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Fermented Water Kerif on the General Performance of Meat-type Chicken Strains

Charles Darwin C. Calubayan[1*], Noli L. Gerona[1,2], Soceline N. Batisla-ong[1,3]
[1]*Iloilo State University of Fisheries Science and Technology*
[*]charlesdarwincalubayan@gmail.com, [2]noligerona25@gmail.com, [3]socelinebatislaong@isufst.edu.ph

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ABSTRACT

This study was conducted to determine the growth and dressing performance of meat-type chicken strains supplemented with different concentrations of fermented water kefir (FWK) using a two-factor experimental design with ten treatment combinations. Factor A consisted of the meat-type chicken strains (Cobb and Ross), while Factor B comprised the supplementation treatments: no supplementation (control), 15 mL FWK, 30 mL FWK, 45 mL FWK, and a commercial probiotic. A total of 150 experimental birds were used, consisting of 75 Cobb and 75 Ross chickens, arranged in a Randomized Complete Block Design (RCBD). The results revealed that the control group supplemented with commercial probiotics exhibited a significantly higher water conversion ratio (WCR = 4.58), indicating poorer efficiency in converting water intake into body weight gain. In contrast, the FWK-supplemented groups showed comparable performance to the un supplemented control group. No significant differences were observed in the dressing performance among the FWK treatments and the control groups. Furthermore, supplementation with 15 mL FWK in the Ross strain yielded the highest net profit and return on investment (ROI), whereas the higher FWK concentrations and the commercial probiotic treatment incurred additional production costs, which reduced overall profitability.

Keywords: *fermented water kefir (FWK), meat-type chicken strains, growth performance, probiotics, water conversion ratio (WCR); randomized complete block design (RCBD).*

INTRODUCTION

The poultry industry remains a vital sector in Philippine agriculture due to the increasing demand for chicken meat as an affordable source of animal protein. According to the United States Department of Agriculture Foreign Agricultural Service (USDA-FAS, 2024), chicken meat consumption in the Philippines is projected to continue increasing, placing pressure on poultry producers to improve productivity and maintain a stable supply of quality products. As demand rises, poultry farmers are challenged to adopt sustainable production practices that enhance growth performance while ensuring profitability and efficiency.

Traditionally, antibiotics have been used in poultry production to promote growth and prevent diseases. However, growing concerns about antimicrobial resistance and its potential risks to human health have led to restrictions on the use of antibiotic growth promoters in many countries (Yaqoob et al., 2022). Consequently, the poultry industry has shifted toward safer alternatives such as probiotics, prebiotics, synbiotics, organic acids, and fermented products. These alternatives have been reported to improve feed efficiency, nutrient utilization, gut health, immune response, and overall growth performance in broiler chickens (Halder et al., 2024; Salahi & Abd El-Ghany, 2024). Among these alternatives, fermented water kefir (FWK) has gained attention because it contains beneficial microorganisms that may enhance digestive health and nutrient absorption. Previous studies have shown that kefir-based supplements can improve body weight gain, feed conversion efficiency, carcass characteristics, and overall health status in broiler chickens (Fahrodi et al., 2025; Manjunatha et al., 2024). These findings suggest that FWK has the potential to serve as a natural probiotic supplement that can support sustainable poultry production while reducing dependence on antibiotic-based growth promoters.

Despite the growing interest in probiotic and fermented feed additives, limited studies have investigated the effects of different concentrations of fermented water kefir on the growth and dressing performance of various meat-type chicken strains. Moreover, information regarding the economic viability of FWK supplementation, particularly its effects on production cost, net profit, and return on investment (ROI), remains scarce. This research gap highlights the need to evaluate the performance of meat-type chicken strains supplemented with varying concentrations of FWK and determine its effectiveness as a natural probiotic alternative. Therefore, this study aims to evaluate the growth and dressing performance of meat-type chicken strains supplemented with different concentrations of fermented water kefir. Specifically, it seeks to determine the effectiveness of FWK as a natural probiotic alternative and assess its economic viability in broiler production. The findings of this study may provide poultry raisers and industry stakeholders with practical information for improving production efficiency, maximizing profitability, and identifying the most cost-effective FWK supplementation level capable of generating higher net profit and return on investment.

Objective of the Study

This study was conducted to determine the general performance of meat-type chicken strains supplemented with fermented water kefir (FWK).

