

Feeding Value Improvement of Rice Straw Fermented by Spent Mushroom Substrate on Growth and Lactating Performance of Dairy Goat

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Abstract : Rice straw with poor feed quality and spent mushroom substrate are both the most abundant agricultural residues in Taiwan. Edible mushrooms from white rot fungi possess lignocellulase activity. It was expected to improve the feeding value of rice straw for ruminant by solid-state fermentation pretreatment using spent mushroom substrate. Six varieties or subspecies of spent edible mushrooms (*Pleurotus ostreatus* (blue or white color), *P. sajor-caju*, *P. citrinopileatus*, *P. eryngii* and *Ganoderma lucidum*) substrate were evaluated in solid-state fermentation process with rice straw for 8 wks. Quality improvement of fermented rice straw was determined by its in vitro digestibility, lignocellulose degradability, and cell wall breakdown checked by scanning electron microscope. Results turned out that *Pleurotus ostreatus* (white color) and *P. sajor-caju* had the better lignocellulose degradation effect than the others and was chosen for advance in vivo study. Rice straw fermented with spent *Pleurotus ostreatus* or *Pleurotus sajor-caju* mushroom substrate 8 wks was prepared for growing and lactating feeding trials of dairy goat, respectively. Pangolagrass hay at 15% diet dry matter was the control diet. Fermented or original rice straw was added to substitute pangolagrass hay in both feeding trials. A total of 30 head of Alpine castrated ram were assigned into three groups for 11 weeks, 5 pens (2 head/pen) each group. A total of 21 head of Saanen and Alpine goats were assigned into three treatments and individually fed in two repeat lactating trials with 28-d each. In castrated ram study, results showed that fermented rice straw by spent *Pleurotus ostreatus* mushroom substrate attributed the higher daily dry matter intakes (DMI, 1.53 vs. 1.20 kg) and body weight gain (138 vs. 101 g) than goats fed original rice straw. DMI (2.25 vs. 1.81 kg) and milk yield (3.31 vs. 3.02 kg) of lactating goats fed control pangolagrass diet and fermented rice straw by spent *Pleurotus sajor-caju* mushroom substrate were also higher than those fed original rice straw diet ($P < 0.05$). Milk compositions, milk fat, protein, total solid and lactose, were similar among treatments. In conclusion, solid-state fermentation by spent *Pleurotus ostreatus* or *Pleurotus sajor-caju* mushroom substrate could effectively improve the feeding value of rice straw. Fermented rice straw is a good alternative fiber feed resource for growing and lactating dairy goats and 15% in diet dry matter is recommended.

Keywords : feeding value, fermented rice straw, growing and lactating dairy goat, spent *Pleurotus ostreatus* and *Pleurotus sajor-caju* mushroom substrate

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