Animal welfare aspects of automatic milking systems: Do animals with long intervals between milkings and/or incomplete milkings suffer stress?

Simone Helmreich[1], Rudolf Hauser[1], Lorenz Gygax[1], Beat Wechsler[1]
[1]Centre for Proper Housing of Ruminants and Pigs, Federal Veterinary Office, Research Station Agroscope Reckenholz-Tänikon ART, CH-8356 Ettenhausen

Key words
Automatic milking system, dairy cows, stress, melatonin, night-time milking, milking frequency

Aim of the study
The project aimed at assessing the ability of individual cows to adapt to the daily routine of automatic milking barns and at showing how behavioral parameters are related to physiological measures of welfare. Furthermore, the study should provide significant information for farmers to improve management aspects on farms with AMS.

Material and methods
The study was conducted on 8 commercial farms in Switzerland, where data of a total of 415 cows (including 126 focus cows for saliva data) was collected. The general activity (local position measurement system), the lying behavior (data loggers) and the cow behavior in the milking stall (video recordings) was observed for behavioral considerations. For physiological analyses, the eye temperature during the milking (thermography) was recorded, concentrations of cortisol, melatonin and IgA in saliva samples were analyzed (EIA, ELISA, RIA) and milk contents (somatic cell count, fat, protein, lactose, urea) were measured.

Results and significance
Each cow copes differently with circumstances like restricted access to barn areas, longer queuing times in the waiting area or attachment failures of the AMS. Prior to the start of the project, it was hypothesized that cows with a high number of long intervals between milkings (≥ 14 hours) together with a high percentage of night-time milkings are less adapted to the diurnal routine in the automatic milking barn. Comparing the better and the less well adapted focus cows no statistically firm difference in lying time could be detected ($F_{1,101}=0.76$, $p=0.39$). The nightly lying time tended to decrease ($F_{1,101}=3.04$, $p=0.08$) with a rising number of night-time milkings. Night-time lying duration did not covary with nocturnal melatonin concentrations ($F_{1,101}=0.72$, $p=0.40$), but cows with a high number of night-time milkings tended to have lower nocturnal melatonin concentrations ($F_{1,101}=3.16$, $p=0.08$). During an observation time of 48 hours, cows with a high milking frequency spent per visit less time in the waiting area ($F_{1,209}=13.22$, $p<0.001$). This result supports the hypothesis that cows with long intervals between milkings have longer waiting times in front of the AMS. The study shows that most cows can cope well with an AMS. However, some individuals are characterized by long intervals between milkings. Farmers should give special attendance to these cows.

Publications, posters and presentations
Helmreich, S.; Wechsler, B.; Jungbluth, T.; Hauser, R. (2009) Validation of a novel data logger for recording lying behavior of dairy cows and its application on robotic milking farms. In Proceedings of the 43th Congress of the International Society for Applied Ethology (ISAE), p. 47, Cairns, Australia.

Helmreich, S.; Gygax, L.; Wechsler, B.; Hauser, R. (2010) Auswirkung des automatischen Melksystems auf das Liegeverhalten von Milchkühen. In Tagungsband der 24. IGN-Tagung, S. 87–89, Tänikon, Schweiz.

Helmreich, S.; Gygax, L.; Wechsler, B.; Hauser, R. (2010) Influence of night-time milking and lying on nocturnal salivary melatonin concentration of dairy cows on automatic milking farms. In Proceedings of the 44th Congress of the International Society for Applied Ethology (ISAE), p. 9, Uppsala, Sweden.

Project *2.06.02*

Project duration *September 2006 – September 2010*