Specifically, the study aimed to:

1. Determine the growth performance of meat-type chicken strains supplemented with different concentrations of fermented water kefir in terms of live weight, weight gain, feed consumption, water consumption, feed conversion ratio (FCR), and water conversion ratio (WCR).
2. Determine the dressing performance of meat-type chicken strains supplemented with different concentrations of fermented water kefir in terms of carcass weight, dressing percentage, and weights of the liver, gizzard, proventriculus, small intestine, visceral fat, and giblets (head, neck, and feet).
3. Determine the significant differences in the general performance of meat-type chicken strains supplemented with different concentrations of fermented water kefir.
4. Determine the significant interaction effect between meat-type chicken strains and concentrations of fermented water kefir on growth performance.
5. Compute the return on investment (ROI) of meat-type chicken strains supplemented with sugar-based fermented water kefir.

Scope and Limitations of the Study

This study was conducted to determine the performance of meat-type chicken strains supplemented with fermented water kefir (FWK) in terms of live weight, weight gain, feed consumption, water consumption, feed conversion ratio (FCR), water conversion ratio (WCR), carcass weight, dressing percentage, and weights of the liver, gizzard, proventriculus, small intestine, visceral fat, and giblets (head, neck, and feet), as well as return on investment (ROI).

A two-factor experiment was conducted using a Randomized Complete Block Design (RCBD) with ten (10) treatment combinations. Factor A consisted of the meat-type chicken strains (Cobb and Ross), while Factor B involved fermented water kefir (K) supplementation in the drinking water of the chickens. The treatment combinations were as follows: C1K0 (Cobb + no supplementation/control 1), C1K1 (Cobb + 15 mL FWK per 1 L water), C1K2 (Cobb + 30 mL FWK per 1 L water), C1K3 (Cobb + 45 mL FWK per 1 L water), C1K4 (Cobb + commercial probiotic/control 2), C2K0 (Ross + no supplementation/control 1), C2K1 (Ross + 15 mL FWK per 1

L water), C2K2 (Ross + 30 mL FWK per 1 L water), C2K3 (Ross + 45 mL FWK per 1 L water), and C2K4 (Ross + commercial probiotic/control 2).

Each treatment was replicated three (3) times, with a total of 30 experimental units. Five (5) birds were assigned to each experimental unit, resulting in a total of 150 experimental birds. The data were analyzed using Analysis of Variance (ANOVA) for the RCBD. The study was conducted at the West Visayas State University–College of Agriculture, Barangay Jayobo, Lambunao, Iloilo, Philippines (Region VI – Western Visayas) from March 17, 2025 to April 20, 2025.

Significance of the Study

The supplementation of fermented water kefir in the drinking water of meat-type chicken strains is expected to benefit various stakeholders. This study may serve as a reference for researchers in exploring alternative natural supplements that can enhance poultry performance and productivity. It also provides valuable insights for poultry raisers in improving farming practices and production efficiency.

Furthermore, the findings of this study may help poultry producers recognize the potential of utilizing unconventional and locally available ingredients in reducing production costs while improving profit margins.

Traditionally, antibiotics have been used in poultry production to promote growth and prevent diseases. However, growing concerns about antimicrobial resistance and its potential risks to human health have led to restrictions on the use of antibiotic growth promoters in many countries (Yaqoob et al., 2022). Consequently, the poultry industry has shifted toward safer alternatives such as probiotics, prebiotics, synbiotics, organic acids, and fermented products. These alternatives have been reported to improve feed efficiency, nutrient utilization, gut health, immune response, and overall growth performance in broiler chickens (Halder et al., 2024; Salahi & Abd El-Ghany, 2024). Among these alternatives, fermented water kefir (FWK) has gained attention because it contains beneficial microorganisms that may enhance digestive health and nutrient absorption. Previous studies have shown that kefir-based supplements can improve body weight gain, feed conversion efficiency, carcass characteristics, and overall health status in broiler chickens (Fahrodi et al., 2025; Manjunatha et al., 2024). These findings suggest that FWK has the potential to serve as a natural probiotic supplement that can support sustainable poultry production while reducing dependence on antibiotic-based growth promoters.

Despite the growing interest in probiotic and fermented feed additives, limited studies have investigated the effects of different concentrations of fermented water kefir on the growth and dressing performance of various meat-type chicken strains. Moreover, information regarding the economic viability of FWK supplementation, particularly its effects on production cost, net profit, and return on investment (ROI), remains scarce. This research gap highlights the need to evaluate the performance of meat-type chicken strains supplemented with varying concentrations of FWK and determine its effectiveness as a natural probiotic alternative.

