The effects of soluble non-starch polysaccharides and β-glucanase in dogs

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High levels of soluble non-starch polysaccharides (NSP) in dog foods have been found to cause some decrease in nutrient digestion and poor stool quality (1). Enzymes are used in other species to reduce these anti-nutritive effects by partially cleaving the NSP molecules (2). The aims of this study were to test the effects of adding barley, a grain rich in soluble NSP to dog diets and to examine if these effects can be negated by the addition β-glucanase.

Thirty-six mixed breed dogs were kept in individual cages for 12 days and randomly allocated to six treatment groups. The experimental diets were extruded and fed dry, containing 12% (control), 32% and 52% barley, with the balance (up to 84%) being wheat-based cereal fractions. β-glucanase or water was added to the diet at feeding. Faecal samples were collected on the final five days of the trial. The measurements taken were faecal score, faecal percentage dry matter, faecal pH, digestibilities of starch, protein, energy and fat, and faecal VFA and lactate concentrations.

The increased inclusion of barley in the diet decreased the digestibility of starch, protein, fat and gross energy ($P<0.05$), and the addition of β-glucanase removed this effect ($P<0.05$). The faecal stools of the dogs on diets with increased barley were looser, as indicated by the increased faecal score ($P<0.05$). These dogs also had decreased faecal pH suggesting an increased level of fermentation in their large intestine. The dogs that received β-glucanase had faecal scores much closer to the ideal range, and the 32% barley diet plus β-glucanase produced faecal scores that were the same as the control diet. The addition of β-glucanase to barley based diets improved both nutrient digestibility and stool quality.

Diet	Starch digestibility	Protein digestibility	Fat digestibility	Faecal Score	Faecal pH
12% Barley[1]	1.0 ± 0.0001	0.75 ± 0.01	0.89 ± 0.004	2.32 ± 0.09	5.42 ± 0.08
12% Barley +E[1]	1.0 ± 0.0001	0.78 ± 0.01	0.89 ± 0.008	2.17 ± 0.09	5.27 ± 0.06
32% Barley[1]	0.98 ± 0.002[a]	0.69 ± 0.02[a]	0.87 ± 0.009	2.59 ± 0.13	4.98 ± 0.08[a]
32% Barley + E[1]	1.0 ± 0.0001[b]	0.72 ± 0.02	0.89 ± 0.005[b]	2.35 ± 0.11	4.98 ± 0.05[a]
52% Barley[1]	0.97 ± 0.008[a]	0.68 ± 0.02[a]	0.84 ± 0.008[a]	3.23 ± 0.13[a]	4.92 ± 0.05[a]
52% Barley + E[1]	1.0 ± 0.0001[b]	0.74 ± 0.01[b]	0.88 ± 0.004[b]	2.85 ± 0.17[ab]	4.97 ± 0.10[a]
P Barley level	**	**	**	**	**
P Enzyme	**	**	**	*	ns
P Level x enzyme	**	ns	**	ns	ns

[1] Mean ± SEM. E Enzyme. P value *P<0.05 **P<0.01 ns not significant [a] Significantly different to control diet (12% barley) P<0.05. [b] Significantly different to diet with same level of barley inclusion without enzyme P<0.05
Faecal Score 1 = hard dry faeces, 5 = diarrhoea

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