

Does automatic milking influence farmers health and wellbeing?

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Summary

Purchasing an automatic milking system (AMS) signifies a huge change to a dairy farmer's operational management and social life. In relation to milking in particular, the focus shifts from manual aspects to include more management based tasks, and controlling and checking the installation. The introduction of an AMS may possibly reduce the physical workload on the farmer, but demands more from them on a mental level. The extent to which this occurs is however unknown. What we do know is that in a number of cases farmers stop using the automatic system and revert to traditional methods. The reasons for this move are not always clear. On the other hand there are also dairy farmers whose main motivation for investing in an AMS is the expected lower physical workload. Personality play possibly a role in these decisions. The objectives of this project are therefore to identify the:

- * Changes in physical and mental load resulting from the transition to automatic milking

- * Effects of these changes on the experienced health of the farmer

- * Influence on the personality of the farmer on experienced health.

Physical load is reduced as a result of automatic milking. This is a persistent effect. As physical health complaints can be reason to invest in automatic milking the comparison with farmers from group 4 is biased. General health complaints decreases after investing in an AMS. A drop in the number of farmers with health complaints is not seen among the group investing in a milking parlour. There is also a decrease in reported specific complaints related to hands/arms, back, neck/shoulder and legs/feet after the introduction of an AMS. The drop in the number of complaints among investors in a milking parlour is smaller or the number of complaints even rises, such as pain in the lower back.

The transition to an automatic milking system also reduces the mental load. Negative exceptions are the social contacts. Farmers with an AMS continually indicate that the system hinders their social contacts. No evident differences in personality between the various categories of farmers were noted. Learning from experiences from other farmers can be a effective way to avoid unrealistic expectations.

Farmers can nowadays still benefit from the experiences of the farmers that became disappointed in automatic milking.

1 Introduction

Purchasing an automatic milking system (AMS) means a huge change to a dairy farmer's operational management and social life. In relation to milking in particular, the focus shifts from manual aspects to include more management based tasks, and controlling and checking the installation. The introduction of an AMS may therefore possibly reduce the physical workload of the farmer, but demands more from them on a mental level. The extent to which this occurs and the possible effects on general health are however unknown. What we do know is that in a number of cases farmers stop using the AMS and revert to traditional milking methods. The reasons for this move are not always clear. On the other hand there are also dairy farmers whose main motivation for investing in an AMS is the expected lower physical workload. To gain insight in health related effects of automatic milking on dairy farmers the Dutch Ministry of Agriculture, Nature and Food Quality granted a research project between 2003 and 2006. The objectives of this project were to identify the:

- * Changes in physical and mental load resulting from the transition to automatic milking
- * Effects of these changes on the experienced health of the farmer
- * Influence on the personality of the farmer on experienced health.

2 Some relevant literature

The AMS was developed in The Netherlands in the first half of the eighties and commercially available since 1992. Between 2000 and 2003 an European 5th framework research project, "Implications of the introduction of automatic milking on dairy farms", focused on milk quality, animal health and welfare, grazing, milking technology and socio-economic aspects. The proceedings of two conferences on automatic milking in 2000 and 2003 organized within this project give an good overview of the state of the art at that moment (Hogeveen and Meijering, 2000; Meijering and Hogeveen, 2004).

Reduction of the amount of labour is mentioned as an important reason to invest in automatic milking. Compared to two times daily milking the AMS reduces amount of labour with 10% on average (Koning, 2004).

Data of effects on physical and mental health are scarce. Wauter and Mathijs (2004) report an improve of physical wellbeing among 55,1% of the included farmers.

Among the same group of farmers, 41,1% mentioned an improve of mental wellbeing. A vast majority of 86% of the included farmers did spend more time with their families and two third said that their general quality of life did improve after the introduction of automatic milking on their farm. However Wauter and Mathijs (2004) were not specific about for example which body parts did benefit most of the AMS and did not give a possible explanation for the improve.

From general physiological research it is known that several factors can increase mental stress. At least two of them are relevant for an AMS i.e. an increase in the available amount of information and a decrease in the (sense of) controllability of an

automated system (Cox-Woudstra, 2000). The question whether the personality of a farmer plays a role in the decision to invest in automatic milking instead of conventional milking or in the experiences mental of physical load has never been asked. It can be concluded from the literature review that further research on physical health and even more mental health is needed and that no data are available about the role of the personality of the farmers.

3 Material and methods

In total 60 farmers were included in the research, and equally divided in four groups:

- 1) Farmers with more than 2 years experience with automatic milking
- 2) Farmers who invested in automatic milking but changed back to conventional milking after some time
- 3) Farmers who recently invested in an AMS
- 4) Farmers who recently invested in a new milking parlour.

