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21 Functional planning and occupational safety of milk production in cold loose housing barns

Janne Karttunen

Work Efficiency Institute, Department of Agriculture
P.O. Box 13
FIN-05201 RAJAMÄKI, FINLAND
E-mail: janne.karttunen@tts.fi

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Abstract

The study charted the most serious occupational hazards of cold loose housing barns. Furthermore, the study gave a good general picture of cold loose housing barns (CLHB) in dairy production. The study was a thesis for the Department of Agricultural Engineering and Household Technology in the University of Helsinki. It was partly financed by the Farmers' Social Insurance Institution. The data was collected from literature, accident statistics, telephone interviews (51) and farm visits (8). The data has been supplemented by the latest research findings in the field.

The majority of CLHBs in Finland have been built after 1995. The savings in building costs were considerable on many farms thanks to simple and light-built structures. The health of the animals and farm workers had either remained the same or improved with the new building. Feed consumption had not increased nor had milk production or its quality decreased in CLHBs, not even during cold spells. The recent researches confirm this.

CLHBs with cubicles were more common than ones with straw bedding on the interviewed farms. The number of cattle had often increased considerably with the new building. Removing manure, bedding and roughage feeding were usually done by tractor power. The majority of farms interviewed had a milking station. Concentrated feed was usually distributed by out of parlour feeders. Drinking bowls and troughs were kept free from ice with electric resistors. Mechanisation reduced the physical strain of farm work considerably compared to the old stanchion barn.

According to the interviews, no serious slipping accidents had taken place in CLHBs. Safety boots with a good grip are recommended. Sudden movements by cattle caused almost half of the accidents reported in animal husbandry. Special caution should always be taken when moving among the cows. The walls and other structure shouldn't have any protrusions, which might injure the worker or cattle. It is advisable to dehorn the cows before moving them to a loose housing barn. Milking parlour is recommended for both ergonomic and occupational safety reasons.

Working in a CLHB is practically outdoor work. Work tasks should be planned so that moving back and forth between cold and warm - the milking area - is avoided. It is extremely important to keep cold draughts from the milking parlour and the animals.

Building a CLHB requires careful functional planning and maintaining it requires uncompromising carefulness from the cattle breeder. If these requirements are met, a CLHB

can help establish a cost-effective, well-functioning dairy farm. Milking and the well-flowing cattle traffic connected with it are key factors for the functioning of the whole system. A cold loose housing barn is suitable for farmers who want to reduce the physical strain of their work but who cannot invest substantial amounts in a full-automated warm loose housing barn. In addition, it is a good alternative for farmers wishing to increase the number of cattle without adding to the physical strain of work or daily hours.

Introduction

Cold loose housing barns (CLHB) are uninsulated. Thus the inside temperature follows quite accurately the outside temperature. During the harsh winter in inner parts of Finland the inside temperature can stay several weeks under - 25°C. In Finland the majority of CLHBs have been built after 1995 (Karttunen 2000). In Finland there are about 200 CLHBs, approximately 2 500 - 3 000 insulated loose housing barns and around 17 000 traditional stanchion barns for dairy cattle (Karttunen 2001). The number of loose housing barns is increasing and the number of stanchion barns is decreasing drastically.

CLHBs became more popular during the 1990's due to their reasonable low building costs compared to insulated barns. Farmer can use his own timber and craftsmanship when building a CLHB. This is possible due to the simple and light-built wooden and concrete structures of the foundations, walls, floor and the roof. The best saving potential according to Berge (1997) lies in the use of existing, still technically sound buildings like the old stanchion barns which may be used as lying, feeding or milking areas. There are some additional costs like the need for the heated water supplies and extra work in several stages of daily work compared to insulated barns (Berge 1997).

