

Improving ruminal digestibility of various wheat straw types by white-rot fungi

ABSTRACT

Background: This study investigated the ruminal degradability of various wheat straw types by the white-rot fungi *Ceriporiopsis subvermispora* (CS) and *Lentinula edodes* (LE). Different cultivars (CV) of wheat straw at different maturity stages (MS) were treated with the fungi for 7 weeks and assessed for chemical composition and in vitro gas production (IVGP). **Results:** Both fungi showed a more pronounced degradation of lignin on a more mature straw (MS3; 89.0%) in comparison with the straw harvested at an earlier stage (MS1; 70.7%). Quantitative pyrolysis coupled to gas chromatography and mass spectrometry, using ¹³C lignin as an internal standard ¹³C-IS Py-GC/MS revealed that lignin in more mature straw was degraded and modified to a greater extent. In contrast, cellulose was less degraded in MS3, as compared to MS1 (8.3% versus 14.6%). There was no effect of different MS on the IVGP of the fungus-treated straws. Among the different straw cultivars, the extent of lignin degradation varied greatly (47% to 93.5%). This may explain the significant ($P < 0.001$) effect of cultivar on the IVGP of the fungal-treated straws. Regardless of the factors tested, both fungi were very capable of improving the IVGP of all straw types by 15.3% to 47.6%, (as compared to untreated straw), with CS performing better than LE – on different MS (33.6% versus 20.4%) and CVs (43.2% versus 29.1%). **Conclusion:** The extent of lignin degradation caused by fungal treatment was more pronounced on the more mature and lignified straw, while variable results were obtained with different cultivars. Both fungi were capable of improving the IVGP of various straw types.

Keyword: White-rot fungi; Wheat straw cultivar; Wheat straw maturity; In vitro gas production; Ruminant feed; Lignocellulosic biomass