

## Compatibility of Automatic Milking Systems with animal welfare in organic dairy farming

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### Abstract

*Automatic milking systems (AMS) expand not only in conventional farming but also on organic dairy farms. As animal welfare is one of the most important aims of organic livestock it must not be impaired by introducing AMS into organic herds. In this study the pasture use, as an important element of species-appropriate husbandry of ruminants, on farms before and after the introduction of AMS was evaluated. The survey of 41 organic dairy farms using AMS in Germany and the Netherlands revealed that about half of the farms (54%) used pasture after the introduction of AMS. But almost one third (29%) of the farms that had used grazing before implementation of the AMS have ceased pasturing afterwards. This shows that AMS is not always compatible with pasture use. On organic dairy farms, where the introduction of an AMS would lead to cessation of pasture use, this should account for a decision against the purchase of this system.*

### Introduction and Aims

The distribution of automatic milking systems (AMS) on dairy farms has increased significantly worldwide since the last millennium. The number of farms that use an AMS was about 1,000 in the year 2000 and rose continuously to 10,000 in 2010 (Harms and Wendl, 2012). Also in Germany there is a trend towards AMS: While the sales figures for milking parlours and carousels have declined, those for AMS are showing a clear upward trend. For organic farms there has been increased interest in the use of this system, as organic dairy farms often have herd sizes between 50 and 150 cows, a size which is best suited for automatic milking systems. Automatic milking systems lead to less physical workload and to more flexible working hours compared with twice daily milking. This amounts to an interesting future perspective both for many aging farmers as well as for potential farm successors.

Main objectives of organic animal husbandry and consumers' expectations on organic livestock production are a high animal health and welfare status (Oekobarometer 2012). Since grazing is a distinct behaviour in ruminants, pasturing could be regarded as crucial for cattle welfare. The EU regulation for organic agriculture (CEC, 2007) recommends pasturing for ruminants if possible, but implementations in national law are different. E.g. grazing for cattle is obligatory for organic farms in the Netherlands but in Germany, farmers may provide a whole-year outyard for their herds.

The implementation of AMS does not only bring along changes in terms of the milking process, but also affects the entire housing system, management and feeding. AMS is

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often connected with a restriction of pasturing and indirectly the risk of lame cows may increase (von Keyserlingk et al., 2009; Hernandez-Mendo et al. 2007).

The aim of this study was to clarify whether the use of AMS is compatible with animal welfare in organic dairy farming, paying particular attention to impacts on pasture use.

### Materials and Methods

In an online survey, 41 organic dairy farmers with AMS have been asked for their feeding and pasture system before and after AMS implementation on their farms. Farms were spread over western Germany with a main area in southern Germany. Additionally two farms were located in the Netherlands.

### Results

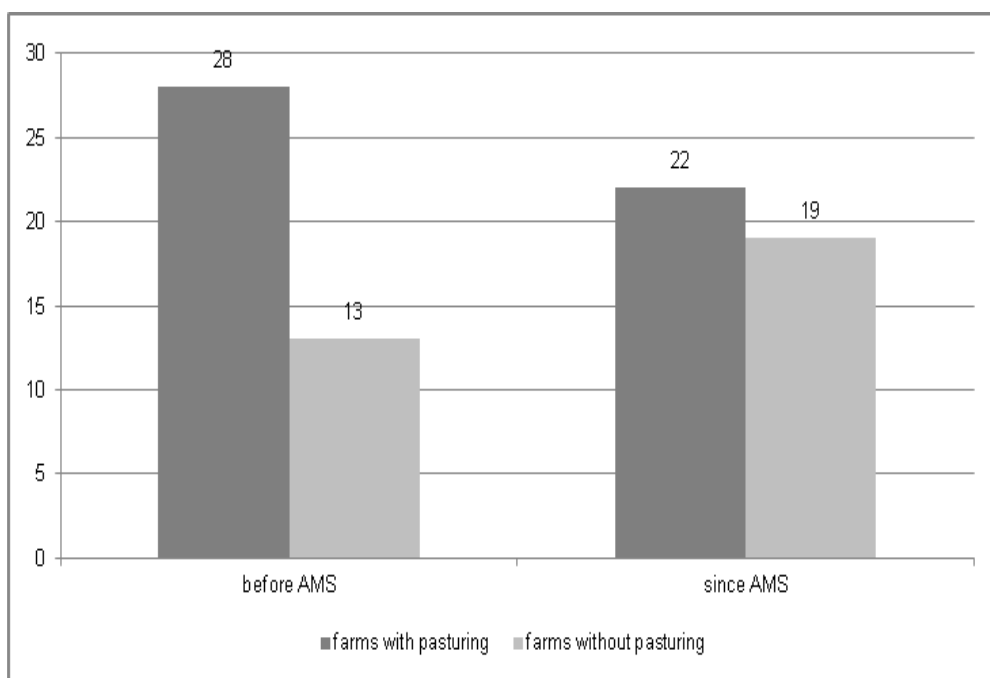
#### Herd data

Average herd size of the 41 farms was 75 with a range of 42 – 170 with an average milk yield of 6,638 ( $\pm$  1,066) kg per cow per year. Most of the farms (74%) have implemented an AMS with free cow traffic. Since

the introduction of the AMS, dairy herd sizes on some farms increased sharply. Four farms have doubled their herd size since the introduction of the AMS. Another four farms quadrupled the number of their cows. On average, the herds have grown by 37% from 55 ( $\pm 25$ ) before to 75 ( $\pm 26$ ) after AMS implementation.

