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FACTORS ASSOCIATED WITH PAPILLOMATOUS DIGITAL DERMATITIS ON U.S. DAIRY OPERATIONS

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L'objectif de cette étude était d'évaluer des pratiques d'élevage à l'échelle du troupeau en relation avec l'incidence de dermatite digitée papillomateuse (dermatite digitée). L'étude a reposé sur un échantillon d'enquête basé sur la population de troupeaux laitiers ayant au moins 30 vaches et participant au Système national de suivi de la santé des troupeaux, dans 20 Etats, représentant 79% du cheptel laitier des Etats-Unis. Un questionnaire a été administré aux éleveurs, en élevage, par des officiers vétérinaires ou des techniciens en santé animale, afin d'évaluer l'incidence de la dermatite digitée reportée par les éleveurs rétrospectivement et l'usage de certaines pratiques d'élevage.

Une incidence de plus de 5% de dermatite digitée a été observée dans 34% des élevages laitiers des Etats-Unis. L'analyse des facteurs de risque a été effectuée avec des modèles de régression logistique avec ajustement et l'analyse de la fraction attribuable dans la population. Les facteurs associés avec une incidence élevée de dermatite digitée, par ordre décroissant de fraction attribuable dans la population, sont le type de pâturage auquel ont accès quotidiennement les vaches laitières en hiver, le pourcentage de vaches nées en dehors de l'exploitation, la région, l'utilisation d'un pareur qui a aussi paré les pieds dans d'autres élevages, le type de sol sur lequel les vaches en lactation marchent, l'absence de lavage du matériel de parage entre vaches, et la taille du troupeau.

BACKGROUND

Since the first report of papillomatous digital dermatitis (digital dermatitis) in Italy in 1974 (Cheli and Mortellaro, 1974), it has been reported from countries around the world as an emerging disease condition in dairy cows (Blowey, 1988). In the U.S., digital dermatitis was first reported as lameness outbreaks in New York dairy herds (Rebhun and others, 1980) and, since the late 1980's, has been recognized as an important cause of bovine lameness.

The etiology of digital dermatitis is not fully understood, but aspects of the host-agent-environment complex have been studied. Research in the area of environmental predispositions for digital dermatitis has suggested that certain herd-level management factors predispose dairy herds to disease. These factors include moisture in corrals where cows walk and introduction of dairy replacement heifers to the operation (Rodriguez-Lainz and others, 1996). Improved understanding of causal factors for this disease would facilitate development of management strategies to prevent or minimize disease and resulting economic losses. The objective of this study was to evaluate specific herd-level management factors associated with digital dermatitis occurrence on U.S. dairy operations.

MATERIALS AND METHODS

In the first phase of the National Animal Health Monitoring System (NAHMS) Dairy '96 Study, a stratified random sample of dairy producers in 20 states was selected from the U.S. Department of Agriculture National Agricultural Statistics Service (NASS) list frame. In January 1996, dairy producers were contacted by NASS enumerators and completed an administered questionnaire assessing dairy health and management. Each producer that completed the questionnaire and with at least 30 dairy cows was asked to participate in the second phase of the NAHMS Dairy '96 Study. Dairy producers with at least 30 dairy cows in these 20 states represented 79% of U.S. dairy cows in January 1995.

In the second phase of this study, each respondent producer was contacted by Federal or State veterinary medical officers or animal health technicians for a second herd visit. During this herd visit, dairy producers completed a second questionnaire which included questions about digital dermatitis. To assess incidence of digital dermatitis as reported by dairy managers, data collectors provided a brief standardized description of the disease and showed several photographs of lesions.

The goal of this analysis was to identify herd-level factors associated with papillomatous digital dermatitis incidence, and evaluate the importance of these factors in the national U.S. dairy herd. The outcome variable was dairy herds with greater than 5% of cow inventory affected with digital dermatitis reported by herd mangers in the previous 12 months compared to those dairy herds with less than or equal to 5% of cow inventory affected. Associations between digital dermatitis incidence and herd factors were evaluated using a logistic regression model using SUDAAN (1996), a statistical software that incorporates study design stratification and weights in variance estimation. From coefficients of the final logistic regression model, odds ratios (as estimates of relative risks) with 95% confidence limits were generated. The importance of these risk factors were evaluated using population attributable fraction methods as described by Bruzzi and others (1985).

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RESULTS

1182 dairy producers participated in the papillomatous digital dermatitis phase of the NAHMS Dairy '96 Study. 33.6% of dairy operations reported at least 5% of their milk cows with clinical signs of digital dermatitis in the previous 12 months. A 5% incidence of digital dermatitis was used as the cut-off level for logistic regression analysis as a conservative precaution because of suspected lack of recognition of this condition by dairy managers in low incidence herds.

Strengths of this analysis were the broad geographic distribution of dairy herds representing the various management styles used by dairy producers across the U.S. and the random sampling of producer participants, both of which allowed generalizability to the entire U.S. dairy herd. The sampling also allowed for estimation of population attributable fractions for certain herd factors associated with digital dermatitis. A limitation of this study was that reporting of digital dermatitis relied upon retrospective assessments of disease incidence by herd managers.

In addition to region and herd size, other variables associated with greater than 5% incidence of digital dermatitis included type of land that lactating cows accessed on a daily basis during winter, percent of cows born off the operation, use of a primary hoof-trimmer who also trimmed hooves on other operations, predominant flooring type where lactating cows walked, and washing of hoof trimming equipment between cows when trimming hooves.

Herds where lactating cows had daily access to dry lot outside areas only were at higher risk of digital dermatitis incidence (odds ratio (OR) = 4.3) and those where lactating cows had daily access to neither dry lots or pasture were at intermediate risk (OR= 2.6), compared to the reference population of lactating cows that had daily access to pastures only. Herds where lactating cows walked on a predominant flooring type of grooved concrete were at highest risk (0R = 2.7) compared to the reference population of herds with textured concrete flooring.

The percent of cows born off the dairy operations was strongly associated with digital dermatitis incidence, with evidence for a dose-response relationship, as herds with greater than or equal to 25% of cows born off the operation were at much greater risk of high digital dermatitis incidence (OR = 7.9) and those with 1-24% of cows born off the operation were at intermediate risk (OR = 4.1), compared to herds with no cows born off the operation.

Herds where the primary hoof trimmer also trimmed hooves on other operations were 2.8 times more likely to have high incidence of digital dermatitis compared to herds where the primary hoof trimmer did not trim hooves on other operations or where cows hooves were not trimmed. Also, herds where hoof trimming equipment was not washed between use on cows were 1.9 times more likely to have high incidence of digital dermatitis than those where the equipment was washed or where no hooves were trimmed.

Population attributable fraction was interpreted as the proportion of herds with high incidence of digital dermatitis (greater than 5%) that could be prevented by removing the effects of a variable. From population attributable fraction analyses, these factors by decreasing order of relative importance included type of land that lactating cows accessed on a daily basis in winter, percent of cows born off the operation, region, the use of a primary hoof-trimmer who also trimmed hooves on other operations, predominant flooring type where lactating cows walked, lack of washing of hoof trimming equipment between cows when trimming hooves, and herd size.

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