J. Dairy Sci. 99:1–12
http://dx.doi.org/10.3168/jds.2016-10896

Dairy farmers' perceptions toward the implementation of on-farm Johne's disease prevention and control strategies

C. Ritter,*[1] J. Jansen,† K. Roth,* J. P. Kastelic,* C. L. Adams,‡ and H. W. Barkema*
*Department of Production Animal Health, Faculty of Veterinary Medicine, University of Calgary, Calgary, AB, Canada, T2N 4N1
†St. Anna Advies, 6525 Nijmegen, the Netherlands
‡Department of Veterinary Clinical and Diagnostic Sciences, Faculty of Veterinary Medicine, University of Calgary, Calgary, AB, Canada, T2N 4N1

ABSTRACT

Implementation of specific management strategies on dairy farms is currently the most effective way to reduce the prevalence of Johne's disease (JD), an infectious chronic enteritis of ruminants caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP). However, dairy farmers often fail to implement recommended strategies. The objective of this study was to assess perceptions of farmers participating in a JD prevention and control program toward recommended practices, and explore factors that influence whether or not a farmer adopts risk-reducing measures for MAP transmission. Semi-structured interviews were conducted with 25 dairy farmers enrolled in a voluntary JD control program in Alberta, Canada. Principles of classical grounded theory were used for participant selection, interviewing, and data analysis. Additionally, demographic data and MAP infection status were collected and analyzed using quantitative questionnaires and the JD control program database. Farmers' perceptions were distinguished according to 2 main categories: first, their belief in the importance of JD, and second, their belief in recommended JD prevention and control strategies. Based on these categories, farmers were classified into 4 groups: proactivists, disillusionists, deniers, and unconcerned. The first 2 groups believed in the importance of JD, and proactivists and unconcerned believed in proposed JD prevention and control measures. Groups that regarded JD as important had better knowledge about best strategies to reduce MAP transmission and had more JD risk assessments conducted on their farm. Although not quantified, it also appeared that these groups had more JD prevention and control practices in place. However, often JD was not perceived as a problem in the herd and generally farmers did not regard JD control as a "hot topic" in communications with their herd veterinarian and other farmers. Recommendations regarding how to communicate with farmers and motivate various groups of farmers according to their specific perceptions were provided to optimize adoption of JD prevention and control measures and thereby increase success of voluntary JD control programs.

Key words: behavior, attitude, mindset, biosecurity, cattle

INTRODUCTION

Johne's disease (**JD**) is an infectious enteritis of ruminants that is prevalent in most countries with a developed dairy industry. Infection with the bacterium causing JD, *Mycobacterium avium* subspecies *paratuberculosis* (**MAP**), can lead to substantial decreases in milk production, chronic diarrhea, and eventually death of affected cattle (Fecteau and Whitlock, 2010). In addition to well-documented effects of JD on animal health, productivity, and welfare, JD is also potentially linked to Crohn's disease in humans (Barkema et al., 2010). To reduce the prevalence and incidence of MAP infection and resultant economic losses for dairy farmers (Wolf et al., 2014b), many countries worldwide have implemented prevention and control programs for JD. One example of a voluntary JD program is the Alberta Johne's Disease Initiative (**AJDI**), launched in 2010 with the aim to reduce the estimated true herd-level MAP prevalence of 68% through farm-specific management changes (Wolf et al., 2014a).

Although a high level of participation is essential for infectious disease control programs to succeed (Barkema et al., 2014), often only a minority of farms enroll in voluntary programs for JD prevention and control (Hop et al., 2011; Nielsen, 2011). With approximately 65% enrollment of Alberta dairy farmers, participation in the AJDI was relatively high (notwithstanding, 35% of farmers chose not to participate). Ritter et al. (2016) reported that MAP infection status did not differ among AJDI participants and nonparticipants. How-

Received January 13, 2016.
Accepted July 18, 2016.
[1]Corresponding author: cmnritte@ucalgary.ca

ever, farmers not participating in the program were different from participating farmers in several aspects. In particular, they regarded available time as larger constraint on their farms and thought that costs associated with AJDI participation outweighed benefits (Ritter et al., 2015).

