

Establishment of the mechanisms of ovarian tissue activation in pre-pubertal cattle – *in vitro* and *in vivo* studies.

The proposed research project assumes examination of the intracellular mechanisms controlling ovarian tissue activation in pre-pubertal and pubertal cattle – *in vitro* and *in vivo* studies. We hypothesize that mechanical stimulation (fragmentation of ovarian tissue, its vitrification and warming) will modulate intracellular mechanisms in both fresh and cryopreserved samples from pre-pubertal and pubertal animals. Moreover, we speculate that used method will not induce apoptosis in activated oocytes and surrounding granulosa cells. Additionally, we speculate that selected *in vitro* activation protocol can be applied *in vivo* with the same effectiveness.

Designed studies, in addition to cognitive advantages for development of the basic research, in the long-term perspective can have practical application in the development of an effective method of the ovarian tissue activation, especially for pre-pubertal animals. Each individual female is born with fixed number of primordial follicles, which is considered as the ovarian reserve. Activation of the primordial follicles allow to obtain a much larger number of follicles especially from pre-pubertal cows, what will directly contribute to doubling the size of the breeding progress through shortening of the generation interval in cattle, and subsequently will multiply significantly the number of the offspring born per animal per year. Among the advantages of genomic selection in the field of doubling the size of the obtained breeding progress through reduction of intergenerational interval, having impact also on reduction of the costs of the assessment of bulls by eliminating the stage test on the offspring, in particular preparation assessment of the breeding value of animals at the earliest possible date period of life, leads to the reorganization of the current national breeding program, and on its basis, to reorganize the evaluation and selection programs in cattle. The main aim of breeding program is to get as much genetic progress as possible, above all on the path of selection based on the PF index, maintaining genetic variability in the population of cattle of this breed, which guarantees farmers and milk producers the highest possible profitability of their farms. Genetic progress will concern, on the one hand, production features with a strong emphasis on the composition and quality of milk, having a significant impact on its price, on the other hand, the improvement of functional features such as fertility, healthiness, longevity, guaranteeing reduction of production costs. Genetic progress achieved in conformational traits will be heading towards obtaining a female material that allows for breeding in proper conditions of milking, nutrition and health with special emphasis on udder and foot features and hooves.