Do You Know Which Heifer To Raise?

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NEWARK, Del.—Many dairy farmers are absolutely confident they know that heifers from that superior cow sired by that superior bull most likely will be a heifer worth raising.

The catch is "most likely." No one really knows for sure, despite all the sire proofs and cow indexes.

What we know for sure is that in the process of fertilization, the chromosomes on the gametes from each parent combine at random. Therefore, it is not an impossibility that superior parents will have a "dud" of an offspring.

Is the possibility a chance worth taking economically when you won't know until lactation if you've really got a dud this time?

Years ago, in the mid-1960s, forward-looking dairy breeders in this region—Dr. Jim Deubler, Atherton Hobler, Harry Haskell, and Frank Brown—asked that same question.

To find the answer they supported a long-range research project at the University of Delaware in cooperation with Ohio State University and Rutgers University.

The inquiry was threefold. What "markers" in blood, milk or other tissues are determinants of superior performance? Could markers be used for selection of different dairy animals of different milk-producing abilities? And, if yes, could these differences be found in heifers and calves to predict differences in milk production?

In a study of more than 3,000 Guernsey and more than 3,000 Holstein cows, we considered many blood types, milk types and production records. What we found were distinct genetic differences in blood and milk types between cows and daughters of different bulls.

These differences were also related to differences in milk, fat and protein production of the cows and daughters of the bulls.

Some of these relationships were significant, although not always great.

New research in Canada has now shown that these relationships can have economic significance for selection of cows; some of these markers are indicative of significant differences in cheesemaking yields and qualities.

Now from Wisconsin (Journal of Dairy Science 78 (1995) :291-295) comes an exciting new research report that follows the same thinking—using markers for selection, specifically of heifers.

The University of Delaware's blood-type research had been aimed at calves; we wanted to be able to say with relative certainty which newborn calves were worth raising, thus saving us two years of investment.

The new Wisconsin research is aimed at heifers in mid-pregnancy. Can we save ourselves six months to a year of raising-heifer investment?

Instead of following blood or milk types as markers, they used one milk protein, beta-lactoglobulin, as a marker.

Beta-lactoglobulin is one of the proteins left in the whey of milk after cheese making. From our Delaware research we found that beta-lactoglobulin has different genetic forms and that these forms are related as markers to different milk-producing abilities of dairy animals.

The contribution from the Wisconsin research is that beta-lactoglobulin is useful not only as a genetic marker, but it is also a more direct physiological marker.

The new theory is based on the fact that beta-lactoglobulin is not only a protein in milk, it also can be found in blood serum in varying amounts. This information can be used as an index of the milk secretion activity of a particular mammary gland of a particular dairy animal and, therefore, of its future lactation milk yield.

This new research has shown that beta-lactoglobulin in blood serum increases during pregnancy in correlation with the developing mammary gland of the heifer.

The beta-lactoglobulin contents were used as an index in correlation studies with subsequent 305-day, first-lactation milk yields and significant correlations of 46, 54 and 48 percent, respectively, of milk, fat and protein yields were found.

These correlations indicate that testing for beta-lactoglobulin content in a single blood sample from heifers during mid-pregnancy can predict future milk yield of that same heifer, potentially saving a lot of time and money in not raising a "dud" heifer.

In other words, blood serum beta-lactoglobulin can be used as a physiological marker to prescreen heifers for milk production potential.

How can a milk protein be found in blood? During pregnancy the secretory cells of the mammary gland develop, including synthesis of milk beta-lactoglobulin. Because these secretory mammary cells are not held tightly together until just prior to parturition, the synthesized proteins can flow freely between cells and spill back into blood serum, which conveniently provides an index of the secretory activity and capactiy of that young new gland.

This new research could prove valuable. It will give dairy producers a way to save money on heifer selection, even in cases where pedigree information holds promise for a certain heifer.

It also may be possible to refine sire proving by providing new information at a much earlier age, thus saving at least one year with reduced environmental influence and improved reliability.

In addition, genetic differences between beta-lactoglobulin types can also be used as another tool for progeny testing of young bulls.

It will be interesting to see what further research will be found in this area, with its promise of greater economic benefits in dairy animal farming.

Offers Scholarships

HARRISBURG (Dauphin Co.)—The Central Pennsylvania Section of the American Society of Civil Engineers is accepting application for two $1,000 scholarships to be awarded to students who are enrolled in either civil engineering or civil engineering technology curricula.

This will be the eleventh year of the scholarship program.

Scholarship application forms detailing eligibility requirements can be obtained by writing ASCE, P.O. Box 118, Harrisburg, PA 17108. Applications will be received through May 31st, and the scholarships will be presented in August.