

ABOMASAL SECRETION OF MILK-CLOTTING ENZYMES IN THE MILK-FED LAMB

P.D. CRANWELL, RHYL A. DOUGLASS and S.J. STUART

Studies on the development of abomasal secretion of milk-clotting enzymes in the lamb have been confined to observations on abomasal mucosa or contents obtained at post-mortem (Walker 1959; Thivend et al. 1980). In this study, the development of the capacity of the abomasum to secrete milk-clotting enzymes was investigated in five single lambs (4 Merino, 1 Merino x Suffolk) 3 to 49 d 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. At 2 to 11 d old, each lamb was prepared with an abomasal fistula and a polyethylene catheter was placed in the jugular vein. The lambs were fasted for 18 h prior to each of the experimental sessions which were carried out at 10 to 27 d intervals. During each session, lambs were restrained in a modified Pavlov sling. For the first 2 h, 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, USA) at dose rates ranging from 1.5 to 6.0 mg/kg/h. Abomasal juice was collected at 15 min intervals by gravity drainage. The method used to determine clotting activity of abomasal juice and the units used (chymosin unit, CU) were as described by Foltmann (1970).

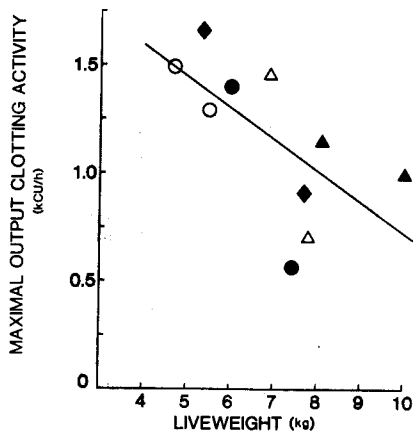


Fig.1 Linear regression of maximal output of clotting activity v. liveweight. Observations for each lamb are represented by the same symbol. The regression equation was: $Y = 2.18 - 0.15x$, $r^2 = 0.41$, $P < 0.05$.

The concentration of milk-clotting activity during the basal period ranged from 16.0 to 292.7 kCU/L. The mean basal secretion rate of clotting activity (146.9 ± 31.8 CU/kg/h) was slightly, but not significantly less than the mean maximal output of activity (173.5 ± 25.2 CU/kg/h), which occurred at 1.5 to 3.0 mg Histalog/kg/h. The concentration of clotting activity during Histalog infusion ranged from 17.1 to 90.6 kCU/L. There were significant correlations between maximal milk-clotting activity output and liveweight (Fig.1) and between maximal secretion of abomasal juice (g/h) and liveweight ($Y = 6.64x - 2.95$, $r^2 = 0.68$, $P < 0.001$). In all lambs, the concentration of milk-clotting activity in abomasal juice decreased with age; decreases of 1.7- to 4.5-fold were observed.

The results presented here are in agreement with those of Walker (1959) and Thivend et al. (1980), and show that abomasal milk-clotting enzyme secretory capacity decreases with liveweight. The decrease is mainly due to the decrease with age in milk-clotting enzyme concentration in abomasal juice.

FOLTMANN, B. (1970). *Meth. Enzym.* 19:421.

THIVEND, P., TOULLEC, R. and GUILLOTEAU, P. (1980). In 'Digestive Physiology and Metabolism in Ruminants', p. 561, eds Y. Ruckebusch and P. Thivend. (MTP Press: Lancaster).

WALKER, D.M. (1959). *J. agric. Sci., Camb.* 53:381.