Effect of Commercial Feed Formula and Feed Constituted with Industry Ready-Made Concentrates on the Growth Performance of Broilers

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Abstract— *Optimal nutrition directly impacts the efficiency and growth performance of broilers, which are critical factors determining the profitability and sustainability of broiler production. Despite the widespread use of both commercial and reconstituted concentrate-based feeds, there has been limited empirical data directly comparing the impact of these feeds under controlled conditions. This lack of comprehensive, comparative studies creates uncertainty for farmers in making informed decisions about the more cost-effective and productive feed to use. This study compared the growth performance of 120 broiler chicks fed a commercial feed formula and a feed constituted with industry-ready-made concentrates. The chicks were randomly assigned to two dietary experimental groups (T1 – Commercial feed; T2 – feed formulated with ready-made concentrate from the feed industry) and fed for eight weeks. The results of the experiment were analyzed using a two-tailed t-test. The findings of the study revealed that although the average feed intake, feed conversion rate, and weight gain of the two groups were not significantly different (P>0.05), broilers fed with reconstituted concentrate-based feed showed significant weight gain in the 6th (p = 0.002), 7th (p = 0.019), and 8th (p = 0.002) weeks of the experiment. The results of the findings showed that the use of reconstituted concentrate-based feed allows for better growth performance in broilers. Thus, the use of reconstituted concentrate-based feed by farmers is recommended.*

Keywords— Commercial feed, Reconstituted concentrate-based feed, Broiler, Growth performance.

I. INTRODUCTION

The broiler production business offers one of the quickest returns on investment for poultry farmers, with high feed conversion rates and the production of one of the cheapest and best sources of animal protein (Akpaeti & Agom, 2018). However, animal protein consumption in Nigeria is grossly below the average required for good health, in line with the Sustainable Development Goals (SDGs) and the World Health Organization (WHO) (Akpaeti & Agom, 2018; Adekunmi *et al*., 2017). This low availability of animal protein might be attributed to the challenges of broiler production faced by farmers, which have slowed down the rate of production in the industry (Anosike *et al*., 2020).

With the growth in the production and rearing of broilers in recent years, industries have launched different commercial feed factories, some of which have benefits and disadvantages for broiler farmers (Wognaa *et al*., 2023). Yadollah and Ali (2016) observed that there is a significant difference between different production concentrates with respect to weight gain and aviculture duration. Using factory concentrates compared to feeds formulated on a poultry farm had positive effects on the diet behaviors of broilers, such that the rate of leftover protein, calcium, and phosphorus in dishes with concentrate feeds was less than that in feeds formulated on a poultry farm.

Mixing ingredients is an essential process in feed manufacturing, as these ingredients must be combined effectively to be supplied as a complete feed to animals (Rocha *et al*., 2022). The general objective of poultry nutrition is to maximize the economic production performance of birds. Diets are formulated to provide specific levels of nutrients needed for optimum performance (Uchegbu *et al*., 2009). Variations in nutrient composition, digestibility, and bioavailability between commercial feeds and those formulated with ready-made concentrates may lead to differences in broiler performance, which need to be

understood to optimize feeding practices. Therefore, this study aims to fill this knowledge gap by rigorously comparing the effects of commercial feeds and feeds reconstituted with ready-made concentrates on the performance of broilers.

II. MATERIALS AND METHODS

2.1 Procurement of Experimental Animals:

A total of one hundred and twenty (120) day-old chicks of mixed sexes, comprising one breed (Arbor Acre), was purchased from Amo Farm Sieberer Hatchery, located at Awe. The chicks were transported by night using Divine Favor Company's supply van to a collection point at Awka, and a tricycle was used to transport them to the school farm where the experiment was conducted. The birds were acclimatized for one week, each breed per compartment. After the acclimatization process, they were randomly assigned to the two treatment groups (T1 = commercial feed; T2 = feed formulated with ready-made concentrate from the feed industry). These two treatments were replicated three times each.

