Cloning Case Study

In December 2004, a tabby kitten named Little Nicky made headlines for being the first cloned-to-order pet in the United States. The original Nicky was a cat that died at the age of 17 years. His owner, Julie, chose to have some of Nicky’s tissue “banked” so that he could be cloned. The company that produced Little Nicky, California-based Genetic Savings & Clone, Inc., also funded the creation of the very first cloned cat, CC, in 2002, and made the first cloned pet cats, Tabouli and Baba Ganoush, in the United Kingdom earlier in 2004. Cloning pets should be a very profitable business indeed: Little Nicky cost Julie $50,000.

How do you make a clone like Little Nicky? The first mammal to be cloned from a somatic (body) cell of an adult was Dolly the sheep. She was made in 1996 at the Roslin Institute in Scotland, using a technique called somatic cell nuclear transfer. In this technique, the nucleus of a cell from a donor’s body is combined with an enucleated egg (one with its nucleus removed) from a female of the same species, and the resulting cell is stimulated to start dividing and grow into an embryo. The embryo is then placed in the uterus of a surrogate mother to continue its development. Although additional sheep, as well as pigs, cattle, goats, horses, rabbits, and mice, have been cloned using somatic cell nuclear transfer, one problem with this method is the low survival rate. Most embryos do not survive long enough to be implanted in a surrogate mother. And of those that do, almost one-quarter of the clones born have health problems so severe that they do not reach adulthood. These problems are thought to stem from the fact that the donor cell has already differentiated, and as a result its nuclear material is structurally different from that in a fertilized egg with respect to associated proteins. Some of the proteins associated with the nuclear chromatin may get carried over to the enucleated egg, where they interfere with development. CC was made using somatic cell nuclear transfer, but most consumers probably would not opt for this technique for cloning their pets because of its low success rate.

In 2003, a new cloning technology known as chromatin transfer became available. In chromatin transfer, the chromatin is made to condense, much as it would prior to cell division. The condensed chromatin is treated to remove any extraneous materials prior to being injected into the enucleated egg. This method has resulted in a greater rate of cloning success, and was used to create Tabouli, Baba Ganoush, and Little Nicky. It is likely that there will be many more cloned pets. In fact, Genetic Savings & Clone looks to clone up to 50 cats over the next year, and plans to include dogs in the near future.

Questions

1. What are some of the reasons an individual might give for having a pet cloned? Cost aside, would you choose to have a pet of yours cloned? Why or why not?
2. The first cloned cat, CC, looks different from her genetic donor, Rainbow, due to a well-understood complication involved in cloning a calico cat. The two also reportedly have different personality traits. On the other hand, Little Nicky, Tabouli, and Baba Ganoush look like their donors, and their owners claim that their personalities are identical. What do you think cloning may teach us about the roles of nature and nurture in development?
3. Critics of Genetic Savings & Clone and its customers say there is no justification for having a pet cloned when so many dogs and cats are being euthanized because no one will adopt them. Do you agree or disagree with this point of view? Explain.
4. Cloning may help save endangered species that have too few members to be rescued by a typical breeding program. Some scientists who are even more optimistic hope to revive extinct species via cloning. What would you predict about the ability of such species to survive without further cloning? Does it make sense to start banking tissue samples from endangered species for future cloning before their numbers reach critical lows? Why or why not?
5. The cloning of primates, including humans, is proving to be more difficult than the cloning of some other mammals. However, it is likely just a matter of time until technological advances make this possible. What reasons can you think of for some people to want to have themselves cloned? What issues would likely arise, for both the clone and the donor?