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Feeding of molassed sugar beet pulp instead of maize enhances net food production of high-producing Simmental cows without impairing metabolic health

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ABSTRACT

Molassed sugar beet pulp (Bp) is a human inedible by-product of the sugar industry being a suitable dietary energy alternative to grains particularly in terms of increasing the net food production efficiency of high-producing dairy cattle. However, there are concerns that feeding large amounts of Bp can limit cow's feed intake, jeopardizing both the production performance and metabolic health especially of high-producing dairy cows that have high energy needs. In the present study dietary inclusion of Bp as a substitute for maize grain was tested in a longitudinal block-randomized experimental design in early lactation high-yielding Simmental cows. The Bp inclusion rates were 0 g/kg (i.e., no Bp inclusion as control), 120 g/kg (12Bp), or 240 g/kg (24Bp) on a dry matter basis. The replacement of maize grain with Bp reduced the human edible input from 135.4 MJ GE/d in the control diet to 50.7 MJ GE/d in the 24Bp diet ($P < 0.001$). Feed and energy intake ($P = 0.693$), milk yield ($P = 0.457$) as well as energy corrected milk ($P = 0.425$) were maintained constant throughout the trial. As a result dietary inclusion of Bp turned a net food loss with feeding the control diet into a net food gain with dietary inclusion of 120 and 240 g/kg Bp ($P < 0.001$). The energy balance and blood metabolites were unaffected by the dietary treatments ($P > 0.05$), whereas dietary fibre digestibility was linearly improved ($P = 0.038$) with Bp feeding, indicating enhanced rumen health and functioning with Bp feeding. In conclusion, feeding molassed sugar beet pulp as partial substitution of maize until 240 g/kg is a viable alternative that can improve net food production without impairing the cows' production performance and the metabolic health status of cows while improving the digestibility of fibre.

Abbreviations: Bp, Sugar beet pulp; NDSF, Neutral detergent soluble fibre; heE, Human edible energy; heP, Human edible protein; eFCE, Edible feed conversion efficiency; EB, Energy balance; ECM, Energy corrected milk; BHBA, β-Hydroxybutyric acid; NEFA, Non esterified fatty acids; AST, Aspartate transaminase; GGT, γ-Glutamyltransferase; GLDH, Glutamate dehydrogenase

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