

EARLY PLASMA BIOCHEMICAL CHANGES IN THE RUNTING-STUNTING SYNDROME IN BROILER CHICKENS

D.H. EMBURY and A.J. SINCLAIR

Runting and stunting syndrome causes a significant growth reduction in broiler chickens. Runted birds show pancreatic degeneration, elevations in plasma amylase activity and depressions in plasma glutathione peroxidase activity (Barr et al. 1983). These changes suggested an involvement of selenium (Embury et al. 1983), however, we have recently established that selenium is unlikely to be a primary cause of this syndrome: (a) runts and non-affected chickens had normal tissue selenium levels; (b) selenium supplementation failed to prevent field outbreaks of the disease; (c) experimental birds placed on selenium-deficient diets did not develop pancreatic lesions or plasma amylase elevations, despite plasma glutathione peroxidase activities falling to extremely low levels; (d) experimentally induced selenium deficiency was associated with a reduction in the plasma level of methionine metabolites in 14-day-old chickens, whereas in runted birds the levels of almost all the plasma amino acids were reduced.

The runting syndrome is thought to be caused by an infectious agent (Pass et al. 1982), however, attempts to reproduce the disease by orally infecting young broiler chickens have not been successful to date, and a specific infectious agent has not yet been isolated. The earliest time at which birds show obvious gross features of the disease is from 10 to 14 days of age, by which time the major biochemical changes as described above have occurred.

Recent observations on birds sampled every three to four days from 4 until 24 days of age showed that amylase activity rose in runted birds between 7 and 9 days of age, at least two to three days before gross pancreatic pathology was seen, and several days before depressions in glutathione peroxidase activity were found. Depressions in plasma amino acid levels were most marked at 4 and 7 days, and the plasma activity of caeruloplasmin oxidase (a copper-containing enzyme and an acute phase protein) was elevated in runts from 4 to 14 days of age. Activities of alkaline phosphatase (a zinc-dependant enzyme) were markedly reduced in runted birds compared with non-runts from 4 until 14 days of age.

The early biochemical changes (amino acid and alkaline phosphatase depressions and caeruloplasmin oxidase elevations) seen in this syndrome are consistent with those reported to occur as a response to a variety of infectious conditions in man and experimental animals (Beisel 1977).

The identification of 4-day-old birds which appear to be normal but which are showing these biochemical changes may enable a better selection of birds from which the isolation of an infectious agent can be attempted.

BARR, D.A., SINCLAIR, A.J., REECE, R.L., EMBURY, D.H., GOULD, J.G.,

HOOPER, P.T. and SMART, I.J. (1983). *Vet. Rec.* 113:380.

BEISEL, W.R. (1977). *Am. J. Clin. Nutr.* 30:1236.

EMBURY, D.H., SINCLAIR, A.J., BARR, D.A., REECE, R.L., SMART, I.J.

and GOULD, J.G. (1983). *Proc. Nutr. Soc. Aust.* 8:207.

PASS, D.A., ROBERTSON, M.D. and WILCOX, G.E. (1982). *Vet. Rec.* 110:386.

Department of Agriculture, Victoria, Veterinary Research Institute,  
Parkville, Victoria 3052