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**Effect of particle size reduction and ensiling fermentation on biogas formation and silage quality of wheat straw**

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**Abstract**

The effect of ensiling fermentation and mechanical pretreatment on the methane yield of lignocellulosic biomass was investigated in order to determine the optimum pretreatment conditions for biogas production. Wheat straw was treated using the following techniques: mechanical disintegration by chopping and extruder-grinding to particle sizes of 2.0 and 0.2 cm, respectively, and ensiling by 30% and 45% total solids with addition of enzymatic, chemical and biological silage additives individually and in combination. The total and volatile solid content, biochemical methane potential and products of silage fermentation of 32 variants were tested. The results indicate that the methane potential increased by 26% (from 179 to 244 ml CH<sub>4</sub> g<sup>-1</sup> VS) by reducing particle size. The maximum methane potential of 275 ml CH<sub>4</sub> g<sup>-1</sup> VS was obtained from silage with 30% total solids and extruder grinding. However, the effect of the addition of silage additives on the methane potential was limited.

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