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Comparison of costs and functions of different milking house arrangements

When dairy cattle houses are planned, the arrangement of the milking house (integrated/lateral/separate) has a significant influence on the functionality of the facility. Given identical milking parlour size and equipment, no differences between these three arrangements were established with regard to the investment requirements. Therefore, they can be used regardless of the herd size. Integrated milking houses are particularly suitable for farms where space is confined. Apart from slightly smaller area consumption, a lateral milking house arrangement does not show any advantages, whereas separate milking houses provide the greatest functionality and variability.

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Keywords

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In addition to the investment requirements, labour management plays an important role in the planning and construction of dairy cattle stalls. With this in mind, attention must focus on the number of workers available. Dairy cattle stalls for classic family farms must be planned and equipped such that the work which needs to be done can generally be carried out by one person. The arrangement of the functional areas in the stall is decisive for the optimization of the work processes. This particularly applies to the location of the milking house (integrated/lateral/separate), the equipment and arrangement of the milking parlour including all up- and downstream functional rooms and –areas (waiting area, selection- and farrowing area) as well as the organization of the functional axes (cow traffic, feeding, demanuring). An analysis of farms in Bavaria has shown that only a few newly constructed stalls feature a separate selection area, for example, even though ca. 32 to 38 activities are carried out per animal and per year, of which approximately 80% could be organized in a selection area such that better labour management would be the result [3].

It was the goal of this study to evaluate the utility value and the investment requirements of the different arrangements of milking houses.

For this purpose, model plans were developed which are based on a 2 • 6 fishbone milking parlour which is suitable for herd sizes of 50 – 80 cows and can be operated by one worker such that it provides good milking quality [5]. The following criteria were taken into account: The plans feature a waiting area into which the animals are driven before milking begins. The cows are able to cope with a longer driving-out period. However, this entails the risk that some animals stay behind and delay the process. Selection after milking by means of automatic animal identification requires appropriate way lengths and the proper arrangement of the functional areas. The design of the selection area is identical with the rest of the stall with cubicles, drinkers, and direct access to the feeding table. The farrowing area is situated near the milking house in order to allow the animals to be observed from the office and to keep the cows´ way into the milking parlour as short as possible. For optimal cow comfort, this passage is littered. Since automatic pusher demanuring entails the danger of calves lying in the pusher path, mobile demanuring is recommended. When planning the milking house, one must make sure that the milk store is situated near an outer corner in order to facilitate milk transport by the tanker and that the office can be reached

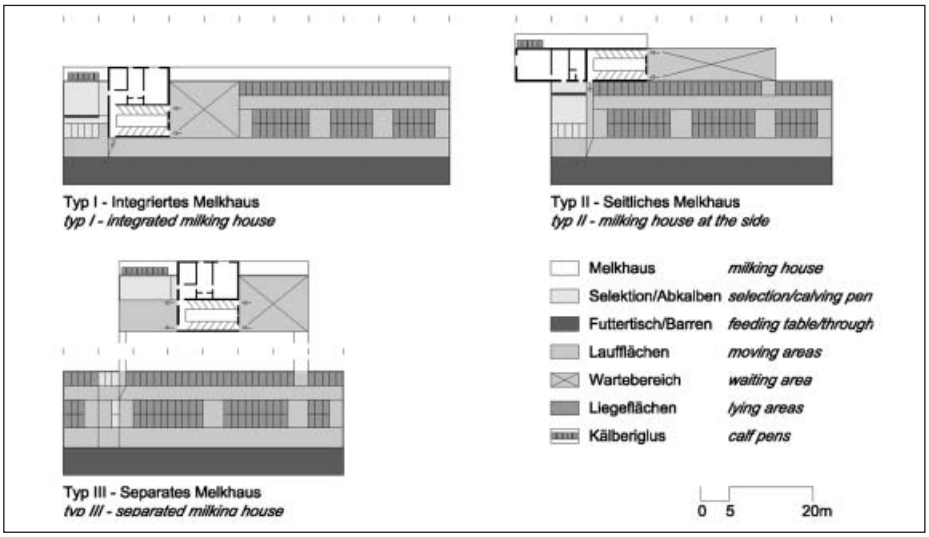

Fig. 1: Arrangement of milking houses

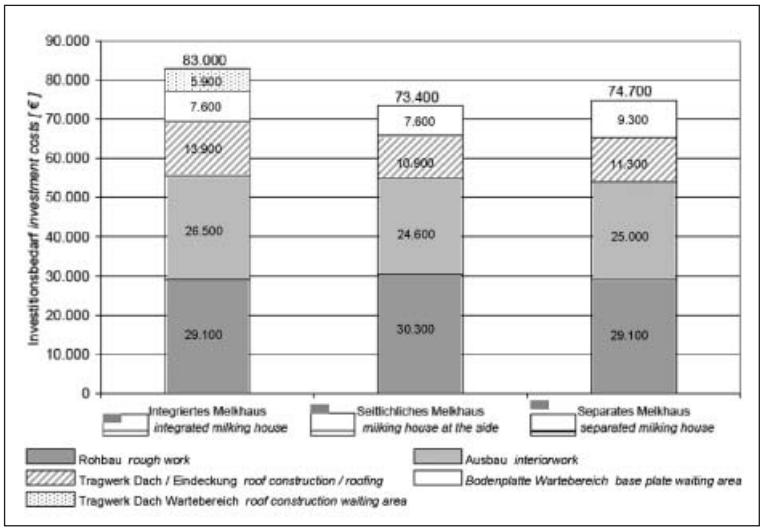

Fig. 2: Comparing investment costs for milking houses

easily from the milking parlour. For hygienic reasons, the milk store does not have direct access to the milking parlour.

