EVALUATION OF UNTREATED GRAIN LEGUME VARIETIES FOR LAYING HENS

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While grain legume production in Australia is increasing rapidly, most of this harvest is grown in the southern states, primarily for human consumption. Some legume varieties, however, are well suited to subtropical regions and show promise as competitive sources of protein for livestock. Although most of the antinutritional factors (ANF) in grain legumes can be reduced by appropriate means such as heat treatment or enzyme additives, this is an extra cost which might be avoidable if varieties with low ANF levels can be obtained. The trials reported here investigated the value for laying hens of some current varieties of legumes, which were grown in Queensland and utilised in untreated form.

Two cultivars of chick pea (Amethyst and Barwon), two of mung bean (Delta and Emerald) and one of lab lab (Koala) were evaluated for Isabrown laying hens in mash and pelleted diets in two trials. In trial 1 the chick pea cultivars were included in mash diets at levels of 100, 200 and 300g/kg and the mung bean cultivars were included at 150, 300 and 450g/kg. In trial 2 the test materials were included in mash and steam-pelleted diets: Amethyst chick pea at 200 and 300g/kg, Emerald mung bean at 300 and 450g/kg and Koala lab lab at 100 (mash only), 200 and 400g/kg. Each trial included control treatments without grain legumes (mash and pellets in trial 2) and all diets were formulated to similar nutrient specifications. Each treatment was represented by six or seven groups of seven or eight birds. The diets were fed for a four-month period (three months for lab lab). Nutrient and ANF profiles were obtained for each legume cultivar by laboratory analysis.

Varieties of the same legume species were nutritionally similar, except that total sulphur amino acid levels were much lower in Amethyst chickpea (1.55 g/kg) than in Barwon (5.50 g/kg). Trypsin inhibition activity (mg/g) was higher in chickpea (3.8-7.1) and lab lab (3.8-5.5) than in mung bean (1.9-2.9), and higher in Amethyst (6.8-7.1) than in Barwon (3.8-4.5) chickpea. However, bird performance appeared to be unrelated to ANF levels.

There was no effect of diet composition on mortality, egg weight or egg specific gravity in either of the two trials. In trial 1, diets containing 450 g/kg mung bean or 300 g/kg Barwon chick pea resulted in 7-9% fewer eggs, 4-5 g/d lower egg mass and 9-10% poorer feed conversion than the control diet (P<0.05). Bodyweight gain over the trial period was depressed by 90-150 g (P<0.05) in four of the six chickpea treatments. Trends in the data suggested that both chickpea varieties had a depressing effect on egg mass output when included in the diet at levels above 100 g/kg.

In trial 2, lab lab at 400 g/kg in mash or pelleted diets resulted in markedly lower egg number, egg mass output and feed intake and poorer feed conversion than any other treatment (P<0.001) but did not affect body weight gain. For 200 g/kg lab lab these comparisons were almost significant (0.10>P>0.05). None of the chickpea and mung bean treatments differed from the mash or pellet control treatment (P>0.05) in respect of egg number, egg mass, feed intake, feed conversion or body weight gain. Egg weight was 0.87 g higher (P<0.05) when birds were fed pelleted instead of mash diets. Mung bean at 450 g/kg in the pelleted diet resulted in 14% more eggs than the control pellets (P<0.05). Although there were no other differences between diet forms and no interactions between diet form and diet composition, the chickpea diets tended to depress performance when fed as mash but not when fed as pellets.

The results overall suggest that safe feeding levels of untreated legumes are: lab lab 100 g/kg, Barwon chick pea 100 g/kg, Amethyst chick pea 100 g/kg in mash or up to 300g/kg in pelleted diets, and mung bean 300 g/kg in mash or >450 g/kg in pelleted diets.

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