

# The Effect of Quantitative Feed Restriction on the Growth Performance of Broiler Chickens

Zitte Leelee Famii and James Favour Amarachi

Department of Animal and Environmental Biology, Faculty of Science University of Port Harcourt, Nigeria.  
Correspondence Author: +234-803-7971-401, [leelee.zitte@uniport.edu.ng](mailto:leelee.zitte@uniport.edu.ng)

## ABSTRACT

This research investigates the impact of varied levels of feeding and controlled feed restrictions on the growth parameters, and feed efficiency of broiler chickens. The study focuses on weight gain, feed conversion ratio (FCR), and feed consumption. A total of twenty-five (25) broiler chicks were grouped into 5 groups. Group 1 (Control) had ad libitum feeding, and Groups 2-5 had 95%, 90%, 85%, and 80% of *ad libitum* feeding respectively for four weeks. Results indicate that the group 2, with 95% of *ad libitum* feeding, exhibited the highest weight gain, less feed conversion ratio (FCR), and higher feed consumption. Result indicates that other groups subjected to feed restriction including the control group, displayed improved FCR values, suggesting enhanced nutrient utilization for growth, less weight, and less feed consumption. The study recommends the adoption of balanced feed restriction strategies for optimizing broiler production, emphasizing the need for continuous evaluation and adaptation of feeding practices for sustainable and economically efficient outcomes.

**Keywords:** Feed restriction, Growth performance, Broiler chickens, Feed efficiency

## INTRODUCTION

The growth performance of broilers is paramount to the poultry industry's economic development, which accounts for the growing demand for proteins. Achieving optimal growth in broiler farming is important to producers and consumers [1]. Feeds are the resource used in promoting the weight, meat value, and overall growth rate of these birds [2] but research has shown that with greater ingestion of these feeds, comes adverse effects that affect the performance of the birds and thus cause issues like mortality, poor reproduction, poor metabolism, and excess fat to the carcass [3]; [4]. Over the past 30 years, there has been a genetic progression of broilers that focuses on fast and lean growth with high muscle yield [5]; [6], [7]. To achieve this, efficient production methods that balance growth performance and economic returns are essential for sustainable broiler farming [2]. Feed restriction as described by [8] is a feeding strategy in which the volume, timing, and duration of the meal are all limited [9]. This impacts the ability of the bird to reach the same body weight as unrestrained birds. While moderate feed restriction may stimulate compensatory growth and improve feed efficiency, excessive restriction can compromise overall growth and development in broilers [5]; [10]. Feed-restricted broiler breeders exhibit increased activity and foraging behavior, as well as aberrant or stereotypic behaviors such as pacing, spot pecking, and polydipsia, as well as a strong desire to get feed when it is available [2]; [1] [11]. The practice of quantitative feed restriction in broiler chicken production remains a significant strategy to optimize growth, and health which reduces production costs [12], [13]. Despite its potential impact on the growth performance of broiler chickens, there exists a gap in the understanding of the optimal implementation of feed restriction strategies and this gap hinders the development of precise recommendations that balance growth efficiency across diverse poultry farming environments. So, this study seeks to address this critical gap by investigating the specific effects of quantitative feed restriction on broiler growth in Port Harcourt, Nigeria. As the demand for poultry products continues to rise, there is an urgent need to enhance the efficiency and profitability of broiler farming. Quantitative feed restriction, characterized by controlled limitation of feed intake during distinct growth phases, has been touted as a potential strategy to achieve these goals. The efficacy of feed restriction in the local context remains largely unexplored. The study's significance stems from its practical relevance for broiler producers and the broader poultry industry. Broiler production is an important component of the agricultural sector since it provides customers with an economical and easily available source of protein. The investigation of the effect of quantitative feed restriction on broiler growth tackles real-world issues confronting farmers and industry consumers. One of the key practical benefits of this study is its potential to offer cost-effective solutions for broiler farmers. Feed constitutes a significant portion of production costs, and optimizing feed

usage without compromising growth is a central concern. Understanding how quantitative feed restriction influences growth parameters can empower farmers to make informed decisions on feed management, potentially reducing expenses and improving overall profitability. The study holds relevance for sustainable agricultural practices. The research contributes to the development of more sustainable and resource-efficient broiler production methods by discovering appropriate feed limitation tactics. This is beneficial not only to individual farmers but also to the industry's impact on the environment. Finally, academically this research extends the current knowledge base by addressing a notable gap in feed utilization in broiler production, according to existing literatures.