2.2 Housing:

The birds were housed in three pens measuring 2.60 square meters (1.22 x 2.13 meters) at the Poultry Unit of the Teaching and Research Farm, UNIZIK, Awka, with similar conditions for both groups. The pens were further demarcated to 0.05 m^2 per bird for 0-3 weeks and 0.10 m^2 per bird from 4-8 weeks, in accordance with Briese and Hartung [8]. Each group was kept in separate but identical pens to prevent cross-contamination.

2.3 Feeding/Watering:

The chicks were fed 6 kg of feed ad libitum (free access) during the first week and ad libitum throughout the experiment. This was to ensure that the birds ate as much as they wanted at any time to support optimal growth and performance. The feed was provided in clean feeders of 25 cm, preventing spillage. Clean, fresh water was made available ad libitum to all the broilers at all times in clean, easily accessible Dinoplast and Loveleen plastic drinkers.

2.4 Sanitation/Bio-Security:

The pens, feeders, and drinkers were thoroughly cleaned and disinfected with hypo and Izal before the arrival of the chicks. A strict cleaning schedule was followed throughout the experiment (i.e., every morning, the Dinoplast drinkers were washed thoroughly with clean water, and fresh water was poured into the clean drinkers for the broilers). Also, the feeders were inspected every morning, scrubbed with detergent and a sponge, and left to dry under the sun before feed was introduced into the feeders for the broilers. Clean, dry bedding (i.e., wood shavings) was provided in each of the three pens used. The bedding was replaced as needed to maintain a dry and comfortable environment, with complete bedding changes done every week.

Entry to the housing area was restricted as much as possible. Footbaths and clean protective clothing were used by personnel before entering the broiler area. Equipment such as pens, feeders, and drinkers were designated for each group to avoid cross-contamination.

2.5 Data Collection:

The weight and daily feed consumption of the birds in each pen were weighed using a Camry weighing balance and calculated weekly. The total feed consumed in a week was divided by the number of birds to get the average weekly feed intake, while the average body weight gained was calculated by subtracting the weight at the start of the week from the weight at the end of the week and dividing by the number of weeks. The FCR was computed by dividing the total feed intake of the broilers by the total weight gained for each group.

2.6 Statistical Analysis:

Comparisons between the two groups were made using a two-tailed t-test. Significant differences were determined at the level of $P < 0.05$ (i.e., $p<0.05$ shows a significant difference; while $p>0.05$ shows no significant difference).

III. RESULTS AND DISCUSSION

3.1 Feed Intake of the Broiler Chicks:

The results of the feed intake (Figure 1) revealed that there was no statistically significant difference between broilers fed with commercial feed or reconstituted concentrate-based feed, both in the starter ($p = 0.233$) and finisher ($p = 0.681$) phases. The overall feed intake also showed no statistically significant difference ($p = 0.360$). This might be because both feed formulations

are designed to meet the essential dietary requirements of broilers, including protein, carbohydrates, fats, vitamins, and minerals, ensuring growth and development. Also, broilers tend to adjust their intake based on energy needs and palatability, which might likely be similar in both feed types. Therefore, despite slight variations in composition, the overall energy and nutrient density remain sufficiently balanced, thus leading to similar feed consumption levels. This finding aligns with the results of Khalid *et al*. (2015), who found that the feed intake of broilers when commercial feed is replaced with reconstituted concentrate-based feed was the same, and had a similar effect on the performance of the broiler chicks with no significant difference. Additionally, the works of Lee *et al*. (2021) and Ammani *et al*. (2012) were in agreement with the findings of this study.

