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Effects of dietary supplementation on growth performance of pigeon squabs (Aves: Columbidae)

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Abstract

A one-way ANOVA examined the effects of feed additives (control, broiler feed, broiler feed + grit) on the growth of the squab from 21 to 30 days old with equal cell sizes (n=10 per cell; N=30). Assumption checks indicated no serious violations: residuals were approximately normal (Shapiro-Wilk p=0.1257) and variances were homogenous (median-based Levene's test), F (2,27) = 0.3073, p= 0.738. The analysis showed a large effect among control, treatment 1 (broiler feed) and treatment 2 (broiler feed + grit) group, F (2,27) = 390.8, p<0.001. Control produced lower weights (M=206.00 g ± 0.149) than broiler feed (M=207.00 ± 0.179 g) and broiler feed + grit (M=208.00 ± 0.165 g). Tukey-adjusted simple effects aligned with these patterns: within control, broiler feed, and broiler feed + grit (all ps<0.001). Differences among groups were found in treatment 1—control (1.01), treatment 2—control (2.06), and treatment 2—treatment 1 (1.05) respectively. Null hypothesis was rejected, so it was mentionable that there were significant differences among control (as usual commercial feed without no broiler feed and grit), treatment 1 (common feed + broiler feed), and treatment 2 (common feed + broiler feed + grit) groups on the growth of the squabs. For the proper marketable growth of squabs, it is recommended to apply broiler feed and grit with the commercial feed of pigeons.

Keywords: Pigeon, feed, growth, broiler feed, grit

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Introduction

Food is the main issue for achieving remarkable profit from a pigeon farm. Food is related with all sorts of biological activities. Food ensures pigeons' fitness and ultimately fitness protects from many diseases. At the present context, there are many branded pigeons feed and probiotic premix in the world. All are found with available nutrients. Due to excess protein content, broiler starter, grower, and finisher are not allowed to pigeon but a small amount could provide for growth of certain breeds for the short time. Mix of broiler mash (protein content 18-24%) with grains makes powdery food stuffs, and pigeon dislike it, so they destroy feed, and sometimes this food causes respiratory ailments. Grits help to fulfill the gap of such nutrients of food. Unlike genetic bird grit, a suitable pigeon grit acts both digestive aid and mineral source. There are two types of grits—soluble (egg shell, oyster shell, etc.) and insoluble (quartz, granite, etc.). According to Lee and Haynes (1946), a suitable mixture is an essential part of the pigeon diet, as all the grains and seeds commonly fed are low minerals. Mineral mixtures commonly contain a variety of ingredients such as oyster shell, charcoal, granite grit, salt, limestone, bone meal, venetian red, and at times such additional products are gentian red, anise seed, and sulphur (Platt, 1950).Protein consists of specific amino acids and crude protein (CP) is defined as total protein with amino acids and non-protein components (urea, nitrite, ammonia). In Bangladesh, most pigeon breeders keep their pigeons mainly for hobby and little amount of flying, and for this less amount of protein and fat is enough. Excess protein caused liver disease and fat enhance obesity. Sticky and highly expanding food are bad especially for pouter or cropper pigeons. Pigeons are lactose intolerant, so they cannot absorb any milk products. Salty snacks cause kidney stress and dehydration, which makes feather dull and 'frizzled'. Bristles of paddy make a micro-injury in the throat, then easily canker parasite (*Trichomonas*) could penetrate. Paddy without bristle could be provided less than 15% with their diet. Pigeons are notably more resistant to the toxic part (neurotoxic) of the Indian pea (*Lathyrus sativus*) than ducks and geese, so need to serve a little amount. Bread with white flour and rice is not suitable for pigeons because this is actually 'junk food' and it makes 'false fullness' of pigeon. Boiled egg scramble is good for breeding and moulting pigeons but once or twice in a week is always recommended. Due to lack of gall bladder, pigeon use their bile juice directly on the oilseeds, and can get more energy efficiently (Sales and Janssens, 2003). The objective of this write-up is to focus the effect of as usual commercial feed, slight grower broiler feed, and grits on the overall growth performance especially on squabs.

Plate 1. German Racing Homer Breeders Association, Dortmund

Materials and Methods

Pigeon breeds: For this study, local pigeon (gola), tumbler (Pakistani, Bangladesh), roller (lotans), Indian bombai, mookee, satinette, and racing homer were kept to apply commercial feed, broiler feed, and grit to observe the weight of such squabs.

Statistical analyses: One-way ANOVA was arranged for this test by using RStudio.

