

Management of Calving in Norwegian Cubicle-Housed Dairy Herds

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Kjæstad HP, Simensen E: Management of calving in Norwegian cubicle-housed dairy herds. Acta vet. scand. 2001, 42, 131-137. – Sixty of the 65 dairy farms with cubicle houses in the Norwegian county of Oppland were included in a field study of the management of calving in 1990. The farmers recorded the location of the cow when giving birth, farmer presence and whether assistance was given during calving, occurrence of suckling, and time after birth when cow and calf were separated. Such data were recorded for a total of 1125 calvings. About 10% occurred on pasture, while 78% of the remaining calvings took place in the cubicle-equipped section. Thirteen percent calved in a calving pen, the remaining cows being tethered at the time of calving. Thirty-two percent of the calvings took place in houses lacking a calving pen altogether. Farmers were present during 41% of the calvings. Suckling most frequently occurred after pasture calvings, and was least frequent after calvings within the cubicle-equipped section of the cowhouse. Injuries to the calf caused by trampling or contact with fittings etc. were rare, and no more common in association with calving in the cubicle-equipped section than with calving taking place with the cow isolated from the rest of the herd. All calves were removed from their dams within 24 h after birth.

dairy cow; cubicle housing; cubicle refusal; calving pen; management.

Introduction

Cubicle housing has become the predominant way of keeping dairy cows in countries such as the United Kingdom and the Netherlands, while in Scandinavia tie-stall housing is still the most common type of accommodation (Bøe 1993). Cubicle housing can arguably be seen as an improvement to dairy cows' welfare in several respects (Schlichting & Smidt 1984). In Norway, current regulations emphasizing the need to give animals the opportunity to move about and exhibit other forms of natural behaviour (*The Royal Ministry of Agriculture* 1996) make it likely that the proportion of cows being kept in cubicle houses will continue to increase. There are of course differences between the management of calving in a cubicle house compared to a tie-stall house. Two main options ex-

ist for dealing with the calving cow in cubicle systems. One is to provide a separate calving pen in which the cow is placed when calving is imminent. The other option is to let the cow calve in the cubicle-equipped section, i.e. in the presence of the other cows in the herd. The latter practice gives rise to concerns regarding the health and welfare of the new-born calf due to chilling/soiling, and possible traumatic injury due to contact with fittings, or injury from being trampled.

Based on the authors' own observations, and statements from farmers and veterinary practitioners, it seems that many cows kept in cubicle houses in Norway calve in the cubicle-equipped section. However, no studies have been published on how common this practice is, or

whether it is causing any problems. Therefore, the main purpose of this study was to investigate how calvings were managed in cubicle houses.

Material and methods

All cubicle-housed herds within a predefined geographical area, the county of Oppland, were initially included in the study. Oppland county was chosen because of its accessibility, and because it was known to have many dairy farms of various sizes located in areas with varying topography. All the 65 cubicle-housed dairy farms in this county in 1990 were identified with the help of the regional agricultural authorities, the farming community, and veterinary practitioners. The farmers concerned were contacted and asked to participate in the study. Three of the identified herds could not be included in the study because the farmers did not wish to participate, while one was excluded because of failure to record data and another for stocking twice as many cows as there were cubicles. The 60 herds included in the study were visited before the calving season, the cow-houses inspected and notes made of the type of calving accommodation existing in the house. At this time, the farmers were also instructed how to record the following data on special forms, using a separate form for each calving:

- Herd size (expressed by number of cow-years)
- cow identity (name, number)
- calving date and calving number
- location favoured by the cow when lying down during the last week before calving (cubicle, alley, halfway inside cubicle, combinations, or unknown)
- location of the cow during the actual calving (cubicle-equipped section, calving pen, tie stall, pasture, or other location)
- specific location of the cow if calving took

place within the cubicle-equipped section (cubicle, alley/dunging area, other site or unknown)

- whether the birth was assisted (no assistance at all, moderate traction applied, or assistance deemed to be absolutely essential to deliver the calf)
- farmer presence during calving (present during calving, present shortly after calving -i.e. wet, recumbent calf, or present only after calving -i.e. standing calf, dry coat)
- location of the calf in the cubicle-equipped section when first seen by the farmer (cubicle, alley, milking parlour, or other location)
- how the calf was cleaned (wiped by hand, licked by mother, combination or none of the options)
- injuries to the calf considered to be caused by fittings, herd mates or the dam itself (yes/no)
- time and date when the calf was separated from its mother
- whether the calf had suckled before being separated (yes, no, or unknown)
- any remarks concerning the behaviour of other cows while calving was taking place.

