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ANIMAL EMBRYO TRANSPLANTATION

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Annotatsion. Cattle breeding is one of the most important branches of animal husbandry and plays a large role in providing our people with livestock products (meat, milk), as well as raw materials for the light industry. In this article, the main issue facing livestock specialists today is the use of embryo transplantation in animals to increase the number of pedigree cattle in cattle breeding and create the most productive herds from them.
Keywords: embryo transplantation, selection, IN VIVO and IN VITRO technologies, superovulation, donor cow, recipient cow, artificial crossing, Holstein breed

The use of embryo transplantation in breeding is currently one of the most pressing issues. Since 2018, the Research Institute of Animal Husbandry and Poultry Farming in the Republic of Uzbekistan has been implementing important scientific measures in the field of animal husbandry with the South Korean center KOPIA in Uzbekistan. In particular, since 2021, significant work has been carried out in Uzbekistan in the direction of organizing livestock breeding and selection work. In 2023, embryos obtained from highly productive Holstein cows of the USA and South Korea were imported, and transplantation was carried out in 3 cattle farms. Embryo transplantation is one of the important innovations in the livestock industry of the Republic of Uzbekistan. Industry specialists and livestock breeders are showing great interest in this process, and seminars are being organized with the KOPIA center.

To date, one healthy calf has been obtained from cows that underwent embryo transplantation at the "Dil Giyo Fayz Baraka" farm in the Chinaz district of the Tashkent region and three healthy calves at the "Kim Pen Xba" farm in the Urtachirchik district of the Tashkent region. The practice of embryo transplantation contributes to the intensification of breeding work in Uzbekistan's livestock industry, the creation of highly productive herds of cows, and the improvement of their genetics. Embryo transplantation is widely used in animal husbandry. This method allows for the reproduction of traits of highly productive, mutant animals and the creation of disease-resistant breeds. Transplantation of embryos and eggs of donor-record-bearing animals to medium and low-productivity recipient animals to create a large number of similar high-productivity herds in a short time.

Embryo transplantation is a systematic biotechnological method of the breeding process in cattle breeding over several generations, associated with artificial insemination of breeding technologies. In cattle breeding, the use of highly productive breeding cows and bulls is the main condition for obtaining appropriate offspring. However, with the increase in breeding differentiation in breeding, the number of breeding stock selection decreases, and the number of offspring obtained from them using stable methods is small. Cattle embryo transplantation is one of the advanced methods for improving the breeding and productive qualities of animals. With its help, it is

possible to obtain offspring from the best cows (donors), multiply their embryos by transferring them to animals of lower breeding quality (recipients), and create high-quality breeding herds in a short time.

Embryo transplantation is 5-7 times cheaper than artificial insemination, and 30-40% cheaper than importing live animals.

Embryo transplantation was first performed on rabbits in April 1890 by the British scientist Walter Heap, and the introduction of this method into production from laboratory conditions began in 1950 with a pig embryo transplanted by A.V. Kvasnitsky of the former association, and a year later, transplant calves were obtained by D. Rouson (Cambridge, England).

Based on the interconnectedness of the history of the development of cattle breeding as a branch in our country, embryo transplantation of cattle in the CIS region began in 1975, and the first transplanted calves were obtained in 1977.

In recent years, the importance of embryo transplantation has increased due to the introduction of genomic selection into breeding work, since its effectiveness directly depends on the number of offspring of selected cows.The more offspring there are, the more opportunities there are for the emergence of leaders with a high breeding index. Therefore, in Europe and America, where livestock farming is highly developed, the method of embryo transfer is mainly used to obtain breeding offspring.

The method of embryo transplantation increases the number of offspring from breeding animals by several tens of times by transplanting recipient cows with low hereditary value, receiving one or more embryos per year from high-yielding donor cows.

Breeding bulls can produce semen for several hundred, even thousands of offspring, however, a sexually mature female cow calves once a year and produces several calves during her lifetime, half of which are male calves. In fact, compared to egg cells that mature in the eggs of mother animals, their reserves are also large. A physiologically mature young animal's egg contains approximately 130,000 unfertilized egg cells. Using them, as a result of embryo transplantation from a cow with high genetic indicators, it is possible to obtain a large number of calves with the same genetic capabilities. For example, in England, starting from 1983, 27 embryos were obtained from one birth, of which 19 calves were obtained.