Therefore, this study aims to evaluate the growth and dressing performance of meat-type chicken strains supplemented with different concentrations of fermented water kefir. Specifically, it seeks to determine the effectiveness of FWK as a natural probiotic alternative and assess its economic viability in broiler production. The findings of this study may provide poultry raisers and industry stakeholders with practical information for improving production efficiency, maximizing profitability, and identifying the most cost-effective FWK supplementation level capable of generating higher net profit and return on investment.

METHODS

Research Design

This study employed a two-factor experiment using the Randomized Complete Block Design (RCBD). Factor A consisted of the meat-type chicken strains (Cobb and Ross), while Factor B involved fermented water kefir (FWK) supplementation levels, namely: K0 (no supplementation/control), K1 (15 mL FWK per 1 L water), K2 (30 mL FWK per 1 L water), K3 (45 mL FWK per 1 L water), and K4 (commercial probiotic/control). The experiment consisted of ten (10) treatment combinations with three (3) replications, resulting in thirty (30) experimental units. Each experimental unit was composed of five (5) birds, with a total of one hundred fifty (150) broiler chicks used in the study.

Locale of the Study

The study was conducted at Brgy. Jayobo, Lambunao, Iloilo, Philippines, located at approximately 11.11°N latitude and 122.42°E longitude, about 62 kilometers northwest of Iloilo City, Region VI – Western Visayas.

Materials

The materials used in the study included brooding boxes, rearing cages, broiler chicks (Cobb and Ross strains), rice hull, newspaper, bulbs, commercial feeds, bamboo feeders, improvised polyvinyl chloride (PVC) water troughs, 12-liter transparent containers, water kefir grains, water, molasses, sprayer, disinfectants, foot bath, measuring cups, buckets, syringes, slaughtering tools, a laptop, and a digital weighing scale.

A total of one hundred fifty (150) day-old broiler chicks, consisting of seventy-five (75) Cobb and seventy-five (75) Ross, were used as experimental animals.

Experimental Treatments and Design

A two-factor factorial experiment was used. Factor A consisted of meat-type chicken strains, namely Cobb (C1) and Ross (C2). Factor B consisted of fermented water kefir supplementation levels, namely K0, K1, K2, K3, and K4.

The treatment combinations were as follows

BLOCK I

C_2K_0	C_1K_1	C_1K_0	C_1K_2	C_2K_4
C_2K_3	C_1K_4	C_2K_2	C_2K_1	C_1K_3

BLOCK II

C_1K_4	C_2K_2	C_1K_0	C_2K_3	C_1K_3
C_1K_1	C_2K_0	C_2K_1	C_2K_4	C_1K_2

BLOCK III

C_2K_1	C_1K_0	C_1K_1	C_1K_2	C_2K_2
C_1K_4	C_2K_0	C_1K_3	C_2K_3	C_2K_4

Figure 1. Experimental Lay-out Arranged in 2x2.5x3
Randomized Complete Block Design (RCBD)

Legend:
Factor A–Strain of meat-type chicken (C)
C_1–Cobb
C_2–Ross
Factor B–Concentration of fermented water kefir (K)

K_0–Without supplementation/Control 1
K_1–15 ml fermented water kefir + 1L water
K_2–30 ml fermented water kefir + 1L water
K_3–45 ml fermented water kefir + 1L water
K_4–Commercial probiotic/Control 2

Each treatment was replicated three (3) times using thirty (30) experimental cages, with five (5) birds per cage.

Data Collection Procedures

Data collected included initial weight, weekly live weight, weight gain, feed consumption, water consumption, feed conversion ratio (FCR), water conversion ratio (WCR), carcass weight, dressing percentage, organ weights (liver, gizzard, proventriculus, small intestine), visceral fat weight, giblets (head, neck, and feet), and return on investment (ROI).

Growth Performance

The growth performance of the broiler chickens was evaluated using the following parameters:

Initial Weight: Determined by weighing the chicks per treatment at the start of the experiment and dividing by the number of birds per cage.

Weekly Live Weight: Measured by weighing birds per treatment at seven-day intervals throughout the experimental period.

Weight Gain: Computed by subtracting the previous week's weight from the current week's weight.

