

Simulation of the variation in grass growth, milk production and residency time in a 40 hectare farm composed of either 6 or 40 paddocks

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Take home message The variation in paddock residency time from 1-2 days to 9-12 days (due to the variation in paddock size) does not impact annual grass growth or farm milk production.

Introduction Management of pasture (such as fertilisation, cutting and grazing height), as well as weather, is an important factor influencing grass growth. The potential to increase grass growth and utilisation through advanced grassland management is receiving more attention in grass-based milk production systems. In Ireland, research has shown the importance of using small paddocks with a residency time of one day to maximise grass utilisation. This paper presents the impact of having either 6 (6.7 ha) or 40 (1 ha) paddocks on a 40 ha farm using the pasture based herd dynamic milk model (PBHDM) (Ruelle *et al.*, 2015) linked with the MoSt grass growth model (Ruelle *et al.*, 2018).

Materials & methods The PBHDM simulates individual cows and paddocks within a farm. The PBHDM allows the establishment of the impact of different management, farm characteristics and weather conditions on grass growth, milk production, silage making, and supplementation required. The model was used on a 40 ha farm, with either 100 cows and a moderate grazing intensity calculating the post grazing sward height (postGH) using the following equation: $4 - 0.1 \times \text{preGH} + 0.015 \times \text{preGH}^2$ (Ruelle *et al.*, 2015) or 150 cows and a high grazing intensity calculating the postGH using the following equation: $3.5 - 0.1 \times \text{preGH} + 0.015 \times \text{preGH}^2$ (Ruelle *et al.*, 2015) with either 6 or 40 paddocks.

Results & discussion Overall, variation in terms of milk production per cow grass intake, silage fed at grazing and, grass growth are similar between systems (Table 1). The amount of grass cut per ha is greater in the 6 paddocks situation (+1,125 kg DM/ha) when 150 cows are present but this difference is not present when only 100 animals are on farm. Pre-grazing height was similar for both system however the post grazing height was lower with 40 paddocks. This is due to the fact that the cattle change paddock only after milking (morning or evening) which leads to a tighter grazing when the paddocks are smaller.

Table 1 Impact of 6 or 40 paddocks in a 40 ha farm with either 150 or 100 cows in term of milk production, silage fed at grazing, grass intake, grass growth, silage produced, grass cut, and grazing management.

Number of cow	Grazing intensity	Number of paddock	Milk production (kg/cow)	Silage fed at grazing (kg DM/cow)	Grass intake (kg DM/cow)	Grass growth (kg/ha)	Silage produced (kg/ha)	Residence time (day)	Pre grazing height (cm)	Post grazing height (cm)
150	high	6	5,162	834	2,629	12,276	1,962	8.5	10.1	4.2
150	high	40	5,032	817	2,581	12,298	2,236	1.3	10.0	3.8
100	moderate	6	5,185	735	2,790	12,068	3,908	11.7	9.9	4.6
100	moderate	40	5,166	519	2,956	12,106	3,710	1.6	9.8	4.0

The model was able to recreate the variation in milk production of the cows due to the low variation in grazing height when the cows remained in the same paddock for several days. However, this variation did not impact overall cumulative milk production on the farm.

Conclusion Overall milk production and grass growth were similar from the 6-paddock farm and the 40-paddock farm.

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References

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