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Nordic dairy farmers' threshold for contacting a veterinarian and consequences for disease recording: Mild clinical mastitis as an example

Mari Espetvedt[a,1], Ann-Kristina Lind[b,1], Cecilia Wolff[c,*,1], Simo Rintakoski[d], Anna-Maija Virtala[d], Ann Lindberg[e]

[a] Norwegian School of Veterinary Science, Department of Production Animal Clinical Science, P.O. Box 8146 Dep, NO-0033 Oslo, Norway
[b] Department of Large Animal Sciences, Faculty of Health and Medical Sciences, University of Copenhagen, Grønnegårdsvej 8, 1870 Frederiksberg C, Denmark
[c] Department of Clinical Sciences, Swedish University of Agricultural Sciences, P.O. Box 7054, SE-750 07 Uppsala, Sweden
[d] University of Helsinki, Department of Veterinary Biosciences, P.O. Box 66, FI-00014 Helsinki, Finland
[e] National Veterinary Institute, SE-751 89 Uppsala, Sweden

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ABSTRACT

Previous studies have addressed the differences in registered disease incidence between the Nordic dairy disease recording systems. The main objective of this study was to investigate whether Nordic dairy farmers have varying intention to contact a veterinarian the same day as detecting signs of mild clinical mastitis (MCM) in a lactating dairy cow. This is the first, and necessary, step in the process leading to a disease event being recorded. The second objective was to study underlying behavioural components influencing this threshold for action.

A questionnaire-based survey was carried out in Denmark, Finland, Norway and Sweden. The questionnaire was based on the Theory of Planned Behaviour from the field of social psychology. After performing qualitative face-to-face elicitation interviews a set of statements about treatment of MCM was identified. These were grouped into behavioural, normative and control beliefs. The most frequently mentioned beliefs were rephrased as questions. Behavioural intention, a proxy for the behaviour of interest, was assessed using case scenarios. The target and eligible herds were in milk recording and had an average herd size of at least 15 cows. The questionnaire was distributed to 400 randomly sampled dairy producers per included country. The response rate was around 50% in all four countries.

The hypothesis of differences in behavioural intention between the countries was tested using Wilcoxon's rank-sum tests. Multivariable linear regression was used to estimate the country-specific variability in behavioural intention as explained by attitude, subjective norm or perceived behavioural control alone, or in combination. The Spearman rank correlations between behavioural intention and each belief, weighted by its outcome evaluation or the motivation to comply, were estimated to find the most important drivers, constraints and social referents for the behaviour of interest.

There were significant ($p < 0.01$) differences in behavioural intention between all countries except Denmark and Norway. Swedish farmers had the weakest behavioural intention and Finnish farmers the strongest. Attitude explained most of the variability in behavioural intention in all four countries. The most important driver in all countries was to achieve a quick recovery for the cow.

* Corresponding author. Tel.: +46 18 671984; fax: +46 18 673545.
E-mail address: Cecilia.Wolff@slu.se (C. Wolff).
[1] Equal contribution – shared first authorship.

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The varying behavioural intention partly explain the differences in completeness of disease data in the Nordic countries: if farmers have different thresholds for contacting a veterinarian the registered incidence of clinical mastitis will be affected. Knowledge about the importance of attitudes and specific drivers may be useful in any communication about mastitis management in the Nordic countries.

