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Production Performance of Broiler Chicken using Commercial Feeds Supplemented with Fodder Sprouts

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Abstract
Aim: This study aimed to evaluate the production performance of broilers fed commercial feed supplemented with fodder sprouts in terms of feed consumption, body weight gain, feed conversion ratio (FCR), livability percentage and its cost and return via income over chick feed cost (IOCFC), over a 35-day rearing period.
Methodology: The study compared four dietary treatments composed of Treatment 1 (Commercial feed), Treatment 2 (Sprouted corn fodder), Treatment 3 (Sprouted *Maramais*) and Treatment 4 (Sprouted sorghum). Production performance data were gathered for each stage of broilers and was analyzed using one-way Analysis of Variance (ANOVA). Significant differences on data were further subjected to Duncan's Multiple Range Test (DMRT).
Results: Significant differences ($P < 0.05$) were observed only in feed intake during the first 14 days, with T1 recording the highest intake (360.28 g) and were comparable to T3. These differences did not translate into significant changes in overall weight gain, FCR, or livability across treatments throughout the rearing period. It is however observed that birds fed with sprouted fodders have a higher total cost but this was not reflected on IOFC as data were comparable to each treatments.
Conclusion: The supplementation of fodder sprouted supported production performances and its supplementation can be integrated into commercial broiler diets without compromising productivity.
Keywords: fodder sprouts, feed conversion ratio, income over chick feed cost, *Maramais.*

INTRODUCTION

Getting back from the COVID-19 pandemic crisis has been challenging for poultry farmers. According to Beriso (2022), the ever-rising prices of feed ingredient remained to be the greatest single item, determining the profit margins in poultry farming, especially in developing countries. The most appropriate strategy for this challenge is to develop diets which allow locally available cereal ingredients that can meet the energy requirement of the birds to be used. Such an approach would reduce feed costs as well as the dependency on imported and conventional feed materials. Cereal grains constitute the major sources of energy in poultry diets in the tropics (Etuk et al., 2012). Due to limited raw materials, farmers seek for alternate energy and protein sources to ensure the broiler production sustainability.

In the Philippines, organic system of meat production is being promoted, aside from finding organic feed resources which can be offered as fresh or processing them into more digestible feed materials and incorporating them as feed ration. Sprouting grains as fodder materials is also an alternative feed resource under mostly hydroponic production, providing an immediate source of feed material especially during scarcity. Sprouting has been used to improve the nutritional value of the grains. The nutritional value of sprouted grains is improved due to the conversion of complex compounds into relatively simpler compounds that are nutritionally more valuable. Sprouting of grains has resulted in increased protein quantity and quality. Sprouting also increases the concentration of certain nutrients including sugars, minerals and vitamin contents (Shariff et al., 2013)

Corn is one of the fodder sprout feed resource which serves as the primary energy and fiber sources in poultry, sorghum may offer the same nutritional values with corn, while *maramais*, a native forage in the country

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shows promising alternative feed resource. The said feed ingredients can be used as an immediate alternative source of feed only at their early stages thru sprouting methodologies. Therefore, evaluating the growth, carcass and sensory characters of broiler chicken fed a commercial diet supplemented with 15% sprouted fodder grains (corn, *maramais*, and sorghum) can provide valuable insights into the potential benefits of this feed additive in broiler chicken production

Objectives

This study evaluated the performance of broiler chickens supplemented with selected fodder sprouts. Specifically, the study aimed to determine the following:

1. the effects of supplementing selected fodder sprouts on the growth performance of broilers in terms of bodyweight gain, feed consumption, feed conversion ratio and livability percentage; and
2. the effect of feeding selected fodder sprouts in broilers on income over chick feed cost (IOCFC).

Hypothesis

Null Hypothesis (H_0):
Supplementing commercial broiler feed with 15% selected fodder sprouts (corn, maramais, and sorghum) has no significant effect on the growth performance (body weight gain, feed consumption, feed conversion ratio, and livability) and economic return (Income Over Chick Feed Cost) of broiler chickens.

Alternative Hypothesis (H_1):
Supplementing commercial broiler feed with 15% selected fodder sprouts (corn, maramais, and sorghum) significantly affects the growth performance (body weight gain, feed consumption, feed conversion ratio, and livability) and economic return (Income Over Chick Feed Cost) of broiler chickens.

