

Studying the

Research funded by the Angus Foundation examines the history of inbreeding and its relationship in Angus cattle.

by *Katie Allen*, Angus Foundation

When David Buchanan was a graduate student at the University of Nebraska (UN), a professor asked him to lead a seminar about a complex paper that examined inbreeding in Shorthorn cattle. The paper, completed in 1925, gave valuable insight to early 20th-century cattle production and identified certain periods of time when inbreeding within the Shorthorn breed was more common.

“The whole idea of the genetic makeup of a breed has been an interest of mine for a long time,” Buchanan says.

Today, Buchanan, a professor of animal sciences at North Dakota State University (NDSU), along with NDSU colleague Paul Berg, an associate professor of animal sciences, and Harvey Blackburn, animal geneticist and coordinator of the National Animal Germplasm Program for the USDA, are working on a research project titled, “An assessment of the history of inbreeding and relationship in Angus cattle.” The Angus Foundation funded the one-year project in 2011.

Inbreeding can be defined as the mating of relatives.

Because all members of a breed are technically related to each other, the definition is frequently refined to say that inbreeding is the mating of individuals more closely related than the average of the breed. Prior research suggests that the negative effects that result from inbreeding are insignificant when the relationship between parents extends back four or more generations.

The role of AI

While many breeds of cattle, including Angus, have been examined for inbreeding over time, most past studies about inbreeding relationships have been conducted prior to the widespread use of

artificial insemination (AI), which began in the 1960s. Buchanan says the importance of Angus as a popular breed of cattle made it logical to look at inbreeding relationships within the breed, particularly after AI.

“In any livestock where AI is widespread, the potential for inbreeding is there,” he says.

AI has allowed breeders to use popular sires within a breed. If many breeders use a small number of sires, the ratio of bulls to cows will be very small, there will be less genetic diversity, and

“Collectively, breeders can sustain a broad genetic base, which is important to the long-term survival of the breed.”

— *David Buchanan*

Angus Family Tree

the family structure of a breed can change dramatically.

Although AI could lead to a higher frequency of inbreeding, Buchanan says little evidence suggests problems or issues of lower performance due to inbreeding relationships in Angus.

“We just need to assess inbreeding periodically and let people know the status of the relationships to avoid any potential issues in the future,” he says.

Determining Angus genetic history

Buchanan and his fellow researchers are evaluating the inbreeding relationships through pedigree data from the American Angus Association. The names of animals were not included in the data. Rather, the animals were coded with a random numbering system. In essence, the researchers had no way of identifying the particular animals that appeared multiple times within a pedigree, but they instead could note identification numbers that appeared often.

An immediate goal of the project is to look at the history of the Angus breed, where it had been genetically, and also where it is today. The researchers are looking at effective population size, those ratios of bulls to cows, during specific time periods over the past 100 years.

Another immediate goal is to determine the relationships within the breed and whether there are sires of higher influence during

certain time periods. Buchanan says from a historical standpoint, it would be interesting to take the numbers that appeared often in the pedigrees and find out the sires those common numbers represented. Then the researchers could relay to breeders the sires that showed up multiple times in pedigrees through the years.

Of course, in the long term, Buchanan believes it is a good idea to follow up and assess inbreeding relationships at certain time intervals in the future.

Results from this research will be analyzed in 2012. Application from findings in this research on Angus farms and ranches could be tremendous, but Buchanan says it is important to note that application has to be done collectively by breeders rather than individually.

“In terms of an entire breed, what an individual breeder does may not make much of a difference,” he says. “Breeders should be encouraged to focus on lines that are genetically excellent and seek out new lines. Collectively, breeders can sustain a broad genetic base, which is important to the long-term survival of the breed.”



Editor's Note: *Katie Allen is marketing and public relations assistant for the Angus Foundation.*