All farmers were contacted by telephone one to two months after the calving season had started to help sort out possible problems concerning the recording of data. The herds were visited at the end of the calving season to collect the forms and review them in collaboration with the farmers.

Results

Data were collected on altogether 1125 calvings which took place on the 60 farms included in the study. The median number of forms returned by the farmers was 17, and the median number of cow-years was 18 (range 11-109).

Table 1. Suckling in relation to calving location.

| Calving location | n | Calf reportedly suckled (%) | RR* | c.i. _{95%} RR | chi square P |
|--------------------------|-----|-----------------------------|-----|------------------------|--------------|
| Cubicle section of house | 654 | 17 | 0.4 | 0.3-0.5 | <0.001 |
| Calving pen | 121 | 43 | 1.0 | - | - |
| Tie-stall | 79 | 30 | 0.7 | 0.5-1.0 | 0.073 |
| Pasture | 85 | 69 | 1.6 | 1.3-2.1 | <0.001 |
| Other | 6 | 20 | - | - | - |

Information for one or both variables in 178 cases either not provided by farmer or indicated as "unknown" on questionnaire.

*Relative "risk" of suckling in this location compared to *calving pen*.

All cows were of the Norwegian Red Cattle breed. First calving heifers comprised 36 % of these, cows expecting their second calf and up comprised 64%. Twenty farms lacked a separate calving pen. Thirty-two percent (358) of all calvings took place on these farms. Most of the calvings took place from July throughout October, 1990.

About 10% (103) of all recorded calvings took place on pasture. The rest of the cows gave birth indoors. Of these, 78% (786) calved in the cubicle-equipped section in the presence of the other cows, while 13% took place in a separate calving pen. The remaining calvings took place after the cows were individually tethered.

Most of the cows were cubicle users before calving (97%), and while this proportion still was high during calving, it was somewhat lower (83%). The first calving heifers showed a much lower level of cubicle use than the older cows, the corresponding figures being 29% and 34% respectively. Observations on both cubicle use during the last week before calving as well as during calving existed for 676 individual animals. The choice of calving location was relatively consistent with the behaviour during the last week before calving, but there was a certain amount of behaviour change also, and this change was associated with the initial behaviour: The probability of changing lying location between the first observation (before calving)

and the other (during calving) was greater if the first observation was cubicle refusal (OR=2.0, c.i._{95%}=1.1-3.4).

Information on the location of the calf when first seen by the farmer was provided in 623 of the 786 instances when calving occurred in the cubicle-equipped section. The most common locations within the section were the alley (76%), or a cubicle (21%). In 1% of the cases, the calf was found in the pit of the milking parlour, while the remaining 2% were located elsewhere. Of the calves that were found in a cubicle, 24 % were considered new-born (they were recumbent and their coats were still wet).

Answers to the question regarding physical injury to the new-born calf, caused by the dam or other cows, (e.g. due to butting or trampling), or cowhouse fittings, were received for 1019 of the calves, 765 of them born within the cubicle-equipped section, the rest in a separate calving pen or tie stall. Physical injuries to calves born in the cubicle-equipped section were reported in 1.3% of cases, the corresponding figure for the other group being 1.4%.

Data on farmer presence and whether assistance was given during calving was available for 1120 calvings. At 72% of these, no assistance was given at all, assistance being deemed to be absolutely essential in only 8% of cases. The farmer was present at 41% of the calvings. All calves, including those born in a separate

Table 2. Calf cleaning after birth in relation to calving location.

| Calving location | n | Licked by dam (%) | RR* | c.i.95%RR | chi square P |
|--------------------------|-----|-------------------|-----|-----------|--------------|
| Cubicle section of house | 770 | 53 | 0.8 | 0.7-1.0 | 0.015 |
| Calving pen | 130 | 65 | 1.0 | - | - |
| Tie-stall | 87 | 50 | 0.8 | 0.6-1.0 | 0.026 |
| Pasture | 94 | 90 | 1.4 | 1.2-1.6 | < 0.001 |
| Other | 7 | 14 | - | - | - |

Information for one or both variables in 37 cases either not provided by farmer or indicated as "unknown" on questionnaire.

