

Evaluation of lipid peroxidation level in corn dried distillers grains with solubles (DDGS)

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Lipid peroxidation in animal feed has been shown to have a negative impact on health, growth performance and meat quality. The objective of this study was to evaluate the lipid peroxidation level in DDGS samples from 31 ethanol plants in the US, and the correlation among indicators of lipid peroxidation. An unaltered corn sample was obtained from a corn processing plant to use as a reference. Oils were extracted with hexane and analyzed for thiobarbituric acid reactive substances (TBARS) and peroxide value (PV). Extracted oil from DDGS samples ranged from 7.3 to 12.0% with an average of 10.4%. The TBARS assay was conducted in triplicate for each sample, and results were reported as ng malondialdehyde (MDA) equivalents/mg oil. The TBARS values for DDGS samples ranged from 1.0 to 5.2 ng MDA equivalents/mg oil. The DDGS sample with the highest TBARS value was 25 times greater than that of the reference corn sample (0.2 ng MDA equivalents/mg oil). Peroxide values of DDGS samples ranged from 4.2 to 84.1 mEq/kg oil. The highest PV among DDGS samples was 27 times greater than that of the reference corn sample (3.1 mEq/kg oil). Color of DDGS samples was measured by Minolta L*, a* and b* corresponding to the degree of lightness, redness and yellowness, respectively. The correlations between TBARS, PV, and color were determined using the Corr procedure of SAS. Values of TBARS and PV were positively correlated ($r = 0.81$; $P < 0.0001$). Both TBARS and PV were negatively correlated with L* ($r = -0.73$; $P < 0.0001$, and $r = -0.63$; $P < 0.0002$, respectively) and b* ($r = -0.67$; $P < 0.0001$, and $r = -0.57$; $P < 0.001$, respectively), which means that darker and less yellow colored DDGS is more likely to have a higher lipid peroxidation level, as measured by TBARS and PV, compared with lighter colored DDGS samples. However, a* was not correlated with either TBARS ($P = 0.66$) or PV ($P = 0.97$). These results indicate that color can be a preliminary indicator of lipid peroxidation level in DDGS, but the exact level of peroxidation is more accurately measured by TBARS and PV.

Key words: DDGS, lipid peroxidation, TBARS, PV