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News Release

No more barnyard doping tricks

A new test against anabolic steroid abuse in cattle feeding

In Europe the use of anabolic steroids in livestock farming is forbidden, but nonetheless economically enticing. Consumers ultimately pay the price for abuse: residual steroids in meat can result in dangerous side effects ranging from tachycardia and muscle fibrillation to fever and vomiting. Researchers at the Center for Life and Food Sciences Weihenstephan of the Technische Universität München (TUM) have now found an inspection process that cannot be foiled.

When young cattle are given hormones like testosterone and estrogen in addition to their feed they not only grow faster but also produce more of the valuable lean meat. Even though trade in anabolic substances is illegal in Europe, as is their application in livestock feeding, the substances are not at all hard to come by. As such, the potential for abuse is ever present. In the EU inspections are accordingly strict to ensure meat quality standards are met. But conventional tests are not infallible: they screen for known substances but often miss new or modified substances available on the black market.

Heinrich H. D. Meyer, professor for physiology, and his team have now taken a major step forward in the fight against anabolic steroid abuse in livestock farming. In a pilot study the TUM researchers developed a process that does not limit testing to specific substances in meat, making it significantly more accurate than other approaches employed to date. The new test is indirect: instead of probing for anabolic steroids themselves it checks for genetic side effects triggered by the substances.

The most important anabolic steroids are sexual hormones, the effects of which can be observed in various stages of metabolism in both humans and animals – for example, in the activity of the ovaries, in the sperm quality or in muscle growth. Specific genes control all of these processes. The researchers can measure the activity of these genes. When a gene is “switched on” associated messenger RNA, so-called mRNA, can be found in the cell, together with a transcript of genetic information. How much of this mRNA is present can be determined using a molecular biology lab technique known as reverse transcription polymerase chain reaction, or RT-PCR for short. The concentration of messenger RNA in a specific gene then serves as a doping test indicator.

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In their research with cattle, the researchers demonstrated that this approach could be employed to spot the telltale effects of anabolic steroids. They are currently fine-tuning the method to handle various kinds of steroids. Once the new testing procedure is ready for the market it will represent an effective weapon in the battle against anabolic steroid abuse in livestock farming. “After all, nobody can dupe the genes,” says Meyer. “In the last 20 years anabolic steroid abuse has not been a problem in Germany. This new process will help ensure that this does not change.” But the new test is not limited to the livestock industry. The method could also prove to be very effective in sports.

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