Brazil's Genetically Modified Goats Will Help Fight AIDS and Heart Attacks

Contributed by Marco Bahé
Tuesday, 08 August 2006

A new sector for sheep and goat farming is being born due to scientific experiments that are being developed in the northeastern Brazilian state of Ceará.

The raising of nine genetically modified goats at the Cearense State University (Uece) will be a definitive step for the birth of specialized production turned to the medical product industry.

With the implant of human genes, the milk of these animals will be used in the treatment of patients with immune deficiencies.

It all now depends on a DNA test that will confirm, in the first week of September, whether one of these sheep goats will become the first Brazilian genetically modified (GM) animal.

In case the test shows the incorporation of human gene G-CSF, inserted in goat embryos in the laboratory, the milk of these animals may be used in the production of various medications.

The target of the researchers are immune deficiencies, like Aids or those caused by radio and chemotherapy, as well as the lesions caused by myocardial infarction.

Vicente Freitas, veterinary surgeon and coordinator of the project, which has been under development in the country for five years, explains that Brazil is currently side by side with countries like France, the United States and South Korea in the biotechnology race seeking solutions to health problems through the development of genetically modified goats.

"The next step is to catch up with Canada and England, which have already managed to use GM goats as bioreactors, i.e., as producers of proteins that may be of public use," pointed out the veterinary-head of the Physiology and Reproduction Control laboratory at the Uece Veterinary College.

The first phase of the work of the Uece researchers consisted in developing techniques that made possible the construction of a new DNA adding the Human Granulocyte Colony Stimulating Factor (hG-CSF) to goat genes.

The hG-CSF is of strategic importance in the human body. It is this gene that stimulates the growth of granulocytes which, when thrown into the bloodstream, originate leucocytes - cells that protect the organism against attacks by fungi and bacteria that cause infections.

Another concern of scientists was incorporation of the human gene into the mammary gland, thus guaranteeing production of large volumes of granulocytes and easy collection, in goat milk.

"A few hours after fertilization, the hG-CSF is microinjected into the embryo, which is then transferred into a receptor goat that operates as a 'surrogate mother'," explained Freitas.

The pregnancy follows its normal course, lasting five months. The success expected for the newly born animals is due to the best fertility rates identified since 2001.

The good rates of embryo survival show, according to the researcher, that the manipulation executed through microinjection did not interfere in the health of the embryos, which presented good development throughout the gestation period, having been born perfect.

DNA testing now depends on the arrival of kits imported from the United States by the Federal University of Rio de Janeiro, a Uece partner in the project. The research also includes university laboratories in another two states, Pernambuco and Paraíba, forecasting total investment of about US$ 500,000, financed by the Bank of the Northeast and the Ministry of Science and Technology.

Despite not being used for direct consumption, GM goat milk, once processed, may be used as an input for the production of cheaper immuneregulators than those currently produced - which use hG-CSF produced by bacteria - and that may cause fewer allergies in patients.

According to Freitas, at least five years of work will be necessary for this medication to reach the market. "The greatest challenge, however, will be completed with the confirmation of genetic incorporation in these goats. The next steps do not require new technologies. It is more a routine work," he forecasts.

Expectations with regards to DNA testing of the Brazilian sheep became even greater in the month of June. Authorization by the European Medical Evaluation Agency (Emea) for the use of anticoagulant A tryn, the first medication produced from GM goat milk, is a great stimulus to the researchers involved in the national project.

"As the method used by the British who developed A tryn follows the same principles as ours, approval of the medication shows that we are not working only on theory. Our project may have a concrete and real impact," explained Freitas.

A tryn has protein antithrombin, an anticoagulant used while operating on patients with genetic deficiency of the substance.

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