Grazing Behaviour of Dairy Cows When Grazing Forage Rape in a Pasture-Based Automatic Milking System

Ajantha Horadagoda
University of Sydney, Australia

Cameron E. F. Clark
University of Sydney, Australia

Kendra L. Kerrisk
University of Sydney, Australia

Mohammed R. Islam
University of Sydney, Australia

Ravneet Kaur
University of Sydney, Australia

See next page for additional authors

The 22nd International Grassland Congress (Revitalising Grasslands to Sustain Our Communities) took place in Sydney, Australia from September 15 through September 19, 2013.

Proceedings Editors: David L. Michalk, Geoffrey D. Millar, Warwick B. Badgery, and Kim M. Broadfoot

Publisher: New South Wales Department of Primary Industry, Kite St., Orange New South Wales, Australia

Presenter Information

Ajantha Horadagoda, Cameron E. F. Clark, Kendra L. Kerrisk, Mohammed R. Islam, Ravneet Kaur, and Sergio C. Garcia

Grazing behaviour of dairy cows when grazing forage rape in a pasture-based automatic milking system

Ajantha Horadagoda, Cameron E F Clark, Kendra L. Kerrisk, Mohammed R Islam, Ravneet Kaur and Sergio C Garcia

Faculty of Veterinary Science, The University of Sydney, Camden, NSW 2570, www.sydney.edu.au
Contact email: ajantha.horadagoda@sydney.edu.au

Keywords: Automatic milking system, forage rape, voluntary cow traffic, grazing behaviour.

Introduction

Forage rape (*Brassica napus* L.) is a high producing, high nutritive value forage that has been successfully introduced as a grazable forage in conventional, intensified pasture-based dairy systems to fill autumn-winter feed gaps (Garcia *et al*. 2008). However, incorporation of forage rape as a grazing forage option for automatic milking systems (AMS), in which cows enter and exit grazing areas voluntarily, has not been investigated yet. We conducted an observational study to investigate the suitability of using forage rape in AMS and gain understanding of cow's foraging behaviour when grazing this forage. The outcomes of this piece of work will help to determine management guidelines regarding incorporation of the crop into voluntary cow traffic systems.

Methods

Forage rape (cv. 'Goliath') was sown on the 24th February 2012. A herd of 180 lactating dairy cows was allocated to perennial ryegrass (*Lolium perenne*) based pasture (target intake= 6 kg DM/cow) in the night (9 pm to 9 am). No cows were able to enter the night paddock after 9 am but cows voluntarily trafficked out of this allocation until 3 pm. Cows remaining in the night paddock at 3 pm were 'fetched' back to the dairy. From 9 am to 3 pm, all cows exiting the dairy had access to an allocation of forage rape (target intake = 4 kg DM/cow). From 3 pm to 9 pm all cows exiting the dairy had access to ryegrass-based pasture (target intake = 2 kg DM/cow). From 3 to 5 pm cows exiting the forage rape paddock had also access to this pasture allocation. At 5 pm all cows remaining on the forage rape paddock were encouraged to move to the day pasture allocation. Cows were trained with forced traffic for 3 days prior to the study to ensure that all cows were familiar with forage rape. After training, cows had a 3 day adaptation period followed by a 3 day data collection period, both with 100% voluntary traffic. This was important as gut fill impacts on voluntary cow traffic and was also expected to impact on grazing behaviour in the forage rape crop.

Entry and exit times and foraging behaviour (grazing, ruminating or idling at 15 m intervals) were recorded at the forage rape paddock during 3 consecutive days between 9 am to 5 pm. In addition, average crop height was measured

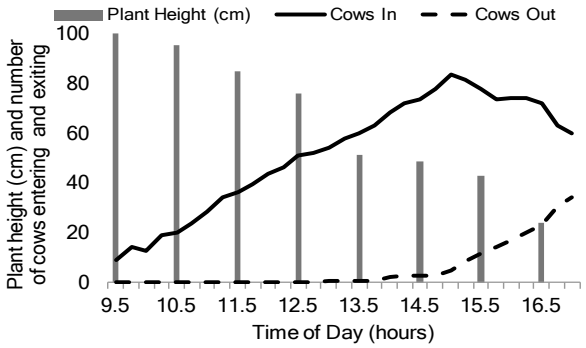

Figure 1. The correlation between average plant height (measured hourly) and the number of cows entering and exciting the paddock in each 15 minutes interval (r=0.76).

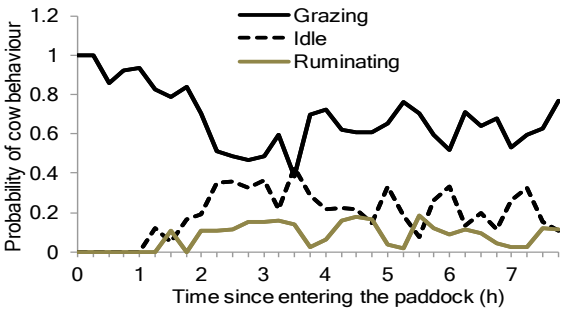

Figure 2. The behavioural probabilities of the 18 observed cows. Cow entry time is given in hours. 0 indicates the cow's entry time.

hourly. Also on an hourly basis, the first 3 cows that entered the paddock at each hour interval (from 1 to 6 h after paddock opened) were monitored for the rest of their stay in the paddock (*i.e*, 3 cows in h=1; 3+3=6 cows in h=2; *etc*.), so there were 18 cows being observed at h=6). Data were analysed using generalized linear mixed models (GLMM) procedure. The fixed model included time, and cow (nested within day) was random.

Results

Forage rape plants were over 90 cm high with a dry matter yield of over 5 t/ha at the commencement of the trial (Fig. 1). Inflow of cows into the rape paddock was linear during access time (Fig. 1), indicating a well-distributed cow

traffic. However, cows commenced to leave the paddock at similar linear rate at the time the new pasture allocation was opened (3 pm) and/or forage rape was grazed down to about 50% of the initial biomass availability (Fig. 1). The probability of finding cows grazing forage rape decreased from 1.0 immediately after entering the paddock (regardless of the time of the day the cow entered the paddock) to about 0.4 about 3 hours after entering the paddock (Fig. 2). At 5 pm, when all remaining cows were 'fetched' from the forage rape allocation to the day pasture allocation, crop height ranged between18-25 cm (Fig. 1). The number of cows ruminating was low (Fig. 2), which could be due to the low dry matter (10.5%) and neutral and acid detergent fibre (18% and 17%, respectively) contents in forage rape.

Conclusions

Regardless of the time cows entered the forage rape paddock, most of them grazed continuously for the first 1.5 to 2 hours, ruminate or idle for another 4 to 5 hours and recommenced grazing again. Cows started to exit the paddock at about 3 pm in order to access a fresh strip of pasture. This suggests that time at which pasture and/or forage crop allocations are open can be used as a management tool to encourage cow traffic in a pasture-based AMS. Further studies are required to improve management of forage rape as a grazing crop and to successfully incorporate it into a whole farm system without negatively impacting on cow traffic, milking frequency or forage utilisation.

Acknowledgements

This study was part of FutureDairy 3 project. We acknowledge funding from Dairy Australia, NSW Department of Primary Industries, The University of Sydney, and DeLaval.

References

Garcia SC. Fulkerson WJ, Brookes SU (2008). Dry matter production, nutritive value and efficiency of nutrient utilization of complementary forage rotation compared to a grass pasture system. *Grass and Forage Science* **63**, 284-300.