# Amazing Grazing: substantial fresh grass intake in restricted grazing systems with high stocking rates

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## Abstract

Due to larger herds on smaller grazing platforms, grazing has been decreasing in the Netherlands. It is a challenge for farmers to achieve high fresh grass intake in modern grazing systems with high livestock densities and high supplementation levels. Two grazing systems were studied during two consecutive years: strip grazing (SG) and compartmented continuous grazing (CCG), both with 7.5 cows ha$^{-1}$ on the grazing platform. Cows had daily access to the paddock for 6-8 h during daytime. During the night, supplementary feed was provided (5 - 12 kg DM cow$^{-1}$ day$^{-1}$; up to 8 kg DM day$^{-1}$ of supplement, only maize silage was fed, above 8 kg DM a mixture of maize and grass silage was fed). Comprehensive data was collected on sward and animal performance focusing on grass intake. Both 2016 and 2017 showed an average grass intake ranging from 5.5 - 6.5 kg DM cow$^{-1}$ day$^{-1}$. The systems showed no significant difference with respect to grass intake and milk production. Each year, on average 174% of the area of the CCG and 233% of the area of SG was mown for silage. The results of this experiment show that grass intake can be substantial (on average 1037 kg DM cow$^{-1}$ during the grazing season) in restricted grazing systems with high stocking rates.

**Keywords:** Amazing Grazing, grazing systems, grass intake, grass production, strip grazing, compartmented continuous grazing

## Introduction

Grazing is a low cost strategy (De Klein, 2001, McCall and Clark, 1999) and improves consumer perceptions of the dairy sector (Boogaard *et al.*, 2011). However, Dutch farmers are faced with new grazing challenges due to larger dairy herds on limited grazing areas. The Amazing Grazing project (Schils *et al.,* 2018) addresses the challenges that farmers face in developing grazing systems with high stocking rates. This study aims to evaluate fresh grass intake for two contrasting grazing systems with high stocking rates and high supplementation levels.

## Material and methods

In 2016 and 2017, a grazing experiment was carried out at the 'Dairy Campus' research farm, Leeuwarden, the Netherlands on a marine clay soil. Two grazing systems in two replicates were compared: strip grazing (SG) and compartmented continuous grazing (CCG). Each grazing system was undertaken with 15 cows on 2.0 ha, equating to 7.5 cows ha$^{-1}$. Each day, cows in the SG system had access to a fixed area of two strips, which was a combination of a fresh new strip and the strip from the day before (total area 1,290 m$^2$). Grass not needed for grazing was mown to increase sward/grass quality and utilisation for the subsequent grazing. The CCG system had six compartments of 0.33 ha each. Each day, cows were moved to a new compartment and rotated on five compartments. The (variable) sixth compartment was cut for silage to increase sward utilisation. If the grass growth decreased, less fresh grass and more supplementary feed was offered. Cows only had access to grazing during day time, between morning and evening milking. At night, the cows were fed maize silage and concentrates. Based on the high stocking rate it was expected that neither of the systems would produce enough grass for full time grazing during the whole season, so supplementation was provided. All cows received a flat rate of 5.5 kg concentrates cow$^{-1}$ day$^{-1}$. The amount of supplementary forage fed depended on the grass allowance and was fed after the evening milking; up to 8 kg DM day$^{-1}$ only maize silage was fed, above 8 kg DM a mixture of maize and grass silage was fed. All supplementary forage and concentrate intakes were recorded individually. Fresh grass intake was calculated as a result of energy intake. The energy needed for milk production, maintenance and growth was calculated. The difference between the energy requirements and energy supplied from supplementary forage and concentrates should be filled in by grass with an analysed energy value. Animal weights were recorded daily. Milk production per cow, amount of supplementary feed and gross grass production were measured for both systems. The effects of the grazing system on grassland and animal performance were statistically analysed with ANOVA (Genstat 18$^{th}$), using year and replicates as random factors.

## Results and discussion

Table 1 presents the sward and animal performance of the two grazing systems as an average of 2016 and 2017. Grazing system had no significant effect on fresh grass intake. The overall average grass intake was 6.1 kg DM cow$^{-1}$ day$^{-1}$, but varied from 9.1 kg DM cow$^{-1}$ day$^{-1}$in spring (up to the end of May) to 5.9 kg DM cow$^{-1}$ day$^{-1}$ in mid-summer (up to the end of July) to 3.7 kg DM cow$^{-1}$ day$^{-1}$ in autumn. In 2016, the grazing season started on 18 April and finished at the end of October, whereas in 2017 the grazing started on 3 April and finished on 6 September due to high levels of rainfall.

With a daily grass intake of 6 kg DM cow$^{-1}$ day$^{-1}$, one third of the total diet consisted of fresh grass which led to a total fresh grass intake of over 1 t DM during the season which is enough to be economically profitable (Van Den pol – Van Dasselaar *et al.,* 2010). Total gross DM production was significantly higher for SG compared to CCG mainly as a result of a higher mowing percentage combined with a higher mowing yield. The SG system had the highest grass production but requires more daily labour. The CCG system is relatively easy to manage from day to day but needs a good balance between grass growth and supplementary feeding. In both systems the grass allowance was fixed. Variations in grass growth were compensated by supplementary feed. Advisors and farmers are hesitant to adopt a system with fluctuating supplementary feeding as they expect a lower milk production. Although this experiment had no comparison with a fixed level of supplementary feed, milk production was not affected by the variation in grass supply and the accompanying variation in feed supplementation. Farmers with larger herds on smaller grazing platforms are indicating that grazing is difficult or even impossible. This experiment demonstrated that even with a stocking rate of 7.5 cows ha$^{-1}$ both systems resulted in a fresh grass intake of 5 - 7 kg DM cow$^{-1}$ day$^{-1}$. Total feed intake and animal performance were not significantly different in both grazing systems. These results are similar to Dale *et al.* (2008) who found no effect on milk production but a reduced DM yield with very short grazing rotations.

Table 1. Sward and animal performance of compartmented continuous grazing (CCG) and strip grazing (SG) (2016 and 2017).

| Parameter | CCG | SG | s.e.d.[1] | *P*-value |
|---|---|---|---|---|
| Daily grass intake (kg DM cow$^{-1}$) | 6.2 | 6.0 | 0.0645 | ns |
| Daily silage intake (kg DM cow$^{-1}$) | 7.4 | 7.2 | 0.1702 | ns |
| Grass intake per cow season (kg DM cow$^{-1}$) | 1,040 | 1,034 | 19.9 | ns |
| Fresh grass utilisation (kg DM ha$^{-1}$) | 7,801 | 7,758 | 149.2 | ns |
| Mown for silage (kg DM ha$^{-1}$) | 2,362$^{a}$ | 3,817$^{b}$ | 373.1 | 0.03 |
| Total gross production (kg DM ha$^{-1}$) | 10,163$^{a}$ | 11,575$^{b}$ | 512.5 | 0.05 |
| Mowing percentage (% of area) | 174 | 233 | 29.9 | ns |
| Fat and protein corrected milk (kg cow$^{-1}$ day$^{-1}$) | 28.0 | 27.4 | 0.232 | ns |
| Body weight (kg) | 607 | 602 | 8.63 | ns |

[1] s.e.d = standard error of the difference.

## Conclusions

At a stocking rate of 7.5 cows $ha^{-1}$, a daily average fresh grass intake of 6.1 kg DM $cow^{-1}$ $day^{-1}$ was achievable. The grazing system, CCG or SG, had no effect on fresh grass intake and animal performance. Gross grass production was higher for SG than for CCG.

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