Final Exam Questions
2022.
Agricultural Biotechnology MSc
Animal biotechnology

1) Compare the aims of the use of assisted reproductive techniques (ART) in animal breeding! List and briefly introduce the ARTs (except embryo transfer and cryopreservation) their connection possibilities, their role in practice! Also mention the possible gene conservation role of the techniques.

2) Describe the benefits of the MOET system and its effect on genetic gain. Briefly describe the work phases of embryo transfer technologies used in farm animals and laboratory model animals, briefly describe the work phases of in vitro embryo production technology.

3) Describe the advantages and goals of ovum and embryo cryopreservation, and briefly summarize the theoretical foundations of cell cryopreservation and the methods used in practice. How can preimplantation genetic diagnosis be applied at creating of commercial embryo banks?

4) Compare the early embryonic development of mouse and rabbit embryos. Describe the method of the injection and aggregation chimera production. Delineate the application possibilities of chimeras in animal biology and biomedical research.

5) Introduce the main types of embryo derived animal stem cells. Compare the developmental potential of naive and primed embryonic stem cells. Describe the method of transgenic mouse production based on embryonic stem cell transgenesis. Introduce the structure of the used DNA constructs.

6) List the possible methods of genetic reprogramming and describe their significance in basic research, veterinary and human medicine!

7) Describe the main technical steps of nuclear transfer-based cloning, the known technological limitations, their biological reasons, the main point of reproduction and therapeutic cloning!! Delineate the methods of production of identical twins! Compare the advantages and disadvantages of these methods!

8) Describe the methods of androgenesis, gynogenesis (meiotic and mitotic) , the tri- and the tetraploidy and characterize the offspring population's perspectives in animal husbandry!

9) Describe the evolutionary characteristics / differences of the nuclear and mithocondrilad genoms (genome duplications, genome sizes, conservations and gene distribution) of fish.

10) Describe the main methods, which are used to create transgenic animals by additive transgenesis! What are the most important DNA constructions used by DNA microinjection? What is the advantage and drawback of using artificial type (BAC,YAC) transgenes? Describe the AquAdvantage salmon!

11) Briefly describe the methods, which are used to create targeted gene modification in animals! Show in detail genome editing methods (especially CRISPR/CAS9)! Mention at least two examples of genome edited livestock which can be useful for agricultural applications!

12) What are the major characteristics of microsatellites? Describe their mutational mechanism, evolutionary model, detection systems and their role in phenotypic variation! How can we isolate new microsatellites and how do they become positioned markers suitable for genetic mapping?

13) Describe the typical genetic architecture of the quantitative traits! List and describe in detail the mapping populations used at the experimental animals, suitable for QTL mapping!

14) Compare the first- and second-generation sequencing methods, detail their major characteristics! Describe the Roche 454 pyrosequencing method!

15) What are the major characteristics of the SNP markers! Describe the operation scheme of the Illumina Golden Gate SNP genotyping system!

Gödöllő, 04 October 2021.

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