Farmers from group 3 and 4 were recruited with help of the suppliers of milking equipment (both parlour and AMS). Farmers from group 1 were recruited from a data based formed in earlier research. Farmers from group 2 were recruited using the 'snowball method': almost every farmer knows one or two others in that quitted automatic milking.

Questionnaires were used to collect data. For physical load the VBA questionnaire was used. VBA stands for 'Vragenlijst bewegingsapparaat' (Dutch Musculoskeletal Questionnaire) and is a well know and frequently used questionnaire developed by TNO (www.tno.nl). It contains three sections: physical characteristics of work, general health and physical health of specific body parts i.e. hands, arms, shoulders, neck, lower back, legs and feet. Results can be summarized in calculated work load scores.

For mental load the VBBA questionnaire was used. VBBA stands for 'Vragenlijst beleving en beoordeling van Arbeid' (Assessment and Experience of Work questionnaire) and is a well know and frequently use questionnaire developed by TNO (www.tno.nl). It contains four sections: mental characteristics of work, organization of work, working conditions and psycho-social effects of work.

For personality two questionnaires were used: a questionnaire developed by Lauwere *et al.* (2002) and a short version of the so called 'Big Five' containing 25 questions.

For general data concerning personal circumstances and farm characteristics an own questionnaire was developed.

Farmers in group 3 and 4 had two measuring moment: at least 3 month before and at least 6 months after installing the new milking equipment (either a milking parlour of an automatic milking system). Questionnaire for mental and physical health were used at both moments. Questionnaires for personality and general data were used only at the first measuring moment. Farmers of group 1 and 2 had only one measuring moment when all the questionnaires were used. Data processing was

done in a database program. Statistical calculations were performed using GenStat version 8.11.

Besides questionnaires on personality and general data, farmers in group 2 were interviewed using a set of open questions about reason and effects of the investment in an automatic milking system and the decision to quit this technology and re-invest in an milking parlour.

4 Results and discussion

4.1 General data

Table 1 gives an overview of some general data of farm size. Farm size in group 1 and 3 is similar, farms of group 4 seems a bit larger compared to group 1 and 3. Each moment of investing of farmers in group 2 leads to a larger farm. On average the farms from this group are the largest.

Table 1: General farm size data.

Category	Measuring moment	Dairy cows (#)	Grassland (ha)	Milk quota (kg)
Group 1	2	89	54	778.500
	1	109	57	704.400
Group 2	2	118	58	782.900
	3 (1)	122	63	818.000
Group 3	1	95	52	736.300
	2	88	50	772.800
Group 4	1	97	54	702.700
	2	99	56	735.100

(1) After re-investing in a milking parlour

Table 2 gives an overview of the AMS that were used by the farmers. The distribution over the different makes of AMS corresponds more or less with the market shares in The Netherlands at the moment of the research. Only group 2 did invest in the AMS of GM, Manus and Prolion. These makes represents a certain type of automatic milking system.

Table 2: Overview of the AMS used by different groups of farmers

Types	Group 1	Group 2	Group3	Total (%)
DeLaval - VMS	4	1	7	27
Lely - Astronaut	7	5	5	38
Fullwood - Merlin	2	1	1	9
Insentec - Galaxy	2		2	9
Gasgoine Melotte - Zenith		3		7
Manus		1		2
Prolion - AMS Liberty		4		9

An important aspect in the decision to invest in an AMS and the attitude towards automatic milking after investing is the expectations and realization of these expectations. Figure 1 gives a summary.

