Bite mass of cattle related to sward structure of four temperate grasses in short-term foraging sessions

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Abstract

Understanding sward structural determinants of ruminant grazing behaviour requires knowledge of sward-animal interactions at the bite level. The effect of sward structure of four grasses on bite mass of grazing dairy cows was evaluated. Holstein cows were offered micro-swards (79 cm x 47 cm x 11.5 cm) of one of four grasses [reed canarygrass; (**RCG**; *Phalaris arundinacea* L.), quackgrass (**QG**; *Elytrigia repens*), orchardgrass (**ORG**; *Dactylis glomerata*, L.), and meadow fescue (**MF**; *Festuca pratensis* Hud.)] in short-term foraging sessions in each of two years (2006, 2007) using a Latin Square design. Seeding rates were 8,000 live seeds m^{-2} in 2006 and 500 live seeds m^{-2} in 2007. Cows were allowed to take 50 bites in each foraging session. Bite mass was calculated by dividing the adjusted micro-sward weight change by the number of bites. Sward height, bulk density, and tiller measurements were recorded pre- and postgrazing. Mean fresh and dry matter (DM) bite masses were not affected by grass species, but were affected by year, averaging 4.11 and 2.63 g fresh/bite and 1.31 and 0.50 g DM/bite for 2006 and 2007, respectively. Despite differences in sward structure within each year, bite mass in cattle grazing these four grasses was not affected.

Introduction

- **To ↓ input costs, greater emphasis has been placed on low-cost pasture systems that rely on complex species mixtures.**
- **Pasture DMI is affected by amount, acceptability and accessibility of herbage.**
- **Amount of pasture herbage grown and consumed is affected by botanical composition, morphology and structure of the sward.**
- **Pastures of a highly diverse botanical composition are perceived to be desirable in terms of:**
  - **Persistence**
  - **Yield stability**
  - **Productivity.**
- **These characteristics not yet tested on US pasture forage species.**

Objective

The objective of this experiment was to determine whether sward structure of four grasses (at the same days of regrowth) affected short-term bite mass for grazing dairy cows.

Materials and Methods

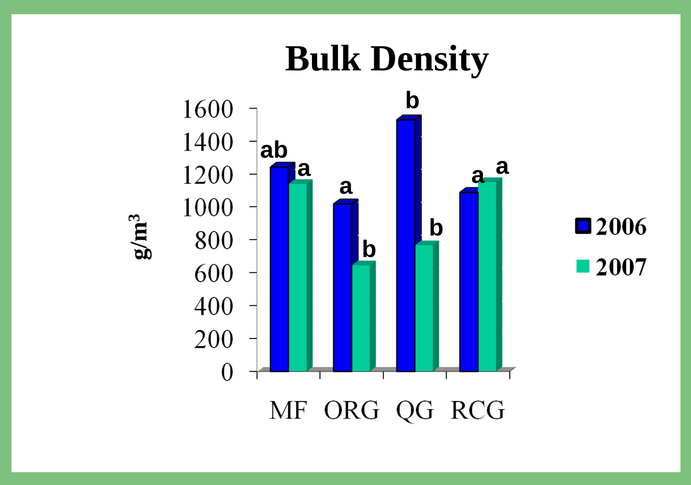
- Micro-sward boxes sown in two years (79 x 47 x 11.5 cm). (Orr et al., 2005a)
- Grasses:
  - Meadow fescue (**MF**, *Festuca pratensis* Hud.)
  - Orchardgrass (**ORG**, *Dactylis glomerata*, L.)
  - Quackgrass (**QG**, *Elytrigia repens*)
  - Reed canarygrass (**RCG**, *Phalaris arundinacea* L.).
- Seeding rate = 8,000 seeds/m^2 in 2006, 500 seeds/m^2 in 2007.
- Represented one “feeding station”.
- Defoliated every 21-d.

