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Enteric methane production in calves depends primarily on the farming system, not on breed

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There are potential benefits for grazing calves concerning animal welfare, resource efficiency, and ecosystem services compared to conventional indoor systems. However, enteric methane production in grazing calves might be an environmental challenge and remains poorly understood. Using the Hohenheim gas test protocol, we evaluated gas and methane production in 72 male dairy veal calves. The calves were evenly distributed across three breeds—Brown Swiss, Brown Swiss × Limousin, and Swiss Fleckvieh—and four farming systems: an indoor control group at FiBL and three grazing systems at Strickhof (intensive grasslands, permanent grasslands, and alpine grasslands). All calves on pasture were fed with similar quantities of maize and alfalfa pellets, as well as soy-free concentrate in limited amounts, while the control group had a slightly different feeding plan. Hay was provided ad libitum across all systems. Total gas production (ml/200 mg), absolute methane (mg), and relative methane production (mg/ml) were modelled based on breed, farming system, and the time between rumen fluid sampling and the start of the gas test. Our results showed a strong effect of the farming system on gas and methane production, but only a minor effect of breed. The time between sampling and testing affected only methane production and was included as a control variable for breed and farming system effects. Total gas production was highest in the intensive grassland system and lowest in the alpine system. Methane production was highest in the permanent and alpine grassland systems and lowest in the indoor and intensive grassland systems. These findings offer valuable insights into the sustainability of grazing calves. However, further research on resource efficiency, economic viability, and land use is essential to determine the feasibility of implementing a resilient grazing system for these animals.

Keywords: greenhouse gases, rumen fermentation, grazing systems, sustainability