

# Non-Starch Polysaccharides in Australian Cereals

J. S Kopinski, P. Martin, G. W. Blight, A. Pytko and P. Van Melzen

Queensland Department of Primary Industries, Animal Research Institute, Yeerongpilly Qld 4 105

Non starch polysaccharides (NSP) are a group of complex carbohydrates which comprise a large component of the cell wall of most cereals. The major components are pentosans and the (1-3), (1-4)- $\beta$ -glucans. The anti-nutritive effects of these non-starch poly-saccharides are manifested by the depression of nutrient digestion and absorption (Antoniou and Marquardt, 198 1). When poultry are fed a mainly barley-based diet the  $\beta$ -glucan present causes growth depression accompanied by sticky droppings which can be ameliorated by  $\beta$ -glucanase addition (Gohl *et al.* 1978). Similarly when poultry are fed rye-based diets (Antoniou and Marquardt, 198 1) or even wheat-based diets (Choct and Annison, 1990) the pentosans present exhibit anti-nutritive activities with lower AME's and growth depression. Little data is available on the levels of these non-starch polysaccharides in the three major cereals used in animal feeding in Australia. The present study examined the levels of  $\beta$ -glucans and pentosans in barley, wheat and sorghum crops grown in 1992. A total of 66 wheat samples (11 varieties x 6 sites), 40 barley samples (10 varieties x 4 sites) and 12 sorghum varieties at one site only, were analysed.

It is generally accepted that problems for poultry with the feeding of wheat can be a result of pentosan levels, while barley  $\beta$ -glucans also cause problems when used for animal feeding. The results in table 1 indicate that barley has a substantial pentosan content, equivalent to wheat. Thus when barley-based diets are fed to animals an underlying 'pentosan' problem may exist which is being masked by the  $\beta$ -glucan effect. Use of  $\beta$ -glucanases in barley diets will increase the importance of the pentosan content of barley on animal performance. Sorghum, although having an insignificant  $\beta$ -glucan content, has a pentosan level

50% of that present in wheat and barley. Site and variety comparisons indicate that wheat pentosans are influenced significantly by site ( $P < 0.05$ ) whereas in barley, variety and not site influences the pentosan content ( $P < 0.05$ ).  $\beta$ -glucan levels in wheat and barley are influenced by both variety and site ( $P < 0.05$ ).

It is important for nutritionists to be aware of the level of pentosan in barley, particularly as pentosans along with  $\beta$ -glucans can influence the energy digestibility of diets for non-ruminants, especially poultry, with deleterious effects on performance.

**Table 1** The pentosan and  $\beta$ -glucan levels (on DM basis) in Australian cereals from 1992.

Grain	Number	Pentosan%*	$\beta$ -glucan%*
Wheat	66	5.91 $\pm$ 1.32	0.67 $\pm$ 0.17
Barley	40	6.04 $\pm$ 1.18	4.94 $\pm$ 0.96
Sorghum	12	3.15 $\pm$ 0.66	0.21 $\pm$ 0.18

\* normal range expressed as  $x \pm 2SD$

## References

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