

AZOLLA PINNATA AS PARTIAL PROTEIN REPLACEMENT ON GROWTH PERFORMANCE OF CROSSBRED PIGS

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ABSTRACT

An experiment was conducted for 120 days in grower phase and finisher phase using eighteen crossbred Large White Yorkshire pigs to evaluate the effect of feeding of sun dried Azolla as a protein replacement on growth performance of crossbred pigs. Eighteen pigs were divided into three groups of six animals each. First group (T1) was maintained on routine farm concentrate. Pigs belonging to T2 and T3 groups were fed with 10 and 20 per cent azolla incorporated test rations, respectively. The cumulative body weight gains, ADG during grower phase and during finisher phase showed no significant difference ($P < 0.05$) among the three experimental groups. Feed consumption was significantly higher ($P < 0.05$) in T1 group compared to T2 and T3 group during grower and finisher phase. However no significant difference was observed in respect of FCR among the three groups.

Keywords : Azolla, growth performance, replacement, crossbred, Large White Yorkshire.

The water fern Azolla is considered as one of the most promising alternative feed ingredient source because of the ease of cultivation, high productivity and good nutritive value.

Azolla is a good source of protein and it contains almost all essential amino acids, minerals such as iron, calcium, magnesium, potassium, phosphorus, manganese etc, apart from appreciable quantities of beta carotene and vitamin B². Several researchers used azolla as partial replacement of protein source for growing-fattening

pigs^{3,6}. Hence, an attempt was made in the present experiment to study the chemical composition of Azolla *pinnata* and to evaluate its inclusion as a partial protein replacer on the growth performance and feed conversion efficiency of crossbred pigs.

MATERIALS AND METHODS

The experiment was undertaken at the pig farm, Department of Livestock Production Management, NTR College of Veterinary Science, Gannavaram, Krishna District in Andhra Pradesh. The Azolla was cultivated in three pits in the same department. A growth trial was conducted for 120 days (60 days growers + 60 days finishers) using 18 Large White Yorkshsire crossbred pigs divided into three groups (T1, T2 and T3) with six pigs in each group based on their body weights.

Grower ration with CP 18.00 per cent and finisher ration with CP 16.00 per cent were formulated using various ingredients based on the

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recommendation⁷. Three grower rations G1 (conventional), G2 and G3 (test rations) and similarly three finisher rations F1 (conventional), F2 and F3 (test rations) were prepared and fed after the incorporation of sun dried Azolla as protein replacement at 10 per cent in G2 (900 g of conventional concentrate ration + 76.5 g of dried Azolla), F2 (900 g of conventional concentrate ration + 68.3 g of dried Azolla) and 20 per cent levels in G3 (800 g of conventional concentrate ration + 153 g of dried Azolla), F3 (800 g of conventional concentrate ration + 136.6 g of dried Azolla).

The body weights of all 18 pigs were recorded every week before offering the morning feed. The average daily gain (ADG) and feed conversion ratio (FCR) were calculated. Dried Azolla sample and all the experimental feed samples after inclusion of Azolla in required proportions were analyzed in duplicate for proximate constituents¹. The data were subjected to standard statistical procedures¹⁰ to arrive at the conclusions.

RESULTS AND DISCUSSION

Chemical analysis showed that dry matter (DM) content of sun dried Azolla meal was 89.73 per cent. Azolla contained 75.73 per cent organic matter (OM), 23.49 per cent crude protein (CP), 14.7 per cent crude fibre (CF), 3.7 per cent ether extract (EE), 24.26 per cent total ash (TA), 7.94 per cent acid insoluble ash (AIA), 2.58 per cent calcium and 0.26 per cent phosphorus. The dry matter content of sun dried Azolla was 89.73 per cent which was in close agreement with the results of². The high moisture content of Azolla may act as an impediment to use it on fresh basis as the bulk required to satisfy the DM requirements of livestock is very high. The crude protein content of Azolla was 23.49 per cent was almost similar to the results obtained by².

The crude fibre content obtained was 14.7 per cent which was found to be in accord with reported values². The total ash content was 24.26 per cent, slightly lesser than that reported values⁸. The ether extract was 3.7 per cent, which was in

agreement earlier values². The NFE content of Azolla was 33.84 per cent, which were similar to the earlier findings⁸. The variation in the nutrient composition of Azolla in different studies could be attributed to differences in the soil nutrients and the differences in inputs added.