METHODS

Pre-trial Germination

A pre-trial study about germination was conducted aimed at identifying the most practical and convenient propagation method for grain fodder sprouts. There were two types of propagation management systems conducted: the use of hydroponics and tray propagation with three sets of each types of seed for corn, Geukdong-PH grass (*Maramais*), and sorghum. Three packs form each type of seed containing 250 grams were subjected to different soaking durations at 12 hours, 24 hours, and 36 hours. This meticulous procedure aimed to determine the most effective germination for each seed type and to identify potential challenges in sprouted fodder production. Samples of each sprout fodder varieties was sent at the Regional Feed Chemical Analysis Laboratory at the Regional Department of Agriculture for their nutrient compositions .

Experimental Animals and Treatments

A total of one hundred twenty (120) day-old commercial broiler chicks were used in the study was sourced from a trusted hatchery in Bulacan. The birds were uniformly distributed into four (4) treatments with three (3) replications, having 10 chicks per cage, following a Completely Randomized Design (CRD) thru random sampling. The experiment involved four distinct treatments aimed at evaluating the effect of incorporating different sprouted fodders into commercial feed on selected performance parameters. Treatment 1 served as the control group fed on standard commercial feed, treatment 2 fed commercial feed supplemented with 15% sprouted corn fodder (SCF), Treatment 3 and Treatment 4 composting of sprouted Geukdong-PH grass (*Maramais*) and sprouted sorghum fodder (SSF).

Preparation of Different Sprouted Fodders

Corn seeds were collected from leftover corn yield in a nearby cornfield and processed through a selection and drying procedure to achieve approximately 14% moisture content before storing, Seeds of native Geukdong-PH grass (*Maramais*) and red dwarf sorghum were purchased from a trusted online seller based in Cordon, Isabela. In the preparation the various sprouted fodders, each batch were exposed to sun drying for one hour, followed by washing with water mixed with chlorine. After rinsing, the seeds were soaked in clean, non-chlorinated water for 12 hours at a 1:3 seed-to-water ratio (kg/L) and the soaking water was changed twice during the process. After

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soaking, the water was decanted, and each type of seed was divided into three portions and distributed onto trays for germination. The seeds were spread on trays lined with black plastic and kept in a controlled room temperature environment for 24 hours. Watering was done twice daily using a sprinkler can, applying 500 ml of water each time to keep the grains moist.

After germination, each tray was filled with 167 grams of soil composed of a 1:1:1 mixture of cocopeat, garden soil, and vermicast. After three days, the sprouted seeds were transferred to a greenhouse for monitoring and care for 14 days until they are ready for harvest. The trays are then cleaned and sun-dried and will be re-used for another batch of sprouting.

Experimental Diets

The sprouted fodders were grown for 14 days, harvested, chopped, and mixed with the commercial feed based on the birds' total daily feeding requirement. Four diets were utilized in this study, corresponding to the following treatments: Treatment 1 served as the control group and was fed with commercial feed. Treatment 2 commercial feed supplemented with chopped sprouted corn fodder. Treatment 3 commercial feed supplemented with chopped sprouted *Maramais* (Geukdong-PH grass) fodder, while Treatment 4 commercial feed supplemented with chopped sprouted sorghum. The commercial feeds used in the study—from starter to finisher—were purchased from a local agri-supply store in Tumauini, Isabela.

Before harvesting, the sprouted fodders were washed for five minutes. The epicoty part was removed, leaving the seeds and soil behind to reduce the risk of microbial contamination. The harvested portions were then chopped into small pieces which will aid in digestion. The experimental diets were introduced on the 15th day of the birds' age were each replication under every treatment received the same ration. All diets containing sprouted fodder were offered to the birds on an *ad libitum* basis.

Experimental Birds

One hundred twenty day-old commercial broiler chicks were purchased from a commercial hatchery in Bulacan were used in the study. Prior to the arrival of the birds, the poultry house, pens, and equipment were cleaned with water and detergent, then disinfected using a solution containing Glutaraldehyde and Quaternary Ammonium compounds. The pens measured 6 square feet each.

Before the placement of the birds, drinkers and feeders were thoroughly cleaned and placed in each pen. One hundred-watt incandescent bulbs were used as a heat source and are lit for three hours before the arrival of chicks for brooding during the first two weeks. The chicks are weighed and randomly distributed to pen replicates and only water with electrolytes was offered. The number of bulbs was gradually reduced until they were completely removed to achieve room temperature by the third week.

A mixture of rice hulls, sawdust, and carbonated rice hulls was spread in each pen at a thickness of 4–5 cm as deep litter to absorb moisture from droppings and to keep the birds dry and warm. The coop was well-lit and properly ventilated to ensure the comfort of the birds. Water and feed were provided *ad libitum*.