Plate 2. A group of healthy pigeons (genetically mixed breeds) at Saidpur town

Results

Mean body weight of pigeons: In Bangladesh, pigeon breeders provide as usual commercial feed from the market, and those feed items are mixed with wheat, corn, sunflower seed, rapeseed, mustard, and millet. When pigeons were provided with this feed mixture, such pigeons were considered as control group. The mean weight of the pigeons in this group was 206 ± 0.149. In the case of treatment-1 group, pigeons were provided only broiler feed with commercial feed of control group. Here mean body weight increased slightly 207 ± 0.179. Finally, pigeons were introduced grit with control group and treatment group 1 feed, and weight was increased slightly with 208 ± 0.165.

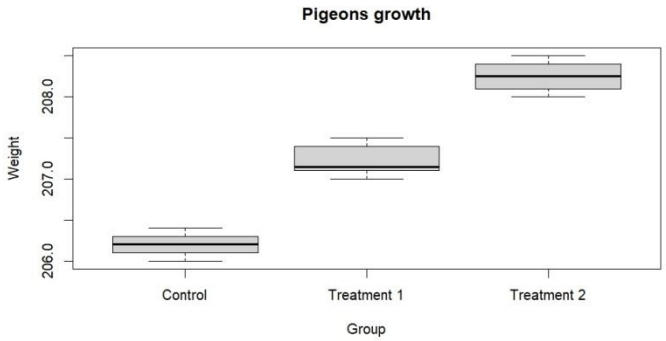

Figure 1. Box plot for the mean weight of control, treatment-1, and treatment-2 group

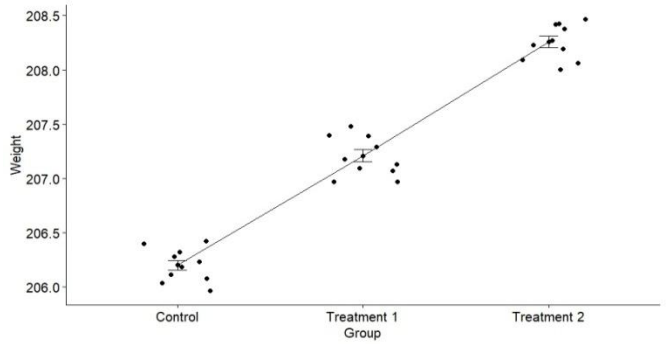

Figure 2. Scatter plot for the mean weight of selected pigeons

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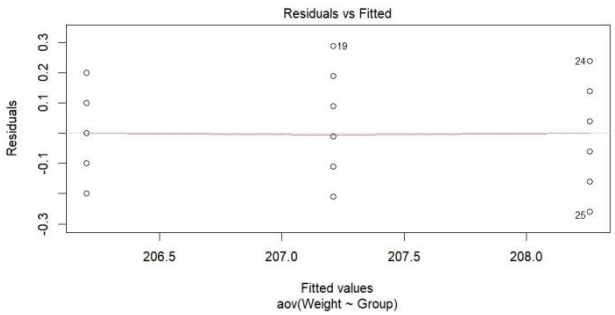
Significance test: The result of ANOVA suggested that there were significant differences between and within group of pigeons (control, treatment-1, treatment-2) ($p < 0.05$) at 2 and 27 degrees of freedom, so null hypothesis is rejected. It is obviously true that if we provide commercial feed to pigeon, commercial feed with broiler feed, and grit mix with commercial feed and broiler feed, the growth of pigeons was increased slightly. Here, p value is smaller than 0.05, so need not continue Tukey (posthoc) multiple comparisons of means but if we do this, the result showed values zero which is less than 0.05 at 95% family-wise confidence level, so again we mention that the differences between control vs treatment-1, control vs treatment-2, and treatment-1 vs treatment-2 were significant at all.

Table 1. ANOVA for the pigeons' growth between and within groups

Groups	Sum of square	df	Mean of square	F value	P value
Between groups	21.221	2	10.610	390.8	<0.001***
Within groups	0.733	27	0.027		
Total	21.954	29			

*P <0.05 at significant level

Homogeneity of variance: A plot showed the data with normal distribution, so homogeneity of variance has maintained during these analyses. Residuals and fitted data showed that there were only two data were outliers, others were in normal distribution between groups and weight of pigeons. Calculated variables (variance) were very important here because when data were in normal distribution the result will be more accepted. In the case of Levene's test, p value was found $p < 0.738$, which is greater than 0.05 at the same 2 and 27 degrees of freedom, so here homogeneity of variance has been maintained.



