



## Promising parameters to foressee intake and feed efficiency at pasture - a meta-analysis approach

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**Promising parameters to foresee intake and feed efficiency at pasture – a meta-analysis approach**

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In a context of major advances in electronic/computer technologies, identifying key and routinely measurable criteria to detect animals that are likely to be more efficient in various feeding environments, is essential. For that purpose, a meta-analysis carried out on 110 publications (n) and gathering 905 experiments (nexp) involving feeding behaviour of grazing cattle and small ruminants, stressed the importance of the bite mass (BM, mg DM/bite/kg BW,  $0.11 < 1.79 \pm 1.27 < 7.41$ , n=582), as an essential unitary criterion for dry matter intake (DMI,  $0.25 < 2.79 \pm 1.06 < 8.01\%$  BW, n=238). The intra-experiment equation is  $DMI = 2.16 + 0.56 BM$  (RMSE=0.42, n=180, nexp=67). This meta-analysis also highlighted the importance of the incisive arcade (IA,  $2.22 < 5.23 \pm 2.11 < 8.60$  cm, n=112), which is measurable and related both to BW ( $IA = 0.91 BW^{0.346}$ , RMSE=0.27, n=20) and to BM ( $BM = 0.015 IA^{1.88}$ , RMSE=0.10, n=45, nexp=21). In addition, we have tested several predictive regressions of DMI and notably one based on BM combined with ruminating time (RU,  $0.52 < 6.06 \pm 2.15 < 9.57$  h/day, n=265). The equation is  $DMI = 1.395 + 0.652 BM + 0.097 RU$ , (RMSE=0.19, n=87, nexp=33). It must be emphasized that grazing time (GT,  $3.33 < 8.79 \pm 2.43 < 18.00$  h/day, n=142) has no influence in the latter equation; moreover, the association of BM and GT in order to predict DMI is less accurate than the association of BM and RU (RMSE of 0.28 vs 0.19, respectively). Otherwise, biting rate (BR,  $11.18 < 46.89 \pm 14.65 < 106.71$  bites/min, n=559), which is also an easily measurable parameter, presents no intra experiment relationship with DMI. As the BM can be estimated from the IA, measurable with a simple Vernier caliper, and that RU is easily measurable with various technologies such as acoustic recordings or accelerometers, these findings are very promising for assessing feed efficiency and individually.

## Session 45

## Theatre 8

**Validation of sensor on rumination and feeding behaviour of dairy heifers in two feedlot systems**R.D. Kliemann<sup>1</sup>, E.M. Nascimento<sup>1</sup>, S.R. Fernandes<sup>1</sup>, M.M. Campos<sup>2</sup>, T.R. Tomich<sup>2</sup>, L.G.R. Pereira<sup>2</sup> and A.F. Garcez Neto<sup>1</sup><sup>1</sup>Federal University of Paraná, Palotina-Paraná, 85.950-000, Brazil, <sup>2</sup>EMBRAPA, Dairy Cattle, Juiz de Fora-Minas Gerais, 36.038-330, Brazil; [americo.garcez@ufpr.br](mailto:americo.garcez@ufpr.br)

The aim of this study was to validate the sensor HEATIME® HR SYSTEM for rumination activity and evaluate the behaviour traits of dairy heifers in tie-stall and loose-housing systems. Eleven Gir heifers with 10 months of age and  $179 \pm 26$  kg of body weight were housed in both systems following a crossover design with two periods of five consecutive days for data recording. A total mixed ration was offered *ad libitum* in both systems. Before each period, the animals were adapted to the collars with the sensors and systems during seven days. Each day of evaluation regarded 8 hours of observation (08:00-12:00 and 14:00-18:00). The time spent in feeding, water intake, rumination in standing and lying, and idleness in standing and lying were assessed by visual evaluation, whereas the sensor monitored only the rumination activity. In the visual evaluation the activities were recorded every three minutes, and the data collected by the sensor were recorded in 2-h interval. For the sensor validation, the data from visual evaluation were adjusted to 2-h interval. The regression of rumination recorded by the sensor to the visual evaluation was significant only for loose-housing system ( $P=0.0002$ ), but the Pearson correlation between both measures was negative and low ( $r=-0.25$ ;  $P=0.0002$ ). The sensor overestimated the rumination by 27.3% in loose-housing (28 vs 22 min/2 h) and 38.5% in tie-stall (36 vs 26 min/2 h) and, therefore, the sensor was not validated. Regarding the systems comparison by visual evaluation, the time spent drinking, idleness in standing, rumination in standing and lying, and the total rumination time not differed between systems. However, the heifers in tie-stall spent more ( $P<0.05$ ) time in feeding (41 vs 29 min/2 h), idleness in lying (19 vs 15 min/2 h) and total idleness (22 vs 17 min/2 h), whereas those in loose-housing spent more ( $P<0.05$ ) time in other activities (50 vs 30 min/2 h). The sensor is not effective to record the rumination activity in Gir heifers. Loose-housing leads animals to greater activity not related to feeding compared to tie-stall.