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Welfare and parasitology condition of extensively reared sheep during winter

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While the welfare of sheep is largely positive when assessed according to natural living in an extensive system, they may face a range of compromises to their wellbeing, principally related to nutritional stress, inadequate water supply, climatic extremes, parasitological diseases, lameness, and inappropriate management. Grazing sheep are therefore exposed to a huge diversity of parasites since natural pastures are the main source of internal and external parasites. The aim of this study was to identify the main welfare issues during winter with an emphasis on parasitological infections in extensive sheep farming systems. The study was conducted during the winter season of 2022 on three farms of native sheep breed Vlačićka zacka in the mountain region Fruška gora. All year round, the flock of ewes grazes in fenced paddocks where shelter is provided by trees, shrubs and other vegetation. A total number of sheep included 550 ewes, 12 rams and 300 lambs. We observed 82 ewes, aged 2-7 years. For welfare assessment, animal-based indicators from the AWIN protocol for sheep were used. All fecal samples for parasites were qualitatively and quantitatively examined. Results were described by descriptive statistics and as prevalence. Relationships between the different welfare indicators and endoparasites were examined by Spearman's Rank correlation. The main welfare issues identified were fleece cleanliness (84.14%), nasal discharge (45.12%), ocular discharge (19.51%), respiratory problems (18.29%, 15/82), body condition score-BCS (15.85%), fleece quality (20.73%-some loss) and borderline anaemia (9.76%). Lesion on legs and minor lameness was present in 4.88% ewes. In the examined feces of ewes, seven endoparasites were identified in the form of coinfections - protozoa (*Coccidia* and *Buxtonella sulcata*), nematodes (strongylides, *Trichuris ovis*, and Protostrongylidae), cestodes (*Moniezia* spp) and trematodes *Dicrocoelium dendriticum* with a total prevalence of 100%. The most prevalent coinfections were *Coccidia* and strongylides (12.20%), *Coccidia*, strongylides and Protostrongylidae (12.20%), and *Coccidia*, strongylides and *Dicrocoelium dendriticum* (12.20). The most common was coccidiosis, in the form of infections of medium and high intensity. Parasite infection was identified as an important and prevalent welfare problem across all farms, with a weakly significant ($r=0.24$, $r=0.22$, $p<0.05$) correlation between certain parasites (*Buxtonella sulcata* and Protostrongylidae) and welfare indicators such as nasal discharge and borderline anaemia. Also, a significant ($r=0.30$, $p<0.001$) correlation between BCS and fleece quality was found. The findings provide useful information on the main welfare issues that can occur in extensive sheep farming and can help farmers to improve animal welfare.