Is it possible for large herds to graze while keeping a high milk yield level? The experience of two Belgian dairy farms

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Abstract

Grazing is more and more abandoned because of increasing size of herds and automation of herd management (e.g. automatic milking system – AMS). In this context, this study aims to evaluate milk production and composition of 2 large Belgian dairy herds equipped with AMS during winter and summer. These herds were followed over 2 years. At grazing, 30% of the offered feed was grass. Milk production in both herds was similar in summer and winter (30.2±7.14 vs 29.7±7.8 in Herd 1 and 26.9±0.8 vs 26.4±0.8 in Herd 2) while milk their composition differed. In conclusion, it is possible for grazing to be preserved even in large herds without noticeably impact on the herd performance.

Keywords: grazing, dairy cows, automatic milking system, milk performance, large herd management

Introduction

In Europe, the number of farms is decreasing while their size is generally increasing. In parallel, the working unit per exploitation has dropped, opening the way for use of new technologies allowing the farmer to manage larger herds with little labour, such as automatic milking systems (AMS). The use of AMS is considered difficult to combine with grazing. However, grazing is beneficial from several points of view, including economic aspects. The aim of this study is to assess the impact of grazing on milk performance in two Belgian dairy herds equipped with AMS and followed over 2 years.

Material and methods

Two dairy herds (H1 and H2) equipped with AMS (DeLaval for H1 and Lely for H2) were followed in 2013 and 2014. In H1, 102 Holstein dairy cows in 2013 and 124 in 2014 grazed on 35 ha pastures, divided into 10 plots from 1.4 to 7.7 ha. In H2, 122 Holstein cows in 2013 and 136 in 2014 grazed on 42 ha pastures, divided into 8 plots. Strip grazing allowed the cows to be provided with fresh grass every day.

The grazing period extended from 30 April to 31 October 2013 (184 d) in both herds and from 25 April to 31 October 2014 (192 d) for H1 and from 14 April to 15 November 2014 for H2 (216 d). The cows had access to pastures from 06:00 until 18:00 on average. Those cows that did not return voluntarily to the barn were fetched. Each received a total mixed ration (TMR) whose composition and amounts offered were recorded. Additional concentrate was given during milking in the AMS. In both herds, calvings took place throughout the year.

To estimate grass availability, grass height was measured on the pastures by using a Jenquip® rising plate meter when the cows came in and out of the parcel. The forage mass available for grazing was estimated by weighing a 10 meter-long strip of cut grass. Cut samples were analysed to determine dry matter (DM) available per ha and per cow. Production data and cow-traffic parameters were obtained from the robots while the data about milk composition were gathered from reports of milk deliveries.

Results and discussion

For H1, in 2013 the forage mass was estimated (mean ± standard deviation) at 1,322±564 kg DM ha^{-1} and in 2014 it was 1,660±299 kg DM ha^{-1}. For H2, in 2013 forage mass was 1,277±633 kg DM ha^{-1}, but the amount was greater in 2014 (1,476±418 kg DM ha^{-1}). The DM ingested by the cows was estimated at 22 kg; this amount was based on winter consumption. In both herds, grass intake was calculated by subtracting DM provided by the TMR and concentrate, from 22 kg. The proportions of feeds were calculated monthly and grass intake averaged 30%.

In H1, milk yield (MY) in summer 2013 was 30.2 kg cow^{-1} d^{-1} with 3.67 kg cow^{-1} d^{-1} concentrate consumed, and in 2014 it was 29.7 kg cow^{-1} d^{-1} produced with an average of 3.70 kg concentrate cow^{-1} d^{-1}. No significant difference was noted between summer and winter MY (Table 1). In H2, the MY was higher during the grazing period. The MY in 2014 was higher than in 2013, despite the increase in number of animals and the relative saturation of the robot. This yield increase was associated with an increase of nearly 2 kg concentrate in the AMS per 100 kg milk produced (0.60 kg cow^{-1} d^{-1}). In 2013, the numbers of milkings in summer and winter were similar, whereas in 2014, milkings decreased during summer. There were fewer refusals in the summers of both years.

In both herds, milk composition was modified during the grazing season (Table 2). Recorded values are in accordance with the literature (Prendiville *et al.*, 2009).

Table 1. Milk production (MY), days in milk (DIM), amount of concentrates given in the automatic milking system and number of milkings day^{-1} during the winter 2014 (December – March) and the summer 2014 (May – October) in herd 1 and during summers (May – October) and winters 2013-2014 (December – March) in herd 2.[1]

	Herd 1		Herd 2			
	2013-2014		2013		2014	
	Winter	Summer	Winter	Summer	Winter	Summer
Nbr cows	87±11	91±11	122±4	122±4	127±7	137±3
MY (kg cow^{-1}.d^{-1})	30.2±7.2	29.7±7.8	25.9±0.7***	26.3±1.7	26.8±0.9***	27.4±0.7
DIM (d)	240±164	221±142	201±4***	211±10	185±6***	201±10
Concentrates (kg cow^{-1}.d^{-1})	3.67±1.66	3.70±0.99	2.43±0.15***	2.69±0.21	3.00±0.11***	3.30±0.18
Milkings (kg cow^{-1}.d^{-1})	2.64±0.50	2.47±0.40***	2.59±0.01	2.60±0.02	2.63±0.08***	2.54±0.06
Refusals (kg cow^{-1}.d^{-1})			1.34±0.08***	1.06±0.31	1.30±0.19***	0.90±0.10

[1] Values are means ± standard error. Values statistically different are indicated by asterisks: * P<0.05; *** P<0.001.

Table 2. Milk composition: fat % (F%), protein % (P%), urea (mg l^{-1}) and somatic cell count (SCC) recorded during summer 2013-2014 (May – October) and compared with those recorded in winter 2013-2014 (from December – March) in Herd 1 and Herd 2.[1]

	2013		2014	
	Winter	Summer	Winter	Summer
Herd 1				
%F	4.07±0.05***	3.89±0.15	4.05±0.07***	3.92±0.10
%P	3.41±0.04***	3.36±0.14	3.40±0.04***	3.33±0.09
Urea (mg dl^{-1})	197±47^{NS}	197±40	252±28***	238±39
SCC (1000 ml^{-1})	223±50***	322±70	208±38 ***	224±45
Herd 2				
%F	4.30±0.07***	4.12±0.17	4.29±0.06***	4.08±0.14
%P	3.43±0.09	3.45±0.14	3.51±0.06***	3.46±0.06
Urea (mg dl^{-1})	220±28*	234±35	245±36***	225±44
SCC (1000 ml^{-1})	190±43***	241±64	154±137***	220±98

[1] Values are means ± standard error. Statistically significant values are indicated by asterisks: * P<0.05; *** P<0.001, NS not significant.

Incorporation of grass in the cows' feed could be increased based on measurements of grass forage mass available for grazing. Variations in milk composition could be minimized by a better adjustment of TMR composition.

Conclusions

These results demonstrate that, in farms equipped with an AMS, grazing is possible even in large herds with high milk production levels.

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References

Prendiville R., Pierce K.M. and Buckley F. (2009) An evaluation of production efficiencies among lactating Holstein-Friesian, Jersey, and Jersey × Holstein-Friesian cows at pasture. *Journal of Dairy Science* 92, 6176-6185.