- Offered to four acclimated non-pregnant, non-lactating Holstein cows in July 2006 and June 2007.
- Latin Square design (4 days, 4 cows, 4 grass species).
- 50 ‘bites’ removed from each box.

- Boxes weighed before and after each test (0.1g), corrected for evapo-transpiration losses.
- Swards analyzed for:
  - Bite mass
  - DM
  - Sward height
  - Tiller length and density
  - Leaf width, length and area.

Results

Figure 1. Bulk density and sward height for four grasses.*



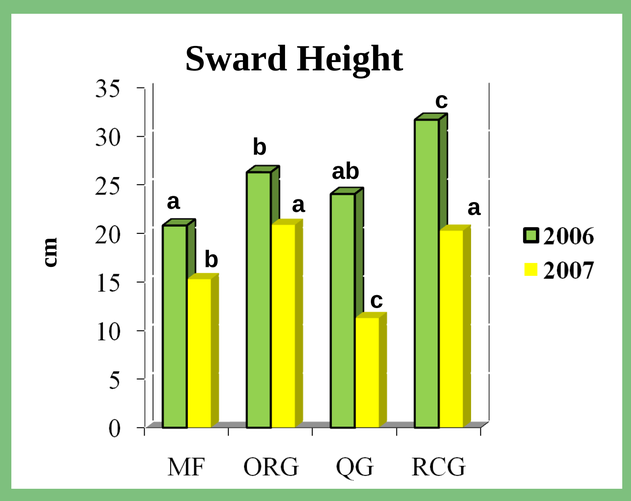
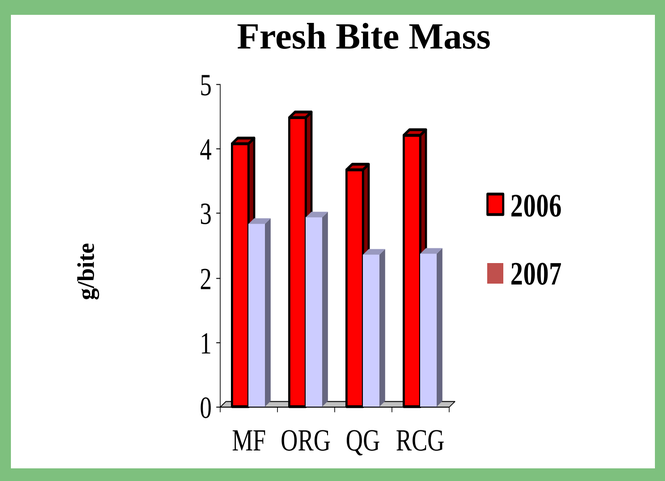


Figure 2. Fresh and DM bite mass for four grasses.*



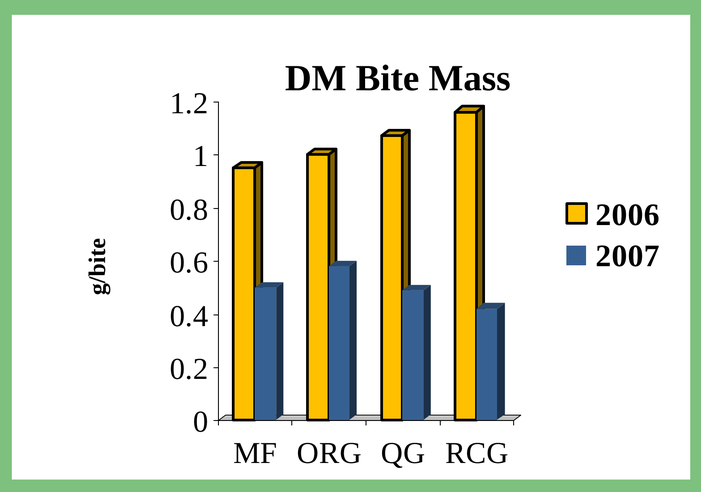
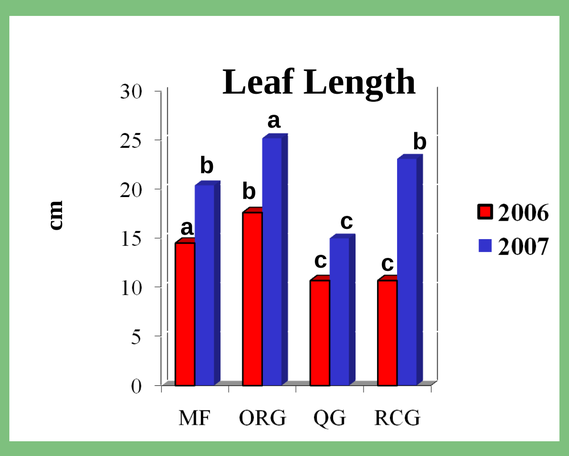