Data Gathered

Initial and weekly body weight. The initial body weight of the birds a day-old chick. Then the weekly body weight of the birds was recorded up to 5th week of the study. The average gain in weight were taken by subtracting the final weight from the initial weight. The weekly gain in weight of the experimental birds were computed using the formula:

$$Gain\ in\ weight = \frac{Final\ group\ weight\ (g) - Initial\ group\ weight\ (g)}{Number\ of\ birds}$$

Feed consumption. The feed consumption of the birds in the different treatments were taken by weighing the feed left over and subtracted to the amount of feed that offered daily. The weekly feed consumption (FC) of the experimental birds was computed using the formula:

$$Feed\ consumption = \frac{Feed\ alloted\ per\ cage - Feed\ remaining\ per\ cage}{Number\ of\ birds}$$

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Feed conversion ratio. The bird's efficiency in converting feed consumption mass into body weight. The feed conversion ratio was determined by using the following formula:

$$FCR = \frac{Feed\ consumed\ (g)}{Gain\ in\ weight\ (g)}$$

Livability. The percentage of birds that survived during the rearing period were health of the birds was closely monitored daily. The dead birds were immediately disposed. The percent livability was computed using the formula:

$$Livability\ = \frac{Number\ of\ alive\ birds}{Initial\ number\ of\ birds} \times 100$$

*Income over feed cost (IOFC)***.** The mean income over feed cost was determined as the difference of the mean sale value of birds and mean feed cost. The mean sale value of the birds was computed as: mean final weight of birds (kg) x farm gate price (Php) per kg live weight of the birds. The mean total cost is comprised of cost of chicks and feed cost which is computed as: mean feed consumption (kg) x cost/kg of diet (Php).

$$\text{IOFC} = \frac{\text{total sale value}}{\text{number of birds}} - \text{mean total}$$

Data Analysis

The gathered data was summarized in a weekly basis and was analyzed where variances are further analyzed thru ANOVA and significant means are further analyzed thru Least Significant Difference (LSD) at significance level P ≤ 0.05 using Fisher's protected least significant difference test.

RESULTS and DISCUSSION

Production Performance

Table 1. shows the production performance of broilers fed commercial feed supplemented with fodder sprouts. Significant difference is observed only in feed intakes for the first two weeks of rearing where T1 has the highest value at 360.2778 g and were comparable to T3. T3 however is comparable to T2 and T4.

Table 1. Production performance of broilers fed commercial feed supplemented with fodder sprouts

PARAMETER	T1 (Commercial feed)	T2 (Sprouted corn fodder)	T3 (Sprouted *Maramais* fodder)	T4 (Sprouted sorghum fodder)	*Prob.*
Feed intake (g)					
0-14 days	360.27[a]	345.55 [b]	348.33 [ab]	343.05 [b]	0.04*
0-28 days	1,584.19	1,561.36	1,608.31	1,603.06	0.55
0-35 days	2,923.64	2,809.69	2,877.47	2,870.56	0.61
Gain in weight (g)					
Initial weight	50.99	49.56	49.40	47.44	0.67
0-14 days	203.68	219.70	230.78	213.53	0.70
0-28 days	1,028.44	1,003.58	967.68	1,028.23	0.39
0-35 days	1,629.47	1,602.32	1,464.63	1,575.73	0.79
FCR					
0-14 days	1.77	1.58	1.51	1.61	0.53
0-28 days	1.57	1.57	1.66	1.56	0.89
0-35 days	1.80	1.77	1.98	1.83	0.51
Livability (%)	96.66	83.33	93.33	93.33	0.37

[1]Means within row with the same superscript are not significantly different (P=0.05).

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This difference may be attributed with their initial body weight as T1 have the highest numerical value on initial body weights. The feed intake significant results did not reflect changes in the results on their gain in weight and FCR as they were comparable to other treatments. These growth parameter results are in consonant with the studies of Rao et al. (2018) in supplementing geminated sprouts of millets in broilers where body weight and feed efficiency were not affected due to feeding of sprouted grains. This results are also in consonant to the study of Olasehinde and Aderemi (2023) on the effect of sprouted whole pearl millet on the growth performance of broilers resulted on caomparable bodyweight gains to the control diet showing trends of increment while FCR showed also comparable results with decreasing trends. This results however are in contrast with the study of Qui et al. (2024) on feeding sprouted rough rice as an alternative to corn for growth, health performance and meat quality of broilers, where inferred growth and health of broilers were enhanced by increased dietary levels of SR in place of maize; the highest growth performance was observed at a replacement rate of 45 %.

