

PHYSIOLOGICAL RESPONSES AND CHANGES IN PLASMA FREE FATTY ACIDS
AND 3-HYDROXYBUTYRATE CONCENTRATIONS IN WORKING RUMINANT

KARTIARSO, B. BAKRIE, E. HOUSTON, R.M. MURRAY and E. TELENI

The importance of free fatty acids (FFA) in the working ruminant was highlighted by Pethick (1984) who reported a tendency for increased FFA utilisation by skeletal muscle of sheep exercised for two hours. This abstract reports on the effects of prolonged work by ruminants on some physiological parameters and on the pattern of circulating FFA and 3-hydroxybutyrate (3-HB).

A pair of small buffaloes (mean live weight, (LW):333 kg) small steers (mean LW:330 kg) and large steers (mean LW:447 kg) were subjected in turns to two different work loads (15 kg and 30 kg draught force) by pulling a two-wheeled cart weighing 500 kg around an elliptical track for three hours. Work was measured using an ergometer and an odometer. Measurements of physiological responses and blood samples from indwelling jugular venous catheters, were taken at 30 minute intervals from 90 minutes before start of work, during the 180 minutes of work and for 120 minutes after work stopped.

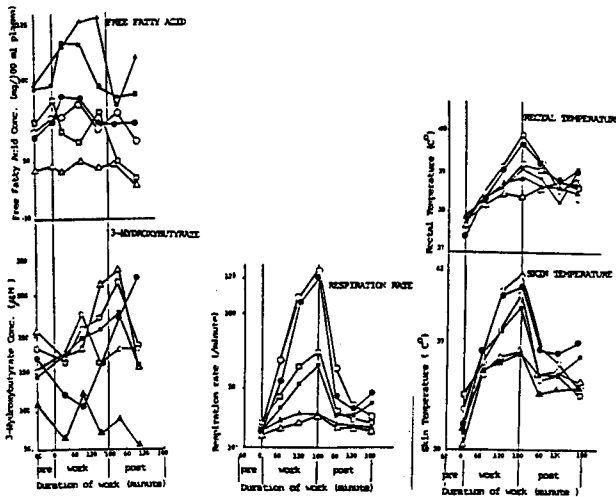


Fig.1 Changes in plasma FFA and 3-HB and some physiological parameters in large steers on light (\blacktriangle) and heavier (\triangle) work load, small steers on light (\blacksquare) and heavier (\square) work and buffaloes on light (\bullet) and heavier (\circ) work load.

Except in one animal on light work (\blacktriangle), FFA concentrations, in general, tended to decline or remain relatively stable after 60 minutes of work. It appears that the rate of FFA catabolism (oxidation and conversion to ketone bodies) was slightly higher than the rate of its release into the circulation. The increasing 3-hydroxybutyrate concentrations as work progressed partly reflected this and is consistent with the view that FFA is an important substrate in the working ruminant.

The poor heat dissipating mechanism in buffaloes was highlighted in the higher rectal temperature and respiration rate recorded in these animals during work compared to steers.

PETHICK, D.W. (1984). In "Ruminant Physiology: Concepts and Consequences". p.277, eds. S.K. Baker, J.M. Gawthorne, J.B. Mackintosh and D.B. Purser (Univ. W.A.:Perth).