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Social influences on the duration of antibiotic treatment of clinical mastitis in dairy cows

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ABSTRACT

Clinical mastitis of dairy cows is a visible inflammation of the udder, which is usually caused by bacteria and treated with antibiotics. Although pressure is increasing to reduce antibiotic usage in livestock in the European Union, feedback from the field suggests that clinical mastitis treatment is frequently repeated after the initial per-label treatment, thereby extending treatment duration. The aim of this study was to explore the social factors influencing farmers' decision-making on the duration of antibiotic treatment of clinical mastitis. In total, 38 dairy farmers in the Netherlands (n = 17) and Germany (n = 21) were interviewed in a qualitative semi-structured way. Extended treatment was defined as any treatment longer than that given in label directions. Of the 38 farmers, 30 reported routine and 7 occasional extended antibiotic treatment. The interviewed farmers were sensitive toward social norms of other farmers and recognition for good stockmanship. Extended treatment is perceived as part of the social norm of "being a good farmer." The participants' perception was that mastitis is not treated "thoroughly" if clinical symptoms were still visible at the time of cessation of treatment, because it may persist or recur. As a result, treatment was frequently extended by repeating the initial label treatment. Farmers, specifically the more "cow-oriented" farmers, expressed insecurity on how to treat mastitis effectively. This insecurity made them more sensitive to comply with other farmers' injunctive ("what ought to be") and descriptive ("what is done") norms and the perceived veterinarians' informational norm that extended treatment is better, resulting in an approved social norm. Social approval reduces the insecurity of being perceived as a poor farmer; thus, extended treatment is emotionally rewarded. This social reward apparently outweighs the higher costs of more waste milk and more antibiotic usage. Perceived positive reference groups with whom the farmer identifies and regularly communicates face to face, such as other farmers, the herd veterinarian, and other farm advisors, confirm the farmer's judgment on extending treatment and influences him or her toward socially accepted behavior. Society was the most negative reference group, barely influencing farmers' decision-making on treatment. The emotional gap between farmers and society is large and probably difficult to overcome. Legislation may reduce antibiotic usage, if doable and controllable. Evidence-based information on treatment efficacy or practical on-farm decision support indicating when to end treatment may be able to change social norms of "thorough" treatment, especially when communicated by a positive reference group such as veterinarians. Because prudent antibiotic use is hindered by perceived subjective norms on optimal duration of antibiotic treatment, more research is needed, particularly on the optimal duration of antibiotic treatment of specific pathogens as related to cure and recurrence of clinical mastitis.

Key words: dairy cow, clinical mastitis, antibiotic treatment, social influence

INTRODUCTION

Mastitis is a painful inflammation of the udder of dairy cows that is usually caused by bacteria. On dairy farms, antibiotics are mainly used when cows are dried off and to treat clinical mastitis cases. Recently, antibiotic use in livestock, including dairy, raised national political concerns in the Netherlands. In Germany, the discussion to restrict the use of antibiotics in livestock is currently ongoing, whereas in the Netherlands, quantitative goals to reduce antibiotic use in livestock have already been set. In both countries, preventive use of antibiotics is now forbidden. In the Netherlands, this has resulted in the introduction of selective dry cow treatment, allowing antibiotics to be used at drying off only in cows with intramammary infections (Scherpen-

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zeel et al., 2014). Apart from dry cow treatment, further antibiotic reduction in the dairy industry could be achieved by changing dosage or duration of treatment of clinical mastitis. Feedback from the field, however, suggests that clinical mastitis treatment protocols are frequently repeated after the initial on-label treatment, thereby extending treatment duration. However, although some studies show a beneficial bacteriological effect of extended treatment (Sol et al., 2000; Oliver et al., 2004; Krömker et al., 2010; Truchetti et al., 2014), the results are conflicting. Some studies did not find a favorable bacteriological effect of extended treatment for *Staphylococcus aureus* (Swinkels et al., 2013a), whereas others did (Truchetti et al., 2014) or showed pathogen-specific bacteriological effects in streptococci (Swinkels et al., 2014) or only an effect on clinical signs (Swinkels et al., 2013a,b). There appears to be an effect of the type of antibiotic used, the pathogen involved, the duration of infection, farm epidemiology, and possibly other factors. The limited scientific data on the benefit of extended treatment suggests that it may not always be necessary and requires evidence-based decisions.

Because of the additional associated costs and the mounting pressure in the European Union to reduce antibiotic use (EMA, 2014), it is relevant to explore why so many farmers extend mastitis treatment. Understanding what influences decision-making on the duration of treatment requires insight into farmers' perceptions toward treatment, specifically toward the duration of mastitis treatment.

Human behavior, such as extending treatment, is shaped by social interactions between different people (Leeuwis and van den Ban, 2004). Thus, a farmer's decision to extend treatment is not taken in isolation but is influenced by others. It has been reported that farmers are influenced both by other farmers (Friedman et al., 2007) and by veterinarians (Jansen et al., 2010). However, little is known about how farmers are influenced and about the role of other actors within their direct social circle. The objective of studying social influence is to understand and explain how the thoughts, feelings, and behavior of individuals are influenced by the actual, imagined, or implied presence of others (Turner, 1991).

The presence of social norms and social uniformities among the members of a social group arise from their interaction and relationships. Such social norms express social values (different subjective aspects on "what is believed the majority does or feels") as well as normative judgments (psychological commitments to "what ought to be," reflecting the consequences of not complying with the rules of the community; Hechter and Opp, 2001; Bicchieri and Muldoon, 2014). Violation of the norm will result in social sanctions. The theory of social conformity states that if a group of people agrees and shares an attitude, that attitude has (subjective) validity (Cialdini and Goldstein, 2004). Group pressure makes such attitudes and beliefs stronger. Theories of social comparison processes imply that people have a need to compare with others to evaluate their opinions and abilities (Cialdini and Goldstein, 2004). Collective wisdom tends to serve the individual and the group as well. In addition, people prefer to compare themselves with more similar others. The more similar the others are, the higher their social influence is, and the greater the tendency is to reduce differences (Festinger, 1954). Social influence theory distinguishes normative influence, when trying to conform to positive expectations of others, and informational influence, when trying to obtain information about objective reality (Deutsch and Gerard, 1955). In normative influence theory, injunctive norms ("what ought to be") and descriptive norms ("what is actually done") both play a role. The essential difference between the two is that injunctive norms involve social sanctions for noncompliance with the norm, whereas descriptive norms do not (Lapinski and Rimal, 2005).

Qualitative research on perceptions of farmers tries to describe, interpret, and understand their experiences and choices through personal interviews. This qualitative research enables us to encapsulate the entire spectrum of the farmers' social environment that influences their behavior (Cialdini and Goldstein, 2004). Qualitative research allows us to study how social influences are created and given meaning (Denzin and Lincoln, 2000). Understanding social influence seems to be a prerequisite for effectively influencing behavior and may be hard to detect if only prewritten quantitative surveys are used. Qualitative research on perceptions of farmers toward treatment of clinical mastitis from the perspective of social influence can provide helpful insights into the reasons why farmers extend treatment and thus can contribute to our knowledge on how to influence behavior toward reduced antibiotic use on dairy farms.

The aim of this study was to explore social influences on decision making of farmers on the duration of antibiotic treatment of clinical mastitis of dairy cows in the Netherlands and in Germany by qualitative research using personal interviews.

MATERIALS AND METHODS

Selection and Description of Farms

The target population of this study was nonorganic dairy farms not involved in milk processing (only