Feed Consumption: Determined by subtracting feed leftovers from the total feed offered per week and dividing by the number of birds per cage.

Water Consumption: Computed by subtracting remaining water from the total water offered per week per treatment.

Feed Conversion Ratio (FCR): Calculated by dividing total feed consumption by total weight gain per treatment.

Water Conversion Ratio (WCR): Determined by dividing total water consumption by total weight gain per treatment.

Dressing Procedure and Dressing Performance

At the end of the experimental period, representative birds per treatment were subjected to slaughter following standard poultry processing procedures.

- Birds were fasted for several hours before slaughtering to reduce gut content.
- Each bird was humanely slaughtered, bled, scalded, defeathered, and eviscerated.
- The carcass was cleaned and the following parameters were collected:
    - **Carcass Weight:** Determined by weighing the dressed carcass after removal of internal organs, head, neck, and feet.
    - **Dressing Percentage:** Computed as the ratio of carcass weight to live weight multiplied by 100.
    - **Organ Weights:** Liver, gizzard, proventriculus, and small intestine were carefully removed and individually weighed.
    - **Visceral Fat:** Collected and weighed after evisceration.
    - **Giblets Weight:** Includes head, neck, and feet, which were weighed collectively per treatment.

Instruments for Data Collection

A digital weighing scale was used to measure body weight, feed weight, and carcass weight. Measuring cups were used to determine water volume and fermented water kefir concentration. Other materials such as syringes and containers were used to ensure accurate preparation and administration of treatments.

Management Practices and Procedures

Preparation of Housing

The existing poultry house of the West Visayas State University–College of Agriculture and Forestry (WVSU-CAF) was used. The facility was cleaned, disinfected, and secured with fencing to prevent predator entry. A foot bath and hand sanitizing station were provided as biosecurity measures.

Preparation of Experimental Cages

Thirty (30) bamboo and wood cages measuring 2 ft × 2.5 ft × 2 ft (L × W × H) were prepared and disinfected prior to stocking. Each cage was equipped with feeders, waterers, and lighting.

Preparation of Fermented Water Kefir

Fermented water kefir was prepared using a mixture of one (1) kilogram molasses, one (1) kilogram kefir grains, and eight (8) liters of water. The mixture was fermented for two (2) days at room temperature. After fermentation, the solution was strained and prepared for supplementation. Kefir grains were stored and reused following proper rehydration and maintenance procedures.

Procurement and Management of Chicks

A total of 150-day-old broiler chicks (75 Cobb and 75 Ross) were procured from a reputable supplier. Upon arrival, chicks were inspected, acclimatized, and brooded for fourteen (14) days under controlled temperature, proper ventilation, and ad libitum feeding and watering.

Brooding and Rearing Management

Brooding was conducted for 14 days using rice hull bedding and incandescent bulbs for heat. After brooding, chicks were randomly assigned to experimental treatments following the RCBD layout and transferred to designated cages.

Feeding and Watering Management

Commercial feeds were provided following standard broiler feeding phases. Water and feed were given ad libitum. Experimental groups received FWK supplementation according to assigned treatment levels.

Health, Sanitation, and Biosecurity

Strict sanitation and biosecurity measures were implemented, including regular disinfection, proper waste disposal, controlled access, and foot bath usage. Birds were monitored regularly to prevent disease outbreaks.

Space Allocation

Each experimental unit was provided adequate space to prevent overcrowding, reduce stress, and ensure proper access to feed and water.

Statistical Analysis

All data were analyzed using Two-way Analysis of Variance (ANOVA) under the Randomized Complete Block Design (RCBD) for a two-factor experiment. Statistical analysis was performed using Statistical Tools for Agricultural Research (STAR) to determine significant differences among treatment means and interaction effects between factors.

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RESULTS AND DISCUSSION

Growth and dressing performance of meat-type chicken strains supplemented with different concentrations of fermented water kefir (FWK)

Growth Performance

Table 1 showed the weekly liveweight of meat-type chicken strains supplemented with fermented water kefir (FWK). The two meat-type chicken strains (Cobb and Ross) exhibited the same liveweights at all observation periods. Initial body weight (0.61 kg) for both strains, increasing uniformly from one week (1.04 kg), second week (1.70 kg), and third week (2.17 kg). Statistical analysis showed no significant effect of strain on weekly liveweight, indicating comparable growth potential between Cobb and Ross under the experimental conditions.

