



## Optimization of Stall Dimensions in the Milking Parlour

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### Key words

dairy cow, behaviour, milk ejection, milking parlour, stall dimensions

### Aim of the study

Owing to the breeding objective of higher yields, dairy cows as a whole have been growing bigger over the last few years. This size increase has not been accompanied by an adjustment of milking-stall dimensions, however. It might therefore be expected that cows do not have enough space in milking parlours. Consequently, the aim of this project was to analyse the effect on dairy cows of various stall dimensions in milking parlours, based on a farm survey (Experiment 1) and experimental investigations (Experiment 2).

### Material and methods

#### Experiment 1:

The farm survey recorded the body mass of cows and the dimensions of milking parlours on 15 dairy farms. From these, we calculated a ratio between cow and parlour size for each individual cow. Tandem, herringbone and side-by-side milking parlours were studied. In addition, the behaviour of ten focus animals was observed during one milking period.

#### Experiment 2:

The experiments took place in an experimental milking parlour, to enable a more precise analysis of the influence of available space on the animal during the milking process. In the herringbone and side-by-side parlours, four dimensions apiece were tested: First, extreme variants with considerably larger and smaller dimensions than are standard in practice, then two control variants with dimensions close to standard. A crossed experimental design was used to investigate the behaviour and milk yield of 30 cows on 11 days in each case.

### Results and significance

#### Experiment 1:

Based on the calculated relative available space of the milking stalls, the milking stalls on the commercial farms studied were for the most part large enough for the milked cows. Overall, farms with a side-by-side milking parlour had smaller milking stalls than those with a herringbone or tandem milking parlour. As the relative available space increased, rumination behaviour tended to occur more frequently during milking.

#### Experiment 2:

In experimental conditions, increased stall dimensions had a positive influence on behaviour and on the physiological characteristics of milk ejection. Cows in their first lactation had the strongest reactions to more available space. They were significantly calmer during milking, and produced higher milk yields. Although an habituation effect was demonstrated with regard to entry in the milking parlours with the extremely small dimensions, even after 11 days the cows still took significantly longer to enter these parlours than the very generously sized ones. The results very clearly demonstrate the importance of available space for cows in milking parlours. Larger dimensions in milking parlours optimise the milking process. Because of the interaction between human and animal during milking, however, larger dimensions in milking parlours must also be evaluated from the ergonomic perspective, and in particular from the viewpoint of the occupational safety of the milking staff.

## **Publications, posters and presentations**

- Gómez, Y.; Hoop, D.; Gyga, L.; Zähler, M.; Savary, P.; Hillmann, E. (2017) Computer-based approach to measure body dimensions of dairy cows reaches higher precision than manual measuring with a tape. Computers and Electronics in Agriculture (in prep.).
- Gómez, Y.; Cockburn, M.; Hankele, A.-K.; Gyga, L.; Zähler, M.; Savary, P.; Hillmann, E. (2017) Effects of small milking stalls on stress response in dairy cows during milking in group milking parlors. Journal of Dairy Science, Vol 105 (in press). <https://doi.org/10.3168/jds.2021-20349>
- Gómez, Y.; Bieler, R.; Hankele, A. K.; Zähler, M.; Savary, P.; Hillmann, E. (2017) Evaluation of visible eye white and maximum eye temperature as non-invasive indicators of stress in dairy cows. Applied Animal Behaviour Science (in press). <https://doi.org/10.1016/j.applanim.2017.10.001>
- Gómez, Y.; Terranova, M.; Zähler, M.; Hillmann, E.; Savary, P. (2017) Evaluation optimaler Melkplatzeinstellungen unter Berücksichtigung von Praxismessungen. Weiterbildungskurs für Bauchfachleute. Tänikon.
- Gómez, Y.; Terranova, M.; Zähler, M.; Hillmann, E.; Savary, P. (2017) Einflüsse der Melkstand-Abmessungen auf das Verhalten von Milchkühen während des Melkens in verschiedenen Melkstandtypen. In: Savary P. und Schick M. (2017). 6. Tänikoner Melktechniktagung - Aspekte zur Optimierung der maschinellen Milchgewinnung, Agroscope Science Nr. 45, S. 47-49.
- Gómez, Y.; Terranova, M.; Zähler, M.; Hillmann, E.; Savary, P. (2016) Effects of milking stall dimensions on behavior of dairy cows during milking in different milking parlor types. Journal of Dairy Science, Vol 100(2), 1331-1339. [http://www.journalofdairyscience.org/article/S0022-0302\(16\)30875-X/fulltext](http://www.journalofdairyscience.org/article/S0022-0302(16)30875-X/fulltext)
- Gómez, Y.; Terranova, M.; Zähler, M.; Hillmann, E.; Savary, P. (2016) Effects of milking stall dimensions on behaviour of cows during milking in different milking parlours. In: proceedings of the 50<sup>th</sup> International Congress of the ISAE, Edinburgh.
- Gómez, Y.; Terranova, M.; Zähler, M.; Hillmann, E.; Savary, P. (2016) Influence of milking parlour size on behavior of dairy cows. In: proceedings of the UFAW Animal Welfare Conference, York. <http://www.ufaw.org.uk/downloads/york-2016---programme-and-abstracts-23-june.pdf>
- Gómez, Y.; Zähler, M.; Hillmann, E.; Savary, P. (2015) Does the size of milking parlours influence behaviour and physiology in dairy cows? IAS PhD Symposium, Einsiedeln.
- Gómez, Y.; Zähler, M.; Hillmann, E.; Savary, P. (2014) Influence of size and shape of milking parlours on behaviour and health of dairy cows. 10<sup>th</sup> Annual Symposium of the PhD-program in Sustainable Agriculture.
- Gómez, Y.; Zähler, M.; Savary, P. (2013) Einfluss von Grösse und Form verschiedener Melkstandtypen auf das Wohlbefinden der Milchkühe. In: Savary P. und Schick M. (2013) 4. Tänikoner Melktechniktagung – Automatisierung rund ums Melken, Agroscope, S. 53.
- Gómez, Y.; Zähler, M.; Hillmann, E.; Savary, P. (2012) Stress-related behaviour of different sized dairy cows in the milking parlour. Symposium – Understanding and assessing Stress, 1.S.

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