Effect of germination on *in vitro* fermentation and enzyme digestibility of different sorghum grain types

R.O. Balogun, J.B. Rowe and S.H. Bird

Animal Science, University of New England, Armidale NSW 2351 rbalogun@metz.une.edu.au

Germination of sorghum initiates the synthesis of proteolytic enzymes which hydrolyse the protein matrix in the endosperm (Pflugfelder and Rooney 1986). The hydrolysis of the matrix increases the availability of starch granules for amylolytic degradation by bacteria and digestive enzymes in cattle. Previous studies showed that germination for 5 days of Western Red sorghum grain increased the digestibility of its starch more than when the grain was steeped in water and stored anaerobically (Balogun *et al*. 2000). This study examined the optimum duration of germination for increased digestibility of the starch.

Waxy and Normal isolines, and Buster sorghum grains were germinated for 0 (unprocessed), 1, 3, or 5 days. Effects of these treatments were examined by *in vitro* assays (Bird *et al*. 1999) that determined the extent of fermentation, as indicated by volatile fatty acid production, and the enzyme digestion of the starch. Rolled (0.4 mm roller mill aperture) and ground (0.5 mm Wiley Mill screen) grains were used for the fermentation and enzyme digestibility respectively.

When compared with unprocessed grains, germination significantly (P<0.05) increased VFA production (Figure 1a). The fermentability of the starch was similar for Waxy and Normal isolines, and it increased as the period of germination increased. Germination of Buster grain beyond 3 days did not appear to further increase starch fermentability. *In vitro* enzyme digestibility also increased significantly (P<0.05) with germination time (Figure 1b) but the effect was less pronounced than for fermentation. Waxy grain had higher *in vitro* enzyme digestibility than the non–waxy and the Buster grains. It is concluded that the effect of germination on the digestibility of sorghum grain starch is related to the duration of exposure to aerobic conditions, and to the type and cultivar of sorghum. The practical application of germination needs further research to ensure control of mould growth.

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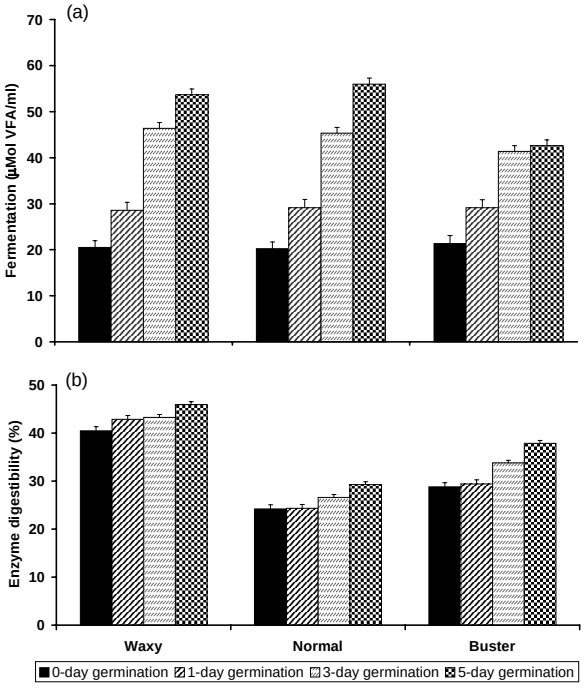

Figure 1 *In vitro* volatile fatty acid production (a) and *in vitro* enzyme digestibility of starch (b). Error bars are SEM within germination time by grain type interaction.