troduodenal junction were reduced. The change in the temporal relationship between pressure events and flow pulses was the causative factor for a decrease in resistance (6.1 ± 0.21 *vs* 14.9 ± 0.54 ml•s^{-1}•mmHg after fundic exclusion and in intact pigs respectively, $p < 0.05$).

The resulting decrease in the pyloric resistance was responsible for larger stroke volume pulses (2.3 ± 0.10 *vs* 0.3 ± 0.01 ml, $p < 0.05$). Moreover backflow and non-pulsatile flow, typical features in intact animals, were not recorded after fundic exclusion. The final score of liquid emptying after fundic exclusion did not differ from control, though obtained in a different way by summing larger but less frequent flow pulses.

In conclusion, even when fundus action is prevented, the antropyloric area can modulate the gastric emptying of liquids by means of adjusted motility of the terminal antrum and of pyloric resistance.

Vagal control of the transpyloric flow and pyloric resistance in the pig. CH Malbert, C Mathis, JP Laplace *(INRA, Station de Recherches Porcines, Équipe Prise d'Aliment et Flux Digestifs, 35590 Saint-Gilles, France)*

Transpyloric flow and antropyloroduodenal resistance in the dog have been shown to vary simultaneously and in parallel [Malbert and Ruckebusch (1991) *Am J Physiol* 260, G653-G657; Malbert *et al* (1992) *Am J Physiol* 263, G202-G208]. As flow-sensing receptors have been found in the duodenum of the cat [Malbert and Leitner (1993) *Am J Physiol* 265, G310-G313], it can be assumed that the pyloric resistance varies as a function of the digesta flow into the duodenum. Therefore, we hypothesized that pyloric resistance is controlled through a vagal reflex, the afferent part of which originates from

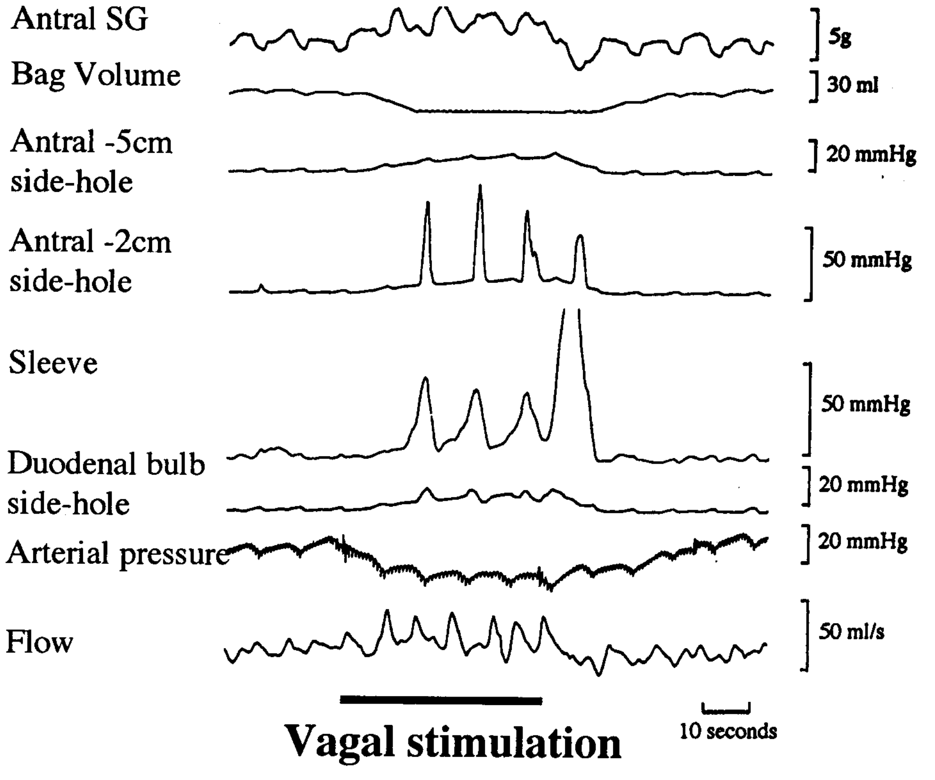

Fig 1. Effects of electrical stimulation (20 volts, 5 H2, 1 µs) of the peripheral end of the left-cervical vagus on antro-pyloro-duodenal motor activity and transpyloric flow. (CH Malbert *et al*)

such flow-sensitive receptors. The present work aims to demonstrate a vagal control of pyloric resistance which could be considered as the corresponding efferent pathway.

