

COMPARATIVE EFFECTS OF WHEAT BRAN ALEURONE AND PERICARP-SEED COAT ON VFA LEVELS IN RATS

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Many dietary plant fibre polysaccharides do not survive transit in man and other omnivores but are broken down by a large bowel digestion resembling that of the rumen and with similar end products i.e. VFA and an increased bacterial mass (Topping & Illman, 1986). The degree of fermentation appears to depend on fibre type and form of presentation. Thus oat bran, high in a hemicellulose commonly called oat gum, yields large amounts of VFA but wheat bran does not although the latter contains significant amounts of fibre polysaccharides. Recently it has become possible to fractionate wheat bran (WB) into the aleurone (AL) and pericarp-seed coat (PC) layers and we have compared effects of both of these fractions with the parent bran and with cellulose (C) in rats (all at levels of 10% of dietary fibre). Faecal bacterial mass were all equally low in the C, PC and WB groups (11.1, 7.3 and 12.6% of dry matter, respectively) and raised to 42.5% in the AL group. Caecal VFA were also low in the C rats and averaged $128 \pm 7(5)$ $\mu\text{mol/ml}$. Concentrations were similar in the WB and PC groups with means of $235 \pm 9(5)$ and $192 \pm 5(5)$ $\mu\text{mol/ml}$ and considerably higher with AL at $289 \pm 15(5)$ $\mu\text{mol/ml}$. Because of differences in caecal volume, the mass of total VFA were the same with the C and PC diets (264 ± 15 and 302 ± 34 μmol), intermediate in the WB group at 564 ± 50 μmol but still highest with the AL diet at 108 ± 110 μmol . The contributions of individual VFA in the former three groups were generally in the order acetate >> propionate < butyrate but with the AL diet there was a significant increase in the proportion of propionate. Concentrations of total VFA in hepatic portal venous plasma reflected those in the caeca with means of: C, $1.09 \pm 0.04(5)$; PC, $1.66 \pm 0.10(5)$; WB, $1.83 \pm 0.17(5)$ and PC, $3.18 \pm 0.21(5)$ $\mu\text{mol/ml}$. Individual VFA also mirrored their relative levels in caecal digesta except that the proportion of butyrate tended to be lower (possibly reflecting utilization by colonic epithelial cells). These data confirm that the properties of wheat bran can be altered by processing and that the high fibre polysaccharide content of the aleurone layer made it a better fermentative substrate than the parent bran or the pericarp-seed coat.

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