Figure 3. Leaf length and area for four grasses.*



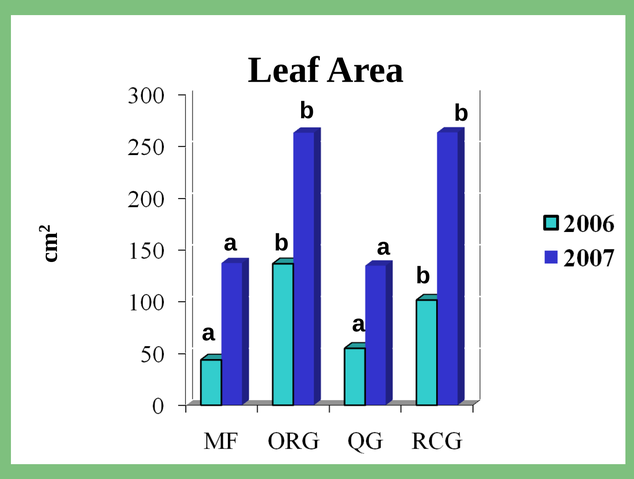
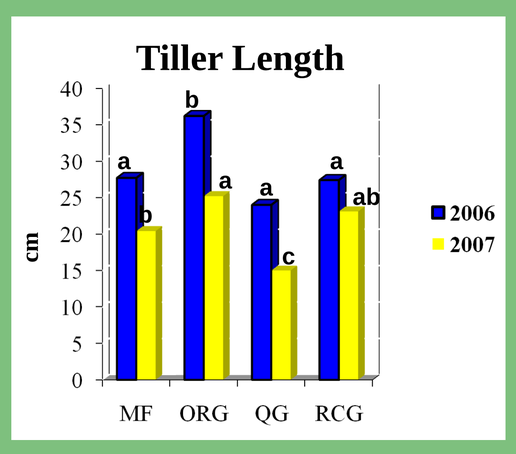
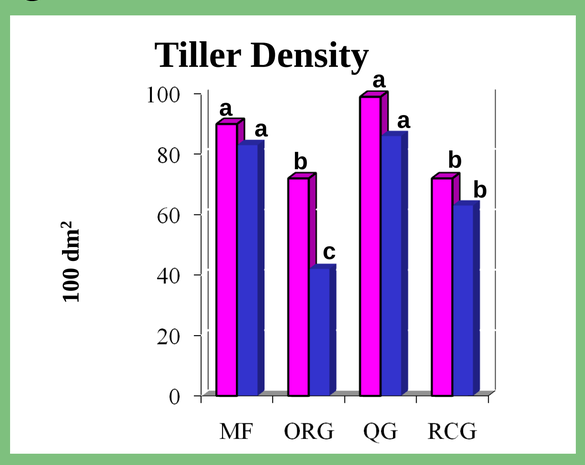
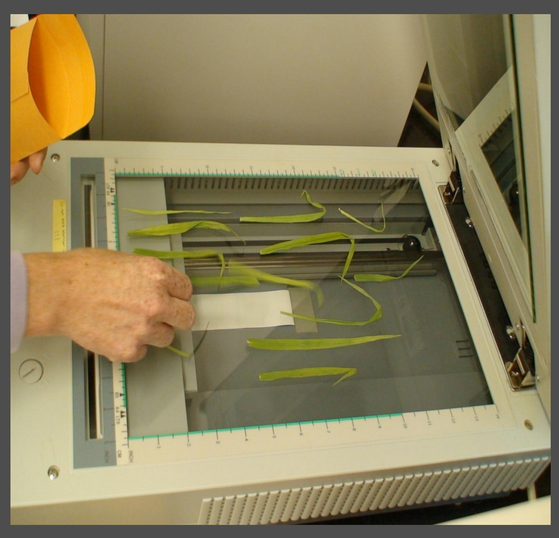


