Using grassland resources for dairy production with low concentrate in humid Spain

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Abstract

Traditional low input systems of dairy production based on the use of farm resources are in regression against intensive production, increasing problems of slurry management and under utilization of grassland areas in Galicia.
Two groups of 20 Friesian cows, grazing a ryegrass-white clover sward, were studied during the whole lactation, receiving 1400 and 750 kg of concentrate, to quantify the potential of a high forage system. Milk yields of cows were 6400 and 5700 kg. cow $^{-1}$ with a similar grazing pressure 4.0 and 3.6 cow ha^{-1} in spring. Grazing with high herbage on offer to maximise grass intake per cow, gave a mean utilization of herbage of a 54 % with good parameters of sward quality during the lactation. After silage feeding in summer, autumn grazing in November and December increased milk yield.
The test of urea was done in each group with figures between 150-350 mg. kg^{-1} showing a balanced grazing ration. It can be concluded that there are no need to be intensive as the grazing system gave similar results but at lower inputs.

Keywords**:** milk yield, grazing pressure, pasture management, low concentrate, urea test.

Introduction

Grazed grass is the cheapest source of nutrients for dairy herds in the humid northwest area of Spain. Grassland is the main forage crop to farms, 11 % of the region (330.000 has), but purchased forages and concentrates are increasing mainly in the more intensive farms.
There is considerable scope to improve animal performance from diets based on grazed grass following recent improvements in the understanding of factors that influence both grass intake and digestion (Peyraud and González, 2000).
It is necessary to achieve a high level of herbage intake per animal by studying critical factors affecting intake, with maximum exploitation of the potential from grazed grass, that will improve the performance of dairy systems, reducing the quantity of concentrates required during the grazing period. When grazing is intensive, the intake is also regulated by non-nutritional factors, such as herbage availability (amount on offer, ease of browse). A leafy sward of good digestibility is essential for large voluntary intakes and high individual performances (Delagarde *et al*, 2001).
Under practical conditions low input dairy system need to be recover in the humid Galicia by increasing the use of farm resources for milk production. Extending the grazing season beyond the normal period, in late autumn and also early spring, with mild winter can be an option for farms, as the cost of grazed grass is lower than conserved forages or concentrates.
This work is part of an evaluation of parameters affecting the performance of the grazing cow during a whole lactation at two levels of concentrate.

Materials and methods

Two group of twenty spring calving (early March) Friesian cows were maintained in an integrated grazing and cutting system on pastures of perennial ryegrass (*Lolium perenne* L.)

and white clover (*Trifolium repens* L.). All cows received 6 kg of concentrates per day (180 g kg^{-1} CP) until the groups were formed in early April, group A received 6 kg and group B only 3 kg/cow during three grazing rotations until the end of July 2001. At summer period all cows were housed for 100 days and fed grass silage, around 12 kg. ha^{-1} DM per cow, and concentrate 4 and 2 kg for A and B respectively. The same concentrate was maintained at turnout to grass in the autumn, using the whole area from end October until mid December. The management of the cows was the same in both groups, grazing at 15-20 cm and leaving the paddock with 5 cm. Cows stay 2-3 days per paddock in spring. The grazing pressure, or number of cow grazing days, was used as a measure of the potential output from the pastures. Daily milk yields per cow were recorded throughout all lactation and weekly milk samples analysed for crude protein, butterfat and the milk urea test. Pasture production was measured with pre- and post-grazing samples, using five quadrates (0.5 m^2) per paddock. Pre-grazing samples were used to determine botanical composition, by hand separation, dry matter content and analysed for crude protein, fibre contents and digestible organic matter by NIRS.