### MATERIALS AND METHODS

The study was conducted at a private poultry Farm in Rumuekini, Port Harcourt, Rivers State located at 53°24"N and 55°56"E. A total of twenty-five (25) day-old broiler chicks were purchased from a well-known and trusted hatchery. After two weeks of brooding, they were placed into five (5) groups randomly. The groups were labeled Group 1 – 5. Group 1 was the control and was treated with *ad libitum* feeding, Group 2 was treated with 95% of the *ad libitum*, Group 3 was treated with 90% of the *ad libitum*, Group 4 was treated with 85% of the *ad libitum* and Group 5 was treated with 80% of the *ad libitum*. During the four weeks of the study, the bird's weights recorded taken every week and after four weeks of treatment, the broiler birds were dressed, and the carcass weight recorded. The feed used was a commercial broiler starter and finisher feed. The starter mash was fed from day old to four weeks and the finisher pellet was given from four weeks. A proximate Analysis of the feed was done. Clean and fresh water was given *ad libitum*. Necessary vaccinations were given to the birds according to the schedule/prescription. Vitamins and antibiotics were given via drinking water to enhance growth at intervals. Strict sanitary measures were adhered to throughout the study to avoid any form of disease outbreak. The litters were changed regularly and kept dry throughout the experimental period. Drinkers and feeders were washed daily and feces were removed regularly. The parameters measured were feed intake, body weight gain, feed conversion ratio, and the final weight. The bird's weight was taken per replicate at the start of the research and subsequently every week, the quantity of feed fed to the birds was measured and recorded daily in grams, the quantity of feed consumed by each replicate was determined by subtracting the left over from the quantity of feed given the previous day. The data obtained were analyzed using descriptive statistics (Analysis of Variance) and then the Standard Error of Mean was considered. The analyses was carried out using the statistics package for social sciences (SPSS).

### RESULTS

The result obtained for the weight gain of the chickens within the period of study, shows that there was a gradual increase in weight for all the chickens. As seen in Table 1, Group 1 bird's initial weight was  $452.2 \pm 28.60\text{g}$  and then by Week 4, their weight was  $1522 \pm 133.37\text{g}$ . Group 2 bird's initial weight was  $505 \pm 14.32\text{g}$  and by Week 4 they weighed  $1578 \pm 85.66\text{g}$ . Group 3 birds' initial weight was  $447.6 \pm 59.30\text{g}$  and by week 4, they weighed  $1276 \pm 194.90\text{g}$ . Group 4 bird's initial weight was  $448.2 \pm 34.70\text{g}$  and  $1250.8 \pm 199.29\text{g}$  was recorded in Week 4. Group 5 initial weight was  $476.6 \pm 15.41\text{g}$  and  $1283 \pm 54.45\text{g}$  was recorded in Week 4. Result obtained for the feed conversion ratio of the broiler chickens shows an obvious reduction in the feed conversion ratio (Table 2). Group 1 Control had a feed conversion ratio of 4.051 in Week 1 and 2.09 in Week 4. Group 2 with a 95% *ad libitum* had feed conversion rate of 2.96 in week 1 and then 1.95 in week 4. Group 3 with a 90% *ad libitum* had feed conversion rate of 4.15 in week 1 and then 2.16 in week 4. Group 4 with an 85% *ad libitum* had feed conversion rate of 2.36 and 2.16 in week 4. Group 5 with 80% *ad libitum* had a feed conversion rate of 3.79 in week 1 and 2.34 in week 4. Based on the feed consumption during the study period, there was a progressive increase in the amount of feed consumed. Group 1 had a feed consumption of 1969g in week 1 and 4397g week 4. Group 2 feed consumption moved from initial value of 1662g in week 1 to 4271g in week 4. Group 3 feed consumption was 1469g in week 1 and 4271g by week 4. Group 4 feed consumption was 1502g in week 1 and 3822 in week 4. Group 5 feed consumption was 1415g in week 1 and 3596g in week 4. The rapid and slowed increase in feed consumption can be said to be as a result of the increase in body mass and the demand to maintain it. (Table 3)

