Estimate of inbreeding depression of the birth weight in the population of Pag sheep breed

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The Pag sheep is a Croatian autochthonous sheep breed mainly reared for milk production. However, the lamb meat is also an important source of income for the breeders. It is desirable that lambs come into the world as heavier as possible to be more vital and disease resistant, but also to reach the slaughter weight as soon as possible. Previous studies conducted on different livestock populations suggest that inbreeding can lead to the serious decline in the birth weight of newborns, but this phenomenon has been scarcely investigated in sheep, especially in extensively managed dairy orientated populations. This study was part of the series of studies related to examination of the important population specific genetic parameters necessary to establish the optimum contribution selection (OCS), which is an ultimate long-term selection strategy in this population (project OPTI SHEEP, CSF, IP: 2019-04-3559). The specific aim of this study was to analyse the impact of inbreeding on the birth weight of lambs in the population included in selection improvement of milk gain. This population has been under comprehensive recording of genealogical and phenotypic data in the last two decades, which makes this population very suitable for investigation of this phenomenon. All data used in the analysis were provided by the Croatian Ministry of Agriculture. There was a total of 281760 animals in the pedigree, with maximally 11 generations traced back. All the available pedigree records were used for the estimation of the coefficient of inbreeding (F) for a total of 15186 lambs with known birth weight and sufficiently informative pedigree (number of equivalent generations >3). The inferential statistical analysis was conducted under the 3-way ANCOVA statistical model with gender, litter size, and parity used as categorical, and F (expressed in %) as continuous numerical predictor (covariate). The estimated regression coefficient of the birth weight (kg) on the F was -0.005 kg ($P<0.001$), indicating thus the presence of inbreeding depression. The obtained result calls for attention in making further mating plans in this population in order to prevent a genetically influenced decrease of the birth weight. However, more research, and more evidence is needed to generalize this effect, preferably under the framework of the animal genetic model in order to account for the mutual genetic relationship between the analysed lambs.

Key words: Pag sheep, lambs, birth weight, inbreeding