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# Effects of Siam Weed (*Chromolaena odorata*) and *Utazi* leaf (*Gongronema latifolium)* Powders on Feed Intake, Growth Performance, and Mortality of Broilers

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**Abstract**

The study investigated effects of siam weed *(Chromolaena odorata)* and bush buck (*utazi)* leaf *(Gongronema latifolium)* powders on feed intake, growth performance, and mortality of broilers. Three hypotheses were tested at 0.05 level of significance. An experimental research design was adopted. The study was conducted at Ebigbo Integrated Farm, Nsukka Local Government Area, Enugu State, Nigeria. Population consisted of 60-day-old chicks. The experiment lasted two months. Growth performance was determined using a weighing balance. Feed intake was calculated using weighing-back technique. Mean and percentage were used to analyze data, and one-way analysis of variance (ANOVA) was used to test hypotheses. Results show that birds fed with siam weed had the highest weight gain (3778.51g) and performed better than birds in other treatment groups. Results of feed intake showed that the control group (T0) had the highest feed intake (5170.33 g), while the *Utazi*-treated group (4823.11g) had the lowest. No mortality was recorded across treatment group throughout the study period. It was concluded that dietary inclusion of siam weed leaf meal in the ration improved growth performance of broiler birds with no adverse effect.

**Keywords:** Siam Weed, *Utazi* Leaf, Feed Intake, Growth Performance, Mortality, Broiler.

## Introduction

Siam weed (*Chromolaena odorata)*, also known as *Christmas bush* or *devil weed*, is a perennial shrub that has become a significant invasive species in many tropical and subtropical regions worldwide. Originally native to the Americas, particularly Central and South America, it has spread extensively across Asia, Africa, and the Pacific islands (Zachariades et al., 2020). Akinmoladun et al. (2022) reported that extracts from the plant were effective against various bacterial strains, including Staphylococcus aureus and Escherichia coli, and that the plant exhibited promising anti-inflammatory properties. According to Ogbonna et al. (2020), Siam weed extract reduced inflammation in rats and is also rich in antioxidants, which can help protect cells from oxidative stress. It is used in traditional medicine and has been studied for its potential medicinal properties, such as antimicrobial and anti-

inflammatory effects. Another medicinal plant with antimicrobial and inflammatory properties is *Gongronema latifolium*.

Bush buck (*Gongronema latifolium)*, commonly known as *Utazi*, is a perennial edible vegetable belonging to the Asclepiadaceae family. It is native to the tropical and subtropical regions of West Africa, particularly Nigeria, Ghana, and Cameroon (Udeh et al., 2020). Alaebo et al. (2023) observed *Utazi* in the south-eastern and Adkeke in the south-western parts of Nigeria, both of which are tropical rainforest plants. The plant is highly valued for its culinary and medicinal properties and plays a significant role in traditional African medicine. *Utazi* is valued for its bitter, aromatic leaves, which are rich in vitamins, minerals, and phytochemicals with potential health benefits, such as anti-diabetic, anti-inflammatory, and antimicrobial properties. The plant is cultivated for its leaves, which are used as a vegetable, spice, and herbal remedy in various parts of West Africa. *Utazi* leaf exhibits broad-spectrum antimicrobial activity. Okafor et al. (2022) observed that ethanol extracts of *Utazi* leaves showed significant inhibitory effects against several pathogenic bacteria, including Staphylococcus aureus and Escherichia coli. Besides its medicinal properties, *Utazi* is a good source of essential nutrients. Okafor et al. (2022) analyzed the nutritional composition of *Utazi* leaves and found significant levels of vitamins (especially A and C), minerals (such as iron and calcium), and dietary fiber. Traditionally, *Utazi* has been used to treat various ailments, including diabetes, high blood pressure, malaria, and digestive issues (Udeh et al., 2020). Both Siam weed and *Utazi* plant are important plants in their respective regions, with Siam weed being an invasive species in some areas and *Utazi plant* being a valuable traditional crop and medicinal plant in West Africa. Siam weed and *Utazi* plant are high in crude protein, vitamins, and minerals, as well as antioxidant, anti-inflammatory, and antimicrobial properties. These properties have the potential to improve broiler immunity and enhance poultry farming.

