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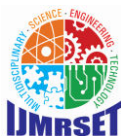
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Effect of Feeding Raw Azolla on Growth Performance of Broilers

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ABSTRACT: Poultry feed industry needs an integrated nutrient supply system. This can be achieved by effective use of non conventional feed resources and green feeding. *Azolla pinnata* is a good source of protein and minerals . Feeding trials carried out with different combinations of commercial feed and fresh *Azolla* showed that 20-25% level of commercial poultry feed could be replaced by supplementing it with fresh *Azolla* in diet. Birds receiving normal feed with 5% extra in the form of *Azolla*, grew faster than the bird fed with 100% feed alone .Feeding azolla to poultry did not have any adverse effect on the weight of broiler chickens and increased the egg production in layers . However, detail studies in broilers are necessary to tap the beneficial effects of *azolla* in rural poultry production. Thus, a study was conducted to assess the effect of dietary inclusion of *azolla* (*Azolla pinnata*) in raw and meal forms on the in broilers. Research on the utilization of green forages and feed has increased considerably during the past few years. It has been seen that turkeys consume more vegetables (green feeds) than do poultry. Hence, feed factor is quite significant for turkeys under the intensive system, as they have no direct contact with plant feeds, especially green feeds. Besides, the phenomenal increase in poultry production has resulted in competition with the conventional human food ingredients leading to a shortage and increased the cost of conventional feed ingredients [1]. Since the cost of the feed accounts for nearly 75% of the total cost of turkey production, the substitution of conventional feedstuffs by unconventional feedstuff will lead to a reduction in the cost of turkey feed, and hence, increase the margin of profit in turkey business.

Azolla is a small aquatic fern that flows on the water surface. The use of *Azolla* as a drug, reclaiming saline soils [2], and bioremediation [3,4] has also been investigated. Few studies have been carried out in chicken to assess the effect of *Azolla* meal and raw *Azolla* feeding on the performance of chickens [5-7]. If turkeys effectively use unconventional feedstuffs like *Azolla* without reducing the performance, it will increase the profitability of turkey business.

It has already been established that choice-feeding system may play a pivotal role in reducing the feed cost of laying hens and turkeys in developing countries [8]. The basic principle behind free choice feeding is that individual birds can select from the various feed ingredients and thus get a chance to compose their diet according to their actual requirement and capacity of production.

Hence, the present study was carried out to evaluate the effect of dried *Azolla pinnata* meal vis-a-vis raw *Azolla* as choice feeding on the body weight, feed conversion ratio (FCR), blood biochemical attributes, and immune competence traits of growing turkeys under intensive system.

I. INTRODUCTION

Global poultry production has undergone a phenomenal transformation in the past few decades. This has resulted in a competition with the conventional human food ingredients leading to shortage and increased cost of conventional feed ingredients .Therefore, some serious attempts have been made by nutritionists in the recent past to substitute the conventional feed ingredients with different non-conventional feed resources. *Azolla* is an aquatic fern, flows on the water surface. *Azolla* hosts symbiotic bluegreen algae, *Anaebaena azollae*, which is responsible for the fixation and assimilation of atmospheric nitrogen .*Azolla*, in turn, provides the carbon source and favorable environment for the growth and development of the algae. It is this unique symbiotic relationship that makes *azolla*, a wonderful plant with

high protein content. Use of *Azolla* was initially limited as green manure but its use as mosquito inhibitor, herbicide, water saver, water purifier, nitrogen fertilizer saver, drug and bioremediation has also been investigated. [1] Considering its nutrient content attempts have been made to use *azolla* as a feed ingredient for poultry, pig and other livestock species. Though variable results were reported, most of the researches suggested improvement in production and reproduction parameters in broiler when birds were fed with *azolla* meal replacing basal diets up to a certain level. Backyard poultry farming is being promoted in India considering the socio-economic condition of Indian farmers. Over the years, various government agencies of India have been developing several strains of poultry birds for backyard farming. Broilers have been developed by Central Poultry Development Organization (CPDO), Chandigarh, India. Considering the potential of *azolla* meal, the current study was planned to assess the effect of feeding different levels of *azolla* (*Azolla pinnata*) meal as partial replacement of standard broiler diet on growth performance, nutrient utilization and carcass characteristics in broiler chicken. [2]

II. MATERIALS AND METHODS

Broiler chicken were kept in 8 week feeding trial. 160 chicks (1 week old) were randomly divided into four groups with four replicates and ten birds each. Control group (T1) was fed on basal diet without *azolla* supplementation and three experimental diets were prepared by replacing basal diet with *azolla* meal at 5% (T2), 7.5% (T3) and 10% (T4) levels. The diets were offered randomly to all the four groups (T1, T2, T3 & T4) for a period of 8 weeks. Live weight gain was significantly improved ($P < 0.05$) in T2 and T3 groups. Feed conversion ratio (FCR) and protein retentions were improved significantly ($P < 0.05$) in chickens kept on T2 and T3. Supplementation of 5% *azolla* meal significantly increased relative weight of breast compared to control. Retentions of crude protein and Ca were significantly ($P < 0.05$) higher in groups fed *azolla* meal. Cost of feed per kg live bird was significantly ($P < 0.05$) lower in all the groups fed *azolla* meal compared to control group

