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## **Is Animal Cloning Ethical?**

*The problematic development in modern agriculture  
technologies*

The “Green Revolution” started in the 1940s when Dr. Borlaug set out a program aimed at assisting poor farmers in Mexico to increase wheat production. In the 1980s, the success of the Green Revolution spilled over to China, which is now the world’s biggest food producer. Africa is still facing the major food crisis in a number of countries and very few people argue that wheat breeding is immoral. By contrast, animal cloning is a very controversial issue. Thus, the ethics of modern developments in agricultural technologies is currently under discussion by EU policy-makers primarily because of the very different opinions between EU Commission, several European governments and the US Administration. If in the future food products derived from cloned animals are to be introduced to the European market, the EGE recommends some requirements. If policy makers will not spread human fertility practices, it will be strictly necessary to use both conventional breeding and biotechnology methods to meet the challenges of this century.

Civilization as it is known today could not have evolved, nor can it survive, without an adequate food supply. Yet food is something that is taken for granted by most world leaders despite the fact that more than half of the population of the world is hungry. Man seems to insist on ignoring the lessons available from history.

Norman Borlaug, *The Green Revolution, Peace, and Humanity*, Nobel Lecture, December 11, 1970

KEY WORDS: *animal cloning, green  
revolution, ethics, food policy,  
population growth.*

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### **1. The Green Revolution**

Scientist and Nobel Peace Prize winner Norman Borlaug died on the 12<sup>th</sup> september 2009. He was known as the father of the “Green Revolution” which transformed agriculture through high-yield crop varieties and other innovations, helping to more than double world food production between 1960 and 1990.

Before the invention of agriculture human life was precarious but, also after the transformation of humankind from wandering hunters and food gatherers to farmer, man did not permanently emancipate from the fear of food shortages, hunger and famine.

Not only in prehistoric times has population growth threatened or exceeded man’s ability to produce enough food. The shortage of food is a very current problem for the entire humanity.

The green revolution started in the 1940s when Dr. Borlaug set out a program, funded by the Rockefeller Foundation, aimed at assisting poor farmers in Mexico to increase wheat production. Nearly 20 years was spent breeding high-yield dwarf wheat that resisted a variety of plant pests and diseases and yielded two to three times more grain than traditional varieties.

It should be mentioned that in Italy during the early years of the 20<sup>th</sup> century, Dr. Nazzareno Strampelli carried out fundamental selective breeding in wheat varieties and invented many, such as high yielding *Ardito*, *Mentana*, *Edda*, *Balilla*, *Roma* and *Fanfulla*. His work led to the establishment of the Italian Experimental Institute of Cereal Crops, in 1919, in Rome, and the autarchic policy of Mussolini's government, during the 20s and 30s in Italy funded research in genetic studies and in cereal crop cultivation to ensure sufficient harvest for consumption (Cesarini 1984).

After the successful initiative of Dr. Borlaug and the spreading of more productive agricultural techniques during the 1960s in Pakistan and India, wheat production programs have succeeded in Mexico and China. In 1968, this revolution was officially named "green" by the U.S. Agency for International Development (USAID), when referring to the big improvement in wheat production in Pakistan and India in the annual report. The label "The Green Revolution" is not related to the "greenies", i.e., environmentalists who are concerned with preserving the environment and not in alleviating world hunger.

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## **2. The European Group on Ethics in Science and New Technologies**

In December 1997, the European Commission deliberated the first mandate of the European Group on Ethics in Science and New Technologies, with the task of advising the Commission on all ethical questions relating to science and new technologies. At present, the Group (EGE) is fulfilling the 2005-08 mandate, with the mission to advise the Commission on ethical questions relating to sciences and new technologies, either at the request of the Commission or on its own initiative.

On 16<sup>th</sup> January 2008, EGE edited, Opinion n° 23 on "Ethical Aspects of Animal Cloning for Food Supply". Several months before, in February 2007, the US Food and Drug Administration (FDA) announced the possible authorization of food products derived from cloned cattle, pigs and goats on the market. Therefore, President Barroso

asked EGE to issue an Opinion on the ethical implications of cloning animals for food supply.

