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THE EFFECT OF COLD STRESS ON NEWBORN BOS INDICUS AND BOS TAURUS CALVES

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SUMMARY

Brahman calves that are born during cold weather tend to be susceptible to cold stress. After parturition Brahman calves in a cold environment do not appear to be able to maintain body temperature and are less vigorous than are European crossbreds. The calves often appear listless and show no attempt to nurse. Data from this study showed that newborn Brahman calves cannot utilize the energy containing components of the blood (glucose, lactate, triglycerides, blood urea nitrogen) to regulate body temperature as well as the crossbred calves when stressed by cold. This dysfunction may be related to or caused by the metabolic hormones from the thyroid gland (triiodothyronine, tetraiodothyronine).

OBJECTIVE

This study was designed to determine the effects of cold stress on newborn Brahman and crossbred calves.

PROCEDURES

Nine newborn Brahman calves and 11 1/2 Simmental X 1/4 Brahman X 1/4 Hereford calves were evenly distributed between 2 treatment groups. Calves were removed from their dam within 20 minutes after birth and placed in either a warm (88°F) or cold (40°F) environment. Jugular blood samples were collected at 20 minute intervals for 180 minutes. Body temperature and calf vigor score were collected at these times also (Table 1). At 100-120 minutes, all calves were given 2.5 pints of colostrum from their dam via a stomach tube. At 120 minutes, cold treated calves were placed in the warm environment for the remainder of the sampling period. Blood samples were analyzed for glucose, lactate, triglycerides, blood urea nitrogen, hemoglobin, triiodothyronine (T3), and tetraiodothyronine (T4) concentrations.

RESULTS

Cold treated Brahman calves had lower body temperatures than warm treated Brahman or cold and warm treated crossbred calves ($P<.0001$; Figure 1) over the treatment period. The cold Brahman calves were not able to bring their body temperature back up to pre-treatment levels even after being removed from the cold. The crossbred calves had a higher vigor score than Brahman calves at either temperature ($P<.008$; 2.8 vs 1.5, respectively). Glucose was higher in cold treated calves than in warm treated calves within a breed type, and Brahman calves had higher glucose levels than crossbred calves within environmental temperature ($P<.0001$; Figure 2). Brahman calves had higher lactate levels than crossbred calves but there was no difference between warm and cold treated calves within a breed type ($P<.02$). Blood urea nitrogen was higher in Brahman calves than in crossbred calves ($P<.0001$), and cold treated Brahman calves had higher blood urea nitrogen (BUN) levels than warm treated Brahman calves. There was no difference in BUN between warm and cold treated crossbred calves ($P<.07$). Triglyceride and T4 levels were higher in cold than in warm treated Brahman, and cold or warm treated crossbred calves ($P<.0001$). Brahman calves had higher T3 levels than crossbred calves regardless of temperature ($P<.0001$). There was no difference in hemoglobin between breed types or temperatures.

TABLE 1.

CALF VIGOR SCORE	CHARACTERISTIC
1	Still, not trying to stand
2	Slightly trying to stand
3	Vigorously trying to stand
4	Standing

FIGURE 1. BODY TEMPERATURE OF BRAHMAN AND CROSSBRED CALVES

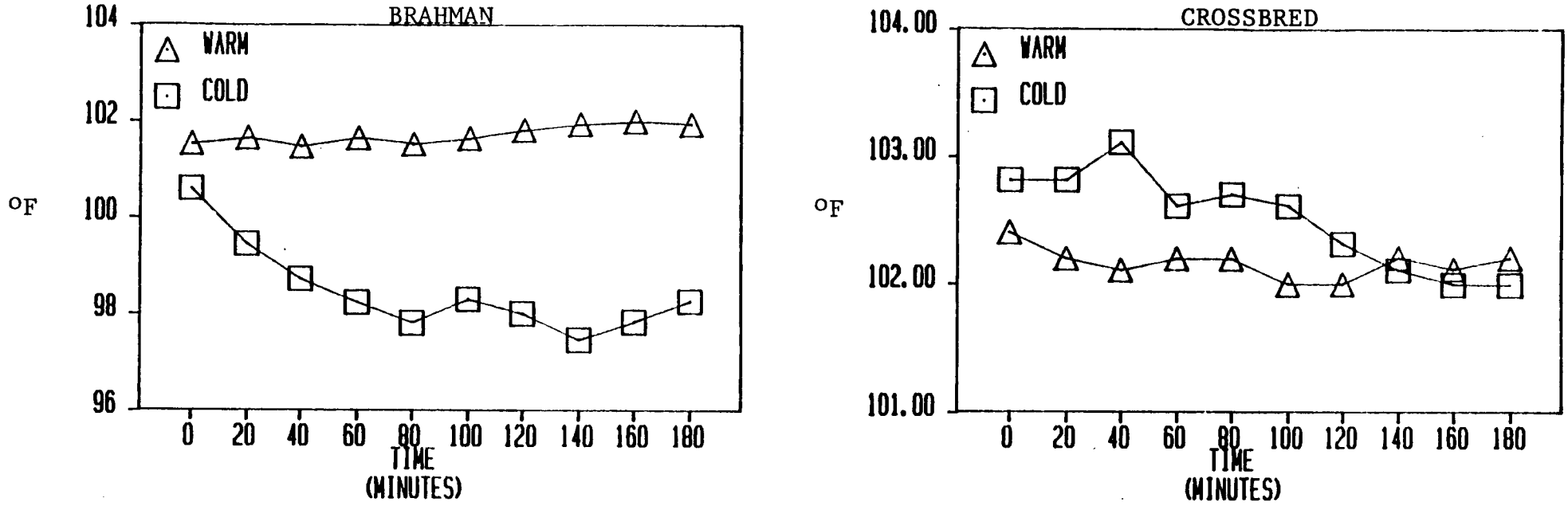

FIGURE 2. BLOOD GLUCOSE OF BRAHMAN AND CROSSBRED CALVES