1. Introduction

The influence of human behaviour on animal disease management is substantial and has in recent years received increasing attention, especially in relation to udder health (Bigras-Poulin et al., 1985; Barkema et al., 1999a, 1999b; Jansen et al., 2009). In the Nordic countries Denmark (DK), Finland (FI), Norway (NO) and Sweden (SE), the majority of dairy farmers participate in country-specific recording schemes, where reproductive data, milk and carcass quantity and quality, culling reasons and disease and treatment data are collected in central databases (Olsson et al., 2001). These databases are managed by the national dairy cooperatives. The main objective of the disease recording systems is to monitor endemic disease, primarily production-related disorders such as udder, reproductive, metabolic and locomotors disorders. Disease incidence is calculated from these databases and used for herd management, advisory work, breeding programmes and research within each country. In addition, comparisons of disease incidence between the countries based on these registrations have been made in order to gain better knowledge of how to manage and control disease (Plym-Forshell et al., 1995; Valde et al., 2004). The countries show differences with regard to incidence of several disease complexes both in official disease statistics and when calculating disease incidence in a similar manner from raw data from the databases (Østerås et al., 2002; Valde et al., 2004). Moreover, the completeness of farmer-detected disease cases in the national databases has been shown to vary; for clinical ketosis from 0.46 in SE to 0.77 in DK (Espetvedt et al., 2012), for locomotors disorders 0.20 in SE to 0.45 in DK (Lind et al., in press) and for clinical mastitis from 0.51 in FI to 0.90 in DK (Wolff et al., 2012). To further understand the reasons for these differences there is a need to examine all stages of the reporting system as possible sources of the between-country variation.

The disease recording systems are based upon veterinary records of treated animals. The recording process starts with detection of the diseased cow by the farmer. Because Nordic dairy farmers have very limited access to prescription drugs, an episode of clinical disease in a dairy cow is unlikely to be treated with, e.g. antibiotics unless a veterinarian has been involved at some stage, whether the veterinarian directly diagnosed the case and initiated medical treatment or was responsible for prescribing medical treatment after some form of direct contact with the farmer. The veterinarian writes a record which is submitted and entered into the national database. In other words, the registered incidence of clinical disease, and completeness of these registrations, depends largely upon whether farmers decide to contact their veterinarian for treatment or not.

Clinical mastitis, and in particular mild clinical mastitis (MCM), is one example of a common disease where the decision to contact the veterinarian for advice or treatment can be expected to be influenced by a complex set of factors, such as the milk yield of the affected cow or the udder health status of the herd, as illustrated by Vaarst et al. (2002). The varying emphasis on these decision factors results in farmers showing different thresholds for taking action leading to medical treatment. This influences the proportion of mastitis cases that are actually captured in the Nordic disease recording systems. In the present study, MCM was used as an example as it may be expected that farmers' behaviour in managing this disease, including thresholds for treatment, would provide more variation than, e.g. milk fever or moderate to severe clinical mastitis. Further, farmer behaviour could be expected to be more similar within a specific country than across national borders, due to the similarity of the context in which dairy farming takes place. Different thresholds for treatment could therefore be one factor causing differences in the recorded disease incidence between countries. In the four Nordic dairy disease recording systems, MCM is recorded as clinical mastitis; only in NO there is a code to be used specifically for recording of MCM. This together with the known underreporting of clinical mastitis cases means that there is currently no knowledge of the number of MCM cases in the Nordic countries. Nevertheless, clinical mastitis is the disorder with the highest recorded incidence in Nordic dairy cows and its economic importance is, similar to that in other countries with a developed dairy industry, well recognized (Seegers et al., 2003; Halasa et al., 2007).

Investigations of human behaviour and the various components that influence behaviour have been extensively carried out within the social sciences and in human health research, for example in studying human immunodeficiency virus (HIV) prevention behaviour (Ajzen et al., 2007). As mentioned by Ellis-Iversen et al. (2010), "human behavioural science and theory is routinely used in human medicine where a change in working practice is needed to improve health". In agricultural and veterinary sciences, research focusing on the human factor in farming decisions has only recently been emerging. Social psychology models such as the Theory of Reasoned Action (TORA) and Theory of Planned Behaviour (TPB) (Ajzen et al., 2007; Fishbein and Ajzen, 2010) have been used in both quantitative and qualitative studies seeking to understand farmers' decision making and related factors (Beedell and Rehman, 2000; Garforth et al., 2006; Rehman et al., 2007; Ellis-Iversen et al., 2010; Elliott et al., 2011). We considered TPB to be a suitable method to quantify national differences between