delayed progress in isolating the material, whose possible identity with similar complexes in milk and blood of other mammalian species is under investigation.

We thank our colleagues Dr G. C. Cheeseman and Mrs J. Jeffcoat for the sedimentation analysis.

***Immunoglobulins in sow mammary secretions throughout lactation and their significance as *Escherichia coli* antibodies to the young pig.** By P. PORTER and D. E. NOAKES, *Unilever Research Laboratory, Sharnbrook, Bedford*

***Interactions between the alkaline earth metal ions and purified bovine casein.** By I. R. DICKSON and D. J. PERKINS, *St. George's Hospital Medical School, London, SW1*

Amino acid levels in blood plasma of growing pigs given diets supplemented with lysine. By R. BRAUDE, K. G. MITCHELL, A. W. MYRES, J. W. G. PORTER and A. P. WILLIAMS, *National Institute for Research in Dairying, Shinfield, Reading*

In a study of factors affecting blood amino acid levels in relation to dietary intake, groups of six pigs were given either a basal diet containing 0·54% lysine, made up of 60% barley, 25% weatings, 12% groundnut meal and supplemented with minerals, vitamins and 0·19% DL-methionine, or the basal diet supplemented with 0·12, 0·24 and 0·36% L-lysine. Between 20 and 60 kg live weight, the mean daily weight gains of the pigs on the basal and lysine-supplemented diets were, respectively, 0·55, 0·59, 0·61 and 0·66 kg. After 3, 7 and 9 weeks on the diets the pigs were fasted for 18 h before being given a normal feed, and samples of venous blood were taken by vena cava puncture at 1, 2 and 3 h after feeding. The plasma was separated immediately and deproteinized with sulphosalicylic acid. The protein-free serum was stored at −20° until analysed using an EEL automatic amino acid analyser.

Mean values, with their standard errors, for the concentrations (μmoles/ml blood plasma) of individual acids in fasting blood of pigs receiving the basal diet were as follows: tryptophan, 0·06 ± 0·01; lysine, 0·08 ± 0·015; ornithine, 0·08 ± 0·02; histidine, 0·11 ± 0·02; arginine, 0·13 ± 0·01; aspartic acid, 0·02 ± 0·01; threonine, 0·10 ± 0·02; serine, 0·27 ± 0·06; glutamic acid, 0·26 ± 0·03; proline, 0·27 ± 0·04; glycine, 0·97 ± 0·21; alanine, 0·52 ± 0·04; valine, 0·36 ± 0·03; methionine, 0·03 ± 0·01; isoleucine, 0·13 ± 0·01; leucine, 0·18 ± 0·03; tyrosine, 0·08 ± 0·01; phenylalanine, 0·08 ± 0·01. The levels of amino acids in blood from the fasted animals were unaffected by

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giving the lysine supplements, except that the levels of lysine were increased to 0·09, 0·12 and 0·16, respectively. After feeding, plasma levels of lysine and methionine increased rapidly, generally reaching peak levels within 1 h. Lysine levels at 1 h after feeding the basal and lysine-supplemented diets were 0·18±0·03, 0·32± 0·03, 0·47±0·04, 0·55±0·07, respectively. The levels of the other essential amino acids increased somewhat less rapidly, though peak levels were probably reached at about 1 h after feeding; the increases for the individual acids were largely unaffected by lysine supplementation. The levels of lysine declined more rapidly than did those of the other essential amino acids but at 3 h after feeding none of the levels had fallen to those found in fasting pigs. The levels of the non-essential amino acids were little affected by feeding, except for a marked increase in the concentration of alanine. The age of the pig had no effect on the levels of amino acids before or after feeding. It was unexpected to find that, although the increased dietary intake of lysine resulted in higher levels of free lysine in plasma, there was little effect on the plasma levels of the other essential amino acids.

Changes in the plasma levels of free amino acids in relation to egg formation in the hen. By T. G. TAYLOR, J. J. WARING and R. K. SCOUGALL, *Agricultural Research Council's Poultry Research Centre, King's Buildings, West Mains Road, Edinburgh*, 9

The levels of free amino acids in the plasma of eight hens fed *ad lib.* were compared in the morning (09·00–10·00 h) and at night (23·00–24·00 h), both when an egg was in the process of formation and when the oviduct was empty. Thus four blood samples were taken from each bird. The experiment was repeated on eight different hens starved for approx. 38 h. Results were analysed by analysis of variance.

It was considered that the synthesis of egg albumen would be actively occurring on egg-forming days and that it would be minimal when egg formation was not in progress, and that changes in the rate of synthesis of albumen proteins might be reflected in changes in the levels of free amino acids in the blood.

In both experiments the levels of total amino acids were significantly higher ($P<0·001$) at night than in the morning and, for each treatment, higher in starved than in fed birds. In general, the essential amino acids tended to be lower and the non-essential ones higher during periods of egg formation than when egg formation was not occurring. Among the essential amino acids, valine and isoleucine showed the greatest differences ($P<0·001$) in both fed and starved birds.

Cystine behaved like an essential acid while methionine showed no consistent changes in relation to egg formation. In the fed birds glutamic acid behaved like the other non-essential acids but in the starved hens it was significantly lower during egg formation.

The results were discussed in relation to the amino acid composition of egg albumen and to the interpretation of plasma free amino acid values in nutrition studies.

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