The Livability percentage likewise have comparable effects within the treatments as T1 have the highest numerical value with 99.66%, followed by T3 and T4 at 93.33% and T2 with the lowest level at 83.33%. This value of T2 however were not significantly different to other treatments. This results resembles on the result of the studies of Baye et al. (2023) and Guteta and Abdu (2023) hydroponic barley fodder and malted barley on supplementation of broilers where dietary treatments showed no significant differences on their mortality rate where proper management could be the main reason for higher survivability rate recorded in their study. The study was conducted on the months were typhoons are common in the country with easterly winds signaling the start of cool season. Proper husbandy practices indeed provided the performance of the birds in livability percentages.

Figure 1 shows the feed intake of broilers fed commercial feed supplemented with fodder sprouts. It is observed that the birds fed in treatment 1 have the highest feed intakes as compared to other treatments, It is noted however that the birds at this stage have not been introduced with fodder sprouts and the feed intake can be attributed to their initial body weights.

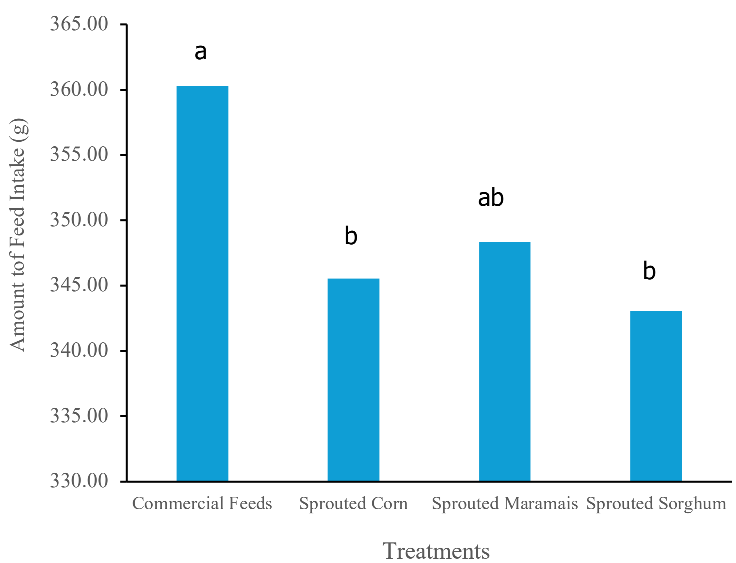

Figure 1. 0-14 day feed intake of birds fed commercial feed supplemented with fodder sprouts

It is noted however that the birds at this stage have not been introduced with fodder sprouts and the feed intake can be attributed to their initial body weights. According to Mendes et al. (2011) on the effects of initial body weights and litter materials in broilers, Initial weight significantly influenced bird performance, as chickens with heavy

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initial weight presented higher feed intake and body weight. The body weight however in the study were not affected by the values on initial body weight in contrary with the study of Mendes as it was comparable to other treatment especially T1.

Income Over Chick and Feed Cost (IOCFC)

Table 2 shows the income over chick and feed cost (IOCFC) of broilers fed commercial feed supplemented with fodder sprouts. There were no significant differences on broilers fed with different fodder sprout supplements and are comparable with each other in live weights, with T1 (commercial feeds only) having the highest numerical value at 1.68 kg, followed by T2 (sprouted corn) at 1.65 kg, T4 (sprouted sorghum) at 1.62 kg, and T3 (sprouted maramais) at 1.51 kg.

This data reflects also on the sale value of broilers fed with different fodder sprout supplements as T1 (commercial feeds) has the highest total sale at Php 229.50, followed by T2 (sprouted corn) at Php 209.12, T4 (sprouted sorghum) at Php 200.47, and lowest in T3 (sprouted *maramais*) at Php 176.22. Despite using different sprouted fodders, the differences in sale value were not statistically significant (P=0.29). Chick cost was the same for all treatments at Php 50, indicating that the variation in income came mainly from the differences in live weight and market value.

The feed cost data show insignificant differences in all treatments for booster, starter, and finisher feeds. T2 (sprouted corn) had the lowest overall feed cost, while T3 (sprouted maramais) had slightly higher costs, especially for the starter feed.

Table 2. Income over chick and feed cost (IOCFC) of broilers fed commercial feed supplemented with fodder sprouts

PARAMETER	T1	T2	T3	T4	*Prob*
Live weight (kg)	1.68	1.65	1.51	1.62	0.54
Sale value (Php)	229.50	209.12	176.22	200.47	0.29
Chick cost (Php)	50	50	50	50	
Feed cost					
Booster (Php)	8.61	8.28	8.88	8.81	0.07
Starter (Php)	27.65	27.32	29.08	28.61	0.43
Finisher (Php)	81.79	78.04	81.09	80.50	0.61
Total, (Php)	131.79[b]	146.03[a]	149.09[a]	148.50[a]	0.001**
IOCFC, Php	229.50	209.12	176.22	200.47	0.29

[1]Means within row with the same superscript are not significantly different (P=0.05).

