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The Effect of Excess of Dietary Lysine on Chick Liver Transaminidase

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Lysine, when given in dietary excess to chicks, leads to arginine deficiency (Smith & Lewis, 1966). The development of signs of this condition, e.g. depressed growth rate and lowered plasma and muscle free arginine concentrations, apparently varies with the dietary protein source (Jones, 1964). The enzyme transaminidase, requiring arginine as substrate, effects the initial stage in creatine formation.

A complete diet (diet 1), based on whole egg protein, and a similar diet (diet 2), equinutritive with diet 1 after the addition of 2.2% of L-lysine, were compounded. Each diet was fed to a group of 14-day-old male chicks for 15 days. The depression in growth rate with diet 2, together with the twofold increase in the plasma concentration and excretion of uric acid, suggests poor protein utilization of this diet compared with diet 1.

At the end of the experimental period, liver transaminidase was assayed (Walker, 1960); diet 2 caused a decrease of one-third in enzyme activity

compared with diet 1. A decrease was also reported by Jones, Petersburg & Burnett (1967) under similar experimental conditions.

The free amino acid concentrations of individual plasma, liver and leg-muscle samples were determined by ion-exchange chromatography. Lysine was increased in plasma, liver and muscle of the chicks on diet 2, whereas liver arginine was decreased. The plasma and muscle arginine concentrations showed no significant difference with the dietary treatment, an observation that differs from previous reports (Jones, 1964; Jones *et al.* 1967). In this study considerable individual variation in muscle free arginine concentrations was found within each group.

The decrease in transaminidase activity with diet 2 was not accompanied by a significant change in liver creatine; the increase in leg-muscle creatine was only marginally significant. The indications of this study add weight to the comment of Walker & Wang (1964) that end-product repression may not be the only factor governing tissue transaminidase. The decreased activity obtained with diet 2, in which the artificial amino acid imbalance renders the diet of low nutritive value, is in agreement with the observation of Kean (1967) that transaminidase of rat kidney increases with the nutritive value of the dietary protein.

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