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Getting There



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Comparison of two methods of milk fatty acids composition to detect SARA (subacute rumen acidosis) in dairy goats

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Requirements of high producing ruminants can only be covered by diets of high nutritive value that can induce subacute rumen acidosis (SARA), but not for all animals at the same time and with the same intensity. A challenge is to find noninvasive biomarkers to detect animals suffering from SARA. Milk fatty acids composition is a good candidate as it is partly linked to rumen metabolism. The aim of this work was to compare two methods of measure of milk fatty acids composition: gas chromatography (GC) considered as a “standard”, but a time-consuming and expensive method and medium infrared analysis (MIR), a rapid and cheap method which can be applied on field. Eight rumen cannulated dairy goats adapted to a low concentrate diet (20 %) were abruptly switched to a high concentrate diet (50 %). Samples of milk were taken individually on the morning for 2 days before the change, the 4 days following the change and once weekly for 3 weeks. 91 fatty acids were detected by GC and 58 were estimated by MIR. Rumen fluid was sampled simultaneously before the morning feed (T0) and 1, 2, 4 and 6 hours after. Rumen samples were analysed for pH and volatile fatty acid (VFA) composition. A principal component analysis (PCA) was used to examine the relationships among milk fatty acids percentages measured by GC. The projection of the saturated fatty acids on the first two components showed an opposition between the short and medium fatty acids (SMFA) up to 13C and the long (L) chain fatty acids (LFA). An index was calculated as the ratio of SMFA/LFA. It was positively linked to the pH values and negatively to [VFA] ones. A similar ratio was calculated from the MIR estimation. Even if both ratios were correlated ($r = 0.60$, $n = 72$), the MIR ratio was higher (0.72 ± 0.06) than the GC ratio (0.50 ± 0.05) and was not correlated with pH and only poorly with VFA. MIR overestimated SMFA and underestimated LFA. In conclusion, GC is a useful tool to detect SARA in dairy goats from milk composition, but MIR is not a relevant method due to the inaccuracy in the prediction of FA.

The acclimatisation process in dairy cows with different milk yield potential - searching for reliable biomarkers

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In dairy cattle, heat thermal stress is a major concern environmental stress that limits animal growth, metabolism, and productivity. Facing global warming tendency, the current increased environmental temperatures, the joint selection for productivity and adaptability should be an objective for dairy farms. This study aimed to evaluate the acclimatisation process of cows with different milk yield potential during summer and winter periods. 13 Holstein-Friesian cows were chosen from a dairy farm located in Alentejo, Portugal, 7 of those with high milk yield potential (HMP) and 6 with low milk yield potential (LMP). All cows were evaluated during summer and winter periods in respiratory frequency (RF), sweating rate (SR) and rectal temperature (RT) as well as milk, blood and saliva parameters. RF, SR and RT values were significantly higher in summer (64.13 ± 12.78 mov./min., 76.89 ± 46.77 g/m²/h and 38.82 ± 0.68 °C) than in winter (36.13 ± 7.67 mov./min., 24.69 ± 7.30 g/m²/h and 38.06 ± 0.52 °C), without differences between the two groups (HMP and LMP). Haematocrit and triiodothyronine levels were significantly lower in summer (23.80 ± 9.39 % and 142.00 ± 13.77 ng/dL) than in winter (30.70 ± 5.00 % and 170.69 ± 17.78 ng/dL) for both groups. However, in summer, HMP cows presented triiodothyronine blood concentrations (133.33 ± 8.14 ng/dL) significantly lower than the LMP (152.40 ± 11.97 ng/dL). Concerning salivary parameters, only HMP cows showed higher HSP70 concentrations during summer, without major changes in cortisol. Regarding milk analysis, urea levels were the only milk compound significantly different between groups ($P < 0.05$): during summer the HMP group (293.62 ± 35.97 mg/kg) had milk urea levels higher than LMP (253.69 ± 33.81 mg/kg). These results showed that although HMP cows did not differed significantly in the first responses to heat (RF, SR and RT) from LMP cows, with the acclimatisation process, they showed higher physiological modifications, decreasing the metabolism, increasing HSP expression and changing milk composition. These results seem to indicate the potential use of HSP70 in saliva and urea in milk as potential biomarkers of heat stress.

