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## 1B-114 - Influence of increasing protease supplementation on two different types of sorghum

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The performance young pigs offered sorghum based diets is up to 20% lower than for pigs offered wheat based diets (Premium Grains for Livestock Program, Final Report). A major reason for the difference is thought to be due to the encapsulation of starch granules within sorghum by a protein envelope consisting of relatively indigestible kafirin proteins.

An experiment was conducted to test the hypothesis that preliminary digestion of the kafirin envelope with a protease, Subtilisin, would improve the performance of young pigs offered sorghum based diets. The experiment was a 2 x 4 factorial array, with the treatments being sorghum type (White or Liberty cultivar and high kafirin red sorghum, the cultivar Buster) and Subtilisin protease dose (0, 50, 100 and 500ppm).

Over the 0 to 21 day experimental period, pigs offered the wheat control out performed animals on the Liberty and Buster controls in daily weight gain ( $P < 0.05$ ) by 16.5% and 20.8%, respectively. The Liberty sorghum supported poorer FCR ( $P < 0.05$ ) than the wheat control, but feed intakes were similar. With Buster the opposite effects were noted. Pigs on the Buster control diet ate less ( $P < 0.05$ ) than pigs on the wheat control but there was no significant difference in FCR. There were no significant differences in growth performance between the two sorghum grains after 21 day. Increasing the protease dose linearly improved FCR ( $P = 0.017$ ). The highest level of enzyme (500 ppm) significantly improved the FCR of pigs offered both sorghum types, producing a similar FCR to that of the wheat control. There was no overall influence of protease on daily gain or feed intake, although the 50 ppm dose significantly increased intake on the Buster sorghum, however intake significantly dropped when the enzyme dose doubled, indicating feed wastage may have been a contributing factor at the low dosage.

The Buster sorghum was measured to be significantly lower in DE and diet digestibility compared to the white Liberty sorghum and the wheat ( $P < 0.001$ ). In fact, DE of the wheat and Liberty based were exactly the same at 14.87 MJ/kg. There was an interaction ( $P = 0.048$ ) between protease and sorghum type, with the enzyme increasing (linear effect;  $P = 0.058$ ) both diet digestibility and DE. The majority of the improvement was observed in the first 100 ppm of the added protease.

Overall, the unsupplemented sorghum diets depressed the performance of young male pigs and the highest dose rate of protease added to both the sorghum varieties improved feed efficiency to the levels of the wheat based diet. The two sorghums did respond differently to the increasing level of protease, with the most notable being the significant improvement in DE for the red sorghum, whereas the enzyme had no effect on the digestibility of the white sorghum. The results indicate the protease can reduce the nutritional barriers caused by the structural and storage proteins in sorghum, and improve feed efficiency to the level supported by wheat based diets. The most cost effective dose rate of the protease is most likely to be between 50 and 500 ppm but would appear to vary with variety.

Further research is warranted to establish the optimum level of enzyme inclusion and to relate this to the chemical composition of the sorghum grain.