Discussion

The findings of this study demonstrate that dietary supplementation significantly influences squab growth. The addition of broiler feed increased body weight, likely due to its higher protein content, which supports tissue development and metabolic activity. Without grit the squab weight at 28 days only 5-7 ounces, while providing grit this weight was noticed 16-20 ounces (Levi, 1941). Only oyster shell was not satisfactory, when this was mixed with salt and charcoal, weight increased averaging 17.4 ounces instead of 11.3 (Platt, 1950). A combination of 85% oyster shell, 10% charcoal, and 5% salt appeared the best (Platt, 1950). The grits used did not have any significant effect upon the production of infertile, broken eggs, dead embryos/dead squabs in the various lots (Platt, 1950). Both male and female prefer maize, female pea, and male prefers wheat (Sales and Janssens, 2003). A complete-formula granulated (CFG) plus premix was beneficial to squab which could improve digestive enzyme and antioxidant ability in the serum; thus, the carcass weight increased but body weights at 21-days were not different significantly (Zhang *et al.*, 2022). It is suggested that high CP (crude protein) level can promote the growth performance of pigeon squabs, which is similar to the results of the studies on broilers (Liu *et al.*, 2005; Wu *et al.*, 2005). Within the certain range, the growth performance of poultry improves with the increase of protein content in their diets (Hounkpevi *et al.*, 2024). Using 16% CP (crude protein) level of diet for artificially feeding squabs during the late stage of growth is recommended (Liu *et al.*, 2025). Under natural parental feeding, squab's growth rate declines significantly after day 21, most reaching their maximum body weight between day 21 and 25 post-hatch (Gao *et al.*, 2016; Xie *et al.*, 2016). Diets supplemented with 16 mg/kg led to the highest abundance of *Gallibacterium* in breeding pigeons which was positively linked to antibiotic resistance genes of squab pigeons (Zhang *et al.*, 2026). To get proper results especially on racing and exhibition pigeon breeds, need to provide different feed ratio in their growing, moulting, and breeding stages (Kabir, 2018b). In fact, broiler feed is not suitable for the pigeons for its higher protein content (Kabir, 2018b). Home-made grits are always good for the growth performance of pigeons (Kabir, 2021). Sometimes, long bristles of paddy attach to the throat of pigeon and causes infection (Kabir, 2021). One kg broiler grower feed with other components, showed 91.25% growth rate at the 3rd week of age of squab (Kabir, 2013). In winter season, for maintaining body temperature, the amount of maize will be provided slightly higher than wheat (Kabir, 2018a). At the time of hatching, regular 60 g feed is required for a parent to nourish their young properly (Kabir, 2018a). According to Stertevant and Hollander (1978) food consumption is about one-tenth of a pigeon's body weight. Grit supplementation further enhanced growth performance, consistent with previous studies reporting improved digestion and nutrient absorption (Levi, 1941; Platt, 1950). Mineral components in grit contribute to skeletal development and enzymatic functions. Protein intake is a critical factor in avian growth. Studies in poultry have shown that increasing dietary protein improves growth performance within optimal limits (Liu *et al.*, 2005; Hounkpevi *et al.*, 2024). However, excessive protein intake may lead to metabolic stress, emphasizing the need for controlled supplementation. The results also align with previous research indicating that squab growth peaks between 21 and 25 days of age (Gao *et al.*, 2016). Nutritional interventions during this period are therefore crucial for maximizing growth potential.

Conclusions

Since white king pigeon is actually a recognized and significant meat-breed in the world, so most research works were found on the efficacy of feed on this type of breed. In Bangladesh, some papers on gola (local meat-breed) were noticed especially on growth rates and feed components. In order to get sufficient profit to sell squab for meat, it is necessary to provide slight grower broiler feed with the as usual feed, but this is true that broiler feeds are only designed for chicken. Most of the pigeon breeders of Bangladesh supplied this type of feed for their all sorts of pigeons. Till now, there were listed hundred plus pigeon breeds in Bangladesh, and most breeders provide excellent feed ratio with probiotic premix, so need not extra chicken pellets. Recently, super grits are available in the country for their all types of pigeons, and the

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productive outputs were seen remarkable at all. Based on this analysis, this type of feed is recommended but for more confirmation, need to set a large dataset on more pigeons in the future. This study confirms that the combination of commercial feed, broiler feed, and grit significantly improves the growth performance of pigeon squabs. Among the treatments, the inclusion of both broiler feed and grit resulted in the highest body weight. However, broiler feed should be used cautiously due to its high protein content and formulation for poultry rather than pigeons. Grit supplementation is strongly recommended as a safe and effective dietary addition. Future studies should include larger sample sizes, longer experimental durations, and breed-specific analyses to further optimize feeding strategies for pigeon farming.

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