THE EFFECT OF DIET AND LIVESTOCK ON GASTRIC SECRETION IN THE YOUNG PIG

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An earlier study, in which gastric secretion was measured in anaesthetized pigs, indicated that development of acid and enzyme secretion was influenced by intake of solid food (Cranwell 1977). This study investigates the effects of diet and liveweight on gastric secretory capacity in conscious young pigs.

Pigs from two litters born within 36 h of each other were used. The pigs of each litter were paired according to sex and size and cross-fostered, i.e., one pig from each pair was allocated to each sow. One litter (milk-fed, M) was reared solely by the sow, the other litter (creep-fed, C) was reared by the sow for 22 d but was given solid food (22% crude protein) at 15 d and was weaned onto solid food at 22 d. Gastric secretory capacity was measured in eight pigs (four pairs) 12 to 37 days old and 3.5 to 10 kg liveweight. Surgical preparation and acid secretion studies were done as described by Cranwell and Stuart (1983). Three dose rates of the secretagogue betazole HCl (Histalog; Eli Lilly, Indianapolis, Indiana, USA) were used; 1.5, 3.0 and 6.0 mg/kg/h.

There were significant correlations between maximal acid output and liveweight for both M-pigs and C-pigs (Fig.1). The regression line for the C-pigs was significantly different \( \beta < 0.001; \) by F-test from that of the M-pigs. There was also a significant correlation between maximal acid output per unit liveweight and liveweight for the C-pigs \( (Y = 0.13x + 0.69; r^2 = 0.66; \beta < 0.001) \) but not for the M-pigs. In seven pigs (3 C-pigs; 4 M-pigs) killed immediately after the final Histalog infusion, liveweights were similar (M-pigs 8.3±0.4 kg; C-pigs 8.2±1.0 kg) but the C-pigs had more stomach tissue per unit liveweight (C-pigs 6.6±0.6 g/kg; M-pigs 5.4±0.2; \( \beta < 0.1 \)) and had significantly heavier fundic mucosa weights (C-pigs 13.9±0.4 g; M-pigs 10.8±0.6 g; \( \beta < 0.05 \)). Maximal acid output per unit fundic mucosa for the seven pigs was 1.06±0.09 mmo1 H⁺/g/h.

Fig.1 Linear regression of maximal acid output v. liveweight of M-pigs (■) and C-pigs (▲). The regression equations were: M-pigs (—), \( y = 1.39x + 0.05; r^2 = 0.74, \beta < 0.001; \) C-pigs (—), \( y = 2.35x - 4.60; r^2 = 0.96, \beta < 0.001. \)

The results indicate that acid secretory capacity of the stomach increases with liveweight irrespective of treatment, but that in pigs given solid food, the increase occurs at a faster rate. The greater acid secretory capacity in the C-pigs could be due to the greater amount of acid secretory tissue (fundic mucosa) in their stomachs. Cranwell and Hansky (1980) have found that basal serum gastrin levels are higher in both weaned and sucking pigs than in adult animals and that the postprandial response to intake of food is greater in pigs fed solid food than in those suckled by the sow. Gastrin is a trophic hormone for the fundic mucosa in adult animals (Johnson 1977) and it is suggested that it could be acting in this way in young developing pigs.


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