In the USA, since the 2000s, 131 calves have been obtained from one high-yielding Holstein breed cow, and in one farm, 201 embryos were prepared from 5 cows 6 times, from which 103 high-breed calves were obtained. The USA, Canada, England, and New Zealand began exporting embryos to dozens of countries.

In this case, the export and import of embryos is not only significantly less expensive than the costs of caring for pregnant animals, but it is also possible to effectively use the semen of breeding bulls, since 30-40% of the semen obtained from breeding bulls during the year turns out to be defective, and a large part of the viable semen is considered inefficient due to many reasons not related to the quality of the semen. This leads to the elimination of opportunities for the effective use of the most productive bulls, from which it is advisable to obtain as much semen as possible.

In Canada and the USA, there is a tendency to obtain 95-98% of breeding bulls and breeding young animals with a high genotype through embryo transplantation. In the USA and South America, the practice of embryo transplantation has become so stable that for 10 years now, an average of 500 thousand In vitro embryos are produced annually in these countries.

So, what is embryo transplantation? The lexicological meaning of this term means "transplantation" and consists mainly of 2 stages, that is, the production of an embryo of a donor animal and its placement in a recipient animal. It should be noted separately that since this technology is new in the conditions of our Republic, many understand the transfer of a ready-

made embryo to female animals as transplantation. However, this is the final technical stage of the transplantation process, which is no different from ordinary artificial insemination.

Embryo transplantation is a complex process, consisting of a series of sequential steps: 1 - selection of donors, 2 - inducing polyovulation in them, 3 - fertilization, 4 - extraction of embryos, 5 - evaluation of embryos, 6 - cultivation of embryos, 7 - transplantation to the recipient.

Currently, this technology is developing in 2 directions depending on the formation of the embryo:

1. The "IN VIVO" (permanent, widespread) method of washing mature embryos from record-breaking cows means that the "IN VIVO" ("In vivo"; Latin - "living, or inside a living organism") method means the formation of an embryo in the mother's organism. In this method, to create several or more egg cells instead of one or two egg cells formed during a normal sexual cycle, hormone superovulation is induced in donor cows, they are fertilized with selected high-breed bull semen, and the 7-8-day-old embryo in the cow's uterus is obtained using special instruments.

2. "IN VITRO" (relatively modern, developing) means washing egg cells and preparing an embryo by fertilization in laboratory conditions, that is, outside the animal organism;

3. Using the "IN VITRO" method ("In vitro"; Lat. - "in a bottle"), donor cow oocytes are obtained, cultivated in an artificial medium, and then artificially implanted in the recipient cow. In this case, the obtained embryo is grown in a test tube for 7-10 days until the pre-implantation stage (late morula or blastocyte form), placed in the recipient, or deeply frozen.

In recent years, the "IN VITRO" method has become more favorable worldwide due to its greater ability to preserve embryonic viability than the "IN VIVO" method.The reason is that the degree of negative impact on the animal is less compared to the "IN VIVO" method.In addition, regardless of the stage of the animal's sexual cycle, the "IN VITRO" method allows obtaining oocytes from cows that cannot undergo superovulation, have a pathology in the reproductive system, and are pregnant (up to 3 months of pregnancy).In addition, it is possible to obtain egg cells from female organisms that have not reached the planned breeding period due to their live weight.There is another interesting aspect: in practice, oocytes can also be obtained and used from baptized animals.In other words, calves can be obtained from non-living donors, and this method is widely used in North American countries and China.

Main advantages of embryo transplantation in animal husbandry.

- Opportunities will be created for large-scale breeding work.
- Prevention of infectious diseases such as chlamydia, brucellosis, trichomoniasis, and campylobacteriosis.
- Breeding calves are obtained through insemination.
- Breeding and genetics will improve.
- Obtained pedigree cattle increase their live weight, growth, milk and meat productivity, and when sold in markets, their prices differ.

Conclusion. Embryo transplantation is one of the advanced achievements of modern biology, which is causing revolutionary changes in many areas.For its effective and safe implementation, highly qualified specialists, modern technologies, and adherence to high ethical standards are necessary.This method has a bright future and will continue to improve with the development of science and technology.

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