*Relative "risk" of being licked by dam in this location compared to *calving pen*.

pen, were removed from their dams within 24 hours after birth. Sixty-eight percent of the calves were reported not to have suckled their mothers before being separated, 21% were reported to have suckled, while 11% had an unknown history in this respect. Suckling was reported most frequently in connection with calving on pasture. Suckling frequently occurred also when calving had taken place in a separate pen, but not as often as on pasture (Table 1).

The extent to which licking behaviour was observed showed a similar tendency as the observations of suckling, licking occurring most frequently on pasture, followed by calving pen (Table 2). A total of fifty-four percent of the cows that calved indoors licked the calf.

Finally, some farmers in this study remarked that certain cows reacted to others calving by vocalising loudly, and that "stealing" of calves by recently calved cows was common.

Discussion

Using the farmers as observers instead of specially trained individuals enabled us to study many herds and obtain a large amount of data on individual calvings. In order to achieve an acceptable level of observation reliability, the data recording process was standardized by making the observation categories in this study as unambiguous and self-evident as possible.

The median number of forms completed for each herd approximated the median herd size, indicating that the response rate was high.

A relatively large proportion of the houses were not fitted with a separate calving pen. Despite the fact that 767 calvings occurred in houses which were fitted with pens, only about 140 calvings took place inside them. This shows that their use was relatively infrequent. The common calving management practice of letting the cows calve in the cubicle section of the house, and not in a separate calving pen, was not in conflict with any official code or regulation at the time when the study was performed. Nevertheless, the observed practice was not in accordance with the intentions of those who design cubicle houses, recommending the use of a calving pen (*Agricultural University of Norway* 1982). Official regulations have been amended to require one calving pen per 25 cows (*The Royal Ministry of Agriculture* 1996). Swedish directives prescribe similar arrangements concerning calving accommodation in dairy cubicle housing (*The Swedish Board of Agriculture* 1995). The reasons for the farmers' not using or even installing a calving pen were not known, but may have been small herd sizes, coupled with seasonally concentrated calving in most farms. The first factor would make the installation of a special pen relatively costly, while the second would mean that it would be difficult to

accommodate all calving cows in a pen even if one had been available. A majority of the calvings therefore took place in the cubicle-equipped section.

Most of these cows chose to lie down in the same place when calving as during the last week before calving. Cows or heifers which did not use cubicles before calving generally did not use cubicles during calving either. This agrees with the results of other studies indicating that refusal to use cubicles is a relatively consistent type of behaviour (*Kjæstad & Myren 2001, O'Connell et al. 1993*). Nevertheless, there was also a considerable number of animals which did not choose the same lying location. A number of cows which used cubicles before calving calved in the alley. One possible explanation of this finding may be that some of the adult, pregnant cows are too large to assume a comfortable calving position (lateral or semi-lateral recumbency) inside a cubicle. However, the analysis of lying locations showed that the significant trend for behaviour change was from cubicle refusal to cubicle use, not vice versa. This finding may reflect a general tendency for generally increasing cubicle use, i.e. an effect of time. Another possible interpretation is that the cubicles on average provide a more attractive calving accommodation, for instance a solid lying surface and more seclusion than what is found in the alley area.

A few cows calved after being tethered. They were accustomed to a certain freedom of movement, and it is not known if or how such restriction influenced their behaviour and welfare.

As regards the few calvings which took place in a calving pen, there was relatively good opportunity to allow the calf to remain with its dam for the first few days. We had therefore anticipated that some of the farmers would practice keeping cow and calf together. This did not prove to be the case as all calves born in pens were also separated from their mothers within

the first 24 hours after birth. This is, however, in accordance with traditional practice in Norwegian dairy husbandry.

