

Concentrate supplementation & milking frequency in automated milking with grazing

Cathriona Foley¹, John Shortall¹ and Bernadette O'Brien¹.

¹Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork, Ireland

Introduction

The successful integration of an automatic milking system (AMS) with grazing is reliant upon voluntary movement of cows around the farm system and achieving an even distribution of milking's over 24 hours. In a spring calving, pastured based system of farming the availability of grass is a key factor in a farmer's management decisions relating to grass budgeting and concentrate supplementation. During a period of grass deficit, for example in the latter end of the year, the dairy system needs to be sufficiently flexible to react and compensate for the shortage of grass with concentrate feed. The current study assesses the effects of concentrate supplementation and milking permission in late lactation on milk yield and cow traffic.

Materials and Methods

An AMS was located on a 25.2ha milking platform divided into sections; A, B and C. Cows moved voluntarily to and from the paddock, passing through the milking yard, between the sections. The grazing area was allocated based on a demand of 18kg grass dry matter (DM)/cow/day over 3 grazing sections in 24hrs. Sixty five cows were randomly allotted to four groups, balanced for breed, lactation, days in milk, previous milk yield and milking frequency. The experimental design was a 2x2 factorial with 2 concentrate levels (3kg, 0.84kg) and 2 milking permissions (3.2, 1.8 times per day). The groups consisted of high concentrate (3kg) with high milking permission (3.2) (HCHP) and low milking permission (1.8) (HCLP) and low concentrate (0.84kg) with high milking permission (3.2) (LCHP) and low milking permission (1.8) (LCLP). Dependent variables included milk production and cow traffic. The statistical model used was a repeated measures ANOVA in SAS with PROC MIXED and Tukey's post-hoc analysis.

