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Availability and use of designated hospital pens in Danish dairy herds

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Abstract

The objective of this study was to describe the availability and use of designated hospital pens in Danish dairy herds and to analyse the association between availability and use of hospital pens and the herd-level incidence of reported disease treatments. Hospital pens were divided into either 'individual hospital pens' designed for only one animal or 'group hospital pens' designed for two or more animals. Questionnaires were sent to 350 dairy cattle herd owners. These questionnaires focused on four animal categories: dairy cows, heifers, males six months or older, and calves younger than six months. Depending on the category of animal, between 50 and 82% of the herds had access to individual hospital pens and between 39 and 65% of the herds had access to group hospital pens. Between nine and 24% of the herds did not have access to any type of hospital pens. The availability of hospital pens was generally higher for dairy cows than the other animal groups. There were significantly more reported treatments for hoof/leg disorders in herds with one or more cows in hospital pens at the day of visit.

Keywords: *animal welfare, dairy cattle, Denmark, disease incidence, hoof/leg disorders, hospital pen*

Introduction

Animals in poor health are known to alter their behaviour as part of an evolutionary strategy facilitating their survival (Aubert 1999; Dantzer & Kelley 2007) and such behavioural changes have persisted in farm animals (Weary *et al* 2009). Dairy cows suffering from infectious disease reduce their activity and feed intake (Huzzey *et al* 2007; Fogsgaard *et al* 2012a). One way to facilitate the recovery of diseased individuals may be to promote such sickness behaviour by use of hospital pens or 'special-need-areas' providing a soft lying surface (Jensen *et al* 2015) and allowing isolation seeking and facilitating inactivity (Proudfoot *et al* 2014). Furthermore, housing sick and injured animals in special pens often facilitates human supervision. It is therefore recommended, and in some countries mandatory, that hospital pens are available in dairy herds. In Denmark, for instance, access to hospital pens will be mandatory in dairy herds from 2016 (Law nr 520, 26/05/2010; Anonymous 2014).

A questionnaire survey in Iowa, USA, showed that 79% of the 123 dairy farmers that responded had special needs facilities allowing diseased animals to be moved away from the home pen, and 49% of the farmers had a designated hospital area for diseased animals (Fogsgaard *et al* 2012b). Information on the availability of hospital pens in dairy herds is otherwise limited. As hospital pens could be an easily measured, resource-based welfare indicator, it is relevant to investigate if the availability and use of hospital pens is associated with animal-based measures, such as disease treatments. The objective of the present study was to describe the availability and use of designated hospital pens in Danish dairy herds, based on a questionnaire survey sent to Danish farmers, and to study whether the availability and/or use of hospital pens for dairy cows was associated with the incidence of reported disease treatments in the herds.

Materials and methods

The study population consisted of 350 Danish dairy cattle herds. The herds were randomly selected by the Danish Veterinary and Food Administration for another study on animal welfare control (Bennedsgaard *et al* 2014). A written questionnaire on the availability and use of hospital pens was delivered to the farmer at a herd visit, and returned to Aarhus University via mail. Questions were addressed separately for the four animal categories: dairy cows, heifers (females older than six months and before first calving), males six months old or older, and calves younger than six months. Hospital pens were divided into being either 'individual hospital pens' designed for only one animal or 'group hospital pens' designed for two or more animals. For herds with dairy cows, additional information on the incidence of reported disease treatments, cow mortality, herd size, bulk milk somatic cell count (BMSCC), milk yield per cow-year, and whether the farm was organic or conventional was extracted from the Danish Cattle Database (DCD). The

Table 1 Outcome and explanatory variables included in the statistical analysis on whether availability or use of hospital pens was associated with the incidence of recorded disease treatments.

Outcome	Explanatory variables
Reported treatment incidence total	Availability of hospital pen, annual cow mortality rate, herd size, BMSCC, milk yield per cow-year, organic
Reported treatment incidence for hoof/leg disorders	Availability of hospital pen, annual cow mortality rate, herd size, BMSCC, milk yield per cow-year, organic
Reported treatment incidence total	Use of hospital pen, annual cow mortality rate, herd size, BMSCC, milk yield per cow-year, organic
Reported treatment incidence for hoof/leg disorders	Use of hospital pen, annual cow mortality rate, herd size, BMSCC, milk yield per cow-year, organic

Table 2 Availability of hospital pens for four different categories of animals in 130 Danish dairy cattle herds.