Liveweight increased progressively across weeks for all supplementation levels. Although birds receiving FWK and control group with commercial probiotic tended to show numerically lower liveweight values compared to control group without supplemention, these differences were not statistically significant. The control group without supplementation recorded heavier liveweights at week two (1.73 kg) and week three (2.22 kg). 15 and 45 ml FWK supplementation showed comparable weights, with slight numerical reductions as FWK concentration increased. The control group with commercial probiotic produced the lighter liveweight after three weeks (2.14 kg), though still no significant differences was observed.

Cobb and Ross chickens responded similarly to all FWK concentrations and probiotic supplementation. Numerically, Cobb chickens achieved lighter weight after three weeks at 45 ml FWK (2.15 kg), while Ross chickens showed the lighter value under control group with commercial probiotic supplementation (2.11 kg). No significant interaction effect was observed between chicken strain and FWK supplementation across all weeks.

The results conformed to the study conducted by Kandir et al, (2015) on the effects of kefir on the growth performance and carcass characteristics of Pekin ducks (*Anas platyrhynchos domestica*) supplementation of water kefir showed no significant result in terms of body weight.The findings of the present study are consistent with previous reports indicating that kefir supplementation does not always result in significant improvements in body weight or growth performance. Although kefir and other probiotic products have been recognized for their potential benefits on gut health and nutrient utilization, their effects on growth performance may vary depending on the animal species, dosage, and management conditions (Jha et al., 2020; Khalid et al., 2022)

In contrast to the results of the present study, Fahrodi et al. (2025) reported that supplementation with coconut water kefir had a significant positive effect on production performance, as evidenced by increased final body weight.

Table 1. *Weekly Liveweight (kg) of Meat-type Chicken Strains Supplemented with FWK*

FACTORS A x B					
		Initial Weight	WEEK		
FACTORS A x B			1	2	3
Factor A: Meat-type Chicken Strains					
C_1					
C_2	Cobb	0.61	1.04	1.70	2.17
Factor B: Concentrations of Fermented Water Kefir	Ross	0.61	1.04	1.70	2.17
K_0					
K_1	Without Supplementation		1.06	1.73	2.22

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K_2	15 ml FWK/1 L Water	1.03	1.70	2.19
K_3	30 ml FWK/1 L Water	1.04	1.70	2.16
K_4	45 ml FWK/1 L Water	1.02	1.70	2.16
Interaction Effect	Commercial Probiotic	1.04	1.68	2.14
C_1K_0				
C_1K_1	Cobb + Without Supplementation	1.06	1.73	2.22
C_1K_2	Cobb + 15 ml KWK/L of W	1.03	1.67	2.16
C_1K_3	Cobb + 30 ml FWK/L of W	1.04	1.71	2.18
C_1K_4	Cobb + 45 ml FWK/L of W	1.01	1.69	2.15
C_2K_0	Cobb + Commercial Probiotic	1.05	1.68	2.16
C_2K_1	Ross + Without Supplementation	1.06	1.73	2.22
C_2K_2	Ross + 15 ml KWK/L of W	1.03	1.72	2.22
C_2K_3	Ross + 30 ml FWK/L of W	1.04	1.69	2.13
C_2K_4	Ross + 45 ml FWK/L of W	1.03	1.70	2.16
Levels of Sig.	Ross + Commercial Probiotic	1.02	1.68	2.11
	(C)	ns	ns	ns
	(K)	ns	ns	ns
cv (%)	(CK)	ns	ns	ns
		3.01	3.95	4.22

Ns Not signficant at 5% level of probability

Table 2 revealed the weekly gain in weight of meat-type chicken strains supplemented with fermented water kefir (FWK). Cobb chickens gained weight (0.42, 0.66, and 0.48 kg) during week one, two, and three, respectively, while Ross chickens gained weight (0.43, 0.66, and 0.47 kg) during the same periods. These results indicate comparable growth efficiency between the two strains throughout the experimental period. Weekly weight gain did not differ significantly between the two meat-type chicken strains across all weeks.

The control group without supplementation exhibited the heavier numerical weight gains in week one (0.45 kg) and week three (0.50 kg). FWK-supplemented groups with 15 and 45 ml showed similar gains across all weeks, with a slight numerical decline at higher FWK concentrations. Birds in control group receiving commercial probiotic tended to recorded lighter gains after second and third week, though these differences were not statistically significant.

