Lameness in cows affects daily feeding time but not rumination time as characterized from sensors

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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 HerdsmanTM). 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.

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