Another remarkable aspect is that in loose housing barn the cattle can behave naturally and the health status of the animals is better than in a stanchion barn (Tirkkonen 1997). Alasuutari & Syrjälä-Qvist (2001) found that the consumption of the feed doesn't rise nor does the production of milk fall even during the harshest winter. Dairy cows manage well when they are protected against draught and there's dry inside due to abundant use of straw, peat or cutter powder bedding.

Dairy farming is physically very demanding. Pinzke (1996) found that over 80 per cent of the Swedish dairy farmers - both male and female - had symptoms from the musculoskeletal system within the last year. According to dairy farmers, silage feeding and milking caused the most physical strain in farm work. Tuure (1995) found that there were special risks of accident at work in the CLHB because of the cold climate during winter. The surfaces of the CLHB might be slippery because of frozen water and the floors may be uneven because of frozen feed and manure.

Use of tractor and machinery for manure handling, bedding and feeding is a necessity in CLHB. Extra workload for the farmer is not an alternative. Suutarinen (1996) found that the use of machinery in general and the use of tractor particularly and the preparing for machinery work increases the chance of serious risk of accident at work. However there is no choice but to use machines more often as the size of dairy herd grows drastically. Tuure (1995) found that labour time is saved and postural load is lighter when hitching or unhitching an implement such as the silage cutter in front of a tractor most preferably using quick-couplings instead of hitching or unhitching an implement behind a tractor.

Traditional distribution of roughage by hand cannot be applied on dairy farms which are expanding their production, because it poses risks to both ergonomic and occupational health. In a CLHB the silage should be wilted to prevent freezing. A feeder wagon is

especially suited for three-walled and/or side-feeding table (figure 3) CLHBs in which the feeding passage can be filled from the outside. In such a case the hygiene risks are reduced. (Karttunen & Peltonen 2001).

It has been and in the future it will be even more important to research and develop ways to produce high-quality milk and beef to a competitive price with high level of occupational safety and low physical strain. There were no comprehensive researches where the farmers' opinion on cold loose housing barns would have been gathered. The aim of the study was to chart the most serious occupational hazards of cold loose housing barns and to develop ways to avoid them. Furthermore, the second goal of the study was to achieve a good general picture of the organisation of work, structure and technical functionality of cold loose housing barns in dairy production. The study was a thesis for the Department of Agricultural Engineering and Household Technology in the University of Helsinki. It was partly financed by the Farmers' Social Insurance Institution.

Material and methods

The background data for the thesis was collected from literature and accident statistics of the Farmers' Social Insurance Institution. In addition to reported accidents, there are numerous less serious and nearby accidents at work, which are not reported. Under slightly different circumstances, they could have resulted in a more serious accident. Telephone interviews and farm visits recorded nearby accidents at work experienced by farm workers.

In spring 1998 there were known to be about 52 farms with a CLHB in Finland. The research data was collected through telephone interviews (51) of these farms and farm visits (8) to some of them. The thesis and its results and conclusions have been supplemented by the latest research findings.

Results

In this study all known CLHB owners in Finland in spring 1998 except for one were interviewed. The most important aspects concerning the functionality of the CLHB were clearly found and they are dealt with in this paper. Occupational safety was studied in three different levels: reported accidents, less serious accidents and nearby accidents.

Functionality

Ninety per cent of farmers were satisfied or extremely satisfied with their CLHB based on the telephone interviews and the farm visits, albeit long and cold periods during the winter caused some troubles in almost every farm. Especially draft in the milking area caused troubles in several farms.

The savings in building costs had been considerable on many farms when compared to warm loose housing barn. For example farmers own timber and work input, the use of natural ventilation and effective use of the old stanchion barn with the new CLHB had saved expenses. Operating costs were appropriate when the acquisition price of the bedding material was reasonable and when the new system enabled farmers to mechanise many tasks compared to the old stanchion barn.

