

# Economic impact of grazing dairy cows on farms equipped with an automatic milking system

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## Abstract

Automatic milking Systems (AMS) have been practised for a number of years in Denmark, France and the Netherlands. During these years, combining automatic milking (AM) and pasture access for feeding has remained problematic. Grazing has, however, many benefits, both for farmers, animals, landscape, biodiversity, and for the overall image of dairy farming. In this study we compared the economic results of dairy farms with AMS (AMS farms) which practice grazing with those of AMS farms without grazing. The economic impact of grazing dairy cows on AMS farms was analysed using accounting data of commercial dairy farms in Denmark, France and the Netherlands. In the Netherlands grazing was economically beneficial but this effect declined with increasing farm size. In France, income tended to be higher on farms that practised grazing, and in Denmark no economic difference of farmer incomes were found. A complicating factor of the analysis was that the actual feed uptake during grazing was not recorded in the database in any of the three countries. A key recommendation from this study is that the level of grazing and intake from grazing as a proportion of the total diet is recorded in the future.

**Keywords:** automatic milking, grazing, economic performance

## Introduction

Automatic milking has been practised for a number of years in Denmark, the Netherlands and France. Grazing in combination with automatic milking (AM) appears to be problematic, in particular for farms with large herds (Oudshoorn and Spöndly, 2013). The actual economic returns were usually not the major driver for investing in AM (Oudshoorn *et al.*, 2013). However, the increasing pressure on farm net income associated with the removal of milk quotas and milk price volatility justifies critical analysis of the economic effects of grazing in AM systems.

Since the overall management of the farm is the dominating factor affecting net income on farm, either with or without grazing, single key performance indicators cannot explain the overall economic effect at farm level. Nevertheless, if an analysis of accountancy data should find a consistent economic advantage associated with grazing across a large number of farms, then strong conclusions can be drawn. The objective of this study was to conduct an economic appraisal of dairy farms deploying AM with and without integrated grazing, using on-farm accountancy data from farms in France, the Netherlands and Denmark.

## Materials and methods

The comparisons have been completed on a per-litre of milk produced, per-hectare of land farmed, and a per-farm basis. The accounting databases were different for the three countries involved and are specified for (1) Denmark, (2) France and (3) the Netherlands.

1. The Danish economic database, containing data from all dairy farms, was made available. However, this dataset did not indicate whether or not Danish farms grazed. Information on whether a farm grazed or not in the accountancy year 2012 was obtained by asking the milk quality assessor from the different regions to identify farms with grazing. Afterwards these farms and their advisers were

contacted by telephone for confirmation. Having identified 14 dairy farms with grazing, 67 parallel dairy farms without grazing were identified and used in the analysis. Economic parameters were computed using the dimensions MJ NEL (Net Energy Lactation) for feed intake and kg of ECM (energy corrected milk).

2. 37 French farms equipped with an automatic milking system (AMS) among 630 farms (in total) with available data were identified for 2011. All data for these farms are stored annually in a database named 'Diapason'. Within the sample of AMS farms, the economic results of the farms, according to the share of grazed grass in the cows' diet, were compared. Three consecutive years were used: 2010, 2011 and 2012. The farms were then ranked according to an increasing proportion of grazed grass to create three groups within the sample: In the first group (no grazing), the grazed grass represents less than 16% of the total DM intake (average: 8%). In the second group (intermediate grazing), the share of grazed grass represents between 16 and 30% of the total DM intake (average: 22%). In the third group (grazing), the grazed grass represents more than 30% of the total DM intake (average: 37%).
3. In the Netherlands, data from approximately 10% of all Dutch commercial dairy farms in 2011 were used to assess economics associated with grazing. In this dataset, 81% of the farms practised grazing (however, not known how much) and 17% used automated milking. The dataset contained financial data (revenues, costs, depreciation, etc.), technical data (land area, number of animals, soil type, milk yield, milk quality, etc.) and social data (successor, age, etc.).

## Results and discussion

In Denmark significant differences in production price per kg ECM, feed costs per kg ECM, yield in kg ECM, veterinary and medicine costs per cow and purchased feed costs per cow per year could be found in the Danish dataset (Table 1).

In France, practising grazing was associated with lower feeding costs, and with lower costs of inputs, both for animals and forage areas, and extra cost of 'buildings and equipment' (Table 2). The production cost before repaying the labour force was lower in the intermediate and grazing groups. In addition, some revenues of the dairy unit related to subsidies for grassland were higher for the grazing farms. This led to 'the more grazing, the higher profits', either per working unit or per 1000 l milk produced.

In The Netherlands, on average, grazing resulted in more efficient management and a higher gross operating profit (data from Hogeveen *et al.*, 2013). However, these positive results declined in relation to increasing farm size. In 2011 the transition point was, on average, a farm size of 85-90 dairy cows. If grazing was combined with automatic milking, much of the efficiency and financial advantage of grazing disappeared. In the dataset, the gross operating profit of farms using grazing was on average € 21,628

Table 1. Results of comparison between 14 automatic milking system (AMS) farms with grazing and 67 AMS farms without grazing in Denmark.<sup>1,2</sup>

	No grazing		Grazing		Grazing 2		Dif.
	mean	SD	mean	SD	mean	SD	
Milk costs, Euro cents per kg ECM	40.15	4.85	39.26	7.51	38.27	4.26	NS
Feed cost, Euro cents per kg ECM	21.73	3.31	21.80	5.94	20.46	3.31	NS
Yield, kg ECM per cow	9,238	834	9,321	655	9,282	699	NS
Vet. and Medicine cost, Euro cow <sup>-1</sup>	89	36	97	41	95	40	NS
Purchased feed cost, Euro cow <sup>-1</sup>	1,003	157	962	195	977	196	NS

<sup>1</sup> One outlier set of farm results from the grazing group was removed as the figures were considered unrealistically high for the feed and production prices; corrected values are in Grazing 2.

<sup>2</sup> ECM = energy corrected milk yield; SD = standard deviation; NS = not significant.

Table 2. Production costs of the three groups over the three years period in France.<sup>1</sup>

	No grazing	Intermediate grazing	Grazing <sup>2</sup>
Number of farm years	31	30	32
Cattle input costs (€ / 1000 l)	99	83	90
Crops input costs (€ / 1000 l)	31	28	27
Breeding costs (€ /1000 l)	46	39	46
Mechanization (€ /1000 l)	83	89	82*
Buildings and equipment (€ / 1000 l)	56	64	70
Land and capital cost (€ / 1000 l)	37	40	45
Labour cost if 1.5 SMIC (€ / 1000 l)	61	76	68
Dairy production per WU dairy (1000 l)	428	370	413
Production cost (€ / 1000 l)	431	439	448
Gross operating profit (€ / 1000 l)	289	274	278
Labour repayment (SMIC per WU dairy)	1.08	1.26	1.47
Farmer's profit (€ / 1000 l)	33	50	57

<sup>1</sup> WU = working unit; SMIC = minimum wage in France

<sup>2</sup> No statistical analysis of results.

higher per farm ( $P=0.001$ ). Automatic milking reduced this effect by € 16,151 ( $P=0.04$ ). So the positive effect of grazing was still present in situations of automatic milking, but was much smaller.

## Conclusion

In the Netherlands an economic benefit to grazing was found for AM farms, which declined with increasing farm size. In France, income tended to be higher on AM farms that practised grazing, and in Denmark no economic difference could be found. A complicating factor of the analyses of the existing accounts was that the actual amount of feed from grazing was not recorded in any of the countries.

## References

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