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Effect of housing type on health and performance of preweaned dairy calves during summer in Florida[1]

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ABSTRACT

The objective was to evaluate the effect of housing type on health and performance of preweaned dairy calves. One hundred calves, Holsteins (HO) or Holstein-Jersey crosses (HJ), were randomly assigned to a Calf-Tel (L. T. Hampel Corp., Germantown, WI) polyethylene hutch exposed to direct sun light (n = 25 for both HO and HJ) or a wire hutch with a plywood shade located under trees (n = 24 and 26 for HO and HJ, respectively). Calf rectal temperature, respiratory rate, health scores, and weaning weight were compared by housing type. Rectal temperatures were higher in calves in Calf-Tel hutches compared with calves in wire hutches at 1500 h, at 40.1 ± 0.28 and 39.1 ± 0.22°C, respectively. Similarly, respiratory rates were higher in calves in Calf-Tel hutches compared with calves in wire hutches at 1500 h, at 90 ± 15 and 65 ± 10 breaths per minute, respectively. Frequencies of calves presenting abnormal ear scores did not differ between calves in Calf-Tel or wire hutches. Abnormal eye scores were less likely to occur for calves in the wire hutches. Frequencies of calves with signs of respiratory disease, such as nasal discharge and coughing, were higher in the wire hutches compared with the Calf-Tel hutches. No differences were noted in the incidence and time of first diarrhea event in calves between hutch types. Calves in wire hutches had 5.47 greater odds of receiving veterinary treatment compared with calves in the Calf-Tel hutches. Weaning weights were not different for calves in Calf-Tel or in wire hutches. The lower frequency of calves with abnormal health scores and receiving veterinary treatment in Calf-Tel hutches and the lack of difference in weight gain suggests that this housing system adapted well to the specific environmental conditions of this study.
Key words: calves, health, housing, performance

INTRODUCTION

Housing type and environment play a pivotal role in the health and behavior of dairy calves (NAHMS, 2007). The most favorable housing for dairy calves depends upon climatic conditions, as calf growth and health are affected by cold and hot weather (Collier et al., 1982; Young, 1983; Broucek et al., 2009). As described by Donovan (1992), an appropriate calf housing environment should be clean, dry, and well ventilated. As individual hutches excel in these recommendations and provide isolation of calves, they are commonly used in calf-rearing programs (Broucek et al., 2009).

A common housing system used in warm humid environments is a wire-framed hutch with a piece of plywood on top to provide shade. Although this type of hutch design has been successfully used in the southeast region of the United States, during summer months calves may experience heat stress due to inappropriate shade. Consequently, many producers choose to raise calves inside open ventilated barns or underneath trees. Another calf hutch design option available to dairy producers is the Calf-Tel (L. T. Hampel Corp., Germantown, WI) housing system. The Calf-Tel hutch is completely enclosed with polyethylene-based plastic, which provides shade and, because of its adjustable rear ventilation door, may be adequate for warm climates where heat stress during summer represents a concern. However, research is lacking on health-related parameters of calves raised in this type of hutch under summer temperatures in a subtropical climate. We hypothesized that dairy calves housed in the Calf-Tel hutches until weaning would adapt well during summer months and experience improved health compared with calves housed in traditional wire framed hutches. Therefore, the objective of the present study was to evaluate the health and performance of preweaned

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dairy calves housed in Calf-Tel hutches during summer under subtropical climatic conditions.