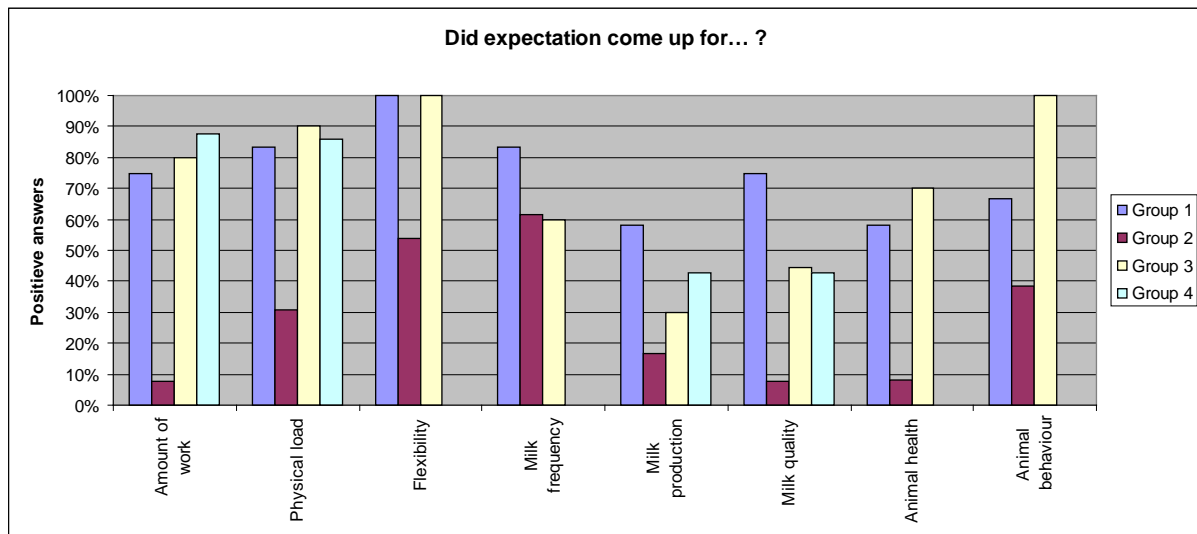


Figure 1: Overview of realization of expectation on different aspect of automatic milking.

For almost all aspects the number of farmers indicating that expectations were met is the lowest group 2. Farmers investing in an AMS are generally speaking to positive about the effect of a new milking installation on milk production and milk quality but apparently have realistic expectation about physical load and flexibility.

4.2 Physical health

The answers on the different questions of the questionnaire were reported separately but also combined to different scores for physical load. The score per group were calculated by averaging the individual farmers scores. That score is the proportion positive answers (indicating physical stress) of the total number of questions. Questions were combined to scores for hands, arms, neck and shoulders (HANS), lower back (LB) and feet and legs (FL)..

Table 3: Results of physical load scores of different groups.

	Moment	HANS (%)	LB (%)	FL (%)
Group 1	2	25 ^a	27 ^a	25
Group 3	1	53 ^b	54 ^b	39 ^a
	2	27 ^{a,c}	36 ^a	23 ^b
Group 4	1	52 ^c	50 ^b	53 ^a
	2	46 ^c	43 ^a	40 ^c

Different letters per column indicates a significant difference ($p < 0,05$) for the tested combinations.

Table 3 shoes that physical load is decreasing after introduction of a new milking system. The decrease for automatic milking is however bigger compared to

conventional milking systems and concerns all three scores. This decrease seems to be persistence as group 1 scores at comparative level. Lower physical load leads plausibly to less complaints. Specific health complaint are presented in figure 2. There is a clear reduction of complaints after installing an AMS in group 3. A smaller reduction can be seen among farmers in group 4 for hand and arms. Probably caused by lighter milking equipment. Due to the fact that physical complaints can be a reason to invest in an AMS a comparison between group 3 and 4 is biased.