**Table 1: Result of proximate analysis done for the chicken feed.**

S/No.	Sample Identity	%CHO	%Lipid	%Protein	%Moisture	%Ash	%Fibre
1	FEED SAMPLE	46.84	16.60	20.13	9.77	3.3	3.36

**Table 2: The Weight of the Birds during the week of study**

GROUP \ WEEK	GROUP 1	GROUP 2	GROUP 3	GROUP 4	GROUP 5
Initial Weight	452.2 ± 28.60	505 ± 14.32	447.6 ± 59.30	448.2 ± 34.70	476.6 ± 15.41
WEEK 1	549.4 ± 33.64	617.2 ± 11.83	518.4 ± 76.03	575.6 ± 27.56	551.2 ± 24.78
WEEK 2	721.6 ± 51.19	773 ± 33.34	633.2 ± 96.73	668.8 ± 98.65	680.2 ± 35.54
WEEK 3	1101.6 ± 69.70	1142 ± 58.41	901.2 ± 150.11	898.6 ± 175.21	975.4 ± 59.84
WEEK 4	1522 ± 133.37	1578 ± 85.66	1276 ± 194.90	1250.8 ± 199.29	1283 ± 54.45

Mean ± SEM n = 5 P ≤ 0.05

**Table 3: The Feed Conversion Ratio during the week of the Study**

GROUP \ WEEK	Week 1	Week 2	Week 3	Week 4
Group 1 ( <i>ad. libitum</i> )	4.051440329	2.932636469	1.97	2.091817317
Group 2 (95%)	2.962566845	2.897304236	1.80704607	1.952010969
Group 3 (90%)	4.149717514	3.37456446	2.282089552	2.159018143
Group 4 (85%)	2.357927786	3.736051502	2.532637076	2.158102767
Group 5 (80%)	3.793565684	2.43875969	1.89498645	2.33810143

**Table 4: Feed Consumption of Groups during the weeks of the study**

GROUP \ WEEK	Week 1	Week 2	Week 3	Week 4	TOTAL
Group 1 ( <i>ad. libitum</i> )	1969	2525	3743	4397	12634
Group 2 (95%)	1662	2257	3334	4271	11524
Group 3 (90%)	1469	1937	3058	4046	10510
Group 4 (85%)	1502	1741	2910	3822	9975
Group 5 (80%)	1415	1573	2797	3596	9381
TOTAL	8017	10033	15842	20132	54024

## DISCUSSION

The research results unveil significant insights into the impact of different levels of *ad libitum* feeding and feed restriction on growth parameters and feed efficiency in broiler chickens. The study centered on weight gain, feed conversion ratio (FCR), and feed consumption. Group 2, with 95% *ad libitum* feeding weight ranged from 505 ± 14.32g in Week 1 to 1578 ± 85.66g in Week 4 and exhibited the highest weight gain compared to all other groups with varying percentages of *ad libitum* access. Restricted access to feed typically correlates with higher body mass accumulation depending on the severity of the feed restriction. This result is consistent with previous research, such as studies by [14] and [15], emphasizing the positive relationship between restricted feeding and weight gain in broilers as a result of compensatory growth effect expressed by the chickens where the energy required for maintenance is being directed towards growth and also for the fact that compensatory growth have been attributed to an improved feed conversion ratio. When evaluating the Feed Conversion Ratio (FCR), the result indicates a noteworthy trend. All groups with some percentage of *ad libitum* feeding (i.e. Group 2 – Group 5) displayed lower FCR values compared to the control group (Group 1). This finding corroborates with the studies by [1] and [16], suggesting that controlled feed restriction can enhance feed efficiency in broilers. The observed lower FCR values imply improved nutrient utilization for growth in the groups subjected to some degree of feed restriction. The data further reveal that Group 1, the control with unrestricted access to feed, consumed more than other groups subjected to varying degrees of feed restriction. This aligns with the principle that broilers with *ad libitum* access tend to consume more feed. Similar trends have been observed in studies by [17] and [18], supporting the notion that feed restriction can lead to reduced feed consumption. The research result highlights the beneficial relationship between growth performance and *ad libitum* feeding is supported by the greater weight increase in the control group this was supported by the findings of [19] and [20] who separately affirmed that feed restriction enhanced productivity in broiler farms. Furthermore, the higher FCR in groups that underwent some degree of feed

limitation is consistent with the body of research supporting the advantages of regulated feed intake in terms of improving nutrient utilization and overall performance.

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