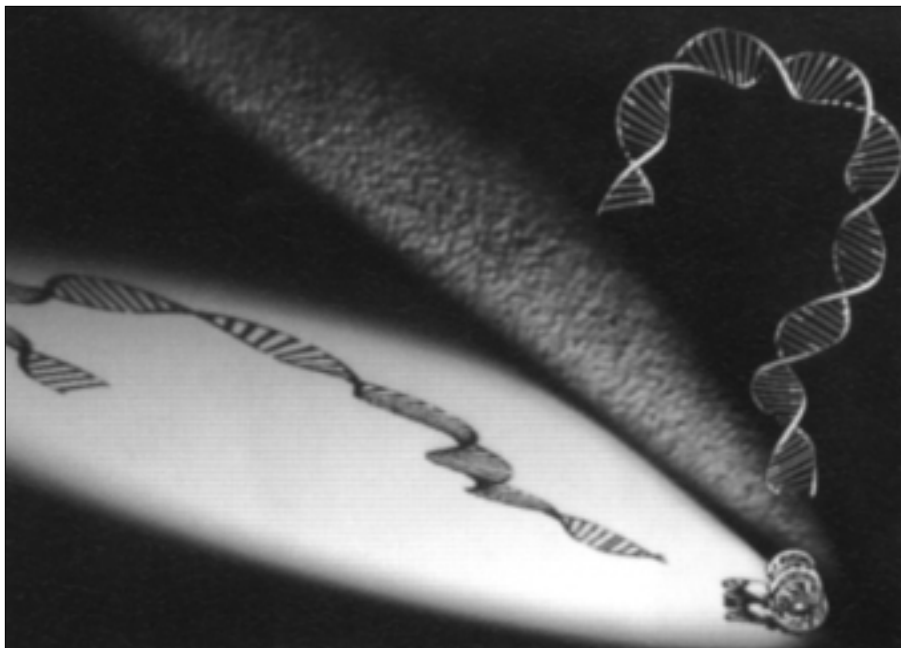


# The New DNA Technology: Your Questions Answered



the process of hiring a DNA technician who will help establish a lab. That facility will analyze blood samples collected by the American Angus Association for the National Cattlemen's Beef Association (NCBA) carcass-merit project and those from an ongoing genetic research project at Ohio State University and Iowa State University to determine the potential of the DNA technology as a genetic predictor. It is expected that these samples will be analyzed starting this spring and summer and that more information will be available in late 2000 or early 2001.

## 1 Exactly what is known about the DNA research announced by Ohio State University scientists?

Scientific details await publication in professional journals, where the discovery is being submitted for peer review. We can say this research utilizes DNA-analysis techniques previously not successful with beef cattle to accurately project the carcass quality and tenderness potential of **individual** animals.

## 2 How much confidence can we have in the research?

Statistical analysis of the findings has shown a probability of high accuracy, especially for molecular-biology research. Blood-test results predict with this high degree of accuracy whether an animal could produce a carcass with very tender or tough meat or have some specific degree of marbling. Health condition of the animal and nutritional and management decisions (such as implants used) can have a significant influence on the outcome, but in a focused management program, we can have a great deal of confidence in accuracy.

We do **not** have research information, to date, on the potential genetic transmission of marbling and tenderness from sire or dam to progeny, nor has a heritability estimate been calculated for quality grade and tenderness utilizing this technology. Because of the strong linkage between DNA and genetic predictability, it is logical to assume there should be a linkage. That is why ongoing

collaborative research between scientists at Iowa State University and Ohio State University will look at determining the genetic-prediction potential of this technology in Angus cattle.

## 3 Have some seedstock producers already utilized the DNA technique to analyze blood samples from their cattle, thereby gaining a competitive advantage?

**Absolutely not.** Because both the sire and the dam transmit DNA, the Ohio State University cow herd is being bled. Additionally, Ohio State University may use blood samples from other university or seedstock cow herds that collect tenderness and marbling data on steers to add to their database. This information is essential to the scientists.

However, even if a producer's cow herd is bled, the information will be used only for research purposes and to understand the heritability of the desired traits. The information will not be used to give anyone a competitive advantage.

Data will be sent to Iowa State University to determine its potential as a genetic predictor. Therefore, it must be understood that merely having cattle bled is meaningless until heritability estimates are developed. At present, all that is known is what an individual animal's predicted tenderness and marbling would be, and **nothing** is known about its offspring's potential for these traits.

Scientists at Ohio State University are in

## 4 What are the scientists at Ohio State University doing?

The key part of their current research effort is the cloning and sequencing of DNA markers for both quality grade and tenderness. They will first complete this for quality grade, which will be followed later this year for tenderness. Having this information is an important part of the patent-application process and provides further insight into how this technology works. Furthermore, this is essential to develop tests that are fast and economical enough to have commercial application.

## 5 Who owns this technology?

The technology was developed at Ohio State University, which retains ownership of both the technique and the findings. To protect these, a patent was applied for by the university in December 1999.

