

Effects of sodium chloride and fat supplementation on finishing steers exposed to hot and cold conditions

J. B. Gaughan * and T. L. Mader **

* School of Animal Studies, The University of Queensland, Gatton, Australia, 4343; and ** Haskell Agricultural Laboratory, University of Nebraska-Lincoln, Concord 68728

Abstract :

Three studies were conducted to evaluate the effects of supplemental fat and salt (sodium chloride) on DMI, daily water intake (DWI), body temperature, and respiration rate (RR) in *Bos taurus* beef cattle. In Exp. 1 and 2, whole soybeans (SB) were used as the supplemental fat source. In Exp. 3, palm kernel meal and tallow were used. Experiment 1 (winter) and Exp. 2 (summer) were undertaken in an outside feedlot. Experiment 3 was conducted in a climate-controlled facility (mean ambient temperature = 29.9°C). In Exp. 1, three diets, 1) control; 2) salt (control + 1% sodium chloride); and 3) salt-SB (control + 5% SB + 1% sodium chloride), were fed to 144 cattle (BW = 327.7 kg), using a replicated 3 x 3 Latin square design. In Exp. 2, 168 steers (BW = 334.1 kg) were used. In Exp. 2, the same dietary treatments were used as in Exp. 1, and a 5% SB dietary treatment was included in an incomplete 3 x 4 Latin square design. In Exp. 3, three diets, 1) control; 2) salt (control + 0.92% NaCl); and 3) salt-fat (control + 3.2% added fat + 0.92% NaCl) were fed to 12 steers (BW = 602 kg) in a replicated Latin square design. In Exp. 1, cattle fed the salt-SB diet had elevated ($P < 0.05$) tympanic temperature (TT; 38.83°C) compared with cattle fed the control (38.56°C) or salt (38.50°C) diet. In Exp. 2, cattle fed the salt and salt-SB diets had less ($P < 0.05$) DMI and greater ($P < 0.05$) DWI than cattle in the control and SB treatments. Cattle fed the salt-SB diet had the greatest ($P < 0.05$) TT (38.89°C). Those fed only the salt diet or only the SB diet had the least ($P < 0.05$) TT, at 38.72 and 38.78°C, respectively. Under hot conditions (Exp. 3), DMI of steers fed the salt and salt-fat diets declined by approximately 40% compared with only 24% for the control cattle. During hot conditions, DWI was greatest ($P < 0.05$) for steers on the salt-fat diet. These steers also had the greatest ($P < 0.05$) mean rectal temperature ($40.03 \pm 0.1^\circ\text{C}$) and RR (112.7 ± 1.7 breaths/min). The RR of steers on the control diet was the least ($P < 0.05$; 98.3 ± 1.7 breaths/min). Although added salt plus fat decreased DMI under hot conditions, these data suggest that switching to diets containing the combination of added salt and fat can elevate body temperature, which would be a detriment in the summer but a benefit to the animal during winter. Nevertheless, adding salt plus fat to diets resulted in increased DWI under hot conditions. Diet ingredients or the combination of ingredients that can be used to regulate DMI may be useful to limit large increases in DMI during adverse weather events.

Key Word :

beef cattle, environmental stress, fat, salt

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