



## Survey of management practices related to bovine respiratory disease in preweaned calves on California dairies

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### ABSTRACT

In the spring of 2013, a survey of California (CA) dairies was performed to characterize management practices related to bovine respiratory disease in preweaned calves, compare these practices across geographic regions of the state, and determine the principal components that explain the variability in management between herds. The questionnaire consisted of 53 questions divided into 6 sections to assess management practices affecting dairy calves from precalving to weaning. The questionnaire was mailed to 1,523 grade A licensed dairies in CA and 224 responses (14.7%) were collected. Survey response rates were similar over the 3 defined regions of CA: northern CA, northern San Joaquin Valley, and the greater southern CA region. The mean size of respondent herds was 1,423 milking cows. Most dairies reported raising preweaned calves on-site (59.7%). In 93.3% of dairies, preweaned calves were raised in some form of individual housing. Nonsaleable milk was the most frequent liquid diet fed to preweaned heifers (75.2%). Several important differences were identified between calf-raising practices in CA and practices reported in recent nationwide studies, including herd sizes, housing practices, and sources of milk fed to heifers. The differences between the CA and nationwide studies may be explained by differences in herd size. Regional differences within CA were also identified. Compared with the 2 other regions, northern CA dairies were found to have smaller herds, less Holstein cattle, calves remained with dams for longer

periods of time after calving, were more likely to be certified organic dairies, and raised their own calves more often. Principal component analysis was performed and identified 11 components composed of 28 variables (questions) that explained 66.5% of the variability in the data. The identified components and questions will contribute to developing a risk assessment tool for bovine respiratory disease in preweaned dairy calves.

**Key words:** dairy calves, preweaning, California dairies, bovine respiratory disease

### INTRODUCTION

Bovine respiratory disease (BRD) is an important economic disease in the North American dairy industry (Sischo et al., 1990). It is the second most common cause of death in preweaned dairy heifers and the most common cause of death in weaned dairy cattle (USDA, 2010). Bacterial agents that cause BRD, such as *Mannheimia haemolytica*, *Pasteurella multocida*, and *Histophilus somnus*, may be isolated from the upper respiratory tracts of healthy cattle (Ames et al., 2002; Callan and Garry, 2002). Viruses such as bovine respiratory syncytial virus and bovine herpesvirus type 1 are also considered etiologic agents of BRD (Gershwin, 2007; Jones and Chowdhury, 2010; Windeyer et al., 2015). In addition, BRD has a multifactorial etiology and commonly occurs following events that compromise the immune system of the respiratory tract, such as failure of transfer of passive immunity (Virtala et al., 1999), viral infections (Martin and Bohac, 1986; Czuprynski et al., 2004), poor air quality (Lago et al., 2006), over-crowding, and stress (Snowder, 2009).

Prevention and control of BRD requires an understanding of the factors and management practices associated with respiratory disease (Patrick, 2009). Several studies have described the relationship between management practices and BRD (Perez et al., 1990; Lago

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et al., 2006; Pithua et al., 2009; Windeyer et al., 2014), but such studies have not been translated into practical guidelines for producers who raise calves (Stanton, 2009). Recommended changes in calf management to control BRD must not only effectively reduce economic losses, but should also be practical and compatible with contemporary dairy management practices (Patrick, 2009).

Previous dairy studies performed by the USDA National Animal Health Monitoring System (NAHMS) have collected information about dairy calf-management practices on US dairies (USDA, 2002, 2010) and have generalized findings regarding dairy heifer practices over broad eastern and western regions, but management of dairies can meaningfully differ between and within states in the same geographic region. The categories in which herd size was reported in the NAHMS studies may not suit the larger herd sizes in California. In 2013, the average herd size in California was 1,186 cows/herd, which is much larger than the national average of 196 cows/herd (CDFA, 2013). In the 2007 NAHMS study, herd size was reported categorically, with the largest category containing herds of 500 cows or more, yet only 20% of the herds sampled had 500 cows or more (USDA, 2010).

California's unique milk-pricing system has created challenges for California dairy producers in recent years (Ellerby, 2010), and California's climate allows for housing systems that are not practical in many other parts of the country (Davis, 1954; Lago et al., 2006). Hence, a clear description of current preweaned dairy calf management on California dairies is required to identify achievable and effective recommendations for BRD control within the state. Similar studies have been used previously to assess other diseases or management practices in California (Aly et al., 2014) and elsewhere (Dutil et al., 1999). Therefore, the objectives of the current survey were to characterize management practices related to BRD in preweaned calves on California dairies, compare these practices across geographic regions of the state, and to determine the principal components that explain the variability in management between herds. Results of the survey will be used to develop an on-farm BRD risk assessment tool that can be used to identify BRD risk factors.

## MATERIALS AND METHODS

### Questionnaire Design

A survey instrument was designed to collect information about management practices thought to be associated with the incidence of BRD in preweaned calves on

California dairies. The questionnaire was tested using in-person interviews with producers and veterinarians. The questionnaire's final 53 questions were partitioned into 6 sections: herd demographics, calving and newborn calf management, colostrum management, preweaned calf management, weaning practices, and disease monitoring and prevention. An additional optional section was included to allow respondents to provide contact information if they were interested in participating in the continuation study and to provide feedback about the questionnaire. The study was reviewed by the University of California, Davis Institutional Review Board and granted exemption status.

### Survey and Data Collection

A list of all 1,523 licensed grade A dairies in California in 2013 served as a sampling frame. Each dairy was randomly assigned a confidential number, which was used as the only unique identifier for each dairy during analysis. Dairies on the list were mailed a survey packet containing a copy of the questionnaire, a postage-paid addressed business reply envelope, and an information cover letter. Respondents were given the option of returning the completed questionnaire using the enclosed postage-paid envelope or completing the survey online. Responses were also solicited from volunteers at the 2013 World Ag Expo (WAE) in Tulare, California, and in person from dairy producers familiar to the authors. To improve questionnaire response rate, dairies received a reminder card 2 wk after the initial questionnaire package. In addition, a second questionnaire followed by a reminder card were sent a month later to dairies that did not respond. Finally, respondents that completed and returned the questionnaire were entered in a drawing to win an iPad 2 (Apple, Cupertino, CA).

### Questionnaire Sections

**Herd Demographics.** The first section of the questionnaire assessed baseline descriptive information about the responding dairy. Questions related to the respondent's role on the dairy, the number of milking cows in the herd, the breeds of milking cows in the herd, the county where the dairy was located, if the dairy was a certified organic dairy, and if the dairy had a working relationship with a veterinarian or veterinary practice.

**Calving and Newborn Calf Management.** The questions in this section included use of group and individual maternity pens, the degree of shelter provided by the maternity pens, how frequently the bedding in the maternity pens was changed, and how long calves

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