#### Grazing and pasture before and since the introduction of the AMS

Before AMS introduction 28 out of the 41 dairy farms (68%) provided their cows access to pasture. 13 farms had a pure stable-feeding system. On 22 farms (54%) the cows had the possibility to graze since the use of the AMS while 19 farms (46%) fed their cows only in the stable. 11 of them performed no grazing also before AMS implementation. Eight companies had ceased the pasture use with the introduction of the AMS. This corresponds to 29% of the 28 companies that had pastured before the AMS. Two farms have started a pasture based feeding system with the implementation of AMS (see Figure 1).



**Figure 1: Number of farms with and without pasturing before and since the introduction of the AMS (n = 41)**

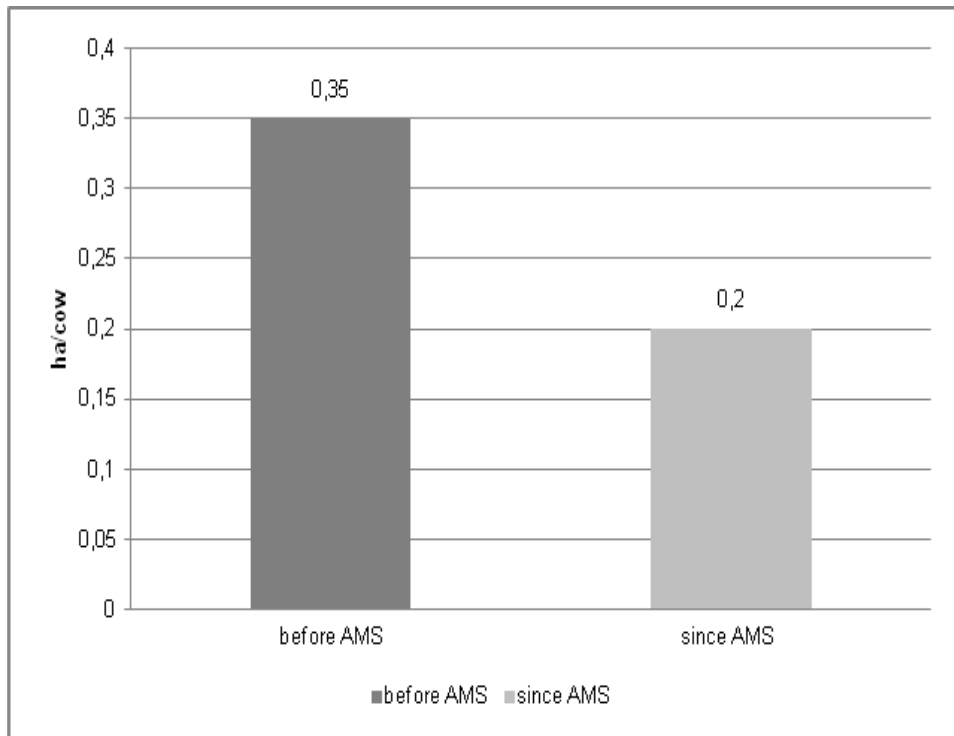
The AMS introduction led to a decline of the average pasture area from 0.35 to 0.2 ha per cow (with a range of 0.01 to 1 ha per cow after AMS implementation; see Figure 2).

#### Grazing time, pasture systems and distance between pasture and barn

The extent of the grazing time in herds that had access to pasture both before and since the introduction of the AMS has hardly changed.

An obvious change of grazing systems after AMS implementation was described by the farmers. The most common pasture system prior to the AMS was rotational grazing, while this grazing system was practiced only by 15% of the farms after the introduction of the AMS. In contrast, the number of farms that performed continuous grazing had increased from 25% prior to the AMS introduction to 65% afterwards.

On most farms, the pastures were in the immediate vicinity of the stable building: on 20 farms the distance between stable and pasture area was at least 25 m. The maximum distance between the rearmost side of the pasture and the stable amounted to an average of approximately 500 m. Among these farms, on three farms the cows had to walk up to 1,000 m from the AMS to the farthest edge of the pasture.



**Figure 2: Average total pasture area per cow on the surveyed farms with grazing before and after the introduction of the AMS (n = 20)**

Depending on the farm situation, namely location of the pastures in relation to the stable with the AMS, a permanent access from pasture to the milking robot was not always possible. However, a temporary separating of the cows from the AMS was only practiced on three of the surveyed farms. The cows on these farms were separated up to three, four and five hours from the AMS. On all other farms that are performing a grazing system, the cows had permanent access from the pasture to the robot.

#### Concentrate feeding

All farms fed concentrates in the AMS. On average, the farms fed 3.055 g of concentrates per cow per day. 51% of the surveyed farms stated that since the introduction of the AMS they have been fed more concentrates than before. Only 10% have been fed less concentrates.

#### Conclusions

The survey of 41 organic dairy farms with AMS showed that the herd size had partially grown significantly since the introduction of the AMS. The herd growth led to a significant decrease in the average grazing area per cow on the farms with pasture use. In addition, total area used as pasture decreased on the majority of the farms. Some farms had even completely ceased pasture use.

In summary, the impact of the AMS on animal welfare depends significantly on the housing conditions and the management of the farmers. In organic dairy farming, impairments of animal health and welfare by AMS have to be avoided. Especially the implementation of AMS should not be connected with ceasing grazing for cattle. Further research is needed on how to combine AMS with grazing.

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