Keeping cow and calf together is thought to have several positive effects, such as an increased growth rate of the calf (*Krohn & Madsen 1985, Metz 1987*) and higher milk yield and feed intake by the cow (*Krohn & Madsen 1985*). It has also been suggested that absorption of colostrum immunoglobulins by the calf is enhanced when the dam is present (*Selman et al. 1971, Smith et al. 1967*), potentially increasing the calf's resistance to infectious diseases. In addition to having positive health effects, the opportunity for the cow and calf to engage in mother-offspring behaviour can be seen as a welfare issue. This is reflected in a statement by the Norwegian Committee on Agricultural Ethics, recommending that cow and calf should be allowed to spend three to five days together before being separated (*The Royal Ministry of Agriculture 1997*). Similar provisions are included in the Swedish regulations for ecological dairy farming, which require that calves be allowed to suckle during the colostrum period (*The certification organisation for organic production 2000*).

Calving in a separate pen was associated with the highest incidences of licking and suckling in the present study (Tables 1 and 2). This was as expected due to the fact that there are fewer distracting elements in this environment, and the cow and calf can direct more attention towards each other. It has been suggested that the two principal functions of licking of the newborn calf are physical stimulation of the calf and establishment of a cow-calf bond (*Lidfors 1994*).

The occurrence of physical injury to the calf within its first 24 h was low, and seemingly unrelated to calving environment. With the reservations that these observations were made by the stockmen themselves and not by veterinary

surgeons, and that calves were left to spend varying times in the calving environment before separation, the results suggest that calves born in the cubicle section are not subject to excessive aggression or trampling by other cows. However, longer-term monitoring of clinical disease such as pneumonia and enteritis was not undertaken, so that we are not able to discuss the occurrence of such disease in this study.

It has been reported that calves born in loose housing with other cows present are likely to follow and suckle other cows than their dams (Edwards 1983, Illmann & Spinka 1993, Lewandrowski & Hurnik 1983). Ingestion of non-colostrum milk by a new-born calf accelerates closure of the intestinal epithelium, impairing the absorption of macromolecules (Michanek *et al.* 1990). Subsequently ingested colostrum immunoglobulins will therefore not be able to pass into the calf's blood. On the other hand, should the cow so suckled be producing colostrum, i.e. itself recently parturient, there may not be enough left for its own new-born calf (Michanek *et al.* 1990). Furthermore, other cows which themselves are close to calving may show investigative or maternal behaviour towards the calf, which may cause distress to its dam. The remarks from the farmers in the present study concerning maternal behaviour by cows other than the dam towards new-born calves are in accordance with the findings of Edwards (1983) that such cows frequently showed maternal, but occasionally also aggressive, behaviour towards new-born calves in group housing.

Although not addressed in the present study, calving in a separate pen may also be better for the health of the cow. For example, supervision of calving is easier, and any complication or associated disease can be dealt with more quickly and effectively than in the cubicle-equipped section. Tending to recuperating patients, such as turning a paretic cow regularly from one side

to the other, is also facilitated in the calm and quiet environment provided by a separate pen. Furthermore, a separate calving pen is easier to keep dry and clean, and provision of a soft, well-littered surface makes it easier for the cow and calf to get up and lie down.

The present study confirmed our general perception that the majority of calvings in cubicle house accommodation occur in the cubicle-equipped section. The study also showed that parturient cows normally prefer to lie down in a cubicle when in labour, and that switching from lying in alley the last few days of pregnancy to cubicle use during calving is more likely than the opposite switch. The management practice found in the study did not seem to be associated with traumatic injury to the calf, the occurrence being about the same for calves born in the cubicle-equipped section as for those born in a separate calving pen. Finally, it is clear that separating cow and calf within 24 h after birth is a common practice in Norwegian cubicle-housed herds, even when calving has taken place in a separate calving pen.

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References

- Agricultural University of Norway*: Innredninger og teknisk utstyr for små løsdriftsfjøs (Fittings and technical equipment for small cubicle houses). Nordiske Jordbruksforskernes Forening Report no. 9, Ås 1982.
- Bøe K: Synspunkter på adferd og produksjon hos melkekuer i løsdrifts- og båsfjøs-systemer (Views on behaviour and production by dairy cows in non-confinement housing and tethering systems). ITF Report 28, Agricultural University of Norway, Ås 1993.
- Edwards SA: The behaviour of dairy cows and their newborn calves in individual or group housing. *Appl. Anim. Eth.* 1983, 10, 191-198.