## 6 If Ohio State University owns the DNA technology, what opportunities are there for the Certified Angus Beef (CAB) Program and the American Angus Association?

The CAB Program Board of Directors approved funding to support ongoing research at Ohio State University in exchange for the opportunity to have exclusive lease rights to the technology. In early January a contract was developed and signed giving the American Angus Association and its subsidiary, the CAB Program, the exclusive licensing rights to the DNA technology developed at Ohio State University. With the recent change that makes the CAB Program a limited liability company, contract wording will change slightly, but not the exclusive leasing of this technology by Certified Angus Beef LLC for use by Angus breeders and licensed feedlots.

## 7 Assuming the current research shows potential for using the technology as a genetic predictor in Angus cattle, how will that be implemented for use by seedstock producers?

CONTINUED ON PAGE 96

If research shows the potential, the information would be taken before the Board of Directors of Certified Angus Beef LLC and the Breed Improvement Committee of the American Angus Association to determine how it might be used or made available to seedstock producers. Only after those decisions have been made will producers have the opportunity to commercially analyze blood samples from cattle in their operations.

**8** If approved by the respective boards, how might the DNA-analysis results be reported?

At a recent meeting in Des Moines, Iowa, scientists from Iowa State University and Ohio State University speculated on how the data might be reported once analyzed and available. In the simplest sense, bulls could have a scoring system developed in which they would be classified as *high*, *average* or *low* in terms of their genetic potential to transmit quality grade and tenderness to their progeny.

Ultimately, the more sophisticated approach would be to utilize the quality-grade information as part of the current EPD calculations for marbling, and a new EPD could be considered for tenderness. Such discussion is premature at this time, however, because the heritability of the traits determined by this test is unknown.

**9** How can seedstock producers prepare for this technology's release?

Again, this is premature. The best course

of action is simply to wait, but keep informed. There is no advantage in collecting blood samples on any cattle at this time, when nothing is known about heritability. In the months before commercial DNA analysis is opened, collection materials and procedures will be made available through the CAB Program and the American Angus Association. These will be well-publicized.

**10** Is there no current, practical application of this technology?

The DNA technology does have the potential of predicting quality grade and tenderness potential in an individual animal. Thus it would be possible to blood-sample calves as they enter a feedlot (or even on the ranch under contractual arrangements with the feedlot) to sort cattle into predicted outcome groups for quality and tenderness. That assumes the cattle do not encounter health problems and have proper nutritional management during the feedlot phase. Staff involved with the Feedlot-Licensing Program (FLP) are visiting commercial cattle-feeding companies to discuss the potential of evaluating this technology with pilot projects, possibly starting as early as this summer.

**11** Are any plans being made to establish some type of lab to handle samples on a volume basis?

Currently a business plan is being drafted with the assistance of scientists at Ohio State University. This business plan will be submitted to the Board of Directors of Certified Angus Beef LLC at the June Board meeting. Subject to approval at that time,

plans could proceed to the development of a laboratory facility to handle samples for licensed feedlots in the near future and ultimately for use by seedstock producers.

**12** If labs were established, what would keep seedstock producers from getting a head start by having samples from their cattle analyzed?

That shouldn't be difficult to control, as only licensed feedlots would be allowed to submit samples during the pilot phase, and those samples likely would be on only experimental projects during the next year. Plus, only the scientists can interpret results at this time. This technology will be made available to all seedstock producers at the same time, with none having preferential access to the pilot program.

**13** Have other companies inquired about leasing or buying this technology?

Yes. However, the licensing agreement in place between the Association/Program and Ohio State University gives us exclusive licensing of this technology at this time. It was also understood that the funding provided by the CAB Program to support ongoing research secures long-term exclusive rights to this technology. In return for that ongoing commitment, Ohio State University expects the Association and the Program to continue to find practical means to utilize the technology in the cattle industry.

**14** How would Ohio State University's research foundation receive financial remuneration for the technology developed in their laboratories?

Once blood samples are analyzed on a commercial basis, a small royalty (5%-7%) of the total sample-analysis cost would be paid to Ohio State University for use of the technology.

**15** Why can't we have access to this technology now?

News announcements are made when breakthrough discoveries are made in many research fields, including molecular biology. It takes time to move new technology from the lab to the field. During that time, additional research is being conducted to verify the preliminary results are 99.5% accurate and to establish heritability estimates to create value in this technology for seedstock producers.

Finally, it will be time to test the technology within the Angus industry to establish greater credibility for the technology and to help Angus producers get a head start before producers of other breeds have access to it.



Francis Fluharty, feedlot nutritionist, left, and Daral Jackwood, molecular biologist, right, have developed a DNA test at Ohio State University to determine the genetic potential of beef cattle. With funding from the Certified Angus Beef (CAB) Program, they have designed a method that identifies the tenderness and marbling potentials of cattle and aims to prevent variations in the quality of beef products.