In addition to identifying impediments for enrollment of nonparticipants, it is also crucial to better understand participants' perceptions of voluntary programs such as the AJDI, given that its success is ultimately dependent on their continued participation and implementation of recommended management strategies for improved JD prevention and control. Uptake of suggested management changes to reduce MAP transmission was often reported to be <50% (Wraight et al., 2000; Sorge et al., 2010; Wolf et al., 2015a), and many dairy farmers in Canada felt that there was no need to improve JD control on their farms (Sorge et al., 2010). Farmers participating in Ontario focus groups often did not perceive a recommendation as practical on their farm, whereas their veterinarians regarded the same recommendation as feasible and attainable (Roche, 2014).

Several studies have attempted to explain farmers' decision-making and farm management (e.g., Barkema et al., 1999; Jansen et al., 2009; Ellis-Iversen et al., 2010; Garforth, 2012; Roche, 2014). Important findings of these studies were that a broad variety of factors influenced farmers' behavior (e.g., on-farm resources such as available time or finances, farmers' knowledge of a certain matter, or their sense of responsibility for consumer health and safety). However, dairy farmers are by no means a homogeneous group (Gasson, 1973), and their behavior is influenced by their individual mindsets (i.e., a collection of unique psychological traits including perceptions, beliefs, attitudes, intentions, and skills; Jansen and Lam, 2012). Therefore, although the usefulness of psychological frameworks is indisputable to provide general factors that might influence people, it is also necessary to identify drivers of farmers' decision making and behavior and how those might differ among individuals.

Accordingly, the objective of this study was to gain an understanding of AJDI participants' mindset toward JD prevention and control. Farmers' experiences with the AJDI were explored, with special attention to their perceptions of recommended on-farm management strategies. A qualitative methodology (grounded theory) was chosen. In grounded theory, data are used to generate patterns within the data without testing a specific a priori hypothesis (Glaser and Strauss, 1967). Constant comparison of emerging concepts and their describing subcategories is used to develop a theory that aims to explain why people make certain decisions. This approach allowed us to inductively obtain an understanding of farmers' perceptions without imposing their responses through predefined choices. Based on the findings, recommendations for successful communication with participating farmers were provided to improve on-farm JD prevention and control.

MATERIALS AND METHODS

Selection of Farmers

Dairy farmers participating in the AJDI were eligible for the study. Participation in the program consists of on-farm assessments, during which an AJDI-trained veterinarian identifies high-risk areas for MAP transmission and provides recommendations to mitigate risk (Wolf et al., 2014a). Risk assessment and management plan (**RAMP**) are combined with environmental fecal sampling to determine the farm's MAP infection status (Wolf et al., 2014a,b). Because of the voluntary nature of the AJDI, farmers can choose whether or not they want to repeat RAMP administration and fecal testing annually. In the present study, a farmer was defined as an AJDI participant if s/he had at least one RAMP and environmental fecal testing done since program implementation.

Purposive sampling was used for selection of farmers to capture a variety of different perspectives. In that regard, farmers' statements from conducted interviews guided selection of consecutive participants (e.g., toward the end of the study, efforts were made to primarily recruit participants with MAP-positive test results to obtain more information on the perceived effect of JD on their farm). Another criterion was to select farmers from various geographic regions at a feasible driving distance (maximally 600 km round trip) from Calgary, Alberta, Canada. Selected farmers were contacted by telephone and asked to participate in the study. Of the 30 contacted farmers, 25 (83%) agreed to be interviewed, and a meeting on their farm was scheduled. Reasons to refuse interviewing were no interest (n = 2), no time (n = 2), or the producer had ceased dairy farming (n = 1). Interviews were done between November 2014 and July 2015.

Data Collection

The interview process was based on the methodology of classical grounded theory (Glaser and Strauss, 1967). The first 10 interviews were conducted separately, with transcription and coding done after every interview to identify emerging themes and adjust subsequent interviews according to farmers' statements. Afterward, to enhance study feasibility, 2 interviews at a time were