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Abstract Submission Form

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Preferred presentation Oral

Preferred session Session 8: Global challenges in measuring methane in ruminants

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Title of your paper Greenhouse gas emission intensity of milk production in three Slovenian sheep breeds

Insert ABSTRACT text

The aim of the study was to determine the intensity of greenhouse gas (GHG) emissions from the milk production of three sheep breeds in Slovenia, to identify the trends and to determine the main impacts on greenhouse gas emissions. Based on information on milk yield, protein, fat and lactose content, average body mass of each breed, litter size, and lambing interval, we estimated methane and nitrous oxide emissions for the period 2010-2022. Emissions were estimated for 21,655 lactations. GHG emissions were expressed in carbon dioxide equivalents. Emission intensity was expressed as emissions per kg of milk produced. Enteric methane contributed to almost 92% of the total GHG emissions. Methane from manure stores contributed about 2% to total GHG while the total contribution of nitrous oxide was about 6%. The differences in the intensity of GHG emissions among sheep fivefold, ranging from about 0.7 to more than 3.6 kg of CO2 equivalent per kg of milk. On average, the emission intensity expressed in kg CO2 equivalent per kg milk was 1.555 for Bovec sheep, 1.379 for Improved Bovec sheep, and 2.026 for Istrian Pramenka. The intensity of GHG emissions decreased between the first parity (1.682 kg CO2 equivalent per kg milk) and the fourth parity (1.534 kg CO2 equivalent per kg milk) and then gradually increased until the tenth parity (1.714 kg CO2 equivalent per kg milk). The emission intensity decreased with increasing litter size. The average emission intensity, expressed in kg CO2 equivalent per kg milk, was 1.639 for sheep delivering single lambs, 1.442 for sheep delivering twins, and 1.241 for sheep delivering triplets. The emission intensity increased with increasing lambing interval from 1.430 kg CO2 equivalent

per kg milk for sheep with a lambing interval between 280 to 314 days to 1.769 kg CO2 equivalent per kg milk for sheep with lambing interval between 416 to 450 days. This means that the total milk yield of sheep with a longer lambing interval, was not high enough to compensate for the higher maintenance requirements of these sheep. The intensity of GHG emissions from milk production in flocks with controlled sheep varied over the years (ranging from 1.522 kg CO2 equivalent per kg milk in year 2022 to 1.657 kg of CO2 equivalent per kg of milk in years 2013 and 2014). Overall, the intensity of GHG emissions decreased by around 6% during the study period. To summarise, some fertility traits are correlated with milk production and consequently also with the intensity of GHG emissions. In particular, a relatively short lambing interval could reduce the intensity of GHG emissions by increasing daily milk production.

Enter keywords milk yield, litter size, parity, lambing interval, trends