Results and Discussion

Table 1. Milk yield, quality, and urea test of a dairy grazing system with two concentrate levels

	Spring grazing		Summer (silage)		Autumn grazing		
	A	B	A	B	A	B	s.e. of mean
Concentrate (kg cow^{-1})	6.1	3.0	4	2	4	2	
Milk yield (FCM) (kg cow^{-1})	28.7	25.5	16.1	13.5	16.2	15.9	1.11
Milk CP (g kg^{-1})	28.7	27.9	29.2	28.2	35.4	34.7	0.28
Milk urea (mg kg^{-1})	268	235	210	165	355	213	8.9
Grazing pressure (cow ha^{-1})	4	3.6	-	-	2.3	2.0	
Grass DM Intake (kg cow^{-1})	10.8	12			14.6	16.8	0.72

Table 1 shows the milk production, fat-corrected milk (FCM), per period in both groups with different rates of concentrate, 1400 and 750 kg cow^{-1} per year. The total milk yield was 6400 and 5700 kg cow^{-1} during the whole lactation. The evolution of milk urea content was satisfactory in the range of 160 and 350 mg. kg^{-1} Low values of milk crude protein (CP) were found in spring and summer, showing perhaps some energy deficit. Milk yield and CP increased in autumn when cows return to graze. The concentrate used represented only 220 and 130 g. kg^{-1} of the milk produced in the A and B treatments. Intensive farms in Galicia are using more than 350 g. kg^{-1} with milk yields of 7.000 kg per cow. Intensification of dairy production increased in the last 15 years in Galicia. At the same time, the proportion of milk produced from forages has declined from 60 % to a 20%. A lack of confidence in the value of grazed pastures is generating an inefficient use of forages (Barbeyto, 1999).
In this trial we try to maintain a high herbage allowance in order to achieve the maximum intake and milk yield per cow. A stocking density of 4.0 and 3.6 cows ha^{-1} were supported by both groups respectively during the spring and 2.3 and 2.0 during the autumn. The total herbage DM on offer was 12 t ha^{-1} with low clover content, the 73% of pasture was produced in 3 rotations in the spring, with 2.5-3.5 t. ha^{-1} per rotation.
The results of pasture quality seems to be good, 180 g. kg^{-1} CP, 250 g. kg^{-1} ADF and 780 g. kg^{-1} DMO in early spring and 115 g. kg^{-1} CP 330 g. kg^{-1} ADF and 760 g. kg^{-1} DMO at the end of spring, despite the high allowances. In autumn these figures were 203 g. kg^{-1} CP, 280 g. kg^{-1} ADF and 810 g. kg^{-1} DMO. The chemical results are not reflecting the real maturity of the sward when pasture accumulation was observed at the end of spring.

The final percentage of utilization was low, only the 54 %, one important factor for that result was to maintain cows for more than one day in the paddock. Increasing herbage allowance in early season also increases residual sward height. Extra cattle were used as followers for grazing these residues at the end of spring.
When high rates of concentrate are used during the grazing period in Galicia, under utilization of sward became a quite extent problem in farms. Topping or grazing with low-producing animals is the most usual method to maintain high quality in pastures, but it is high time consuming for farmers, while the home produced pasture is replace for concentrate to maintain milk yield.
The mild weather in autumn and winter in the coastal area of Galicia can be exploited by dairy farms, maintaining grazing until to the end of December and less concentrate may be required to cows at the end of lactation, as in previous experiments (González, 2003)
A good solution for farmers should be to adopt a more restricted grazing regime in spring and feed supplementary concentrates more efficiently, trying to increase grazing pressure at the same time to reduce concentrate feeding. A research challenge would be to develop a strategy for sward structures that ensures high intakes are maintained under the limitations of a low residual sward height. These data are helping in the development of a decision support system software in a UE project aiming to increase farmers confidence in grazing (Mayne *et al*, 2004) with more information in the website http://www.arini.co.uk/grazemore/

Conclusions

Dairy production could be based on farm resources; good milk yield results were obtained by grazing perennial ryegrass/white clover swards with low use of concentrates. This reduction of inputs is possible if good pasture management is observed at grazing.
The level of utilization of herbage by the animal was low due to a high herbage allowance and a low stock density imposed to increase forage intake per cow. The analytical parameters of pasture were good, without reflecting the importance of the characteristics of sward, like leaf content or stage of growth, when pasture was accumulated at the end of spring.
Increasing stock density in spring is recommended to improve cow performance with grazed grass. The mild climate in late autumn permitted to extend the grazing season and improve the milk output from the system.

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