At the same time, the European Food and Safety Agency (EFSA), was asked to produce an Opinion on food safety, animal health, and environmental implications of live cloned animals obtained through somatic cell nuclear transfer technique (SCNT), and the implications for their offspring and the products derived from them.

Within the last decade (CE 1999) EU policy has considered the health and welfare of food producing animals to be essential for public health and consumer protection. Some diseases, such as tuberculosis, salmonellosis and listeriosis can be transmitted to humans through contaminated food making controls necessary to preserve the public health. Furthermore, food safety policy places a strong emphasis on animal welfare. The European Commission considers that the impact of quality and safety of products of animal origin intended for human consumption needs to be reflected in legislation.

Whereas animal welfare aspects are covered by the Council of Europe's European Convention the Protection of Animals and several Council Directives, such as CD 98/58, CD 1999/74/EC that define the minimum welfare criteria. Thus, the debate about the most appropriate farming techniques to achieve better health and welfare and to improve meat quality is still open.

The EU when contemplating animal welfare must give careful consideration to the opinion of EGE. In fact, the EGE clearly expressed doubts as to whether cloning animals for food supply is ethically justified, based on the lack of convincing arguments to justify the production of food from clones and their offspring.

If in the future food products derived from cloned animals were to be introduced into the European market, EGE recommends that the following requirements are met (EGE 2008):

*Food safety* - The safety of food products for human consumption as a precondition for their marketing must be guaranteed and scientific updates and follow up research into progeny should be carried out.

*Animal welfare and health* - In accordance with the Amsterdam Treaty (animals as sentient beings) and the Lisbon Treaty, additional requirements should be met in intensive animal breeding, with the aim of following the guidance on animal welfare provided by the World Organisation for Animal Health (OIE), e.g. the five freedoms: from hunger, thirst and malnutrition; from fear and distress; from physical and thermal discomfort; from pain, injury and disease; and to express normal patterns of behaviour.

*Traceability* - Current EU legislation on food regarding traceability of animals and their food products should be enforced. It should be ensured that EU legislation provides for the ability to identify individual animals where necessary.

*Global trade* - The import of cloned animals, their offspring and materi-

als derived from cloned animals (e.g. semen and food products) should be conditional on proper documentation, in particular with regard to traceability provisions and animal welfare.

One should point out that the ethical concerns arise from a broad spectrum of human decisions with regard to:

1. cloned animals and their offspring, use of animals for human purposes; animal health; animal welfare; animal integrity;
2. human beings, human health and welfare; food safety; bio-safety; possibility of misuse;
3. environment (biodiversity; environmental pollution and degradation; environmental sustainability);
4. human society at large, social desirability, social acceptance; consumers' rights; justice issues, local, regional, global; intellectual property rights, industrialization of agriculture and its sustainability.

All of these arguments contain both benefit and risk features which are currently evident but are not yet revealed in future technological progress. In fact, EGE recommends that the scientific community carries out further studies and analyses on long-term animal welfare and the health implications for clones and their offspring, as well as more comparative analyses using other assisted and traditional reproductive technologies in animal farming.

Social communities need EU policy makers to prepare a Code of Conduct on responsible farm animal breeding, including animal cloning. Thereby preserving, the genetic heritage of farm animal species. Public participation should be promoted when considering the impact of farm animal cloning on agriculture and the environment, the societal impact of increasing meat consumption and rearing of bovines, as well as on the fair distribution of food resources.

### **3. Are the doubts on animal cloning well-founded?**

It is necessary to launch a thematic *Eurobarometer* survey and general qualitative studies on animal cloning for food supply, in order to collect indicators of public perception concerning the introduction of such products to the food market as is being done in other countries. Additional complex concerns regard the labeling of food produced with cloned animals, the intellectual property, global trade and finally the freedom of consumers.