The chemical composition of the grower rations G1, G2 and G3 and finisher rations F1, F2 and F3 is presented in Table I. The chemical composition of grower rations G1, G2 and G3 and finisher rations F1, F2 and F3 on dry matter basis revealed that crude fibre, ether extract and total ash values increased with the increased level of dried Azolla (0, 10 and 20 per cent) in the rations owing to their higher values in dried Azolla and the NFE decreased as the inclusion of Azolla decreased due to the corresponding lower NFE in dried Azolla. The CP per cent in the diets revealed that the diets were iso-nitrogenous and confirmed to the recommendations of BIS⁵ for pigs.

The performance of growers and finishers is presented in Table II. The overall mean daily feed consumption in pigs fed rations G1, G2 and G3 during grower phase (60 days) and F1, F2 and F3 during finisher phase (60 days) showed significant difference between their means ($P < 0.05$). The average feed intake in growers and finishers was reduced as the level of inclusion of Azolla increased in the rations. The depression in feed intake may be because of excessive crude fibre and ash content in the rations and stated that Azolla affected the palatability of feed and reduced the feed consumption⁴. However, higher dry matter intake in finishers fed with fresh Azolla based diets than in pigs fed with control diet was reported^{3&6}.

Cumulative body weight gains and SE in pigs fed G1, G2 and G3 rations and in pigs fed F1, F2 and F3 rations, respectively did not differ significantly (Table II). Slightly higher gain was observed in control group than the treatment groups containing Azolla^{3,6}. Hence, from this study it could be inferred that inclusion of dried Azolla upto 20% in the ration did not influence the cumulative body weight gain in pigs.

Azolla pinnata as protein replacer

The average daily gain (ADG) in pigs fed with G1, G2 and G3 were 0.36 ± 0.06 , 0.35 ± 0.05 and 0.35 ± 0.03 kg, and pigs fed with F1, F2 and F3 was 0.35 ± 0.07 kg, 0.34 ± 0.06 kg and 0.35 ± 0.05 kg, respectively and the difference between the groups were non-significant ($P > 0.05$). The ADG in growing pigs obtained were similar to that reported³ but on the contrary⁶ slightly higher ADG in growing pigs fed with azolla based diets. Higher ADG in finisher pigs fed with diet containing fresh Azolla as protein replacement

at 15 per cent than pigs fed with diets containing 0 and 30 per cent fresh Azolla was reported³.

It was observed that FCR in pigs (Table II) fed with G1 and F1 control ration was high when compared to the other two groups of pigs fed with G2, G3 and F2, F3 rations containing Azolla as an ingredient. FCR values obtained in the study were in accord with earlier findings^{3,6} who reported that the FCR was lower in pigs fed with 10 and 20 per cent fresh Azolla as protein replacement than pigs fed with control diets.

Table I. Chemical composition of experimental diets (g/kg)

Ingredient	G1	G2	G3	F1	F2	F3
Maize	300	300	300	300	300	300
Soyabean meal	100	100	100	100	100	100
Wheat bran	100	100	100	100	100	100
Cracked corn	100	100	100	100	100	100
Cracked sorghum	100	100	100	100	100	100
Cracked millet	100	100	100	100	100	100
Cracked rice	100	100	100	100	100	100
Cracked jowar	100	100	100	100	100	100
Cracked ragi	100	100	100	100	100	100
Cracked finger millet	100	100	100	100	100	100
Cracked kodo millet	100	100	100	100	100	100
Cracked proso millet	100	100	100	100	100	100
Cracked barnyard millet	100	100	100	100	100	100
Cracked little millet	100	100	100	100	100	100
Cracked foxtail millet	100	100	100	100	100	100
Cracked amaranth	100	100	100	100	100	100
Cracked buckwheat	100	100	100	100	100	100
Cracked quinoa	100	100	100	100	100	100
Cracked amaranth	100	100	100	100	100	100
Cracked buckwheat	100	100	100	100	100	100
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Cracked amaranth	100	100	100	100	100	100
Cracked buckwheat	100	100				

CONCLUSION

The study revealed that the inclusions of dried Azolla as protein replacement upto 20% in the conventional concentrate ration did not hinder the growth performance in growers or finishers. Hence, it might be concluded that sun dried Azolla can be included in the swine ration upto 20% with

no deleterious effects on the performance and livability of pigs.

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