Both Cobb and Ross strains responded similarly to FWK inclusion and control group with commercial probiotic supplementation. Numerically, lighter gained weight was observed in Cobb chickens receiving 45 ml FWK (0.40 kg) after week one, while the lighter weight gained after week three occurred in Ross chickens supplemented with 30 ml FWK and commercial probiotic (0.44 kg). However, these numerical variations did not result in statistically significant differences.

The results conformed to the result of the study conducted by Kandir et al, (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) that inclusion of fermented water kefir (FWK) as supplement showed no statistical difference in terms of body weight gain and opposed to the result of study of Fahrodil et al, (2025) on the effect of the use of coconut water kefir supplementation on the performance, carcass, and gastrointestinal tract of broiler chicken that had a significant difference in production performance in terms of weight gain.

Table 2. *Weekly Gain in Weight (kg) of Meat-type Chicken Strains Supplemented with FWK*

FACTORS A x B				
		WEEK		
FACTORS A x B		1	2	3
Factor A: Meat-type Chicken Strains				
C_1				
C_2	Cobb	0.42	0.66	0.48
Factor B:Concentrations of Fermented Water Kefir	Ross	0.43	0.66	0.47
K_0				
K_1	Without Supplementation	0.45	0.67	0.50
K_2	15 ml FWK/1 L Water	0.43	0.66	0.50
K_3	30 ml FWK/1 L Water	0.43	0.66	0.46
K_4	45 ml FWK/1 L Water	0.41	0.68	0.47
Interaction Effect	Commercial Probiotic	0.43	0.64	0.46
C_1K_0				
C_1K_1	Cobb + Without Supplementation	0.44	0.67	0.49
C_1K_2	Cobb + 15 ml KWK/L of W	0.42	0.64	0.49
C_1K_3	Cobb + 30 ml FWK/L of W	0.42	0.67	0.48
C_1K_4	Cobb + 45 ml FWK/L of W	0.40	0.68	0.47
C_2K_0	Cobb + Commercial Probiotic	0.43	0.63	0.48
C_2K_1	Ross + Without Supplementation	0.45	0.66	0.50
C_2K_2	Ross + 15 ml FWK/L of W	0.43	0.68	0.50
C_2K_3	Ross + 30 ml FWK/L of W	0.44	0.65	0.44
C_2K_4	Ross + 45 ml FWK/L of W	0.42	0.68	0.46
Levels of Sig.	Ross + Commercial Probiotic	0.42	0.64	0.44
	(C)	ns	ns	ns
	(K)	ns	ns	ns
cv (%)	(CK)	ns	ns	ns
		6.20	7.34	9.08

^{ns}Not signficant at 5% level of probability

Table 3 displayed the weekly feed comsumption of meat-type chicken strains supplemented with fermented water kefir (FWK). It showed that Cobb chickens consumed (0.91, 0.98, and 1.09 kg) feed during week one, two, and three, respectively. Ross chickens consumed (0.76, 0.99, and 1.08 kg) during the same weeks. Feed consumption did not differ significantly between Cobb and Ross chickens throughout the experimental period.

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Although Cobb birds showed a numerically higher feed intake in week one, this difference was not statistically significant, indicating similar feed consumption patterns between the two strains.

Birds in control group without supplementation showed the higher numerical feed intake in week two and three. Supplementation of 15 and 45 ml FWK and control group with commercial probiotic consistently recorded slightly lower feed consumption compared with the control group without supplementation. On week one, lower feed intake was observed at 45 ml FWK (0.74 kg) and control group commercial probiotic supplementation (0.74 kg). Different concentrations of fermented water kefir and control group did not significantly affect weekly feed consumption.

Both Cobb and Ross strains exhibited similar responses to increasing FWK concentrations. Numerically, Cobb chickens receiving 45 ml FWK consumed the least feed in week one (0.72 kg), while Ross chickens in control group receiving commercial probiotic had the lower intake in after one and second week. These numerical differences did not result in significant strain-specific responses.

The results conformed to the result of the study conducted by Kandir et al, (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) that inclusion of fermented water kefir (FWK) supplementation showed no significant result in terms of feed intake in contrast to the result of the study of Fahrodil et al, (2025) on the effect of the use of coconut water kefir supplementation on performance, carcass, and gastrointestinal tract of broiler chicken that has a significant difference in production performance in terms of feed intake.