Figure 4. Tiller length and density for four grasses.*





*a,b,c Different letters identify significance ($P < 0.05$) among grasses within year. Significant ($P < 0.05$) year effect for all variables.



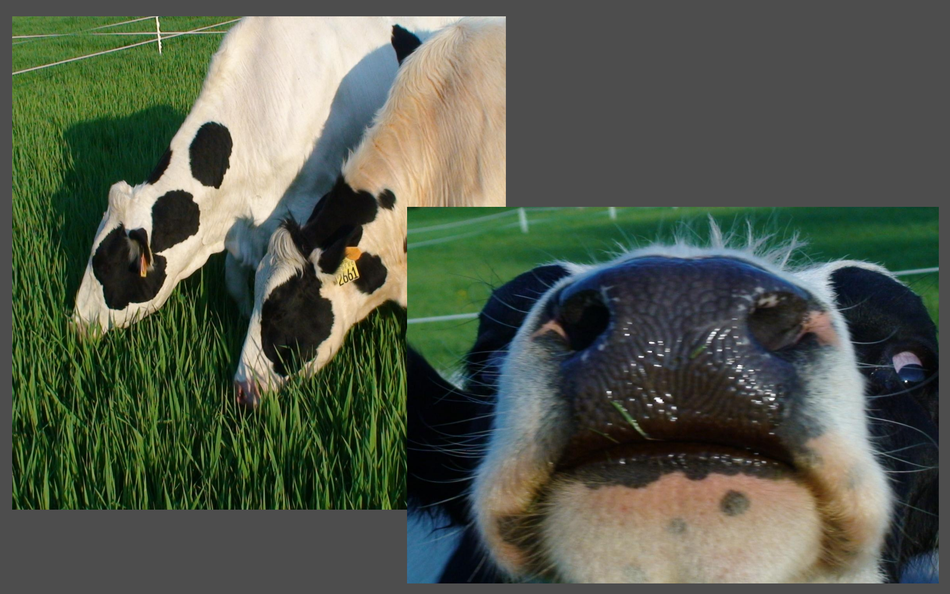
Conclusions

- Sward height was the main driver of bite mass.
- This was the first controlled results for bite mass using NE pasture species.
- Sward height may result in greater apparancy (exploitation) of upright species.
- However, grazing ruminants may prefer and search for underlying species, thereby changing sward dynamics.
- This may not necessarily mean ↓ intake as cows may ↑ grazing time due to ↑ search time.
- Sward structure may be more erect and vegetative than in the field, altering results.
- Greater spatial heterogeneity of species in the field may alter results.
- Results may vary in a mixed sward vs. a monoculture.

Implications

- Experiment provides an important first insight into intake characteristics of various grasses.
- Results should easily be extended to other forages using these methods.
- However, results may not be immediately applicable to sward conditions in the field.
- While results may not be identical to field conditions, results can be expected to provide useful comparisons between forages that are correlated with field results from the same forage.

Knowledge of differences in sward structure and how these differences may affect DMI and diet selection of grazing dairy cows would permit producers to more efficiently utilize existing or new pasture forages grasses, thereby improving pasture and animal productivity.



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