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Ruminal fermentation of a diet including brussels sprouts in a Rusitec system

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Brussels sprouts (BS) contain multiple secondary compounds which might modulate ruminal fermentation. As other by-products, wastes of BS coming from industrial horticulture could be used in ruminant feeding after proper evaluation of their nutritive value. The aim of this study was to assess the effect of partially replacing soybean meal and totally replacing barley grains, in the concentrate part, by dried BS in a mixed diet (1:1 alfalfa hay:concentrate) on ruminal fermentation parameters and apparent digestibility in Rusitec fermenters. Two diets with 17.3% protein and 29.0% neutral detergent fibre content were incubated in 4 Rusitec fermenters in a cross-over design in 2 periods of 14 days each. The diets were supplied daily to the fermenters into nylon bags containing 30 g, and in each period 2 fermenters received the diet with no BS (CON) and the other 2 received the diet with dried BS (14,7% BS, as feed). On the last four days of incubation, samples of liquid effluents and gas were collected from the fermenters for determining the daily production of volatile fatty acid (VFA) and methane. In addition, diet digestibility was measured as the disappearance of the diet from the nylon bags. There were no differences between diets either in the total VFA or in the daily methane production. However, caproate proportion was greater ($P \leq 0.034$) and valerate and isovalerate proportion was lower ($P \leq 0.001$ and $P \leq 0.013$) for the BS diet than for the CON one. Dry matter, crude protein, neutral and acid-detergent fibre apparent digestibility did not differ between diets. The results indicate that BS can partially replace conventional feed ingredients, such as soybean meal and barley grains, in mixed diets without negatively affecting ruminal fermentation and diet digestibility and causing only minor changes in VFA profile. *In vivo* research is needed to assess the influence of BS-containing diets on animal performance.

Evaluation of the nutritional value of silages based on agro-industrial by-products

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With climatic changes, increase in temperature and decrease in precipitation, pastures and forages productions are irregular and increasingly limited to short periods of time, making it necessary to resort to concentrate feeds. In Portugal, concentrate feeds are based in cereals and oilseed cakes, which are high-cost imported feeds. The use of agro-industrial by-products as alternative feed sources must be stimulated in order to reduce imports, promote economic and environmental sustainability and reduce human/animal competition for food. In this study, it was our aim to characterise chemically and nutritionally agro-industrial by-products and mix them in order to produce balanced silages to use in ruminant diets. Potato tubers (PT), carrots (C), wheat bran (WB) and brewers grains (BG) were analysed for chemical and nutritive characterisation and ensiled in bags in order to obtain final balanced silages with 40% of dry matter (DM) and 14% of crude protein (CP). Carrots are rich in sugars (39% DM) and PT are rich in starch (34% DM). Wheat bran and BG are protein sources (29 and 18% DM, respectively). So, two silages were performed: Silage PT: 30% PT + 35% BG + 20% WB + 15% of grass hay and; Silage C: 30% C + 35% BG + 20% WB + 15% of grass hay. The silages obtained were well preserved, with low pH (4.49 and 4.31 in PT and C silages, respectively), $\text{NH}_3\text{-N} < 10\%$ of total-N and soluble-N $< 50\%$ of total-N. The CP level, in both silages was 16% DM, the organic matter digestibility was higher in PT than in C silage (56 vs 42%). The concentration of metabolisable energy was estimated at 1,894 and 1,398 kcal/kg in PT and C silages, respectively. This work is funded by PRD2020 through the FEADER, project SubProMais (PDR2020-101-030988) and by National Funds through FCT – Foundation for Science and Technology, projects UIDB/05183/2020 (MED) and UIDP/CVT/00276/2020 (CIISA).