- Illmann G, Spinka M*: Maternal behaviour of dairy heifers and suckling of their newborn calves in group housing. *Appl. Anim. Behav. Sci.* 1993, 36, 91-98.
- Kjæstad HP, Myren HJ*: Failure to use cubicles and concentrate dispenser by heifers after transfer from rearing accommodation to milking herd. *Acta Vet. Scand.* 2001, 42, 171-180.
- Krohn CC, Madsen KK*: Undersøgelser vedrørende ko-kalv samspill (Investigations concerning cow-calf interaction). 1. Indflydelse af 10 dages patteperiode på koens mælkeydelse, yversundhed og reproduksjon samt på kalvens tilvækst og livskraft. Communication no. 586 from Statens Husdyrbrugsforsøg, København 1985.
- Lewandrowski NM, Hurnik JF*: Nursing and cross-nursing behaviour of beef cattle in confinement. *Can. J. Anim. Sci.* 1983, 63, 849-853.
- Lidfors L*: Mother-Young Behaviour in Cattle. Parturition, development of cow-calf attachment, suckling and effects of separation. Thesis, Swedish University of Agricultural Science, Uppsala 1994.
- Metz JHM*: Productivity aspects of keeping cow and calf together in the post-partum period. *Livestock Prod. Sci.* 1987, 16, 385-394.
- Michanek P, Ventorp M, Westrøm B*: Milk intake before first colostrum in newborn dairy calves. Effect on intestinal transmission of macromolecules. *J. Dairy Sci.* 1990, 73, 480-483.
- O'Connell JM, Giller PS, Meaney WJ*: Weanling training and cubicle usage as heifers. *Appl. Anim. Behav. Sci.* 1993, 37, 185-195.
- Schlichting MC, Smidt D*: Versuch einer ethologischen Bewertung von Milchviehhaltungssystemen. *KTBL-Schrift* 1984, 307, 72-78.
- Selman IE, McEwan AD, Fisher EW*: Studies on dairy calves allowed to suckle their dams at fixed times post partum. *Res. Vet. Sci.* 1971, 12, 1-6.
- Smith HW, O'Neal JA, Simmons EJ*: The immune globulin content of the serum of calves in England. *Vet. Rec.* 1967, 80, 664-666.
- The certification organisation for organic production -KRAV*: Kravregler (regulations of KRAV). Uppsala 2000.
- The Royal Ministry of Agriculture*: Forskrifter om hold av produksjonsdyr (Regulations concerning the keeping of production animals). Oslo 1996.
- The Royal Ministry of Agriculture*: Skille av melkeku og kalv etter fødselen. Uttalelse fra Rådet for Dyreetikk (Separation of dairy cow and calf after birth). Statement from the Council for Animal Ethics), Oslo 1997.
- The Swedish Board of Agriculture*: Djurskyddsbestämmelser (Animal protection regulations). Jordbruksinformation 10, Jönköping 1995.

Sammendrag

Stellrutiner omkring kalving i norske løsdriftsfjøs.

Denne studiens formål var å undersøke stellrutiner omkring kalving i norske løsdriftsfjøs for melkekyr. Seksti av de i alt 65 melkekubesetningene med løsdrift i Oppland fylke i 1990 inngikk i en feltstudie der bonde/røkter selv noterte observasjoner på et eget skjema, bl.a. registrerte en hvor i fjøset hver ku kalvet, eventuell forekomst av amming samt tid inntil mor og kalv ble skilt. I alt 1125 kalvinger ble dokumentert på denne måten. Trettito prosent av alle kalvingene skjedde i fjøs som ikke var utstyrt med en egen kalvingsbinge. Av de kalvingene som foregikk innendørs, dvs. ikke på beite, fant 78% sted i løsdriftsarealet. Tretten prosent skjedde i en egen kalvingsbinge, mens resten av kyrne var bundet ved kalving. Bonden var selv til stede under 4% av fødslene. Det var få tilfeller av fysisk skade på den nyfødte kalven som kunne tilskrives kontakt med andre kyr eller med innredningen. Det forekom relativt ofte at kyrne fikk slikke og amme kalvene, men ku og kalv ble alltid skilt innen 24 timer etter kalving, også når kalven var født i kalvingsbinge.

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