The importance of preserving fresh and stored grains from oxidation in managing New Grain Syndrome

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"New Grain Syndrome" has been anecdotally associated with substantial performance and health issues including fever, diarrhoea, immunosuppression, reduced feed intake, growth suppression and vitamin deficiencies following consumption of freshly harvested grains.

It is hypothesized that its occurrence is linked to oxidation when the grains are ground, due to the release and activation of endogenous lipoxygenase. Lipoxygenase catalyzes molecular oxygen to the cis,-1,4-pentadiene system in the polyunsaturated fatty acid content, forming hydroperoxides which decompose into aldehydes and oxygenated fatty acids, ultimately causing rancidity and reduced palatability of the grains.

To investigate this theory a pilot study was performed. Four samples of fresh (<1 month after harvest) and old (stored from previous harvest) winter wheat and winter barley were collected. Samples were divided into two aliquots, ground, stored at room temperature, and analysed for extracted peroxide value (PV) on d0, d7, d14, d21 and d28. One aliquot was treated with 100 g/ton of an antioxidant blend (BHT and propyl gallate) while the other remained an untreated control.

After grinding, both fresh and old samples of wheat and barley showed a significant peak in peroxide value (PV) at around one-week, however PV of the old grain samples were substantially lower than in fresh samples. At d0, PV in wheat were between 3.9-4.8 meq/kg (old) and 7.6-12.5 meq/kg (new), but by d7 reached 5.9-6.9 meq/kg (old) and 11.95-21.6 meq/kq (new). Subsequently, PV started to fall until around week 4 when a second PV peak was observed (7.4-13.1 meq/kg (old), 13.2-24.7 meq/kg (new)). When antioxidants were applied to the fresh samples of wheat and barley, PV were significantly reduced compared to an untreated control.

These results indicate that oxidative reactions could be a plausible explanation for New Grain syndrome symptoms. Further research is required to confirm lipoxygenase activity, and to elucidate its mechanism and link to "New Grain Syndrome".