Poultry farming in Nigeria is a significant part of the agricultural sector. As the poultry industry continues to grow, there is an increasing focus on sustainable production practices. Ghanem and Adly (2020) noted that improving feed intake and growth performance, reducing antibiotic use, and implementing more effective waste management practices would enhance sustainable production practices. Feed consumed by broilers over a given period plays a critical role in their overall growth, health, and productivity (Lowgder et al., 2021). For effective performance in broiler birds, proper feed intake is essential.

Feed intake is a critical parameter for assessing broiler health and production outcomes. Feed intake significantly affects broiler performance. Feed intake in broilers is defined as the quantity of feed consumed by the birds, typically measured in grams or kilograms per bird per day (g/bird/day or kg/bird/day). According to Sun et al. (2022), feed intake is the amount of feed an animal consumes over a given period. It can vary depending on factors such as the type of feed, the bird's age, and environmental conditions. Proper intake ensures that broilers gain weight at the desired rate, while insufficient intake leads to slower growth performance

Growth performance in broiler chickens refers to how well the birds grow and develop, particularly in terms of weight gain and feed efficiency, from day-old to market weight. It is a key indicator of a broiler operation's overall health, productivity, and profitability. Liu et al (2022) observed that a faster growth rate usually results in shorter production cycles, which is economically beneficial for broiler producers. Growth performance can be managed through proper nutrition, disease management strategies, and environmental controls. For instance, ensuring that the birds receive a balanced diet rich in essential nutrients can help mitigate immune suppression associated with rapid growth (Sun et al., 2022). Vaccination programs also play a critical role in protecting fast-growing broilers from disease (Al-Sherai et al., 2021).

Disease is a disorder that interferes with the body's normal functioning. Typically, a disease is something that a physician diagnoses. According to the World Health Organization (WHO, 2022), a disease is a condition that impairs normal functioning and is typically manifested by distinguishing signs and symptoms. It represents a deviation from the normal state of health and can be caused by various factors, including pathogens, genetic disorders, or environmental stress. If these diseases are not properly treated, they will lead to mortality in poultry.

Mortality refers to the death rate within a flock. It is typically expressed as a percentage of the total population over a specific period (e.g., daily, weekly, or over the entire production cycle). Anosike et al. (2023) and Borah et al. (2023) observed that mortality is a major challenge that hinders many people from venturing into poultry farming in Nigeria. One of the greatest fears of most poultry farmers is a high mortality rate. High mortality in poultry production indicates a loss of investment, and the investor will not maximize profit (FAO, 2021). That is why agricultural scientists are researching the incorporation of medicinal plants, such as *Utazi* leaf and Siam weed leaf, as supplements and antibiotics in poultry feeds to reduce mortality in poultry production. The review of available related studies in the theoretical aspect showed that many researchers (Akinmoladun et al., 2022; Adedapo et al., 2022; Harun et al., 2021; Igwe et al., 2020) have done a lot of studies on Siam weed and poultry production, yet none have really carried out a study on the effect of Siam weed and *Utazi* leaf powders on feed intake, growth performance, and mortality of broilers in Enugu State, Nigeria. This is a gap that needs to be closed; hence, this study.

**Purpose of the Study**

The study focused on the effects of Siam weed leaf and *Utazi* leaf powders on feed intake, growth performance, and broiler mortality. Specifically, the study determined the effect of siam weed leaf powder and *Utazi* leaf powder separately, and a combination of both on:

1. growth of broiler birds compared to the control
2. feed intake of broiler birds compared to the control
3. mortality of broiler birds compared to the control

**Hypotheses ($HO_s$)**

The following hypotheses were formulated and tested at a 0.05 level of significance.