III. DISCUSSION

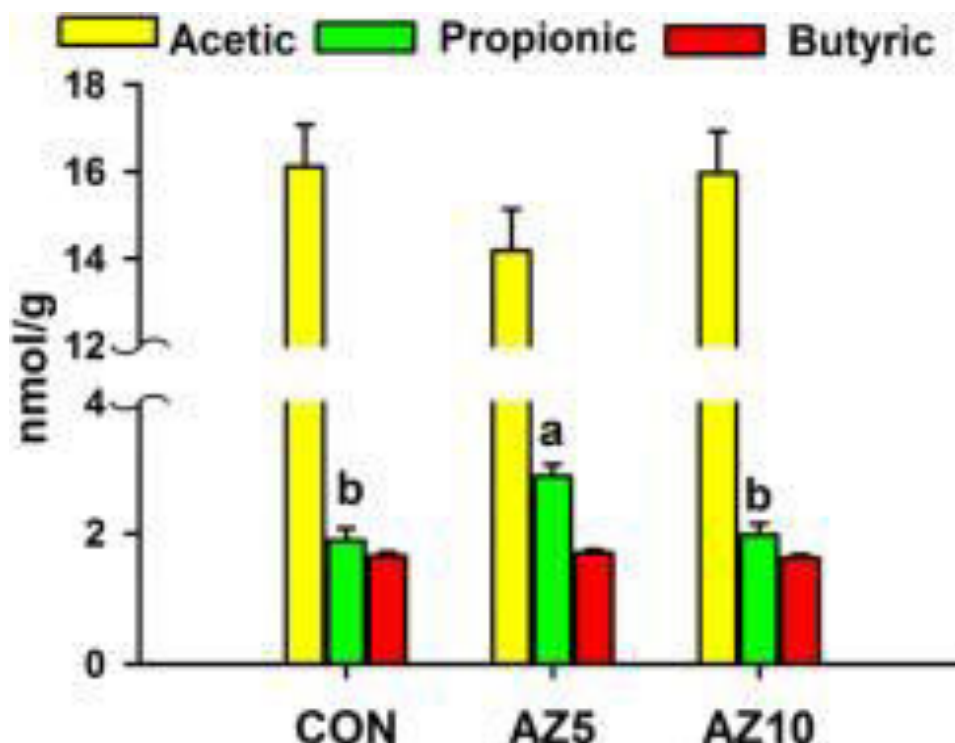


Figure 1. Effect of *Azolla* on cecal short chain fatty acids of broiler chicken. The ALM at 5% level increased the propionate level ($Q < 0.01$), where CON is the control group, AZ5 is the group fed on diet containing 5% *Azolla* and AZ10 is the group fed on diet containing 10% *Azolla*.

Azolla is known to have a high amount of ash. Although this could be an issue in inserting *Azolla* into the diet of poultry or any other livestock species, our data do not indicate any negative consequence in feed intake when provided



with up to 5% of the diet. The high amount of ash could be one of the reasons for the lack of additional benefit or even a decrease in benefit when provided with higher doses, as observed in our study in most of the measured parameters.[3] However, the high ash content of *Azolla* did not affect the amount of ash in the meat of broilers.

IV. RESULTS

Inclusion of *Azolla* in broiler chicken diets activated the key muscle protein synthesis regulator p70S6 kinase. The effect of *Azolla* on propionate production was only limited to a dose of 5%. Inclusion of *Azolla* in the broiler chicken diet of up to 5% could be beneficial to partially replace soybean meal in the diet of broiler chickens without any negative impact on the growth performance but with a positive effect on meat quality. Part of the reason for the positive effect of *Azolla* is due to the stimulation of the muscle protein synthesis through activation of the mTOR/S6 kinase signaling pathway.[4,5]

V. CONCLUSION

Broiler chicken is generally promoted as a poultry bird for backyard farming for poor and marginal farmers. Thus cost of production is of prime importance for sustainable Broiler chicken farming. Present investigation showed that Broiler chicken farming may be sustainable when commercial feed is replaced at particular level by *azolla* meal which could be easily grown by farmers at very low cost.[6,7] The result of the present study indicated that dietary inclusion of *azolla* meal up to a level of 7.5% improved body weight gain, feed conversion ratio, retention of nutrients without causing any adverse effect on carcass quality and slaughter traits with reduction in cost of production. Therefore, it is suggested that *azolla* meal may be fed to Broiler chicken at a level of 7.5% replacing the standard concentrate diet to rear them economically without any adverse effect on their overall performance [8,9].It was concluded that dietary inclusion of *azolla* meal upto 7.5% was beneficial in terms of improved performance and nutrient utilization in broiler chicken without any deleterious effect on carcass quality with reduced feedcost.[10]

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