



Is Meat and Milk Derived from Animal Clones Safe to Consume

After years of detailed study and analysis, the **U.S. Food and Drug Administration (FDA)** has concluded that meat and milk from clones of cattle, swine (pigs), and goats, and non-cloned offspring is **as safe to eat** as the food from conventionally bred animals. Researchers have been cloning livestock since 1996 to help improve the quality of herd and the meat and milk from these animals has now been proven to be safe.

What are cloned animals? Cloned animals are biological copies of adult animals. They are like identical twins of adult animals. At a cost of about \$20,000 each to produce, clones are used for breeding—not for food. It may be the descendants of cloned cattle, pigs, and goats that are potential sources for meat and milk.

How long has cloning been around? The technology to clone farm animals was developed more than 20 years ago, in the 1970s. Early methods of cloning in the 1970s involved a technology called embryo splitting, or blastomere separation. Embryos were split into several cells and then implanted into a surrogate mother for growth and development. But there were a limited number of splits that could be made, and only a few clones could be produced from one egg. The characteristics of the clone were also unpredictable because scientists were cloning from an embryo whose traits could not be predicted. Today's method of cloning, somatic cell nuclear transfer (SCNT), has been around only since 1996.

What is the process for cloning animals today? The practice of cloning took on new meaning in 1996 with the birth of Dolly the sheep was the world's first mammal cloned from an adult cell using a technique known as somatic cell nuclear transfer (SCNT). SCNT was more precise than earlier embryo-splitting methods of cloning and has become the method of choice for this process. Since the cloning of Dolly, this technology has been used to clone cattle, mice, goats, pigs, rabbits, and even a cat. SCNT can be used to make an unlimited number of copies of one animal.

The SCNT process starts with an unfertilized egg, or oocyte. Scientists remove the oocyte's nucleus, which contains the egg's genes, or hereditary "instructions." What remains after removal of the nucleus is a cell that contains nutrients essential for embryo development and other cellular machinery waiting for a new set of instructions.

A somatic cell from the animal to be cloned—or in some cases, just the cell's nucleus—is cultured in an incubator and then injected under the coating of the unfertilized oocyte. (Somatic cells are any cells of the body except sperm and eggs.) Stimulated by a mild electrical pulse, the oocyte cytoplasm (everything in the cell but the nucleus) and the genetic material from the donated somatic cell combine. If fusion is successful, the resulting fused cell divides just as if it were a fertilized egg and produces an embryo. The embryo is placed in the uterus of a surrogate mother and, if development proceeds normally, an animal clone is born. The new animal is genetically identical to its 'parent'; sort of like producing an identical twin to an adult.

Why would you want to clone an animal? Proponents of livestock cloning see it benefiting consumers, producers, animals and the environment. Some argue that cloning offers tremendous advantages to farmers whose livelihoods depends on selling high-quality meat and dairy products. Cloning gives these farmers the ability to preserve and extend proven, superior genetics. Farmers can select and propagate the best animals—beef cattle that are fast-growing,

have lean but tender meat, and are disease-resistant; dairy cows and goats that give lots of milk; and sheep that produce high-quality wool. Through cloning, it would be possible to predict the characteristics of each animal, rather than taking the chance that sexual reproduction and its gene reshuffling provide. Cloning also has the potential to eliminate some animal diseases by cloning a naturally-resistant animal.

How are cloned animals different from traditionally bred animals? Adult cloned animals – plus their non-cloned offspring – are the same as traditional, non-cloned animals born to other traditional, non-cloned animals. Cloned animals used for meat and milk have only traditional animal genes. They have a mother; they do not develop in a test tube or incubator. In addition, clones are used to reproduce non-cloned offspring that also have only traditional animal genes.

Is a cloned animal the same as a genetically modified organism, or GMO? There is nothing genetically modified because cloned animals contain only their own species' traditional genetic material. There is nothing genetically added or subtracted either. Cloned animals and their non-cloned offspring are not genetically modified organisms because GMOs (aka, genetically engineered organisms or transgenic organisms – here, transgenic animals) all contain deliberately added foreign genes.

Why are people concerned about cloning? The many reports of what may possibly go wrong with animal clones have proved to be not much more than exciting scientific fiction when compared to the rather dull findings that cloned animals are the ordinary animals people have raised and consumed for millennia.

Also, some organizations claim that animal cloning is unnatural human intervention, but that bridge was crossed many centuries ago. For millennia, people have closely controlled domestic animal reproduction to develop specific animal breeds for companionship, food, and work. Today, all breeds of cattle, dogs, cats, pigs, horses, chickens, plus all other domestic animals are the direct result of intensive, unending, human intervention using selective animal breeding programs. None of today's domestic animal breeds would ever have developed using only natural selection and random breeding. There would be no Holstein cows for superior milk production or Angus cattle for high-quality beef. There most certainly would be no Siamese cats or Chihuahua dogs if humans had let "nature take its course."

Are there any benefits to cloned animals over traditionally bred livestock? Cloning allows livestock producers to reduce, by years, the decade or so now required to get superior animals to market. For instance, USDA prime beef – currently about three percent of all beef steaks – could become our only grade of beef – and at affordable prices! Also, fewer superior dairy cows could produce the same quantity of milk while making less animal waste.

What is the future of cloning of human-food animals? Although the FDA has concluded that meat and milk from cloned animals is safe, the USDA is concerned about public perception of this relatively new technology. Therefore, the USDA has asked for farmers to delay bringing food from cloned animals to market until the public has a chance to embrace the idea.

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