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Perceptions of veterinarians in bovine practice and producers with beef cow-calf operations enrolled in the US Voluntary Bovine Johne's Disease Control Program concerning economic losses associated with Johne's disease

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ABSTRACT

This study compares the perceptions of producers and veterinarians on the economic impacts of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) infection in cow-calf herds. Questionnaires were mailed to beef producers through the Designated Johne's Coordinators and to veterinarians belonging to a nationwide professional organization. Important components of losses associated with MAP infected cows were used to estimate total loss per infected cow-year using an iterative approach based on collected survey data. Veterinarians were more likely to perceive a lower calving percentage in MAP infected cows compared to producers ($P = 0.02$). Income lost due to the presence of Johne's disease (JD) in an infected cattle herd was perceived to be higher by veterinarians ($P < 0.01$). Compared to veterinarians without JD certification, seedstock producers were more likely to perceive genetic losses due to culling cows positive for MAP ($P < 0.01$). There were mixed opinions regarding the magnitude of lowered weaning weight in calves from infected cows and perceived differences in risk of other diseases or conditions in infected cows. An annual loss of $235 (95% CR: $89–$457) for each infected animal was estimated based on information from the producer survey. The analogous estimate using information inputs from veterinarians was $250 ($82–$486). Mean annual loss due to JD in a 100 cow herd with a 7% true prevalence was $1644 ($625–$3250) based on information provided by producers. Similarly, mean annual loss based on information collected from veterinarians was $1747 ($575–$3375).

1. Introduction

Johne's disease (JD), or paratuberculosis, caused by infection with *Mycobacterium avium* subsp. *paratuberculosis* (MAP) is a disease of worldwide economic importance (Johnson-Ifearulundu et al., 1999; Harris and Barletta, 2001). Infection with MAP causes reduced production in dairy herds (Ott et al., 1999; Harris and Barletta, 2001; Tiwari et al., 2008; Raizman et al., 2009). Mortalities and sale of underweight infected cows represent a loss of revenue for beef producers and may have negative impacts on the reputation of seedstock

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producers (Roussel, 2011). There are negative impacts related to regulatory and ethical issues (Rossiter and Burhans, 1996) as well as legal liabilities for the sale of an infected cow, contamination of land, and breeding animals from infected herds (Kennedy and Allworth, 2000).

The National Animal Health Monitoring System (NAHMS) periodically evaluates producer attitudes and knowledge of JD as well as use of management practices related to herd biosecurity (NAHMS, 1994, 1999, 2010). A NAHMS study on beef in 1997 estimated that 92 percent of beef producers were either unaware of JD or only recognized the name (NAHMS, 1999) and a more recent study in 2007–2008 found that 69% of beef producers were either unaware of JD or only recognized the name (NAHMS, 2010). The United States Voluntary Bovine JD Control Program (VBJDCP) was created in 2002 to provide minimum national standards for the control of JD and to educate veterinarians and producers regarding management, prevention and control of JD (VBJDCP, 2002). Beef producers with herds having low risk of JD (level 4) in the US Voluntary Bovine Johne's Disease Control Program (VBJDCP) believe that a control program becomes economically beneficial as it progresses (Benjamin et al., 2009). A total of 59% of producers and 50% of veterinarians in Texas believed that losses in beef production due to JD are substantial (Benjamin et al., 2010). However, only 25% of producers with JD low-risk herds perceived a significant benefit of participation in control programs (Benjamin et al., 2009).

Data to estimate losses from JD in the US beef herds are limited. Bovine JD can cause herd-level losses even in the absence of clinical disease (Benedictus et al., 1987; Johnson-Ifearulundu et al., 1999, 2000; Gonda et al., 2007). Veterinarians presumably influence opinions of producers regarding the estimation of JD associated costs, testing and other control measures (Benjamin et al., 2010). The purpose of this study was to describe and compare the perceptions of producers and veterinarians related to economic impacts of MAP infection in beef cow-calf herds using responses from mailed questionnaire surveys.

2. Materials and methods

The study protocol was approved by the Institutional Review Board at Texas A&M University (protocol number 2010-06666).

2.1. Questionnaire development

The beef producer questionnaire contained 31 questions with applicable sub-questions in three major sections. The first section considered general herd information. The second section included questions about disease burden, perceived losses and differences between the productivity of MAP infected and non-infected cattle, possible costs associated with implementing control programs, facility upgrades deemed necessary for testing, and herd health management. The final section included questions related to activities for the control of MAP transmission.

The majority of questions for the veterinarian questionnaire were designed to be comparable to those in the producer questionnaire. There were three major sections with 35 main questions with some sub-questions, and two open ended questions for explanations related to preceding questions. The first section considered general demographic information including type and size of the veterinary practice. The second part was related to estimating disease burden in practice clientele herds, perceived losses, and differences between the productivity of MAP infected and non-infected cattle. The final section included questions related to control of MAP transmission in client herds. The veterinarian questionnaire was pre-tested by administration to bovine practitioners in the listserv of a professional veterinary organization via the Internet and revised based on the responses and comments.

Both questionnaires utilized a combination of free numerical or text responses, 5-category Likert scales, dichotomies (yes/no), and multiple choice questions. Both questionnaires were designed to be completed within 30 min. All questionnaires were printed in booklet form with a page containing survey information, rights of the respondents, and ethical approval. The questionnaire packet also included a cover letter that described the purpose of the questionnaire and was signed by two of the investigators (BB and AR). Guidelines for completing the questionnaire were explained in the cover letter and information sheet.

2.2. Questionnaire administration

Questionnaires were mailed during November and December, 2010 to all beef producers that had risk assessments performed and herd management plans developed for JD. Participants were contacted by the Designated Johne's Coordinators (DJC) of the 9 states in the USA (FL, GA, IA, MO, ND, SC, SD, WI, WV), who were willing to send the study questionnaires to the producers in their respective states. All eligible participants were selected to receive the questionnaire. A personal cover letter from the State DJCs was included with the questionnaire booklet. Introductory letters prior to the questionnaire, incentives and reminders were not sent to producers because information concerning questionnaire recipients was not disclosed to investigators.

Veterinarians with active membership in a US professional veterinary organization who listed "bovine" as one of their practice types as of July 2011 served as the sampling frame. All listed veterinarians satisfying the inclusion criteria from the same 9 states used for the producer survey were contacted. Questionnaires were uniquely coded to protect confidentiality. Veterinarians were contacted with an introductory letter 12 days prior to the mailing of questionnaires. Reminder post-cards were mailed 8 days after the questionnaire. A business reply envelope and a $2 bill were included in each questionnaire packet as an incentive to improve response proportions (Bhattarai and Fosgate, 2010).

2.3. Analysis

Responses from the completed questionnaires were recorded using SelectSurvey (ClassApps.com, 2006,