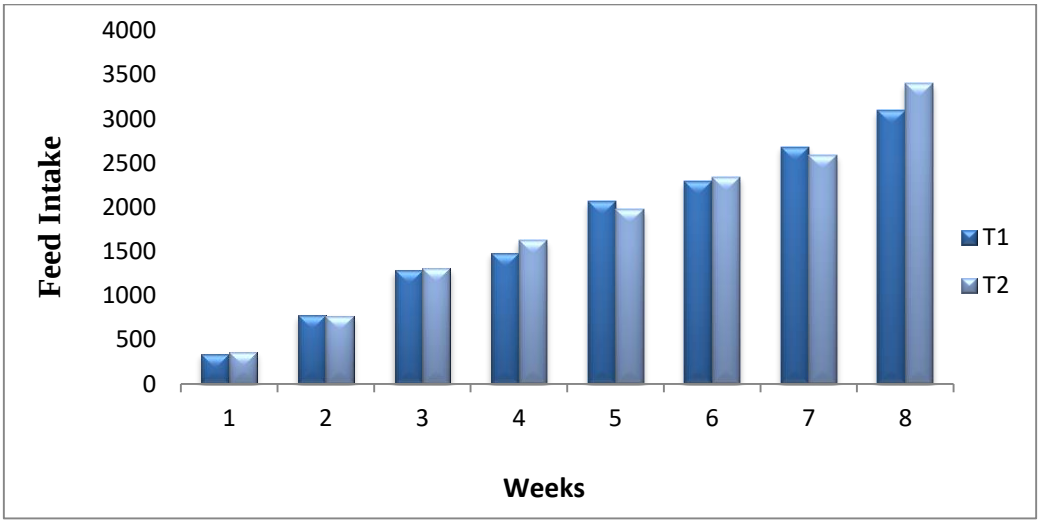

FIGURE 1: Feed Intake of Broiler Chicks fed with commercial feed and reconstituted concentrate-based feed

3.2 Weight Gain of the Broiler Chicks:

The average weight gain of broilers (Figure 2) showed no statistically significant difference in the first 5 weeks ($p>0.05$), but was statistically significant in the 6th ($p = 0.002$), 7th ($p = 0.019$), and 8th ($p = 0.002$) weeks. This suggests that the reconstituted concentrate-based feed may offer a higher concentration of key nutrients essential for optimal growth, such as proteins, fats, and energy-rich ingredients, crucial for supporting the rapid growth phase of broilers, especially in later stages (Leeson & Summers, 2001). This result contrasts with the findings of Ammani *et al*. (2012) and Hassan *et al*. (2021), who reported higher broiler weights with commercial feed compared to locally formulated feed.

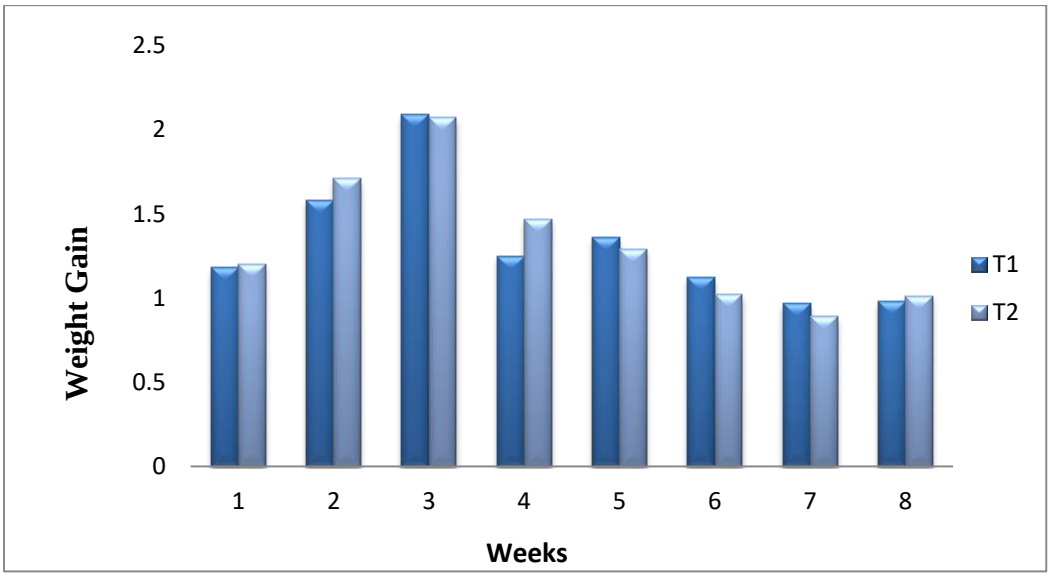

FIGURE 2: Weight gain of Broiler Chicks fed with commercial feed and reconstituted concentrate-based feed