There are no significant differences in the mean ratings of following parameters of broilers fed with Siam weed, *Utazi* leaf, and the combination of both, and those fed with the control diet:

**$HO_1$:** growth rate,
**$HO_2$:** feed intake,
**$HO_3$:** mortality rate.

**Materials and Methods**

***Design of the Study*:** The study adopted a true experimental research design with randomization. Three treatment conditions were administered to three experimental groups, and the outcomes were compared with those of a control group that did not receive any therapy. The designs used were **TI**-Treatment one (Control Birds); **T2**-Treatment two (Poultry feed with Siam weed supplement); **T3**-Treatment three (Poultry feed with bush buck (*Utazi)* leaf supplement); and T4- Treatment four (Poultry feed with both Siam weed and *Utazi* leaf supplement). The experiment lasted two (2) months.

***Materials***

**Sourcing of Broilers:** The chicks were purchased from Agrited Hatchery, Ibadan State. The study population consisted of 60-day-old chicks, and a sample of 48 birds was selected using a random sampling method.

**Preparation of Siam Weed and *Utazi* Powder Sample***:* The procedure for converting Siam weed leaves and *utazi* leaves into powder samples involves several steps. Initially, foe each set of leaves, the leaflets were separated from the petiole, and any diseased leaves were discarded. The remaining leaves were then washed separately and thoroughly with clean water. The leaves were laid out in a thin layer on a clean mat and placed in a ventilated room with a ceiling fan to dry. The leaves were turned over at least twice each day to ensure even drying. Once the leaves were adequately dried, they were ground using a blender. Two powder samples (saim weed and utazi) were produced.

**Number of Treatments:** Three treatment conditions were administered to three experimental groups, and the outcomes were compared with those of a control group that received no therapy but regular chicken feed. Each of the four treatments contained 12 broilers, which were replicated in three pens and assigned equally to each pen. **TI**-Treatment one (Control Birds); **T2**-Treatment two (Poultry feed with Siam weed supplement); **T3**-Treatment three (Poultry feed with *Utazi* leaf supplement); and **T4-** Treatment four (Poultry feed with both Siam weed and *Utazi* leaf supplement). The birds with equal weights were sampled for the experiment using a scale.

**Steps for Assigning Birds to Groups:** Assigning numbers to all birds with a marker; transferring these numbers to pieces of paper; rolling each paper and putting them in a basket; getting four students to select twelve pieces of paper each; and the numbers selected on each paper were used to select the corresponding broiler birds. The birds were placed in a brooding pen at 34 or 35 degrees centigrade. Before the arrival of the chicks, the feeders, drinkers, and brooding pen were washed and disinfected. Litter materials in the form of wood shavings were placed on the floor at a thickness of 4-8cm. Clean drinking water and chick starter feed were provided. On arrival at the farm, the chicks were separated into four segments. Light was provided for 24 hours for 0-7 days to give

them the maximum opportunity to feed. Processed Siam Weed Leaf and *Utazi* Leaf Powder were used.

***Data Collection Instruments*:** A weighing scale was used to measure the birds' weights. Birds of equal weight were sampled for the experiment using a scale. The following steps were involved: assigning numbers to all birds with a marker; transferring these numbers to pieces of paper; rolling each paper and putting them in a basket; getting four students to select twelve pieces of paper each; and the numbers selected on each paper were used to select the corresponding broiler birds.

***Data Collection Techniques*:** Assigning numbers to all birds with a marker; transferring these numbers to pieces of paper; rolling each paper and putting them in a basket; having four students select 12 pieces of paper each; the numbers selected on each paper were used to select the corresponding broiler birds.

***Data Analysis*:** The collected data were analyzed using the mean for weight gain and feed intake of the birds. Percentages were also used to present results for research question three, showing the broiler mortality rate. Analysis of Variance (ANOVA) was used to test the null hypotheses at a 0.05 level of significance. The decision rule was that if 'P' is less than or equal to 0.05, it is significant, and the null hypothesis is rejected. However, if 'P' is greater than or equal to 0.05, it is not significant and is accepted.