With regard to the latter, Prof. Krzysztof Marczewski, EGE member that requested and *addendum* to the EGE Opinion n° 23, disagreed with the doubts on animal cloning expressed by EGE, the future benefits of animal cloning having economic, social and environmental features but expressed concern on consumer's rights and freedom: "*If we decide that the protection of people and animals are more important than the consumer's right to free choice we should, without doubts, begin from absolutely ban for tobacco*" (EGE 2008).

We should also give some consideration to the loss of big potential developments for biotech in Developing Countries, in particular in Africa. For example, many biotech crops, containing the gene for herbicide tolerance, promote good farming methods, eliminating a lot of safety risks for workers.

In the last century, conventional breeding produced higher yields than that of some genetically modified (GM) food crops and will continue to do so in this century. Researchers and scientists have the responsibility to reduce world hunger. Genetically modified food crops will stop world hunger as well as traditional plant, but we have to consider that biotech crops permit the use of less land, thus causing less impact on the environment. Dr. Borlaug was convinced that conventional farming would destroy wildlife habitat when cropland is expanded and that biotechnology helps farmers produce higher yields on less land. The world's grain output in 1950 was 692 million tons. Forty years later, the world's farmers used about the same amount of acreage but harvested 1.9 billion tons, that is to say a 170% increase, saving 1.8 billion hectares of land. If we had continued practicing conventional farming, we would have cut down millions of acres of forest, thereby destroying wildlife habitat, in order to increase cropland to produce enough food for an escalating population. Technology allows us to have less impact on soil erosion, biodiversity, wildlife, forests, and grasslands.

The implications of the green revolution from the perspective of human population growth, are that in many nations over a couple of decades life expectancy has increased by more than 10 years, and many people who would otherwise have starved, have survived and had children. From this perspective, the green revolution has kept people from starving.

Yet, from another viewpoint, it has been inhumane and cruel as the green revolution has artificially boosted "K", the Earth's carrying capacity, through *unsustainable* agricultural technologies and food imports in LDCs, which have provided solely short term relief, exacerbating the long-term suffering of the population. In this sense, rather than being kind, the green revolution may have been cruel from a global perspective.

#### 4. Ethical dilemma

This perspective is referred to as "bioregionalism" or "life boat ethics", in the sense indicated by Garrett Hardin, the author of "Tragedy of the Commons" (Harding 1968). Each region of the world should support only as many people as it is able to, without food subsidies. That is, each region should support only as large a population as its own resource base will allow. Furthermore, food subsidies are even more problematic if they result from agricultural practices in the donor nations regions that are likely to be unsustainable. Each nation might calculate its water and land availability, use that to calculate how many people could be given a desired type of diet, and then work towards achieving that population size. This is a very crucial ethical dilemma that involves individual freedom in decision making.

Other problems are not so clearly ethical, but relate to specific practices and their effects on the agroecosystem or other ecosystems, to questions about the sustainability of these practices with reference to (i) plant varieties used (restricted to high yielders); (ii) fertilizer inputs; (iii) irrigation practices; (iv) pesticide use.

Finally, we must not forget a fundamental point. In spite of biotech's great potential, access to technologies is a very big problem, as most of the research on crops is conducted by private enterprises which hold the patents on their inventions, excluding farmers. Global governments need to seriously address the problem.

Governments also need to address issues such as a framework for testing genetically modified foods, funding research in the public sector, and better educating the public about agricultural science and technology. Most people in the "western" world are urbanites and don't know what it takes to feed the world. These people can afford to buy expensive "organic" food and to criticize genetically modified food. They pressure governments to ban genetically modified foods and this, in turn, could be disastrous for developing nations.

The Green Revolution is an ongoing continuum. Millions of people are currently undernourished in the world. The world population for 2025, at a medium fertility rate, is projected to be about 8.3 billion people. It is possible to calculate that the world will need an additional one billion tons of grain.

The world has to increase yields to feed the entire population, that is more bushels per acre, more tons per hectare. Higher yields are especially important now due to spreading urbanization, which erodes agricultural land. If policy makers will not spread human fertility practices, it will be strictly necessary use both conventional breeding and biotechnology methods to meet the challenges of this century.

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