3.3 Feed Conversion Rate of the Broiler Chicks:

The feed conversion ratio (FCR) showed no statistically significant difference (p = 0.691) between broilers fed commercial feed and those fed reconstituted concentrate-based feed. This similarity might be due to a similar balance of essential nutrients (carbohydrates, fats, vitamins, and minerals) in both feeds. Additionally, consistent experimental conditions (environment, management practices, and health status) may have reduced FCR variability. These findings are consistent with studies that found similar FCRs in broilers fed commercial and diluted concentrate-based feeds (Khalid *et al*., 2015; Kuleile, 2020; Yadollah & Ali, 2016).

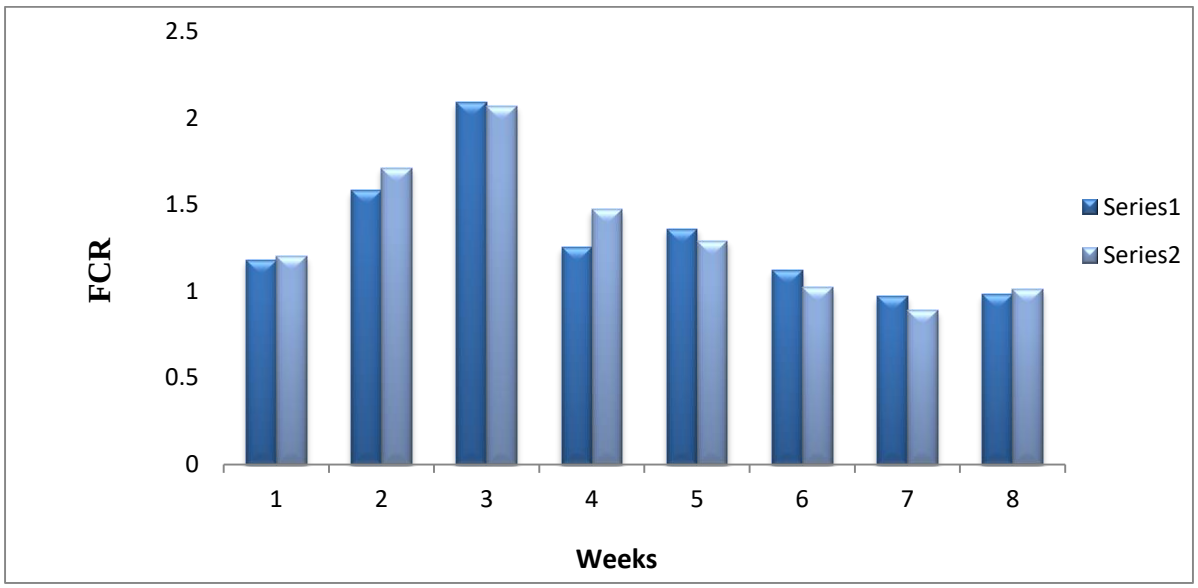

FIGURE 3: Feed conversion ratio (FCR) of Broiler Chicks fed with commercial feed and reconstituted concentrate-based feed

IV. CONCLUSION

This study showed that broilers fed reconstituted concentrate-based feed exhibited greater weight gain in the later stages of the experiment. This suggests that reconstituted concentrate-based feed may be a viable alternative to commercial feed for maximizing broiler growth performance. Further research is needed to determine the optimal formulation of reconstituted concentrate-based feeds for different broiler growth stages.

CONFLICT OF INTEREST

There is no conflict of interest

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