Herds with	Number of herds with animals of the given category*	Percent with hospital pens for individual animals	Percent with hospital pens for groups of animals	Percent without hospital pens for either individuals or groups
Dairy cows	83	78	65	9
Heifers	90	50	42	24
Males, six months or older	52	82	45	12
Calves	95	58	39	22

* Individual herds may have more than one animal category.

DCD compiles information from several sources, including treatments performed by veterinarians, hoof-trimmers or farmers, and milk quality from dairies. The extracted information included the 12 months prior to the date of answering the questionnaire. The following variables were defined and calculated:

• Availability of hospital pen — a dichotomous variable of whether one or more hospital pens (either individual or group) were available in the herd;

• Use of hospital pen — a dichotomous variable of whether one or more hospital pens were in use on the particular day of answering the questionnaire;

• Annual cow mortality rate — the number of dead (unassisted or euthanised) cows per cow per year;

• Reported treatment incidence for all diseases — the number of disease treatments recorded in the DCD per 100 cows per year;

• Reported treatment incidence for hoof/leg disorders — the number of recorded treatments for hoof/leg disorders in dairy cows (including: interdigital phlegmone, sole ulcer, heel horn erosion, interdigital dermatitis, sole haemorrhage, digital dermatitis, swollen hocks, joint inflammation, digital dermatitis, interdigital hyperplasia, white line disease, and other hoof/leg disorders) per 100 cows per year;

• Herd size — the number of cow-years calculated as number of cow-days in the herd divided by 365; and

• Milk yield per cow-year: the average milk yield per cow per year.

Both the availability and the use of hospital pens were calculated as prevalences among respondents for each animal category. To analyse the association between availability or use of hospital pens and the incidence of reported disease treatments, four statistical models were established. The outcome and explanatory variables for each model are shown in Table 1. The additional five explanatory variables were included as they could be confounded with presence and use of hospital pens. The four models analysed data using multivariable models with stepwise backwards elimination (PROC MIXED, SAS version 9.4). We checked for confounding between additional explanatory variables and availability and use of hospital pens by checking for differences in model estimates when including or excluding one variable at a time.

Results

The questionnaires were answered and returned by 130 of 350 herd owners (response rate: 37%). The availability of hospital pens among respondents for each animal category is presented in Table 2. Among herds with dairy cows, 47% (35 out of 74 responses to that question) had answered that the hospital pen for cows was in use on the day of the visit.

When analysed, the association (together with the demographic variables presented in Table 1) between the availability (presence of hospital pen[s]) or the use of hospital pens (the presence of cow[s] in hospital pen[s]) and disease treatment incidence at the herd level, demonstrated a greater number of recorded treatments for hoof/leg disorders in herds with one or more cows in hospital pens at the time of

answering the questionnaire (P = 0.006). The number of recorded treatments for hoof/leg disorders was 123/100 cows per year in herds with cow(s) in hospital pen(s), compared with 32/100 cows per year in herds without cow(s) in hospital pen(s). The three other models were non-significant. No confounding between additional explanatory variables and availability and use of hospital pens was seen.

Discussion

We found that, depending on the animal category, 9–24% of the herds had no access to hospital pens, and 18–50% of the herds had no access to individual hospital pens. In general, access to hospital pens was more common for cows compared with the other animal categories. The response rate (37%) was comparable to other similar studies with written questionnaires and no use of reminders (Laven *et al* 2009; Elbers *et al* 2010; Thomsen *et al* 2012). However, some selection bias may still be anticipated. Thus, farmers without hospital pens may have been less likely to answer and the proportion of herds without access to hospital pens may therefore be higher than estimated by the present study.

We propose two different theoretical explanations for a greater number of reported treatments for hoof/leg disorders in herds with cow(s) in hospital pens, although we do not have data to support these. Firstly, in herds requiring many treatments for hoof/leg disorders, it may be found necessary to make use of hospital pens, while this may not be considered as important for other diseases. Additionally, a high number of sick animals *per se* increase the probability of finding one or more cows in a hospital pen on any given day. Alternatively, it may be that a low treatment incidence is due to a high treatment threshold among farmers. Farmers being reluctant to treat lame animals may also find that lame animals do not need the special care provided by housing in hospital pens.

Animal welfare implications

As the availability of hospital pens was not associated with treatment incidence, care should be taken in the consideration of this as a welfare indicator. However, we can speculate that the lack of hospital pens in some herds may compromise animal welfare of sick cows needing special care. In the case of a sudden outbreak of disease or animal injury in a herd without readily established hospital pens, a delay is likely before such pens can be established, or before the animal can be euthanised or slaughtered. Thus, the lack of hospital pens runs the risk of potentially compromising animal welfare in these herds.

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