

To Clone or Not to Clone

Amy K. McLean and William M. Graves
University of Georgia

Great advancements in biotechnology and genetic engineering have now made cloning techniques in cattle possible. Why would someone want to clone a cow or bull? Cloning produces an exact genetic copy of an animal. If one owns an outstanding dairy cow and would like a genetic duplicate or copy, cloning would be the answer. Instead of continually breeding to improve one's herd genetics, an excellent cow could be readily copied many times. The dairy industry may benefit a great deal from cloning. If a producer could one day economically clone a herd of Excellent Holstein cows that produced over 50,000 pounds of milk each a year, how could one go wrong? However, would this whole herd of genetically identical high producing Excellent Holsteins actually produce the same as their clone?

We know that during the cloning process the same genetic material is transferred, so the clones should have the same genetic potential to be excellent cows and produce high yields. But what we don't know is how or if this genetic material will be expressed the same way. After working with cloned calves this past summer at the University of Georgia we noticed different habits among the calves. These heifers were cloned from tissue collected from the ear of an Angus cow when she passed away. Unwanted DNA is first removed from each ovum. New DNA from the donor cow is inserted. The eggs are allowed time to develop, then transferred into recipient dams where they are hopefully carried to term.

These calves looked the same, but did show signs of expressing their genetic makeup differently. Eating and social habits were very different. Some were more aggressive, some grew faster, and others were more concerned about what you were doing and could have cared less about eating or playing with the other calves. Interestingly, another cloning company has shared similar stories. The clones of a Holstein cow named Con-Acres HS Zita would all lie under the same tree. If a producer were to clone an excellent high producing Holstein or Jersey, would the clone match the same production records? We know environment effects will affect comparisons.

Only more clones, more experimentation, and time will answer our questions. If you are interested in cloning a cow or top bull you can now do so through several cloning companies. Prolinia, Inc. works with the University of Georgia in Athens. The cost usually depends on how many clones you want and veterinary expenses. An average cost is around \$11,000-20,000 per clone. Veterinary expenses can vary greatly because most clones have all been delivered by caesarian and the condition of the newborn clones' lungs and legs can vary. Treatments can require thousands of dollars. Hopefully, in the future, the cloning process will become more routine and more economical.

Cloning is still a tool that will most likely be used by purebred producers to preserve or copy a desirable individual. Just remember the changes that have taken place in the dairy industry with artificial insemination (AI), dairy herd improvement (DHI), total mixed rations (TMR), milking three times a day, and new pharmaceutical products like bST. We now have cows that produce three

times more milk than cows did twenty or thirty years ago. We must not altogether forget selective breeding procedures to improve herd genetics. After all, half of our ovulated eggs produce bulls that may play a role in genetic improvement. Even though a cloned herd of high producing excellent cows sounds like a dream come true, won't the industry still need genetic diversity?