

## The effect of grazing different pasture herbage masses on rumen pH in lactating dairy cows

E. Lewis<sup>1</sup>, F. Coughlan<sup>1</sup>, M. O'Donovan<sup>1</sup>, C. Wims<sup>1,2</sup>

<sup>1</sup>Teagasc, Moorepark Dairy Production Research Centre, Fermoy, Co. Cork, Ireland

<sup>2</sup>School of Agriculture, Food Science and Veterinary Medicine, UCD, Belfield, Dublin 4, Ireland

Email: [eva.lewis@teagasc.ie](mailto:eva.lewis@teagasc.ie)

**Introduction** The optimal use of grazed grass is identified as a key component of profitability in Irish dairy production systems (Shalloo *et al.*, 2004). Pre-grazing mass, also known as herbage mass, affects herbage quality and is one factor that can influence herbage intake (DMI) at grazing. O'Donovan and Delaby (2008) illustrated that swards with higher herbage mass reduced the feeding value of grass and thus reduced DMI. However, it is also suggested that grazing high quality pastures can lead to low rumen pH (Gibbs *et al.*, 2007). Rumen pH is cited as an important factor related to milk fat %, fibre degradation, nutrient absorption and overall cow health and welfare (Kleen *et al.*, 2003). Unfortunately, most of the information on rumen pH derives from work done with feeding high grain diets. Little information is available on the rumen pH of grazing dairy cows. Hence, the objective of the current study was to investigate the effects of three different herbage mass treatments on dairy cow rumen pH.

**Material and methods** A systems study with three separate farmlets was established at the Teagasc Moorepark research farm and 20 dairy cows were allocated to each treatment. The three treatments were i) low herbage mass [LM] (1200kg DM/ha), ii) medium herbage mass [MM] (1600kg DM/ha) and iii) high herbage mass [HM] (2200kg DM/ha). The treatments operated for the duration of the grazing season (Apr-Oct). Stocking rates (2.9cows/ha) and post-grazing sward heights (4cm) were the same for all three treatments. Grass was allocated on a daily basis and no supplementary feed was offered. All cows were milked twice daily. Six lactating rumen-cannulated dairy cows were arranged into two 3x3 latin squares and allocated to each treatment for one period each of two weeks. The study was carried out in the autumn part of the grazing season (Aug-Oct). Rumen pH was measured on days 10 and 11 of each period by means of an indwelling rumen pH probe. The Ionode IJ44 pH probe (Ionode Pty Ltd., Australia) was maintained immersed in one location at the bottom of the rumen by utilising a 1.5kg stainless steel weight (Flyco, Ireland). The data were logged at 60-second intervals over the 48-hour period using a Delta Ohm HD 2105.2 datalogger (Delta Ohm S.r.l., Italy) which was strapped to the cow's back using a MuPack backpack (Cassidy Covers, Ireland) and which was connected to the pH probe via a 2m cable passing through a modified cannula bung (Bar Diamond, Inc., USA). Average rumen pH across the day was calculated, as was the amount of time spent below certain pH thresholds (see table). The data were analysed as a 3x3 latin square using the mixed procedure (PROC MIXED) of SAS with herbage mass treatment, experimental period, square, cow and their interactions included in the model.

**Results** There was no difference in the average ruminal pH of dairy cows when grazing grass of three different herbage masses. In addition, no effect of treatment was found on the amount of time during which rumen pH was less than pH5.2, pH5.5 or pH5.8. In comparison to data derived from lactating dairy cows on total mixed ration-type diets, it appears that the rumen pH of grazing dairy cows could be lower and the time they spend below certain thresholds greater. For example, Nocek *et al.* (2002) found that lactating dairy cows fed a total mixed ration diet spent 120mins/d below pH5.5. However, the data presented here do agree with the low pH values suggested by Gibbs *et al.* (2007) for grazing dairy cows.

**Table 1** The effect of grazing different pasture herbage masses on rumen pH in lactating dairy cows

	LM	MM	HM	s.e.	Significance
Average rumen pH	5.90	6.09	5.98	0.057	NS
Time spent at rumen pH <5.2 (mins/d)	37	0	52	37	NS
Time spent at rumen pH <5.5 (mins/d)	187	43	216	46	NS
Time spent at rumen pH <5.8 (mins/d)	518	288	360	62	NS

**Conclusions** In the current study herbage mass did not have an effect on dairy cow rumen pH. Further work is needed to expand on the very limited data available for grazing dairy cows, and to explore the mechanisms by which the low pH values seen in grazing systems are attained without the concomitant and expected problems in terms of lameness and milk fat concentration. Such work could re-define the guidelines for rumen pH in the grazing dairy cow specifically.

**Acknowledgements** The authors gratefully acknowledge the Dairy Levy Research Fund for financial support, and the help and co-operation of John Paul Murphy and the Moorepark farm staff.

### References

- Gibbs, J., Laporte-Urbe, J., Trotter, C. and Noel, J. 2007. *Journal of Dairy Science* 90(Suppl. 1), 655 (Abstract).
- Kleen, J.L., Hooijer, G.A., Rehage, J. and Noordhuizen, J.P. 2003. *Journal of Veterinary Medicine Series* 50 (8), 406-414.
- Nocek, J.E., Allman, J.G. and Kautz, W.P. 2002. *Journal of Dairy Science* 85, 422-428.
- O'Donovan, M. and Delaby, L. 2008. *Livestock Production Science* 115, 158-168.
- Shalloo, L., Dillon, P., O'Loughlin, J., Rath, M. and Wallace, M. 2004. *Grass and Forage Science* 59, 157-168.