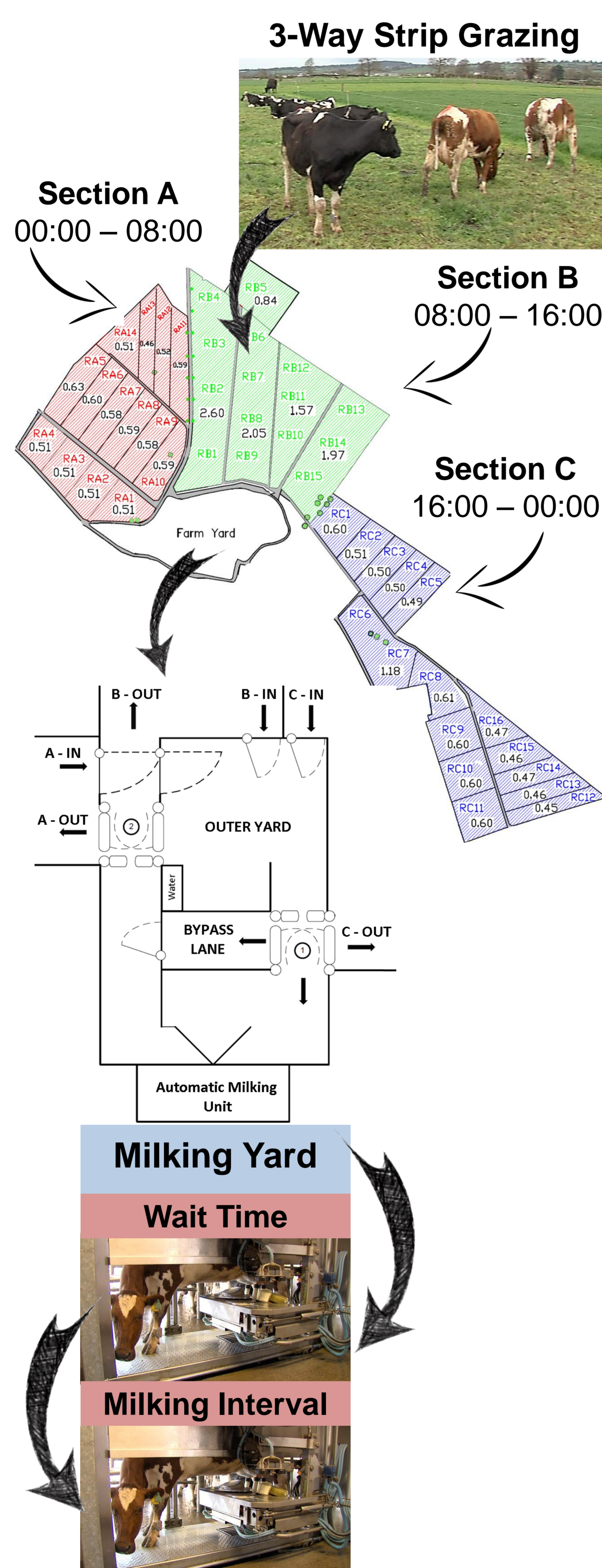


Figure 1: 3-way strip grazing system of grass management encourages voluntary cow movement from paddock to milking yard. Wait time was defined as the time spent in the milking yard. Milking interval is the time between two milkings for the same cow.

Results

Table 1. Effect of milking permission and concentrate supplementation on milk yield (MY), milking frequency (MF), milking interval (MI), milking duration (MD) and waiting time (WT) per day (d) and per visit (v). Least squares (L.S.) means and standard error (S.E.) are represented. The two treatments were milking permission (high - HP and low - LP) and concentrate supplementation (high - HC and low - LC).

| | Milking Permission/Day | | | | p value |
|-------------|------------------------|------|------------|------|---------|
| | 3.2 | | 1.8 | | |
| | HP | LP | HP | LP | |
| | L.S. Means | S.E. | L.S. Means | S.E. | |
| MY/d (kg) | 15.7 | 0.2 | 15.0 | 0.2 | 0.002 |
| MY/v (kg) | 8.1 | 0.2 | 11.1 | 0.2 | <0.0001 |
| MF/d | 1.9 | 0.0 | 1.3 | 0.0 | <0.0001 |
| MI/v (hrs) | 11.6 | 0.3 | 16.6 | 0.3 | <0.0001 |
| MD/d (mins) | 10.5 | 0.1 | 8.6 | 0.1 | <0.0001 |
| WT/d (hrs) | 2.1 | 0.1 | 1.6 | 0.1 | 0.003 |
| | Concentrate/Day (kg) | | | | p value |
| | 3 | | 0.84 | | |
| | HC | LC | HC | LC | |
| | L.S. Means | S.E. | L.S. Means | S.E. | |
| MY/d (kg) | 16.3 | 0.2 | 14.5 | 0.2 | <0.0001 |
| MY/v (kg) | 10.0 | 0.2 | 9.3 | 0.2 | 0.008 |
| MF/d | 1.7 | 0.0 | 1.6 | 0.0 | 0.022 |
| MI/v (hrs) | 13.6 | 0.3 | 14.6 | 0.3 | 0.012 |
| MD/d (mins) | 9.9 | 0.1 | 9.2 | 0.1 | 0.001 |
| WT/d (hrs) | 1.7 | 0.1 | 2.0 | 0.1 | 0.230 |

In Ireland the integration of AMS systems is relatively new and this is the first study in an Irish context to attempt to define best animal, grass and concentrate supplementation management practices during the latter stages of the grazing season. The results indicated that for the dependent variables of milk production (milk yield per visit and per day) and cow traffic (milking frequency, milking interval per visit, milking duration per day and waiting time per visit) the interaction between milking permission and concentrate was not significant. The main effects of milking permission and concentrate were significant for each dependent variable. Cows on the HP and LP had a milking frequency of 1.9 and 1.3 per day, respectively. Cows on HC and LC had an allowance of 3 and 0.84 kg per day, respectively. Decreasing milking permission had a positive impact on cow traffic as cows spent significantly less time waiting to be milked. This effect was not observed by increasing concentrate supplementation, instead an increase milk yield per visit and per day was achieved. Reducing milking frequency reduced time spent waiting to be milked which may benefit lower ranking cows providing them increased opportunities to access the AMS and also reduce time spent standing on hard surfaces enhancing cow welfare.

Conclusions

- Reducing milking frequency reduced time spent waiting to be milked
- Concentrate supplementation increased milk yield
- Concentrate did not increase milking frequency

Acknowledgements

The research has received funding from the European Union's Seventh Framework Program under the AUTOGRASSMILK project. Walsh Fellowship funding from Teagasc is also recognized. Finally, the authors thank Teagasc staff and placement students for facilitating and assisting with this study.