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EARLY MATERNAL DEPRIVATION AFFECTS A BRAHMAN CALF'S PHYSIOLOGICAL AND BEHAVIORAL REACTIONS TO RESTRAINT AND WEANING

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Background. For several species, stress in infancy has been shown to decrease emotional behavior and(or) increase the ability of the animal to cope with stressful situations in maturity. If this phenomena occurs in cattle, the production benefits would be numerous. The objective of this experiment was to determine what effect maternal deprivation and restricted nursing has on a calf's ability to resist later stressors. Allowing a calf to nurse from its dam only once a day is commonly used as a management tool to obtain shorter calving intervals. At birth, 40 Brahman calves were assigned to either a restricted nursing treatment (RN) or an ad libitum nursing treatment (ALN). The access of the RN calves to their dams was restricted starting at 21 days of age. They were allowed to nurse their dams for 2 hours each day for the next 18 days. After 18 days of restricted nursing, the calves were turned out on pasture with their dams until weaning. The ALN calves remained with their dams from birth until weaning. All of the calves were given a restraint challenge at 192 days of age that consisted of holding each calf in a squeeze chute for 20 min, during which time blood samples were taken via jugular veni-puncture and heart rate samples were taken via telemetry. When the calves were weaned two weeks later, blood samples were taken for cortisol analysis and behavioral observations were made to quantify vocalizations, distance travelled, and time spent eating.

Research Findings. The mean plasma cortisol concentrations did not differ between treatments ($P>.10$); however, the heart rates of the ALN calves were greater than the RN calves ($P<.0001$) during restraint (Figure 1 and 2). In response to weaning, the ALN calves had greater mean plasma cortisol concentrations than the RN calves at 2 sampling times ($P<.04$). On the day of weaning, two 15 min behavioral observations indicated that more RN calves ate than did ALN calves ($P<.05$), and the RN calves spent more time eating than the ALN calves ($P<.02$). The rate at which the calves vocalized did not differ between treatments ($P>.20$). Initially, the RN calves travelled farther on the day of weaning ($P<.004$), but the ALN calves travelled farther on the next day ($P<.04$).

Implications. Maternal deprivation and restricted nursing of a calf has variable effects on how that calf copes with stress during restraint and weaning. The calves responded differently to the acute stress (restraint) than they did to the comparably moderate stress of weaning. Whether the early stress associated with maternal deprivation and restricted nursing helps the calf respond to stress later in life is not clear from these data. However, the observation that the RN calves were eating sooner than the ALN calves would indicate that these calves are less stressed by weaning than the ALN calves.

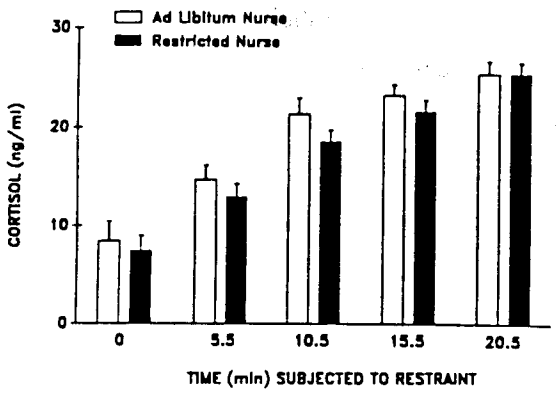

Figure 1. Mean plasma cortisol concentration in response to restraint. Concentration increased during restraint ($P < .0001$), however there were no differences due to treatment ($P > .10$).

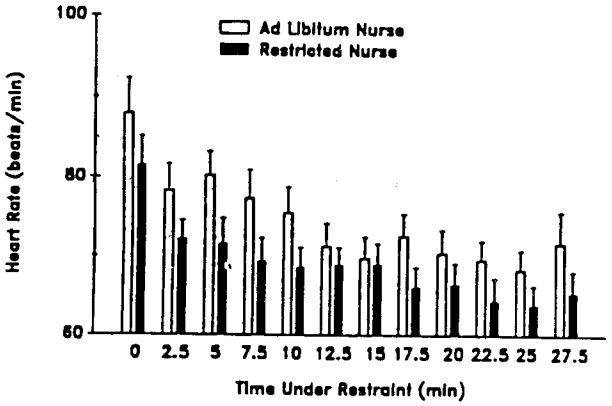

Figure 2. Mean heart rate in response to restraint. The ad libitum nurse calves had greater heart rates than the restricted nursed calves ($P < .0001$).