

Formulation of a xylanase additive for efficient arabinoxylan hydrolysis in broiler feeds

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Endo- β -1,4-xylanases are ideal for application in the animal feed industry, as they alleviate the anti-nutritional effects of arabinoxylan, a major polymer in cereal cell walls, which increases digesta viscosity, delaying digestion and nutrient absorption. In this study, xylanases from *Trichoderma viride* (Xyn2A, GH11) and *Geobacillus stearothermophilus* (XT6, GH10) were used to formulate a binary xylanase cocktail for efficient arabinoxylan hydrolysis, in an attempt to alleviate the aforementioned digestive challenges. The optimal xylanase cocktail, based on reducing sugar release from wheat-flour arabinoxylan hydrolysis, was 75% Xyn2A to 25% XT6. The viscosity reduction of soluble wheat-flour arabinoxylan also demonstrated effective degradation of the biomass by the xylanases, where the xylanase cocktail elicited the greatest effect compared to using either Xyn2A or XT6 alone. Furthermore, the degradation of broiler feeds (starter and grower) by the xylanases was conducted and analysed using TLC and HPLC. The xylanases mainly produced xylotriose and xylopentaose as the major xylo-oligosaccharides (XOS) from the broiler feeds. The prebiotic potential of the XOS produced by Xyn2A, XT6 and the xylanase cocktail was investigated *in vitro*. XOS produced from the hydrolysis of the two feeds by the xylanases enhanced the cell viability of the probiotic *Streptococcus thermophilus*, while XOS produced from the grower feed enhanced cell viability of *S. thermophilus* and *Lactobacillus bulgaricus*, compared to XOS produced by either Xyn2A or XT6. The use of the xylanase cocktail in cereal animal feeds, therefore, resulted in decreased arabinoxylan content and feed viscosity, and in the production of prebiotic XOS, mitigating some of the digestive challenges associated with cereal grains. Due to the highly branched nature of insoluble arabinoxylan (AX) in animal feeds, the synergistic potential of the xylanase cocktail with arabinoxylan debranching enzymes; feruloyl esterases and acetylxylan esterases, is currently being investigated.

Keywords: additive; arabinoxylan; broiler feed; GH10; GH11; NSPs