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Optimization of some fermentation conditions and composition of the fermentation medium for bio-ethanol production from poultry and cattle feed by yeast fermentation

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The study aimed to increase the bioethanol production by optimizing the fermentation conditions from poultry and cattle feed. Submerged fermentation was carried out in the presence of Baker's yeast (*Saccharomyces cerevisiae*). The fermentation medium contained 50 g glucose, 2.5 g yeast extract, 1.15 g peptone, 0.25 g $(NH_4)_2HPO_4$ and 0.025 g $MgSO_4$ L^{-1} and inoculated (250 mL fermentation medium / 10 mL inoculum) with activated Baker's yeast. When glucose of the fermentation medium was replaced with 50 gL^{-1} of different types of commercially available poultry feeds such as layer grower, chick feed, layer feed, cattle feed, rice bran, sesame oil seed cake and coconut oil seed cake separately, cattle feed (mean 0.4% v/v) and rice bran (mean 0.3% v/v) showed highest bioethanol activity compared to other carbon sources at 48 h of fermentation at 100 rpm. Glucose containing medium (control) produced a mean bioethanol percentage 3.2 (v/v) at 48 h of fermentation at 100 rpm. Cattle feed and rice bran were selected for further analysis. The optimized medium composition, 50g cattle feed, 4.5 g yeast extract, 2.0g peptone, 0.25g $(NH_4)_2HPO_4$ and 0.025g $MgSO_4$ L^{-1} improved the mean percentage of ethanol yield from 0.4 to 0.7 (v/v). The optimized medium of which composition was 50g rice bran, 4.5g yeast extract, 2.75g peptone, 0.25g $(NH_4)_2HPO_4$ and 0.025g $MgSO_4$ L^{-1} improved the bioethanol production from the mean of 0.3 to 0.7 (v/v). When the optimized fermentation medium was incubated at different rotation speeds at room temperature separately, the mean bioethanol yield increased to 0.86% (v/v) at 150 rpm in both media. This study shows that cattle feed and rice bran are potential sources for bioethanol production and optimization of yeast extract, peptone, and rotation speed slightly increased the bioethanol production.

Keywords: Bioethanol, Oilseed cakes, Poultry feed, Cattle feed, Rice bran

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