With regard to the arrangement of the milking houses, different variants are possible (*Fig. 1* / type 1).

The advantages of an integrated milking house lie in the compactness of the ground plan and the clear separation of the functional areas lying hall, waiting area, milking, and separation or farrowing. Due to the short way back to the feeding table, only manual selection is possible. Later constructional changes generally require significant alterations to the substance of the building. All in all, the lying hall can be extended in only one direction.

In lateral milking houses, the necessary functional areas are arranged laterally next to the lying hall along the outer wall (*Fig. 1* / type II). The lying hall can be extended in two directions. Due to the length of the way back after milking, it is possible to install a selection system with automatic animal identification. The littered farrowing area in the stall interrupts a demanuring axis. In practice, the constructive connection between the lying hall and the milking house is often insufficient and causes potential damage to the building due to material change and inadequate constructive realization. In addition, the attached wall- and roof construction of the milking house reduces the open wall area required for freely ventilated stalls.

If the milking house is a separate unit, the separation of the lying hall and the milking house provides a stall arrangement whose functional axes are clearly structured (*Fig. 1* / type III). The areas which require intensive labour (waiting, after-waiting, farrowing) are combined. The functional axes in the stall are not interrupted by any special areas. The stall can be extended in two directions. If sufficient space is available, the facility can be doubled by attaching a symmetrically identical facility to the milking house. Due to the length of the way back, a selection system with automatic animal identification can be installed. If the cow traffic paths are planned appropriately, the herd can be divided into performance groups. In contrast to the integrated and lateral arrangements, the separate milking house arrangement allows a wide variety of ground plan solutions to be realized. If the animals are driven out on both sides (without any crossing of persons and animal traffic), a raising waiting area and, hence, a level access to the milking parlour can be constructed.

Cost comparison

In order to examine the investment requirements for the individual arrangements, the ground plan variants shown above were compared based on separate cost determination. Together with the other necessary rooms for milk storage, equipment, the toilet, and the office, all plans show area requirements of ~ 140 m^2. The necessary space for functional rooms is based on standard plans [1]. This means that the masses and unit numbers of the foundation, the base plate, rising inner and outer walls, wall openings including doors and windows, and even the roof cover are virtually identical in all milking houses. Since the climatic conditions are the same even in an integrated milking house due to the location in freely ventilated stalls, the construction-physical requirements for all three variants are identical.

Results

The results of the cost determination for the different models are shown in *Figure 2*. The costs are shown without VAT based on the assumption that all work is carried out by service providers.

The result shows only small cost differences. The integrated solution is the most expensive variant because the covered waiting area for all cows causes additional expenses of ~ € 5,900. If the size of the waiting area were halved for this solution (which would require more time to fetch the cows), the investment requirements would approximately be the same as those for the lateral or separate milking house variant. Smaller cost differences in individual positions result from the expenses for the individual supporting constructions and slight deviations in the masses and unit numbers of walls, tiles, doors, windows, etc.

Conclusions

Since the expenses for all three arrangements are approximately the same, a decision can be made regardless of the number of animals. Milking houses are particularly suitable for farms where space is confined. Apart from reduced area requirements, lateral milking houses do not show any advantages as compared with separate milking houses. The latter, however, have the highest functionality, variability, and extendability. If the necessary space is available, they should therefore be considered more often in the planning of stalls for family farms.

Literature

[1] ALB Bayern e.V.: Arbeitsblatt Anordnungsweisen von Melkhäusern (02.03.20). ALB Bayern e.V., Freising, 2006

[2] ALB Bayern e.V.: Arbeitsblatt Milchräume - Einrichtung und Zuordnung (02.15.01). ALB Bayern e.V., Freising, 2005

[3] *Benninger, D.*: Sonderarbeiten und deren Bereiche im Milchviehstall. Persönliche Mitteilungen vom 23. 6. 2006

[4] *Simon, J., P. Lingenfelser, A. Beibl und E. Kränsel*: Stallsysteme und Baukosten für Milchviehställe. In: Artgerechte, umweltverträgliche und wettbewerbsfähige Tierhaltungsverfahren, Tagungsband der LfL – Jahrestagung am 24. Mai 2006 in Freising, Institut für Landtechnik, Bauwesen und Umwelttechnik, 2006

[5] *Ordolff, D., R. Artmann, K. Barth, A. Fübbeker und H. Grimm*: Melktechnik und Melkverfahren II. In: Kartei für Rationalisierung: 4.2.1.1, Rationlisierungs-Kuratorium für Landwirtschaft (RKL), Kiel, 2004