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LARGE BOWEL VOLATILE FATTY ACIDS IN PIGS FED WHITE RICE, BROWN RICE AND RICE BRAN

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The Indonesian diet is presently low in fat with most energy coming from starchy foods such as rice (Biro Pusat Statistik, 1988). This balance probably accounts for the low rates of degenerative illnesses in that country. Although brown rice is higher in nutrients and fibre than polished (white) rice, the latter is preferred by Indonesians because of stability problems with the oil in unpolished rice. For the same reason rice bran generated during milling is mainly used for stock feed even though it is a good source of non-starch polysaccharides (NSP; "fibre). Heat stabilisation has made brown rice and rice bran available in forms more acceptable to the consumer and in the present study we have their effects of these diets on large bowel digesta mass and volatile fatty acids (VFA) in the pig.

Twenty adult male Large White pigs (five per group) were fed diets based on the NSP and nutrient intakes of Indonesians which provided 25% of energy as fat and 60% of energy as starch. Protein was present as soya protein and fish meal. There were 3 groups in which palm oil was the major fat source: white rice (WR); brown rice (BR); and, rice bran (RB). In one further group, raw rice oil was substituted for the palm oil (RO). Diet WR provided 20 g of NSP/pig/day (the current intake) while NSP was increased to 37, 43 and 43 g of NSP/pig/day in diets BR, RB and RO, respectively. After 20 days of dietary adaptation, the pigs were anaesthetized, the large bowel excised and digesta mass and VFA measured.

The mass of total digesta was lowest with WR (433±28 g) and highest with BR (911±192 g) while diets RB and RO diets gave masses intermediate to the other two (602±60 g and 712±102 g, respectively. Both digesta mass and water content were highest in the proximal hind gut and fell along the colon, a pattern very close to that in man. With WR, RB and RO the profile of total VFA paralleled those of digesta weight and moisture content but with BR, concentrations were maintained along the large bowel colon so that in the proximal colon this group was the same as the others and in the distal colon concentrations were highest with BR. Calculation of the pool of VFA showed that although rice bran raised the pool of VFA, the greatest effect was due to BR. In the distal colon there was a disproportionate increase in butyrate with diet BR. This is a finding of some interest as butyrate is a preferred metabolic substrate for normal colonocytes and may be protective against colonic neoplasms (British Nutrition Foundation, 1990).

The data show that increased NSP as rice bran raised faecal bulk and colonic VFA but that at equivalent intakes, brown rice gave more digesta mass and VFA, especially in the distal colon. We believe that the reason for this increase is starch that has escaped digestion and that this resistant starch raises the effective fibre content of brown rice.

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