The health of the animals and farm workers had either remained the same or improved with the new building. Several farmers mentioned that the air of the CLHB and the milking place in the milking parlour or the tie stall was fresh and dustless. Symptoms of asthma or blocked nose had almost vanished. Feed consumption had not increased nor had milk production or

its quality decreased in cold loose housing barns, not even during cold spells. These findings were similar to Tuure (1995), Tirkkonen (1997) and Ala-Suutari & Syrjälä-Qvist (2001).

Figure 1. Some cold loose housing barns have a greenhouse structure and the roof is made of see-through acrylic plates.

Figure 2. It is relatively common to build the CLHB joined to the old stanchion barn where the milking takes place.

According to the farmers, cold weather wasn't the worst condition for cows as one might expect. Cows were clean and seemed to enjoy themselves in the outdoor run even when it was cold. But when the temperature was around 0 °C, the cows were wet and more or less dirty because of rain, wet snow and mud. The above mentioned combined to the slippery and windy conditions in the outdoor run caused some troubles in many farms.

The average size of the cattle was 28 milking cows. The variation was from 13 cows to 55 cows. Cold loose housing barns with cubicles (39) were more common on the interviewed farms than ones with deep straw bedding or sloped floor - figure 1 - (12 altogether). Straw and peat were the most common bedding materials. The number of cattle had often increased considerably - doubled or tripled - with the new building. In spite of that the amount of the daily work of animal husbandry had in many cases remained the same. Many farmers' opinion was that mechanisation had reduced the physical strain of farm work compared to the old stanchion barn.

Manure disposal and bedding were most often done with tractor's front lift shovel. Roughage - silage in practise - was most often handled using a tractor and a silage cutter or round bale cutter or a shredder. Access to silage was not limited but heifers and dry cows got less silage and more straw or dry hay. Wilted silage didn't freeze during the cold periods of winter. Concentrated feed was most commonly (34) distributed by out of parlour feeders. Farms that had two out of parlour feeders had on the average 32 milking cows. Six farms used diet feeding (figure 3). Drinking bowls and troughs - one/15 cows - were kept free from ice with electric resistors.

Figure 3. This farm uses diet feed, which must have high dry matter content during cold winter in order to avoid freezing problems. (Picture: Sakari Ala-Suutari)

Figure 4. The cow traffic between the old stanchion barn and the new CLHB runs well when fences and gates are sturdily built and yet easy to handle.

Cows were always milked in a warm room - usually in the old stanchion barn - where the small calves were also kept (figure 2). Also the sick and calving pens were usually located in a warm area. The majority (37) of farms interviewed had a milking parlour - a 2 x 2 tandem station was most common - and the rest (14) milked in a tie stall - usually three milking units. Some farmers were going to invest in a milking parlour later.

In many cases it had become difficult to pasture effectively when the size of the cattle had grown. Thus not all the farms pastured their cattle any more. These farms usually had an outdoor run and it was possible to feed the cattle indoors effectively around the year.

Occupational safety

About 85 per cent of barns in Finland are traditional - in most cases relatively small - stanchion barns. Thus most accidents at work collected in table 1 have happened in stanchion barns and are related to its physically demanding working conditions. In a CLHB the feeding - both roughage and concentrated feed - of the cattle is usually done with machines and milking is usually done in a milking parlour. Because of that there has to be transportation of the cattle between the actual CLHB and the milking area twice a day (figure 4). Situation is quite the same in insulated loose housing barns, too. These remarkable changes in the working processes may in the long run have an effect on the statistics of the accidents at work during animal husbandry. However in this research (Karttunen 2000) it was not possible to find any clear differences in accidents at work between uninsulated and insulated loose housing barns.

Table 1. Animal husbandry: accidents at work in 1998 and the classification of them between different phases of work (Statistics: Maatalousyrittäjien eläkelaitos 1999, Farmers' Social Insurance Institution 1999).