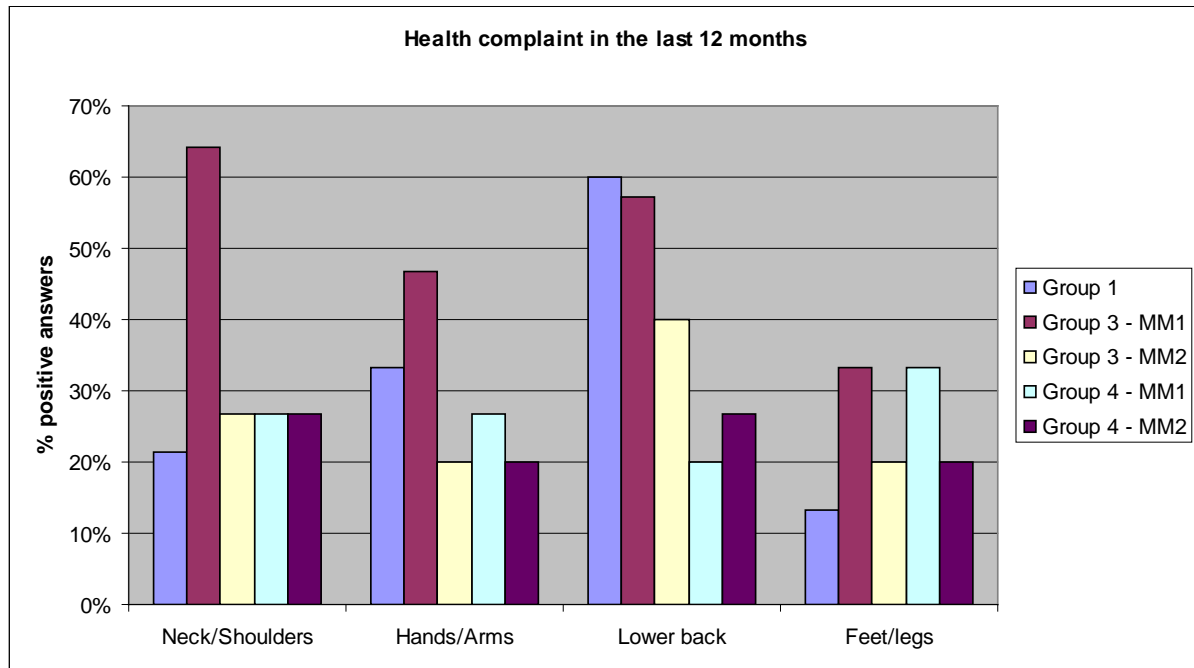


Figure 2: Specific health complaints in the last 12 months for each group and measuring moment.

4.3 Mental health

Results of the questionnaire are combined to 17 scales indicating different aspects of mental health. Results range from 0-30, lows scores means less problems on this scale.

Table 4: Summary of results of mental health questionnaire Only the scales that gave significant differences between the groups are presented

Scale	Group 1	Group 3		Group 4	
		1	2	1	2
Work pace and workload	12,7 ^a	15,2 ^b	14,0 ^{a,d}	16,6 ^{b,c}	14,4 ^d
Emotional burden	4,9	7,6	6,4 ^a	10,0	10,7 ^b
Learning possibilities	10,5	12,0 ^a	9,5 ^b	10,9	12,3
Social life	16,2 ^a	19,3 ^b	17,6 ^{a,b}	13,6 ^c	12,0 ^c
Expectations of the future	7,7	7,7	5,7 ^a	8,3	9,7 ^b
Working conditions	9,1 ^a	12,2 ^b	9,0 ^a	12,8 ^b	13,2 ^b
Looking for other work	3,3	2,0 ^a	3,3 ^b	1,7 ^a	3,0 ^b
Time for recovery	6,0 ^a	8,7 ^b	7,7 ^a	7,6 ^{b,c}	8,7 ^{a,c}

Sleep	3,5 ^a	6,9 ^b	6,3 ^b	6,3 ^b	5,0 ^b
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Different letters within the lines indicated a significant difference ($p < 0,05$).

Table 4 shows a positive effect on working pace and workload for both investing in automatic milking and conventional milking equipment probably caused by a better match of equipment capacity and farm size. Experienced emotional burden decreased for farmers investing in an AMS and slightly increased for those investing in a new milking parlour. Automatic milking systems seem to hinder social contact. Farmers from group 1 and 3 have lower scores than farmers from group 4. On the contrary, farmers with an AMS score better on the scale working conditions with questions about flexibility of work. The score on sleep is for both group 3 and 4 higher than group 1. Apparently an investment, whether in automatic or conventional milking equipment, costs night's rest but only temporarily.

In general the results of mental health are less unambiguous as for physical health but it can be stated the mental health is improved by introduction of automatic milking with a critical point for the social life of dairy farmers with an AMS.

4.4 Personality

The results of the two personality tests give hardly any reason to believe that personality plays an important role in decisions concerning investments in (automatic) milking systems or in the experienced physical and mental health. Only farmers in group 3 scored significantly higher ($p < 0,05$) on the openness scale compared to farmers of group 4. Farmers of group 2 scored significantly higher ($p < 0,05$) on the conscientiousness scale compared to all the other groups. The characteristics of conscientiousness are disciplined, hard working and ambitious with pitfalls that can be characterized as arrogant, compulsive and petty. Arguing that these negative aspects of the personality may lead to an increase of mental load and/or a distorted relationship with the supplier of the automatic milking system gives a hypothetical explanation of the disappointing automatic milking experience.

4.5 Results from interviews of farmers from group 2

Three kinds of reasons were mentioned for quitting automatic milking: AMS related reasons, cow behavior related reasons and farmer related reasons. A disappointing low decrease of workload and increase of flexibility combined with poor technical performance, decreasing production levels, a persistent high level of cows to be fetched and too high expectations can be considered to be the most important reasons for farmers of this group to quit automatic milking and re-invest in conventional milking technique.

5 Conclusions and recommendations

- * The physical stress is decreased after introduction of an automatic milking system. This is a persistent effect. As physical health complaints can be reason to invest in automatic milking the comparison with farmers from group 4 is biased.
- * In general mental stress is decreased after introduction of an AMS. Only exception is the reported quality of the 'social life' of farmers with an AMS.
- * No clear personality differences between groups of farmers have been found
- * Learning from experiences from other farmers can be a effective way to avoid unrealistic expectations
- * Farmers can nowadays still benefit from the experiences of the farmers that became disappointed in automatic milking.

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