizations do now eliminate inferior bulls when the performance of their daughters is below average.

Cow Families

Much has been written and said about the importance of cow families. No one wishes to discount the importance of the female in breeding. We must appraise bulls on the performance of female progeny. Outstanding dams are, therefore, always sought and should be carefully evaluated in sire selection. Animals within the so-called "cow families" are often not as closely related, however as one would expect. Indeed, it is often difficult to define a cow family accurately. Lady Luck helped to make some cow families simply by making the sex of the calves female. This sometimes was more important than the actual merit of the animals themselves. In other words, many "cow families" exist not because of superior merit but because of luck in producing more heifer calves. Selection of a bull out of this kind of family may not always be advisable, particularly if the immediate sire of the bull is not proven to be outstanding.

Breed Dairy Heifers to Dairy Sires

The mating of first calf heifers of the larger dairy breeds to Angus bulls is, unfortunately, a rather common practice. The major objection to this practice is, obviously, the loss of valuable dairy herd replacements. The reason usually given for this practice is that it reduces calving difficulties by producing a smaller calf. While this argument is probably valid, the practice is a mistake for commercial dairy-men and purebred breeders. Even if the resulting calf is to be used for beef it still is an unwise practice because of a slower growth rate to slaughter. If heifers are properly grown, little difficulty should be experienced at first calving, at 24-27 months of age.

V.P.I.'s Recommendations

Place maximum emphasis on increasing milk production with a concurrent improvement in useful type traits. Thanks to modern technology and research, we can "have some cake and eat some too." Our recommendations are based on the best available research information, the benefits of high speed electronic computers, and the judgment of practical breeders. The genetic potential of Virginia's dairy herds can be among the best in the entire country if we use the information wisely. Briefly, we suggest a breeding program consisting of (a) Sire Directories for each breed to be distributed twice yearly. These include all available AI and non AI proven bulls in the USDA's sire summaries. (b) Cow rankings according to breeding value for all Virginia DHIA herds--this procedure uses the most appropriate production information for each animal. (c) Culling guidelines for Virginia DHIA cows during lactation. Cows are ranked within the herd according to projected, mature, completed lactations. To this ranking, dairymen can add other pertinent information and make wiser decisions regarding culling.

V.P.I.'s Suggested Breeding Practices

1. Know your herd, keep accurate identification, production, and breeding records.
2. Study list of available AI and non AI proven bulls.
3. Group the top bulls in this list according to milk superiority.
4. Eliminate bulls with serious type defects or with other objectionable characteristics.
5. From the remaining bulls, select animals that have sired the best type, or those which you think should correct faults in your own herd. It is not necessary to confine your choice to the bull that actually has the highest plus over herdmates.
6. Breed 80% of your herd to the bull or bulls finally selected in Number 5.
7. Breed remainder to young bulls being sampled in AI.
8. Cull according to individual needs and from the bottom group of cows.
9. Provide environment conducive to profitable herd production.
10. Put cowmanship back into your operation. Be a dairyman! Place priority on cows, not "farm chores."

How, then, do we achieve the practical breeding program mentioned earlier? Practice intelligent sire selection, a strict culling program and effective herd management. The selection of the herd sire is your most important breeding decision. He contributes the genetic potential but you must feed and milk it out.