through the digestive tract of patients with a malabsorption syndrome. In addition, our preliminary results show that a 6 h breath $^{13}CO_2$ test could be a valid indirect measurement of overall CHO digestibility carbon from dietary CHO.

Effect of algal fibre supplementation *(Eucheuma cottonii)* on intestinal absorption of glucose and insulin response in the pig. B Darcy-Vrillon [1], P Vaugelade [1], F Bernard [1], C Hoebler [2], F Guillon [2], S Mabeau [3], PH Duee [1] *([1] Unité d'écologie et de physiologie du système digestif, Inra, 78352 Jouy-en-Josas cedex; [2] Laboratoire de technologie appliquée à la nutrition, Inra, 44316 Nantes cedex 03; [3] Centre d'étude et de valorisation des algues, BP 3, 22610 Pleubian, France)*

Although marine seaweed is the source of several phycocolloids used in the food industry (alginates, carrageenan, agars), edible seaweed consumption is low in western countries. Their generally high content in soluble dietary fibre is of nutritional interest, however. As part of a systematic study of their nutritional properties, this work investigated the possible effects of algal polysaccharides on postprandial blood glucose levels and insulin response.

Four Large White pigs (48 kg) were surgically implanted with permanent catheters in the portal vein (PV) and the carotid artery (CA), and with an ultrasonic portal blood flow probe. Eight to 10 days after surgery, each of them received an alternate sequence of test meals (800 g of maize starch + casein) supplemented either with 40 g of algal fibres extracted from *Eucheuma cottonii* (EC, $n = 2$) or with 40 g of purified cellulose (PC, $n = 2$). The meals were given after a 24 h fast. Blood glucose and plasma insulin levels were monitored for 8 h after the meal. Glucose balance across the small intestine was also measured during this period. Then, after adaptation to the supplemented diet (6 days), the pigs were slaughtered at 5 h postprandial, and the digestive contents were sampled for subsequent analysis (stomach residue, intestinal content rheology).

Basal glycemia (3.6 ± 0.2 mM) and portal blood flow rate (30 ± 2 mL.min.kg) were identical for both diets. Portal and arterial glycemia increased following the meal intake, but the maxima reached (mean ± SEM) were significantly lower with EC: 6.7 ± 0.1 vs 8.1 ± 0.4 mM (PV); 4.8 ± 0.1 vs 6.0 ± 0.3 mM (CA). Moreover, glycemia peaked from 40 to 85 min with EC vs at 40 min with PC. In both groups, insulin concentration rose within 30–40 min after the meal; however, it returned more slowly to the basal level with EC diet (after 120 vs 90 min). As for glycemia, the peak levels (mean ± SEM) were significantly lower with EC: 148 ± 17 vs 229 ± 44 µU/mL (PV) and 84 ± 10 vs 153 ± 44 µU/mL (CA). Glucose absorption (mmol/min) was lower with EC in the first postprandial hour, but higher after 120 min. Nevertheless, the glucose absorption balance across the small intestine did not differ for 8 h after the meal, accounting for 46 ± 6% and 41 ± 5% of the starch ingested with EC and PC diets, respectively.

We concluded that the addition of 40 g of carrageenan-rich seaweed fibres to a high carbohydrate meal lowers blood glucose and insulin response as compared to that observed with purified cellulose, without modifying the intestinal glucose absorption balance.

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Kinetics of pancreatic secretion in milk- or soyabean-fed preruminant calves. Preliminary results. G Le Dréan [1], I Le Huërou-Luron [1], JA Chayvialle [2], V Philouze-Romé [1], R Toullec [1], P Guilloteau [1] *([1] Laboratoire du jeune ruminant, Inra-Rennes, 35042 Rennes cedex; [2] Inserm,* *U 45, Physiopathologie digestive, 69437 Lyon cedex 3, France)*

Milk-fed calves digest as monogastric animals since the abomasum is the only functional gastric pouch. Replacement proteins are less digestible than milk protein and their effects on pancreatic secretion are not elucidated. In this study, the kinetics of pancreatic secretion were compared in calves fed with diets based either on milk or soyabean protein.

Five 60–120-day-old Holstein calves were fitted with two catheters, one into the pancreatic duct and another in the duodenum. The pancreatic juice was continuously collected and simultaneously reintroduced into the intestine after removing samples at 15 min intervals, from 1 h before to 6 h after the morning meal. Calves were fed at 830 and 1630 hours with a milk substitute diet, the protein of which was provided either by a skim milk powder (milk diet) or by an alcohol-extracted soyabean concentrate (soyabean diet) after a 4 day adaptation period.

With the milk diet, the pancreatic outflow decreased by 80% between the first 15 and 30 min postfeeding, remained low for 2 h and increased thereafter up to the prefeeding level which was reached about 4 h after the meal. Protein and trypsin outflows showed similar patterns except that the low postfeeding level lasted only 1 h. With the soyabean diet, compared to the milk diet, prefeeding juice flow was 32% lower; 45 min after the meal, the volume was decreased by 59% but remained low for 4 h. It increased thereafter up to the level obtained with the milk diet, 6 h after the meal. In opposition to the milk diet, protein and trypsin outflows increased, especially during the first hour postfeeding. Globally during the 6 postfeeding hours, the pancreatic juice secretion was 26% lower and protein and trypsin flows were increased, respectively, by 50 and 140% as compared to the milk diet.

These changes with diet could be partially controled by gut regulatory peptides. The replacement of milk by soyabean protein has been previously shown to induce a decrease of prefeeding plasma secretin and an increase of postfeeding plasma cholecystokinin. The lower prefeeding level of pancreatic juice flow and the higher postfeeding level of protein output are consistent with these variations. Therefore, digestive processes appear to adapt to the faster gastric emptying of the soyabean diet. Nevertheless, this increase in enzyme secretion is not the only nutritional adaptation implied since the soyabean protein remained less efficiently digested than milk protein.

Effects of different amounts of dietary triglycerides (0–50 g) on postprandial lipemia in healthy human subjects.
C Dubois [1], M Armand [1], P Borel [2], M Senft [1], H Portugal [1], V Azais-Braesco [2], C Latge [3], D Lairon [1] *([1] Unité 130-Inserm, 18, avenue Mozart, 13009; and hôpital Sainte-Marguerite, Marseille; [2] Unité Vitamines, Inra-LNH, Clermont-Ferrand; [3] Crealis, Brive, France)*

Postprandial events can play key roles in the development of coronary heart disease. Generally, the amount of fat present in the test meals (70–140 g) greatly exceeded that usually ingested during a meal (usually called 'oral-fat load'). In line with our recent studies [Dubois et al (1994) *Am J Clin Nutr* 60, 374-382; Dubois et al (1994) *J Lipid Res* 35, 1993-2007], the present study was aimed at comparing for the first time the postprandial responses to five different amounts of dietary triglycerides in the range of usual fat intake (0–50 g/meal) in healthy humans.

Eight healthy males ingested on separate days in a random order five mixed meals (640–1 090 kcal) containing either 0, 15, 30, 40 or 50 g emulsified triglycerides as sunflower oil. Vitamin A was added to