

THE DEVELOPMENT OF GASTRIC SECRETION OF PEPSIN AND MILK-CLOTTING ENZYMES IN THE CONSCIOUS YOUNG PIG

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In this study the development of the capacity of the stomach to secrete pepsin and milk-clotting enzymes was measured in eight pigs from two litters 12 to 37 d old and 3.5 to 10.0 kg liveweight. Surgical preparation and gastric secretion studies were done as described by Cranwell and Stuart (1983). For the first 2 h of each experimental session, sterile physiological saline was infused intravenously (basal period) followed by a 4 h period of infusion of the secretagogue betazole HCl (Histalog; Eli Lilly, Indianapolis, USA) at dose rates of 1.5, 3.0 and 6.0 mg/kg/h. The method used to determine clotting activity of gastric juice and the units used (chymosin units, CU) were as described by Foltmann (1970). Pepsin was measured by the method of Fourie et al. (1974). One unit (u) of pepsin activity is equivalent to a  $\Delta A_{280}$  of 0.001 per min at 37°C, measured as TCA-soluble products using human haemoglobin as substrate (final volume = 3.1 mL).

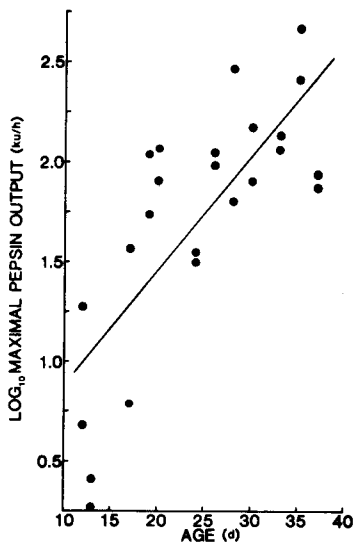


Fig.1 Linear regression of  $\log_{10}$  maximal pepsin output v. age. The regression equation was:  $\log_{10} Y = 0.06x + 0.30$ ,  $r^2 0.58$ ,  $P < 0.001$ .

Both the pepsin and milk-clotting activity secretory responses to Histalog, at all dose rates, were significantly greater than outputs during the basal period ( $P < 0.001$ ). Maximal pepsin secretory output ( $14.5 \pm 3.0$  ku/kg/h) occurred at the dose rate of 6 mg Histalog/kg/h. Maximal clotting activity output ( $29.6 \pm 3.4$  CU/kg/h) occurred at the same dose rate. There were significant correlations between  $\log_{10}$  maximal pepsin output and age (Fig.1) and between  $\log_{10}$  maximal clotting activity output (CU/h) and age ( $\log_{10} Y = 0.02x + 1.70$ ,  $r^2 0.46$ ,  $P < 0.001$ ). The ratio of maximal clotting activity output to maximal pepsin output (CU/h:ku/h) in pigs 12 to 17 d old ( $17.2 \pm 6.8$ ) was significantly greater than in pigs 19 to 28 d old ( $2.9 \pm 0.5$ ), which in turn was significantly greater than in pigs 29 to 37 d old ( $1.6 \pm 0.2$ ) ( $P < 0.05$ ).

The results presented here are in agreement with those of Foltmann (1981) and show that the gastric secretory capacity of pepsin is low up to about 3 weeks of age and then undergoes a very rapid increase. Pepsin and chymosin have similar milk-clotting activity, but pepsin has much greater proteolytic activity (Foltmann 1981). Consequently, the decrease in the milk-clotting to proteolytic activity ratio with age would indicate that in the younger pigs chymosin was the more important milk-clotting enzyme and that, as the animals increased in age, pepsin became predominant.

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