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Is spontaneous rumen acidosis related to feeding behaviour in goats?

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Subacute rumen acidosis (SARA) is generally associated with off-feed periods and is quite often detected in intensive ruminant production systems. It appears in an unpredictable manner in a herd and only some animals are affected at a given time. It is also quite difficult to study experimentally spontaneous acidosis due to the unpredictability of its occurrence. Nevertheless, it seems that there is a clear relationship between spontaneous rumen acidosis and feeding behavior in goats. This paper aims to better understand the driving force by using different measurements obtained simultaneously in cannulated dairy goats from our experimental unit fed with total mixed rations (TMR) containing different proportions of concentrate. Feeding behavior was characterized by different variates: proportion of dry matter eaten 90 min after the afternoon feeding which corresponded to two thirds of the daily feed allowance (P90), sorting behavior (ratio between cellwall intake and cellwall given) or chewing durations. Rumen pH was measured either with indwelling probes or after direct rumen fluid sampling. Bouts of spontaneous acidosis were generally of short duration (one day) with a clear rebound of several days of relatively high rumen pH (>6.5) before recovery of pre-acidosis values. The pH decrease was followed by a decrease in DMI, reaching a nadir around 2 d after the start of the episode. The pH decrease seemed to be due to the combination of a high intake and a high rate of intake. The intensity of the pH rebound was linked to different animal feeding strategies: a decrease in dry matter intake, a decrease in intake rate (estimated by P90), an increase in the ratio “chewing duration/intake duration” or an increase in sorting behavior. Goats presented different susceptibilities to SARA and different feeding strategies to face it. Some of them never suffered from acidosis and others presented more than one episode of acidosis. This between-animal variability could be due to their feeding behaviour and/or their rumen fermentation profile.

A future challenge is to better understand the between-animal variability and to find the best criteria to phenotype the animals for the risk of SARA when fed a high energy diet.

1.11

Lameness in cows affects daily feeding time but not rumination time as characterized from sensorsVivi M Thorup^(1,2), Birte L Nielsen⁽³⁾, Pierre-Emmanuel Robert^(1,2), Jakub Konka⁽⁴⁾, Sylvie Giger-Reverdin^(1,2), Nicolas C Friggens^(1,2)¹⁾ INRA, UMR791 Modélisation Systémique Appliquée aux Ruminants, Paris, France; ²⁾ AgroParisTech, UMR791 ModélisationSystémique Appliquée aux Ruminants, Paris, France; ³⁾ INRA, UR1197 Neurobiologie de l'Olfaction, Jouy-en-Josas, France; ⁴⁾

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This study is the first to characterize individual cow feeding and rumination behavior simultaneously by the use of automatic sensors to investigate how lameness affects feeding and rumination. Twenty mixed parity, lactating Holstein cows were loose-housed with free access to 24 cubicles and 12 automatic feed stations. Milking was performed 3 times per day and fresh feed delivered once daily. The cows were locomotion scored on four occasions over 22 days. From 18 cows during the same period, 14,977 feed station visits were recorded, and 8,627 rumination events were obtained from 3-dimensional, neck-mounted accelerometers (Silent Herdsman™). Eight cows were categorized as not lame and 10 cows as lame. Daily summaries of rumination (time and number of events) and feeding characteristics (intake, duration, feeding rate, and number of visits) were calculated. The effects of lameness and stage of lactation were tested in a mixed model using each of the rumination and feeding characteristics in turn as response variable. Furthermore, using rumination time as response variable, the effects of four feeding characteristics in turn and milk yield and lameness were tested in another mixed model. The first model revealed that lameness decreased daily feeding time and number of feed station visits, but increased feeding rate. Lame cows did not differ from non-lame cows with respect to milk yield, fresh matter intake, rumination time and number of rumination events. The second model showed that rumination time was best described by feeding rate, which decreased rumination time by a small, yet significant amount and by milk yield, which increased rumination time. Neither daily feeding time nor feed intake affected rumination time significantly. In conclusion, cows can be characterized by their feeding behavior, in particular feeding rate. Lame cows eat the same amount and ruminate as long as non-lame cows, but lame cows eat faster and make fewer visits to feed stations. Similar precision livestock farming systems have the potential to detect lameness automatically at an early stage, but more research is needed to quantify rumination efficiency to elucidate why an increased feeding rate causes cows to ruminate less.