In terms of feed cost, although no significant differences were observed for the booster, starter, and finisher phases individually, a significant difference (p = 0.001) was found in the total feed cost across treatments. The control group (T1) had the lowest total feed cost (Php 131.79), while T2 (Php 146.03), T3 (Php 149.09), and T4 (Php 148.50) incurred significantly higher costs. These increases are attributed to the added labor, materials, and inputs required for sprout production.

Despite the increase in feed costs, Income Over Chick and Feed Cost (IOCFC) did not significantly differ among treatments (p = 0.29). T1 recorded the highest IOCFC (Php 229.50), followed by T2 (Php 209.12), T4 (Php 200.47), and T3 (Php 176.22). The comparable IOCFC values suggest that, although fodder sprout supplementation slightly increased feed costs, it did not adversely affect the overall economic returns of broiler production. Notably, sprouted corn (T2) achieved relatively good performance with reduced finisher feed cost and acceptable IOCFC, making it a potentially cost-effective alternative feed supplement.

Figure 2. shows the total cost of birds fed commercial feed supplemented with fodder sprouts. Supplemented treatments have higher total feed cost due to additional cost in sprotuting. This aligns with the findings of Baye et al. (2024), who reported that barley sprout supplementation in broiler diets increases total

variable and feed costs. However this in contrast in the study of Ashom et al. (2014) on their study in using processed roselle (*Hibiscus sabdariffa L.*) seed meal diets feed cost and feed cost per weight gain were not significantly affected.

These results support the idea that sprouted grains can be integrated into broiler rations without detrimental effects on profitability, particularly when using locally available and nutritionally valuable grains like corn and sorghum. However, the use of maramais sprouts (T3) may require further refinement, as its use led to lower live weight and IOCFC compared to other treatments.

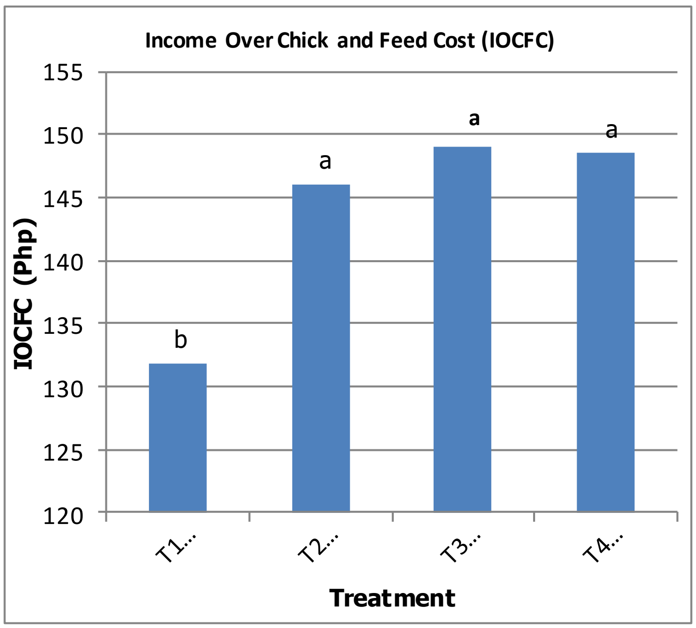

Figure 2. Total cost of birds fed commercial feed supplemented with fodder sprouts

Conclusions

Fodder sprouts can be integrated into broiler diets without negatively impacting growth performance or economic returns, despite slightly increasing total feed costs. Among the treatments, sprouted corn demonstrated a favorable balance between cost and performance, indicating its viability as a feed supplement. While the inclusion of sprouted maramais and sorghum did not significantly impair performance metrics highlighting the need for further optimization. Overall, the findings support the strategic use of locally available sprouted grains to enhance broiler nutrition sustainably and economically.

Recommendations

It is recommended that sprouted corn be adopted as a practical and cost-effective feed supplement for broiler production due to its consistent performance and acceptable economic return. Broiler producers, particularly in resource-limited settings, are encouraged to consider on-farm sprout production using locally available grains to improve feed sustainability. Further studies are needed to optimize the use of sprouted maramais, focusing on improving its nutrient profile, palatability, or synergistic effects when combined with other feed ingredients. Additionally, future research should explore different inclusion levels to refine the economic viability of integrating fodder sprouts into commercial broiler diets.

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