Phase of work	pc	%
Feeding of the cattle	869	23
Milking	713	19
Transportation of the cattle in the cowshed	634	17
Manure disposal and bedding	215	6
Other phases of work (cattle husbandry)	680	18
Husbandry of the other farm animals (pigs, horses, poultry etc.)	624	17
Total	3 735	100

According to the accident statistics and the interviews, only few slipping accidents had taken place in cold loose housing barns. Cows were usually dehorned (35) or the horns had been cut off before bringing them to the CLHB. Sudden movements by milking cows and heifers caused approximately half of the accidents reported in animal husbandry. These accidents were usually bruises and breaches but also some serious accidents had happened. According to the interviews it was quite common that milking cows and heifers caused minor and nearby accidents at work which were not reported.

Both men and women worked about the same time in the barn during a normal working day. About two-thirds of the animal husbandry related accidents and two-thirds of the accidents which were caused by cows or heifers occurred to men. The working environment inside and outside the barn - fences, stairs, gates etc. - caused almost forty per cent and bad working postures over ten per cent of the accidents at work. Usually men fed the cattle, took care of the manure handling, bedding and cow traffic. Thus they were more exposed to the accidents caused by cattle and working environment than women who usually milked in a parlour and fed the calves.

Conclusions and discussion

The effectiveness of the whole CLHB is often evaluated by how easily the milking is done and how well the daily cow traffic is planned. The acquisition of a milking parlour is recommended for both ergonomic and occupational safety reasons. It is extremely important to keep cold draughts from the milking parlour and the animals. Local heaters and floor heating can be used in the milking parlour during winter. The draft in the milking area can be avoided by placing the gathering area for the cows between the cold area and the warm milking area. Also plastic wind curtains and local warm air blowers can be used between the cold area and the gathering area.

CLHB is not suitable for those who are susceptible to colds. Because working in a cold loose housing barn is practically outdoor work, it must be possible to put on the work clothing layer by layer. Work tasks should be planned so that moving back and forth between cold and warm can be avoided. Safety boots with a good grip are recommended. They protect the foot if trod on by cattle and support the ankle when working with a tractor and walking on the uneven floors and paths.

When the cattle size doubles or triples it can be too difficult to pasture effectively anymore. Even though it is not obligatory now and probably won't be in the future either - when the

cows are in a loose housing barn - a functional outdoor run may be useful in many ways. However it is obligatory to pasture if farming is organic.

Abundant straw, sawdust or peat bedding, which can partly be replaced by cow mats, keep the cattle sleeping area dry. It is important to have warm pens for calving, sick cows and for the artificial insemination. During special treatments cows have to be tied to secure the occupational safety.

The walls and other structures of a cold loose housing barn and its corridors should not have any protrusions, which might hurt the farm worker or cattle. Loose paths are important in order to prevent accidents at work and to make the cow traffic fluent. Cattle are free to move around in loose housing barns, so special care should always be taken when moving among them. Children and temporary staff, such as relief workers and veterinarians, in particular, are at risk.

Access to roughage should be free and it is essential that the cows get sufficient amount of good quality drinking water. Cows with horns disturb each other, especially at out of parlour feeders, but next to the feeding table and drinking bowls as well. Dehorning calves and sawing off the horns of cows should be done well in advance before moving the animals to a loose housing barn. Dehorned cows behave calm and the consequences of butting are usually not serious.

According to the previous (e.g. Tuure 1995, Tirkkonen 1997) present and the latest (Alasuutari & Syrjälä-Qvist 2001) researches it has been clearly shown that building a cold loose housing barn requires careful functional planning and maintaining it requires uncompromising carefulness from the cattle breeder. If these requirements are met, a cold loose housing barn can help establish a cost-effective, animal and farmer friendly and well-functioning dairy farm.

If the above criteria are filled, a CLHB is suitable for farmers who want to reduce the physical strain of their work but who cannot invest substantial amount of money in a full-automated warm loose housing barn. In addition, it is a good alternative for farmers wishing to increase the number of cattle without adding to the physical strain of work or daily hours. However, this system is neither a short cut to lighter work load nor does it give permission to neglect the well being of one's cattle.

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