**Results**

**Table 1: Mean Growth Comparison between Broilers Fed with Siam Weed, *Utazi* Leaf, and the Combination of Both, and Those Fed with the Control Diet**

| Parameters/ | Treatment | | | | |
|---|---|---|---|---|---|
| | Control | Siam weed | Utazi leaf | Siam + Utazi leaf | p-value |
| Initial weight | 40.21±0.02 | 40.27±0.03 | 40.77±0.02 | 40.09±0.03 | 0.378 |
| Final weight | 3634.88±3.27 | 3778.51±3.30 | 3280.51±3.28 | 3511.43±3.28 | 0.000** |
| Weight gain | 3594.68±3.27 | 3738.24±3.34 | 3239.74±3.27 | 3471.34±3.28 | 0.000** |

*Mean ± Standard error (SE); n: Number of observation (sample size) per treatment group, Control: Birds fed with the basal/control diet only; Siam weed: Birds fed diet supplement with Siam weed; Utazi leaf: Birds fed with feed supplement with Utazi leaf, Siam + Utazi leaf: Birds fed diet supplement a combination of Siam weed and Utazi leaf, P-value: Probability value indicating level of statistical significance. **: Indicates highly significant difference ($p < 0.01$).*

Table 1 shows that broilers fed with Siam weed (treatment two) had the highest weight gain (3778.51g). Birds in the control group (3594.68g) and those fed with Siam and *Utazi* leaf (treatment four) had similar growth performance (3511.43g), while those fed with *Utazi* (treatment three) had the least weight (3280.51g). The table also shows that there was a significant ($P<0.05$) difference in the mean weight gain of broilers fed Siam weed, *Utazi* leaf, or the combination of both compared with the control birds. The null hypothesis was therefore rejected because the F-ratio was less than the F-value tabulated at the 0.05 level of significance.

**Table 2: Mean Feed Intake Comparison between Broilers Fed with Siam Weed, Utazi Leaf, and the Combination of Both, and Those Fed with the Control Diet**

| Parameters/ | Treatment | | | | |
|---|---|---|---|---|---|
| | Control | Siam weed | Utazi leaf | Siam + Utazi leaf | p-value |
| Weight gain | 3594.68±3.27 | 3738.24±3.34 | 3239.74±3.27 | 3471.34±3.28 | 0.000** |
| Total feed intake | 5170.33±3.61 | 5057.90±3.61 | 4823.11±3.60 | 4935.54±3.62 | 0.000** |
| Av. daily feed intake | 95.74±3.32 | 93.66±3.30 | 89.31±3.14 | 91.39±3.56 | 0.000** |
| Feed conversion ratio | 1.41±0.02 | 1.38±0.02 | 1.50±0.02 | 1.42±0.02 | 0.001** |

*Mean± Standard Error (SE); n: Number of birds per treatment group; Control: Birds fed with control diet only; Siam weed: Birds fed diet supplement with Siam weed; Utazi leaf: Bird fed diet supplement with Utazi leaf; Siam + Utazi leaf: Birds fed diet supplement with a combination of Siam weed and Utazi leaf; Weight gain: Difference between final body weight and initial body weight; Total feed intake: Total quantity of feed consumed during the experiment period (g/bird); Av daily feed intake: Average daily feed consumed per bird [(g/bird/day); Feed conversion ratio (FCR): Calculated as feed intake divide weight gain; P-Value: Probability value indicating level of statistical significance among treatments, **: Indicates highly significance difference (P < 0.01).*

Table 2 shows that the broilers in the control group had the highest feed intake (5170.33g), followed by birds fed the Siam weed (5057.90g) treatment two, while the least feed intake was observed in birds fed the *Utazi* leaf (4823.11g) treatment three. The table also shows that there is a significant (P<0.05) difference in the mean feed intake gain of broilers fed Siam weed, *Utazi* leaf, or the combination of both compared with the control birds. The null hypothesis was therefore rejected because the F-ratio was less than the F-value tabulated at the 0.05 level of significance.

