Detoxification of *Jatropha Curcas* Meal as Poultry Feed

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Abstract

The increasing of Jatropha curcas cultivation as raw material of biodiesel in Indonesia leads to increase Jatropha curcas meal as byproduct. Besides being a source of oil, Jatropha also provides a meal which may serve as a highly nutritious protein suplement in animal feed if the toxins are removed. Curcin and phorbol ester are the main toxic components contained in the Jatropha curcas meal. This experiment was conducted to study the effects of various treatments (physical, chemical, biological) of Jatropha curcas meal on curcin, protein utilization efficiency, metabolizable energy values, retention of calcium and phosphorus. The treatments used in this experiment were: (1) heat treatment using autoclave at 121°C during 30 minutes; (2) adding NaOH 4%, followed by autoclaving at 121°C during 30 minutes; (3) fermentation using Rhizopus oligosporus. To determine the protein utilization efficiency, retention of calcium and phosphorus as well as metabolizable energy values, 23 broilers of 35 days of age were used in this experiment. The chickens were placed in individual cages and the excreta were collected during four days. The experimental diets used in this experiment were: BD (100% basal diet), T0 (80%BD + 20% untreated Jatropha curcas), Tphys (80%BD + 20% heat treated Jatropha curcas), Tchem (80%BD + 20% chemical treated Jatropha curcas), Tbiol (80%BD + 20% biological treated Jatropha curcas). The data of curcin was analysed descriptively and the others data were analysed using analyses of variance. The results showed that physical, chemical as well as biological treatments decreased the curcin of Jatropha curcas meal up to 66.7%, 77.8% and 22.2%, respevtively, compared to the untreated one. All of the treatments increased the protein utilization efficiency with the values of 12.1% (T0), 36.6% (Tphys), 44.5% (Tchem) and 48.2% (Tbiol). The retention of calcium were 22.2% (T0), 28.8 % (Tphys), 31.2% (Tchem) and 38.4% (Tbiol). The retention of phosporus were 26.0% (T0), 51.5% (Tphys), 43.2% (Tchem) and 50.5% (Tbiol). The metabolizable energy (MEn) values were 2505.2 kcal/kg (T0), 3055.9 kcal/kg (Tphys), 3017.5 kcal/kg (Tchem) and 3152.5 kcal/kg (Tbiol). The conclusion of this experiment is that biological treatment (fermentation using Rhizopus oligosporus) is the best method to detoxify the toxins and thus increasing the nutrititive value of the Jatropha curcas meal for poultry.

Keywords: *Jatropha curcas* meal, detoxification, nutritive value, broilers

Introduction

The increasing of *Jatropha curcas* cultivation as raw material of biodiesel in Indonesia leads to increase *Jatropha curcas* meal as byproduct. So far, cultivation area of *Jatropha curcas* in Indonesia is about 35,000 hectares, and the target of Indonesia is to plant the *Jatropha curcas* on about 1 million hectares of land. Besides being a source of oil, *Jatropha* also provides a meal which may serve as a highly nutritious protein suplement in animal feed. *Jatropha curcas* meal (fully defatted) has a crude protein content of between 53-63% and about 90% of this is present as true protein (Aderibigbe *et al.*, 1997). Makkar *et al.* (1998) reported that pepsin digestibility nitrogen in *Jatropha curcas* meal was very high (93-95%), suggesting high availability of protein to animals. However, both seed and oil have been found to be toxic to animals. El-Badawi *et al.* (1995) reported high mortality and severe pathological changes in Brown Hisex chicks fed diet containing 0.5% *Jatropha curcas* seed. Feeding *Jatropha curcas* meal at the level of 5% in the diet to the broilers reduced feed consumption, caused 100% mortality at the age of 22 days and it damaged the liver as well as kidney (Sumiati *et al.*, 2007). Ahmed and Adam (1979) studied the sequential development of the clinical signs an lesions in the organs of desert sheep and Anglo-Nubian goats dosed with *Jatropha curcas* seeds at 0.005, 0.5 and 1 g/kg/day. Diarrhoea, reduce water consumption, dehydration, sunken eyes, inappetence and ioss in condition were the important signs of poisoning in the sheep and goats.

The toxic or antinutrient compound contained in the *Jatropha curcas* include curcin-a lectin, phenol, tannin, phytate, trypsin inhibitors, saponin and phorbol esters (Francis *et al.*, 2006). Curcin and phorbol ester are the main toxic components contained in the *Jatropha curcas* meal. The meal of