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Impact of Artificial Insemination Biotechnology in Cattle Breeding

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Abstract: Artificial insemination (AI) is one of main interest research area in biotechnology, being widely used in cattle breeding, having a significant impact on the animal industry. AI facilitates the rapid dissemination of superior genetics within the cattle population, leading to genetic improvement, enhancing the cattle quality, increasing production efficiency, and reduces the risk of disease transmission between animals.

• AI biotechnology

- Application of AI biotechnology has a positive result in optimizing breeding schedules and synchronize the reproductive cycles of cows, resulting in more efficient and predictable production cycles. Diversity of breeding programs allows breeders to create breeding programs tailored to specific goals, whether they are focused on milk production, meat quality, disease resistance, or other traits.

• AI importance in biotehnology

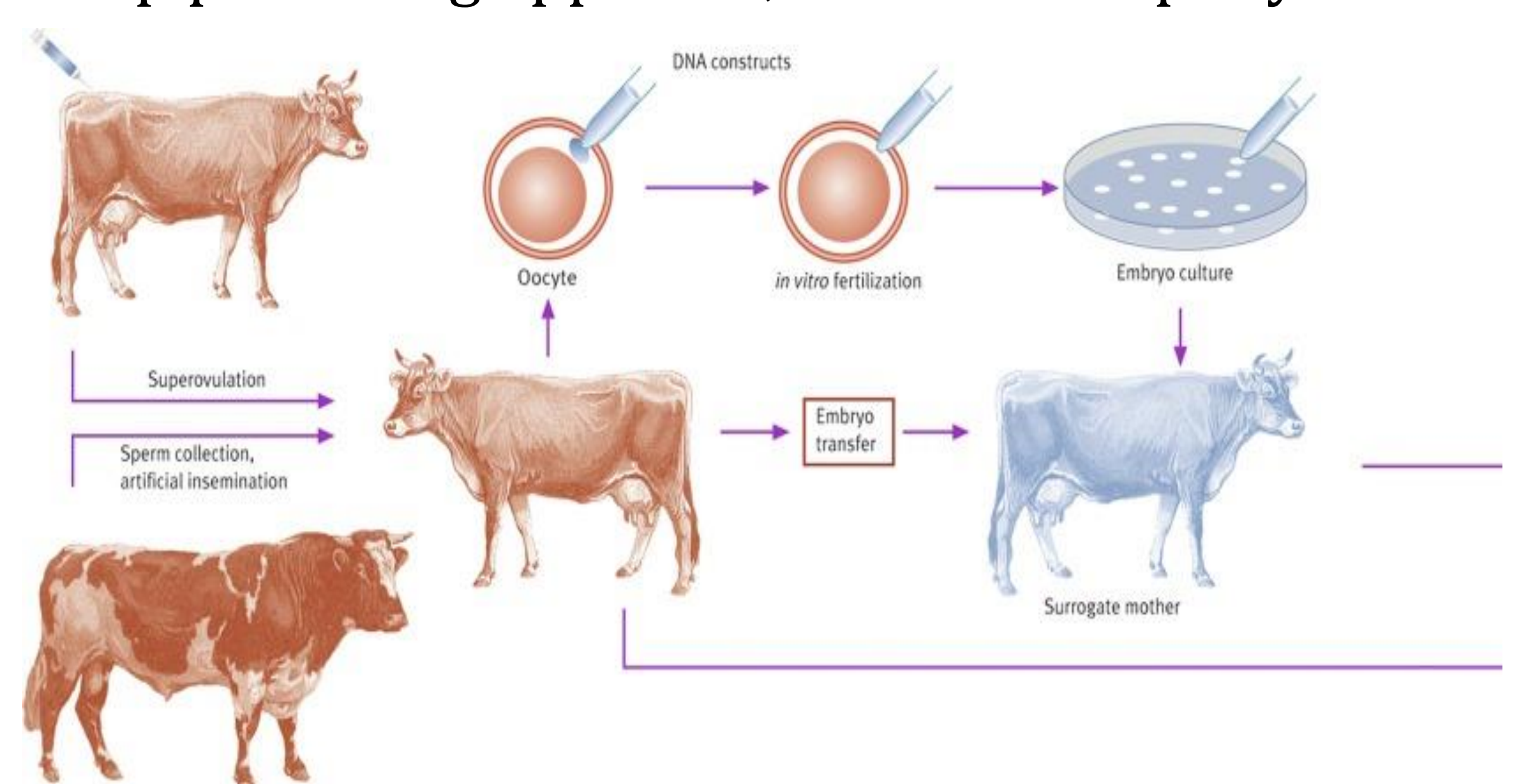
- In the 1950s, due to the fact that semen from various animal species needed to be preserved, various methods of temporary storage of semen in liquid nitrogen (at -196°C or -320°F) were developed. This has revolutionized animal breeding biotechnologies. Thus, the transport of ultra-frozen semen was possible not only over short distances but even across the ocean. Currently, in industrialized countries, approximately 90% of dairy cows and pigs have been born following the application of artificial insemination techniques.

• AI advantages

- prevents and reduces the risk of inbreeding, which is crucial for maintaining genetic diversity and preventing the expression of undesirable recessive traits in cattle populations.
- improved record keeping,
- enhanced reproductive management and labour efficiency, with real economically benefits,
- preserving and conserving the genetics of endangered cattle breeds.

• Cost-effective AI

- It is a cost-effective method.
- in the ejaculate of a stud bull that "copulates" with a "false cow," there are approximately 400 portions of semen, and each contains approximately 20 million spermatozoa.
- One bull used in artificial insemination replaces approximately 1,000 traditional breeding bulls.
- In the last 40 years, the performance of dairy cows has increased greatly.
- If in the 1950s a dairy cow produced approx. 1,000 l of milk per year, now a dairy cow ends up producing approx. 8,000 l of milk per year.



• Conclusions

- AI in cattle breeding is crucial nowadays
- has positive bio-socio-economic impact,
- Is considered a critical tool in modern cattle production systems,
- contributes to the overall sustainability and efficiency of the industry,
- maintain a very healthy and safe breeding,
- Maintain genetic diversity
- reduces the risk of disease transmission