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Rationalisation in milking parlours – chances and risks

Increasing herd sizes have changed the working environment in milking parlours. Consequences such as job sharing, high cow throughput and shift-work help optimising staff utilisation. At the same time there is a high incidence of muscular-skeletal-disorders among milking parlour operatives. The number of affected women is significantly higher. Therefore a precise analysis of the work place helps adjusting it to the worker in order to improve the health status on the long run.

Keywords

Ergonomics, milking parlour, muscular-skeletal-disorders

Abstract

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■ The structure of dairy farms has changed worldwide over the past decades. Herd sizes increase while the number of farms is decreasing. Based on data of the Federal statistic office the average number of cows per farm is 49 in Germany (livestock census in May 2011). 55 % of all dairy cows are held on farms with less than 50 animals. Dairy farms in former East Germany have a larger average herd size.

The omission of the quota regulation in Europe in 2015 will enhance the trend towards large farms. In general larger units clear the way for standardization and automation. At the same time it is noticed that once a company expands rationalization follows automatically.

For the dairy farms this means: working routines are organized by division of labour and are highly repetitive similar to assembly line work. Chances and risks that come along with this development are discussed in this article.

Half of the working time to produce milk is spent for milking the cows. The time effort per animal decreases with increasing herd size and depends on the milking system and the degree of automation. Based on Finnish standard times TUURE an ALASUUTARI [1] calculated that the utilization rate of a milker is over 90 % in herringbone and auto tandem parlours, when there are eight or more milking units, one milker and more than 40 cows.

The following work organizational elements are suitable to reduce the time effort:

- Waiting times are reduced or abandoned
- Entry and access of cows work well
- Walkways between cows are short

If the animals are kept clean a reasonable amount of time can be saved for udder preparation.

Apart from work organizational aspects there are technical measures to save time in loose housing systems and their milking parlours:

- Gates in the waiting areas to optimize cow traffic
- Automation of pre-milking and automatic cup removal
- Automatic disinfection
- Automatic floor cleaning

Besides automation there exist technical aids to lower the workload such as:

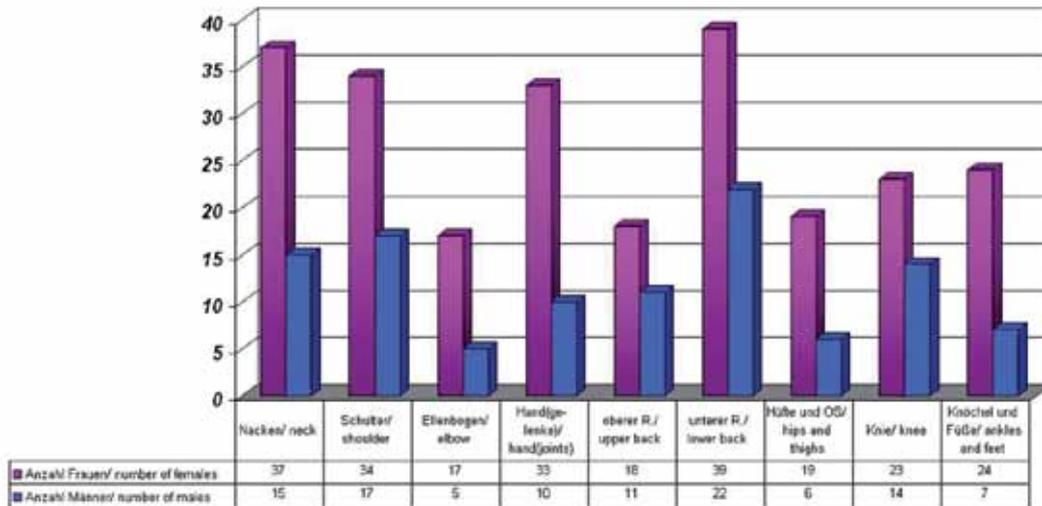
- Service arms
- Indexing for the positioning of the animal
- Adjustable floors

Workload while milking

National as well as international studies outlined a precarious situation among milking parlor operatives suffering from muscular skeletal disorders (MSD) [2, 3, 4, 5]. While a few decades ago ergonomists were expecting that a change over from tie stall systems to loose housing barns with separate milking parlours would reduce the number of risk factors such as carrying heavy loads and awkward working postures, actual numbers do not support these expectations [6, 7]. If one compares bucket or pipeline milking systems with stationary milking stalls the workload does not seem to have been reduced, it has only been changed, if one takes the number of physical complaints as a measure of exposure. A good example for that is a 14-year follow up study from Sweden counting around 80 % of MSD among milking parlour operatives in both evaluation periods, but there were slightly more complaints in the second period, although separate milking stalls were more prevalent [3].

