Biotech hormone reduces cost of inducing ovulation in livestock

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A Brazilian startup called Kimera Biotecnologia, based in Ribeirão Preto, Brazil, has produced the first biotech version of equine chorionic gonadotropin (eCG), a hormone widely used to induce and synchronize estrus in cattle and pigs, with the aim of optimizing the results of artificial insemination.

Already tested in both species, the new recombinant eCG (r-eCG) has proven as effective as the conventional version, and is between 30 percent and 50 percent cheaper, according to Kimera. It also eliminates the controversial use of pregnant mares to produce the hormone.

Since conventional eCG was first used in livestock reproduction more than three decades ago, it has been obtained from the blood of pregnant mares, frequently resulting in animal mistreatment, abortions and the premature deaths of these animals.

"Kimera's hormone is can be synthesized in the laboratory without the need for extracting blood from mares or any other animal, and at far lower cost," says Camillo Del Cistia Andrade, a founding partner in Kimera and principal investigator for the research project. Andrade holds a PhD in genetics from the University of São Paulo (USP).

The demand for eCG is rising with the growing use of artificial insemination as a basic tool to accelerate genetic improvement and increase livestock productivity. The success of the procedure depends on knowing when females will ovulate. In addition, being able to inoculate

many animals or an entire herd at the same time reduces the cost of insemination and permits synchronization with other stages of production, optimizing the production process as a whole.

Breeders of all sizes now use artificial insemination and increasingly employ reproductive hormones to synchronize estrus. In 2010, fixed-time artificial insemination (FTAI) accounted for half of the insemination procedures performed in Brazil. Indeed, the use of FTAI is one of the factors that has enabled Brazil to expand its cattle herd by 40 percent since eCG was first used some 25 years ago. The country has become the world's leading meat exporter. In addition to estrus synchronization, the hormone can also be used to hasten puberty, induce superovulation in females and rapidly reverse the period of sexual inactivity that follows separation from their young, increasing fecundity.

Andrade succeeded in cloning the gene responsible for producing eCG and inserting it into cultured cells. These cells produce the hormone, which is then purified. With FAPESP's support, Kimera developed an innovative biotech process and applied for a patent jointly with USP.

During Stage 1 of its PIPE project between September 2014 and May 2015, Kimera produced the hormone on a laboratory scale and performed initial tests using rats. Later, tests were conducted to compare the results of r-eCG application with the use of eCG produced in Nelore cows that had given birth at least once: 127 received eCG and 50 were given r-eCG.

All the cows ovulated and were inseminated, with a pregnancy rate of 50.2 percent in those given the hormone from mares and 48 percent for those given r-eCG. The difference was not considered statistically significant. Tests in sows yielded similar results, and the same success rate is predicted with female goats and mares.

In Stage 2, which began in November 2016 and is still in progress, researchers are exploring the best way to ramp up the production of r-eCG. While completing this research project, his team is already studying the possibility of working on the development of new recombinant hormones and vaccines.

Provided by FAPESP

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