J. Dairy Sci. 101:1–17
https://doi.org/10.3168/jds.2017-14010

Preweaned heifer management on US dairy operations: Part I. Descriptive characteristics of preweaned heifer raising practices

N. J. Urie,*† J. E. Lombard,*[1] C. B. Shivley,*‡ C. A. Kopral,* A. E. Adams,*‡[2] T. J. Earleywine,§ J. D. Olson,# and F. B. Garry†

*USDA-Animal and Plant Health Inspection Service (APHIS)-Veterinary Services (VS) Center for Epidemiology and Animal Health, National Animal Health Monitoring System, Fort Collins, CO 80526-8117
†Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins 80523-1678
‡Department of Animal Sciences, College of Agricultural Sciences, Colorado State University, Fort Collins 80523-1171
§Land O'Lakes Animal Milk Products Co., Cottage Grove, WI 53527
#Zoetis, 5 Giralda Farms, Madison, NJ 07940

ABSTRACT

The objective of this study was to describe preweaned dairy heifer calf management practices on dairy operations across the United States that were used to analyze factors associated with colostrum quality and passive transfer, *Cryptosporidium* and *Giardia*, morbidity and mortality, and average daily gain. This study included 104 dairy operations in 13 states that participated in the National Animal Health Monitoring System's Dairy 2014 calf component study. This 18-mo longitudinal study focused on dairy heifer calves from birth to weaning, and data were collected on 2,545 heifer calves. Descriptive statistics were generated regarding colostrum feeding, preweaning housing, milk feeding and consumption, growth, morbidity and mortality, and weaning practices. The majority of calves enrolled were Holsteins (89.4%). Over half the calves (63.2%) enrolled in the study received the majority of their colostrum via bottle; however, 22.1% of calves from 51.0% of operations received colostrum via suckling from their dams. For all calves, the mean time to the first colostrum feeding was 2.8 h, and the average amount of colostrum at the first feeding was 2.9 L, with 4.5 L provided in the first 24 h. The mean serum IgG of all calves was 21.7 g/L; however, 76.0% of operations had at least 1 calf with failure of passive transfer of immunity with a serum IgG below 10 g/L. The majority of calves in the study were housed individually (86.6%). Nonetheless, 20.2% of operations housed some calves in groups, representing 13.4% of all calves. Approximately one-half of the calves in the study (52.3%) were dehorned or disbudded during the preweaning period, with only 27.8% of these calves receiving analgesics or anesthetics during the procedure. Whole or waste milk was the liquid diet type fed to 40.1% of calves, and milk replacer was fed to 34.8% of calves. A combination of milk and milk replacer was fed to 25.1% of calves. Calves, on average, were fed 2.6 L per feeding and fed 2.6 times/d, resulting in a total of 5.6 L of liquid diet fed per day. The mean average daily gain for all calves enrolled in the study was 0.7 kg/d. Fecal samples were collected and almost all operations had at least 1 calf positive for *Cryptosporidium* (94.2%) or *Giardia* (99.0%), and 84.6% of operations had calves that tested positive for both *Cryptosporidium* and *Giardia.* Over one-third of calves (38.1%) had at least one morbidity event during the preweaning period and the mortality rate was 5.0%. The mean age at weaning was 65.7 d. This study provides an update on dairy heifer raising practices in the United States.

Key words: preweaning management, liquid diet, dairy heifer calves

INTRODUCTION

The management of preweaned dairy heifer calves in the United States is complex and varies based on many factors, including operation size and location. Previous reports regarding management practices of preweaned dairy calves have been published (Heinrichs et al., 1994; Fulwider et al., 2008; Walker et al., 2012). However, continual change in the industry necessitates current information regarding management practices of preweaned dairy heifer calves throughout the United States. Additionally, rearing heifer calves is an expensive endeavor at approximately $5.50/calf per day (Zwald et al., 2007). Nevertheless, the cost of raising a heifer calf generally does not exceed the cost of purchasing a springing heifer (McGuirk, 2008). Therefore, ensuring that preweaned heifer calves are managed

Received October 17, 2017.
Accepted March 30, 2018.
[1]Corresponding author: Jason.E.Lombard@aphis.usda.gov
[2]Current affiliation: School of Agriculture and Natural Resources, Morrisville State College, Morrisville, NY 13408.