**Table 3: Mortality Rate of Broilers Fed with Siam Weed, *Utazi* Leaf, and the Combination of Both Compared to those Fed with the Control Diet**

| Parameters/ | Mortality rate (%) | F-cal |
|---|---|---|
| Control | 0 | 0 |
| Siam weed | 0 | 0 |
| Utazi leaf | 0 | 0 |
| Siam + Utazi leaf | 0 | 0 |

*Mortality rate %: Percentage of bird that died during the experimental period; Control: Birds fed with the basal/ control diet only; Siam weed: Birds fed diet supplement with Siam weed; Utazi leaf: Birds fed diet supplement with Utazi leaf; Siam + Utazi leaf: Birds fed diet supplemented with a combination of Siam weed and Utazi leaf; F-cal: Calculated F-value from analysis of variance (ANOVA); 0 (Mortality values): Indicates no mortality recorded in all treatment groups; Statistical analysis: Data analyzed using one-way ANOVA; Significance level: Difference considered significant at P < 0.05*

Table 3 shows that there is no mortality across the treatment groups. Although the Siam weed and *Utazi* treated groups were not vaccinated, no mortality was recorded throughout the experimental period. The null hypothesis was therefore accepted.

**Discussion of the findings**

The result of weight gain of broilers presented in Table 1 shows that the broilers in the control group and those fed with dietary inclusion of Siam weed leaf meal (T2) outperformed birds in other treatment groups. The findings agreed with Igwe et al. (2020), who observed that Siam weed leaves are very high in protein and other vitamins and should be used for birds. The findings also agreed with those

of the Nigerian Poultry Farmers Association (2023), which reported that *Utazi* leaf meal increased nutrient absorption, improved gut health, reduced oxidative stress, and reduced broiler mortality rates. The results in Table 1 show that there was a significant ($P<0.05$) difference in the mean weight gain of broilers fed Siam weed, *Utazi* leaf, the combination of both, and the control birds. There was a significant difference in the mean weight gain of broilers fed Siam weed, Utazi leaf, or a combination of both compared with the control birds. The null hypothesis of a significant difference was rejected.

The results in Table 2 on the effects of Siam weed powder and *Utazi* leaf powder and the combination of both on the feed intake of broiler birds compared to the control show that birds in the control group recorded the highest feed intake values, followed by birds in treatment two and four, while the least feed intake values were recorded in treatment three (T3) birds. The findings were in line with those of Ekine et al. (2021), who reported that reduced feed intake in broilers fed Gongronema *latifolium (Utazi*) leaf meal is primarily due to high levels of anti-nutritional factors (saponins, tannins, glycosides) and a high fiber content, which decreases palatability and digestibility. While low-level inclusion acts as a growth promoter, high concentrations (generally 1% or higher) often reduce feed intake. There was a significant difference in feed intake among the treatment groups. The null hypothesis of significant difference was therefore rejected.

Results in Table 3 show that Siam weed powder, *Utazi* leaf powder, and their combination had no mortality in broiler birds, compared to the control group. Although the birds fed with Siam weed and *Utazi* were not vaccinated, no mortality was recorded throughout the experimental period. The findings were consistent with those of Okafor et al. (2022), who observed that ethanol extracts of *Utazi* leaves showed significant inhibitory effects against several pathogenic bacteria, including Staphylococcus aureus and Escherichia coli. This would help to reduce the mortality of broiler birds. The findings were also consistent with those of Igwe *et al.* (2020), who reported that the improved health and immune state observed in the birds could be attributed to the chemical components of Siam and *Utazi,* which have been shown to possess anti-inflammatory, antimicrobial, and antioxidant properties. The null hypothesis was therefore accepted.

**Conclusion**

The study emphasized that Siam weed and bush buck *(Utazi)* leaf powders are essential, as they make significant contributions to the poultry industry. For effective broiler production management, Siam weed and *Utazi* leaf powders should be included as feed additives in broiler rations. This is because it enhanced productivity by increasing weight gain and reducing mortality, due to the chemical content of the plants, which were known for their medicinal properties. The use of siem and bush buck leaves significantly improved performance over the control, demonstrating their usefulness in the poultry industry.

**Recommendations**

Based on the findings of the study, the following recommendations were made:

1. Extension agents should use the findings to educate poultry farmers on incorporating Siam weed and *Utazi* leaf meals into poultry feeds to improve growth performance and reduce broiler mortality.
2. Findings of this study should be considered as a teaching tool for students on how to use Siam weed and Utazi leaf powders, or a combination of both, to improve broiler performance.
3. The government should use the findings to organize seminars and workshops for researchers on the use of leaf meals and other unconventional and potential feed stuff for the growth of broilers.

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