Influence of mating systems and selection intensity on the extent of inbreeding and genetic gain in the Slovak Pinzgau cattle

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The aim of the present paper was to simulate the scenarios for a maximum avoidance of inbreeding (MAI) mating strategy, and compare it with a random mating alternative, with the main focus on inbreeding and development of the genetic gain. The parameters of the simulation were based on the structure of the Slovak Pinzgau active population of 2868 animals (930 purebred cows). The selection under a total merit index (TMI) was simulated, covering the milk, survival, and live weight breeding value estimation results. The heritability of TMI (h^2 = 0.09) was estimated using a REML single trait animal model. Alternatives assumed a closed population structure, fixed number of mating per parent, and equal use of sires in insemination. Animals in generation 0 were set as founders without pedigree information. In separate simulation runs, the number of sires of sires was set at 2, 4, 5 or 10 mated with 40 dams of sires in all cases. The sex ratio of the offspring was assumed to be 50/50 male/female. Twenty consecutive generations were simulated for both random and maximum avoidance of inbreeding mating, which resulted in a total of 8 scenarios. Significant positive differences in genetic gain were observed in the MAI mating system with 2 (0.74**), 4 (0.24**), 5 (0.13**) or 10 (0.09**) sires in comparison to random mating design. When using MAI, significantly lower inbreeding was observed with 2 (5.44**), 4 (3.18**), 5 (2.43**) or 10 (1.16**) sires. Simulation results showed that the use of a maximum avoidance of inbreeding mating strategy would lead to significantly decreased rates of inbreeding while maintaining suitable levels of genetic gain in the

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