All studies came to the result, that women were more often affected than men. A recent study carried out from the Institute for Agricultural Engineering Potsdam-Bornim e.V. (ATB) collecting the one-year-prevalence of MSD with the help of the

Fig. 1



Yearly prevalence of disorders in the muscular-skeletal-system among milking parlour operatives (n = 100)

Standardised Nordic Questionnaire [8] showed that 95 % of the women and 88 % of the men were suffering. The frequency of occurrence is based on mentioning pain in at least on part of the body. In many cases more than one body region is affected. **Figure 1** shows the percentages of the one year prevalence grouped by sex and body region.

Regarding those high numbers it seems to be necessary to take a closer look on the workplace milking parlour and possibly reface the workload assessment.

Examples of recent workload assessment in modern milking parlours

Motion analysis and electromyographic measurements regarding the impact of working height and weight of the milking cluster proofed, that small changes have a significant impact on body posture, movements and the muscular load [9, 10]. A range of 30 cm in working height was covered. If the udder is located above shoulder height, the arms have to be lifted higher inducing a higher load on the involved muscles whereas work below shoulder level is coupled with upper body inclination and/or torsion. This can also be the case if the arms are too short to reach the udder.

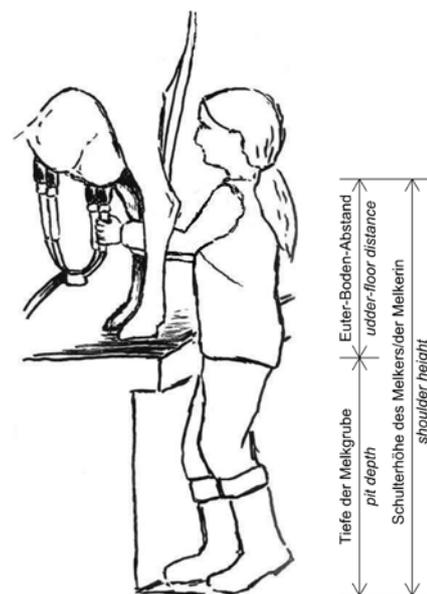
Under practical conditions you find a larger variation for the working height because the bovimetric and anthropometric variations both show an effect. The horizontal distance between the udder and the edge of the pit floor also influences the work place design. This distance was kept constant in the experimental measurements, but it strongly varies under practical conditions.

The research carried out at ATB came to the conclusion that the recommended working height is given when the bottom of the udder is at the same height as the shoulder of the worker. Furthermore the smaller the horizontal gap between worker and cow the better.

Unfortunately the status quo is depicted by a possible maximum of 60–70 % of animals on ideal height. If the milking parlour has no adjustable floor only workers with an ascertained body height find ideal working conditions described by: pit floor depth + average distance between udder and floor = ideal shoulder height (**Figure 2**).

The average size of women is smaller and they also have a shorter reach [11]. Women had to attach the clusters above shoulder height more often than men on the farms visited. This is of course unfavourable for other tasks to be done at the udder as well.

Fig. 2



Optimal working height

Conclusions

Work organisational measures due to rationalisation change the job profile. Partial loads, little rest times or shift work are characteristic for large herd operations and work places. Rationalisation also means you need less input for the same amount produced.

The on farm survey including 20 participating farms so far carried out by ATB showed that the working heights, especially for the female workers are not aligned. The pit floor depth as well as the horizontal gap between udder and worker was unsuitable in many cases. A comparison of the arm length – measured from the hand to the front of the body – with the distance between udder and the edge of the pit floor showed that especially smaller persons were unable to reach the udder without excessive stretching or bending.

The implication of adjustable floors can help to improve the alignment between worker and work place. Nevertheless the natural range of variation in bovimetrics and anthropometrics exceeds the scope of possible adaption to be realised by existing technical measures.

To reassure that farmers find content and qualified workers in the future a shift in attitude is necessary. It seems to be essential to improve the working conditions for milking parlour operatives as it is unacceptable to have 90 % of the workers suffering from MSD.

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