Experiments were performed on 17 Large White female pigs (36.5 ± 3.2 kg). Gastropyloroduodenal motility (miniature strain gauges, sleeve manometry, and electronically regulated pneumatic barostat) and transpyloric flow (endoluminal flow probe) were simultaneously recorded under continuous saline gastric loading. The vagus nerves were cut at the cervical level and bipolar stimulatory electrodes were placed on the distal stumps of the cervical vagus and on the dorsal and ventral vagus distal to the cardiac branches.

Bilateral cervical truncular vagotomy did not significantly modify the pyloric resistance (15.1 ± 0.83 *vs* 11.6 ± 1.25 ml•s^{-1}•mmHg, $p > 0.05$), and the characteristics (stroke volume, peak flow and duration) of the flow pulses. Electrical stimulation (frequency range 0.62–10 Hz) of the cervical or thoracic (similar effects) vagus nerves significantly decreased the pyloric resistance by about 67% (7.5 ± 1.57 ml•s^{-1}•mmHg) and triggered flow pulses of large stroke volume (4.5 ± 0.78 ml *vs* 0.3 ± 0.01 ml). The larger flow rate was associated with increased fundic tone and pressurisation of the antrum (fig 1). Endovenous phentolamine (α-adrenergic antagonist, 1.5 mg•kg^{-1}) but not propranolol (β-adrenergic antagonist, 1 mg•kg^{-1}) reduced the transpyloric flow and pyloric resistance responses to vagal stimulation.

To assess the relative importance of the fundic tone *versus* pyloric resistance on the vagally induced increase of flow, fundic distension and fundic exclusion manœuvres were performed. Distension of the fundus was performed using a pneumatic barostat and exclusion of the fundus was achieved according to the method of Lind *et al* [(1961) *Am J Physiol* 201, G197-G202]. Pressurisation of the antro-pyloric area and flow pulses of large stroke volume were recorded during fundic distension, but pyloric resistance was unchanged. After surgical exclusion of the fundus, the basal pyloric resistance was significantly lower (5.3 ± 0.33 ml•s^{-1}•mmHg, $p < 0.01$) than in intact pigs (11.6 ± 1.25 ml•s^{-1}•mmHg). Under surgical exclusion of the fundus, the vagal stimulation resulted in a reduced pyloric resistance (2.5 ± 0.37 ml•s^{-1}•mmHg *vs* 9.6 ± 0.43 ml•s^{-1}•mmHg) and a 3-fold increase in stroke volume of flow pulses.

In conclusion, we were unable to demonstrate a tonic vagal influence on the pyloric resistance in the pig. But the activation of an efferent vagal pathway, involving α-adrenergic receptors, stimulates transpyloric flow as a primary consequence of reduced pyloric resistance.

Control of the rate of passage in the rabbit in response to the dietary fibre level.

T Gidenne (*INRA, Station de Recherches Cunicoles, BP27, 31326 Castanet-Tolosan, France*)

Incorporation of fibre into rabbit feed reduces the mean retention time (MRT) of the diet in the whole digestive tract, but we do not know how fibre acts in the different parts of the tract.

Table I. Mean retention time (MRT) in the rabbit digestive tract according to the fibre (NDF) level (T Gidenne).

Dietary NDF (%DM)	*MRT*				
	Whole tract		*Ileo-rectal*	*Stomach*	*Caecum-colon*
	Reference	*Model*	*Reference*	*Model*	*Model*
21.7	28.6[a]	28.1[a]	23.8[a]	1.1[a]	21.5[a]
30.4	21.7[ab]	20.9[ab]	16.6[b]	1.6[ab]	14.1[ab]
39.6	16.6[b]	16.3[b]	12.8[b]	2.8[b]	9.7[b]
Pooled SEM	1.8	1.9	1.6	0.3	1.9
P level <	0.010	0.011	0.007	0.03	0.012

[a,b] Means with a common superscript are not different at the level $P < 0.05$.