ABOMASAL SECRETION IN THE MILK-FED LAMB

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Apart from the pH measurements of abomasal contents from foetal and newborn lambs reported by Hill (1956) and Shulkes et al (1981), there is little information available on the development of abomasal acid secretion in the lamb.

In this study the development of acid secretory capacity of the abomasum was investigated in five single lambs (4 Merino, 1 Merino x Suffolk) 3 to 49 days old and 4.7 to 10.0 kg liveweight. The lambs were not allowed access to solid food and were reared solely by their dams. Surgical preparation and acid secretion studies were performed in a manner similar to that described for 'pigs by Cranwell and Stuart (1983). For the first two hours of each experimental session, sterile physiological saline was infused intravenously (basal period) followed by a 3.5 to 5 h period of infusion with the secretagogue betazole HCl (Histalog; Eli Lilly, Indianapolis, Indiana, USA) at dose rates ranging from 1.5 to 6.0 mg/kg/h.

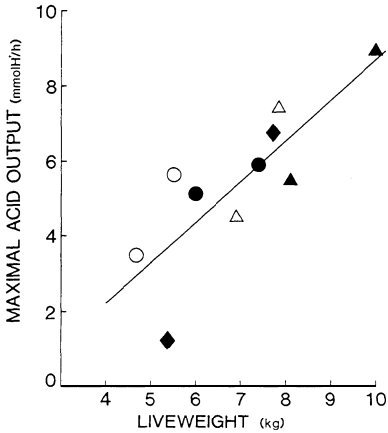

Fig. 1 Linear regression of maximal acid output v. liveweight. Observations for each lamb are represented by the same symbol. The regression equation was: $Y=1.08x-2.09$, r^2 0.66, $P<0.01$.

The concentration of acid secreted during the period of saline infusion ranged from 10 to 113.5 mmol H^+/l (pH 4.12 to 1.22) and the mean basal secretion of acid was 0.15±0.10 (s.d.) mmol H^+/kg/h. The maximal acid secretory response to Histalog, which occurred at the dose rate of 3 mg/kg/h, was 0.84±0.05 mmol H^+/kg/h (range 0.59 to 1.02 mmol H^+/kg/h). In lambs 6 d and older the mean maximal concentration of acid during Histalog infusion ranged from 111 to 137.7 mmol H^+/l (pH 1.18 to 1.02). In lamb A (◆) at 3 d (5.35 kg) the maximal concentration was 69 mmol H^+/l (pH 1.42). There was a significant correlation between maximal acid output and liveweight (Fig.1) and also between maximal secretion of abomasal juice (g/h) and liveweight ($Y = 6.64x - 2.95$, r^2 0.68, $P<0.001$). Following the final Histalog infusion, the lambs were killed and post-mortemed. Mean abomasal weight for the five lambs was 7.04±2.09 (s.d.) g/kg and mean fundic tissue weight 4.82±1.10 (s.d.) g/kg. The mean maximal acid production was 0.19±0.017 mmol H^+/g fundic tissue/h.

The results are in agreement with those of Hill (1956) and Shulkes et al (1931) and indicate that acid secretion by the abomasum is well developed within the first week after birth. The acid secretory capacity of the abomasum increases with liveweight and most of this increase is probably due to a concomitant increase in secretion rate rather than to a change in acid concentration which remained relatively constant. Compared with pigs of similar liveweight (Cranwell and Stuart 1983) the maximal acid secretory response to Histalog occurred at the same dose rate but the lamb has a much lower acid secretory capacity even though its abomasum is of similar weight to the stomach of the pig.

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