EFFECT OF DIFFERENT PERIODS OF FEED RESTRICTION ON THE DEVELOPMENT OF DIGESTIVE ENZYMES INVOLVED IN PROTEIN DIGESTION IN THE PANCREAS

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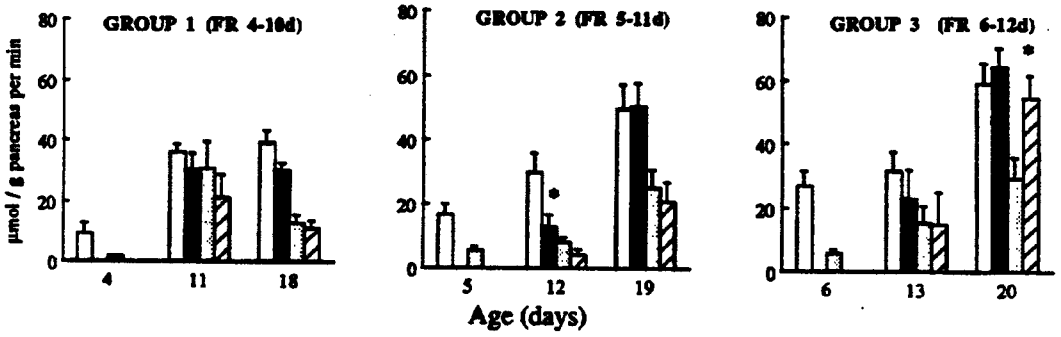
Feed restriction of broiler chickens can be used to improve growth rate and feed conversion efficiency, but sometimes it is not effective. The lack of effect of feed restriction may be due to an interaction between period of feed restriction and developmental age of the birds. We have shown (Susbilla et al. 1995) that feed restriction from 5-11 days of age can delay development of pancreatic enzyme activity. Therefore, the present study looked at the effect of different periods of feed restriction on pancreatic enzyme activity.

Broiler chickens were divided into three groups of four pens/group (23 birds/pen, n=92). Birds in two pens/group acted as the ad libitum fed controls for the treated birds in the other two pens of that group, to which one of the following feed restriction (FR) periods was applied: Group (1) feed restricted to 40% of the intake of their controls (FI 40) from days 4-10; Group (2) (FI 40) from days 5-11; and Group (3) FI 40 from days 6-12. The birds (three/pen) were killed after an overnight fast on the day before restriction, immediately after feed restriction and one week after restriction. In vitro determinations of carboxypeptidase A (CPA) activity and general proteolytic activity (GPA) of the pancreas were done (Tarvid 1992). Commercial broiler starter crumbles (Barastoc Stockfeeds Pty. Ltd., Pakenham, Vic) were fed throughout the experiment.

Immediately following feed restriction, the birds which were feed restricted from days 5-11 had lower ($P<0.05$) CPA activity, compared with that of their controls. However, the birds which were restricted from days 4-10 or from days 6-12 did not show a significant decrease in either CPA and GPA. One week after the resumption of ad libitum feeding, there was an increase ($P<0.05$) in GPA in birds which were restricted from days 6-12.



The effect of feed restriction period on CPA (expressed as µmol free leucine/g pancreas per min.) and GPA (µmol tyrosine/g pancreas per min.), mean values±SE (n=12 before FR; n=6 after FR). ☐ CPA Control; ■ CPA Restricted; ▨ GPA Control; ▨ GPA Restricted. * $P< 0.05$.

These results show that the periods during which feed restriction is applied influence differently the subsequent activity of the two enzymes studied and suggest that the functional development of the pancreas might be compromised by feed restriction during critical periods. This effect may have implications for the successful induction of improved growth and feed conversion efficiency following feed restriction in broiler chickens.

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