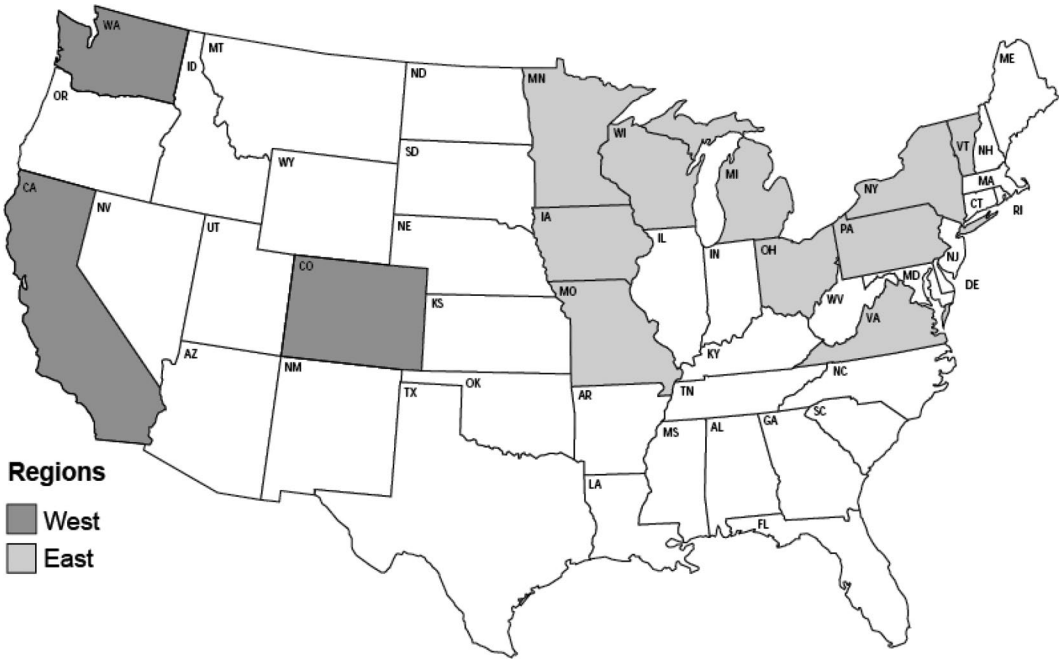

Figure 1. Map of states participating in the calf component of the Dairy 2014 study. Regions were defined as West (blue states; California, Colorado, and Washington) and East (green states; Iowa, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Vermont, Virginia, and Wisconsin). Color version available online.

properly to produce healthy dairy cows is extremely important to the industry. As part of USDA's National Animal Health Monitoring System Dairy 2014 study (USDA, 2016), the calf component aimed to describe current dairy heifer calf health and management practices during the preweaning period. The objectives of the longitudinal heifer calf study were to (1) describe practices related to colostrum management, milk feeding, and calf housing; (2) evaluate colostrum quality and passive transfer; (3) estimate the incidence of disease and its relationships with management factors; and (4) evaluate ADG during the preweaning period. The specific objective of this paper was to describe the study sample of operations and calves that were used to analyze factors associated with colostrum quality and passive transfer, *Cryptosporidium* and *Giardia*, morbidity and mortality, and ADG.

MATERIALS AND METHODS

Study Design

The USDA's National Animal Health Monitoring System (**NAHMS**) conducts national surveys to collect information on the health, management, and productivity of domestic livestock species (USDA, 2016). In 2014, a nationwide survey was conducted to collect information about the US dairy industry and included an 18-mo longitudinal preweaned heifer calf study.

The calf component was part of the NAHMS Dairy 2014 study and consisted of a convenience sample of 104 dairy operations (Figure 1 and 2). These operations were located in 13 states, including California, Colorado, and Washington in the West region, and Iowa, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Vermont, Virginia, and Wisconsin in the East region. Dairy operations were categorized, based on the number of mature cows, as small (30 to 99 cows), medium (100 to 499 cows), or large (500 or more cows).

Data collection for the calf component of the study occurred from March 2014 through September 2015. Each operation was instructed to enroll 24 heifer calves over a 1-yr period, or an average of 2 calves/mo. Farm personnel selected which calves to enroll in the study. However, a calf must have been alive at 24 h of age to be enrolled. Because fewer operations participated than originally planned, the target number enrolled per operation was increased to 48 calves. Additionally, because enrollment of farms did not occur as quickly as anticipated, the study encompassed 18 mo instead of the 12-mo period that was planned (Figure 2).

Heifer Calf Health Card

Each calf enrolled in the study had a Heifer Calf Health Card ("Calf Card") filled out to record information on events that occurred from birth to weaning