

Exploring pedigrees: an overall picture of biodiversity in Italian small ruminants

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To avoid the reduction of biodiversity and genetic erosion, local breed conservation continues to be a relevant topic of rural development policy. Optimal breed management requires careful control of the inbreeding level within a breed together with the availability of accurate demographic information. The calculation of the main demographic and genetic parameters allows us to better estimate the short- and long-term breed risk status, as well as to determine the best management practices for breeds with unreliable data and so which require particular attention. The Italian association of small ruminant breeders (ASSONAPA) monitored all goats and sheep breeds in a national project entitled 'Conservation, Health and Efficiency Empowerment of Small Ruminant' (CHEESR-PSRN 2014–2020). This study described the panorama of pedigree information for Italian sheep and goat breeds. In this study, 81 pedigrees (35 for goats and 46 for sheep) were analysed. Using optiSel R package we calculated the pedigree depth (full and maximum generation traced) and completeness, and the effective size (N_e) applying Write's formula. Furthermore, for the 10 breed case-study, we estimated the longevity and the percentage of animals eliminated from pedigree during their first 3 years of life (for the triennium 2007–2009). The analyses showed a median pedigree depth, for goats and sheep, equal to 2 and 3 full generations (interquartile range IQR =2–4 and 2–5), and 5 and 7 maximum generations (IQR =3–10 and 5–12), respectively. Pedigree completeness was variable; breeds with a complete first generation (median, IQR) were higher in sheep (34%, 19–47) than in goats (14%, 5–28). Overall, the median N_e was 176 in goats and 234 in sheep (IQR =74–547 and 128–774). The mean \pm SD longevity was 5.6 ± 1.8 (range =3.9–7.5) and 5.5 ± 1.1 years (range =4.3–7.6), respectively, with a marked difference (equal to 3 years) between, more and less selected, goat breeds. On average, $16 \pm 22\%$ goats and $25 \pm 11\%$ sheep (range =1–41 and 5–40) were eliminated before 3 years of age. In conclusion, the Italian panorama is very variable and the pedigree analyses depict very different situations. Ovine populations are characterized by greater effective size, pedigree depth, and completeness than caprine populations. When information is lacking, pedigree analyses can be corroborated by genomics to determine good practice in breed management.