MATERIALS AND METHODS

Animals and Animal Housing

The study followed the University of Florida animal care committee guidelines and was conducted at a north-central Florida dairy farm during the summer of 2009. The climate, as described by a weather station close to the farm (Gilchrist County weather station, Bell, FL), is classified as subtropical with average ambient temperatures for the months of the study (June to August) ranging from 21.1 (minimum) to 32.2°C (maximum), with a relative average humidity (±SD) of 92.9 ± 15%. One hundred female Holstein (**HO**) calves or Holstein- Jersey crosses (**HJ**) were enrolled in the study. Calves were separated from their dam within 2 h after birth and fed 3.8 L of colostrum that contained >70 g/L of IgG measured by the use of a colostrometer (Calloway et al., 2002), calves then had their navel dipped with an iodine solution and were identified by use of an ear tag. Treatment allocation was blocked by calf breed (HO, HJ) and calves were randomly assigned to either a wire hutch (HO, n = 24; HJ = 26) or a Calf-Tel hutch (HO, n = 25; HJ = 25) until weaning (9 wk of age). The wire hutches consisted of a rectangular 2-m^2 space enclosed with hog wire with a plywood roof. As commonly performed in Florida dairies, the wire hutches were situated over a sand floor located underneath parallel rows of tall trees (>9 m in height) that were about 4 m apart, resulting in all animals having similar levels of partial natural shade through the entire day. The wire hutches were aligned in 2 rows oriented east-west, approximately 2 m apart. The Calf-Tel housing was constructed with polyethylene. The rear door provided superior airflow for ventilation and its opaque walls reduced the penetration of UV light; size was approximately 4 m^2 (2 m^2 inside the hutch plus a wired 2-m^2 outside area). The Calf-Tel hutches were located in an open area, exposed to direct sun light, and arranged in rows oriented east-west.

Calves were managed the same across housing type and received 2 feedings of 3.8 L of colostrum during the first 24 h of life, then 3.8 L of pasteurized enriched hospital milk (13% total milk solids) daily until 7 wk of age. At wk 8, milk was provided only in the morning. At wk 9 calves were weaned. After 7 d of age, calves had ad libitum access to the starter diet described in Table 1, which met or exceeded the requirements for preweaned Holstein calves (NRC, 2001). Water from a plastic bucket (7.6 L), filled twice a day, was provided throughout the study from 2 d of age. Calves were dehorned before 30 d of age with electric cauterization under local anesthesia with veterinary supervision and vaccinated according to farm operational procedures established by the farm veterinarian. Briefly, the vaccination protocol for preweaned heifers included intranasal TSV-2 (IBR/PI3; Zoetis, Florham Park, NJ) at 2 d; Clostridial 8-way (Zoetis) and Bovi-Shiled Gold (IBR/PI3/BVD/BRSV; Zoetis) at 2 and 6 wk; and Ocu-guard MB-1 (*Moraxella bovis*; Boehringer Igelheim, St. Joseph, MO) at 7 wk. In addition, calves received 3 mL of Bo-Se (Se/vitamin E; Merck Animal Health, Millsboro, DE) at 2 d and Safe-Guard (Merck Animal Health) at 8 wk.

Table 1. Composition of the starter grain diet fed to the study calves

Nutrient content[1]	Starter grain
NE_G (Mcal/kg)	1.24
CP (%)	22
Fat (%)	2.5
ADF	10.5
Ca (%)	0.9 – 1.3
P (%)	0.6
S (%)	0.00006
Vitamin A (IU/kg)	17,640
Monensin[2] (g/t)	60

[1]Values were taken from company analysis; Purina, St. Louis, MO.
[2]Elanco Animal Health, Greenfield, IN.

Experimental Procedures

Blood samples were collected from the jugular vein to measure serum total proteins (**STP**) concentration to determine failure of passive transfer in calves 2 to 7 d old using evacuated tubes without an anticoagulant (Becton Dickinson Vacutainer, Franklin Lakes, NJ). Samples were allowed to clot and serum was harvested for determination of STP concentration using a handheld refractometer (Calloway et al., 2002). Calf weight was measured soon after birth and at weaning using a digital scale (AllFlex New Zealand, Palmerston North, NZ). Calf pelvic height was measured at birth and at weaning using a height measurement stick (Nasco height stick, Fort Atkinson, WI). Rectal temperature, respiratory rate, and health scores were collected 3 times per week at 0900 and 1500 h until weaning. Rectal temperature was measured using a rectal thermometer (30-s digital thermometer, Lifelabs CSN Stores, Boston, MA). Respiratory rate was evaluated by counting the movements of the abdominal muscles in the flanks during respiration according to Spain and Spiers (1996). Health status was assessed following the calf health-scoring chart developed by the University