Table 3. *Weekly Feed Consumption (kg) of Meat-type Chicken Strains Supplemented with FWK.*

FACTORS A x B				
		WEEK		
FACTORS A x B		1	2	3
Factor A: Meat-type Chicken Strains				
C_1				
C_2	Cobb	0.91	0.98	1.09
Factor B:Concentrations of Fermented Water Kefir	Ross	0.76	0.99	1.08
K_0				
K_1	Without Supplementation	0.78	1.01	1.13
K_2	15 ml FWK/1 L Water	0.75	0.97	1.07
K_3	30 ml FWK/1 L Water	0.78	0.98	1.07
K_4	45 ml FWK/1 L Water	0.74	0.98	1.10
Interaction Effect	Commercial Probiotic	0.74	0.98	1.07
C_1K_0				
C_1K_1	Cobb + Without Supplementation	0.78	1.01	1.12
C_1K_2	Cobb + 15 ml KWK/L of W	0.76	0.94	1.05
C_1K_3	Cobb + 30 ml FWK/L of W	0.78	0.96	1.09

C_1K_4	Cobb + 45 ml FWK/L of W	0.72	1.01	1.09
C_2K_0	Cobb + Commercial Probiotic	0.75	1.00	1.10
C_2K_1	Ross + Without Supplementation	0.78	1.02	1.13
C_2K_2	Ross + 15 ml FWK/L of W	0.74	0.99	1.09
C_2K_3	Ross + 30 ml FWK/L of W	0.78	1.01	1.04
C_2K_4	Ross + 45 ml FWK/L of W	0.76	0.96	1.11
Levels of Sig.	Ross + Commercial Probiotic	0.73	0.95	1.07
	(C)	ns	ns	ns
	(K)	ns	ns	ns
cv (%)	(CK)	ns	ns	ns
		5.01	6.09	6.76

[ns]Not signficant at 5% level of probability

Table 4 revealed the weekly water consumption of meat-type chicken strains supplemented with different concentrations of fermented water kefir (FWK). Cobb chickens consumed water (1.64, 2.61, and 3.32 L) during weeks one, two, and three, respectively. Ross chickens consumed water (1.67, 2.67, and 3.32 L) during the same weeks. The similar intake values indicate comparable drinking behaviour between the two strains under the experimental conditions. Weekly water consumption did not differ significantly between Cobb and Ross chickens throughout the experimental period.

Birds in the control without supplementation and commercial probiotic recorded the higher numerical water intake, particularly in the third week. FWK supplementation with 15 and 45 ml FWK showed a numerical reduction in water consumption as FWK concentration increased, with the lower values observed at 45 ml FWK. In the week three, water consumption (3.56 L) was recorded the higher in birds receiving commercial probiotic supplementation, although this difference was not statistically significant.

Both Cobb and Ross chickens responded similarly to FWK inclusion across all concentrations. Numerically, Cobb chickens received 45 ml FWK consumed the least water in week one (1.51 L), whereas Ross chickens in control group with commercial probiotic showed the higher water consumption in weeks two and three (2.86 and 3.56 L). No significant interaction effect was observed between chicken strain and FWK supplementation on weekly water consumption.

The results conformed to the result of the study conducted by Gangnat et al, (2021) on the effect of water kefir for weaned piglets, its palatability and its effects on growth performance that inclusion fermented water kefir (FWK) supplementation showed high water intake but no statistical difference was observed.

Table 4. *Weekly Water Consumption (L) of Meat-type Chicken Strains Supplemented with FWK.*

FACTORS A x B		WEEK		
		1	2	3
Factor A: Meat-type Chicken Strains				
C_1	Cobb	1.64	2.61	3.32
C_2	Ross	1.67	2.67	3.32
Factor B:Concentrations of Fermented Water Kefir				
K_0	Without Supplementation	1.73	2.64	3.32

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of Education, Research, and Innovation Perspectives
Volume 2 Issue 6 (June 2026)

K_1	15 ml FWK/1 L Water	1.66	2.61	3.29
K_2	30 ml FWK/1 L Water	1.63	2.56	3.23
K_3	45 ml FWK/1 L Water	1.59	2.60	3.21
K_4	Commercial Probiotic	1.69	2.70	3.56
Interaction Effect				
C_1K_0	Cobb + Without Supplementation	1.72	2.62	3.26
C_1K_1	Cobb + 15 ml KWK/L of W	1.70	2.50	3.22
C_1K_2	Cobb + 30 ml FWK/L of W	1.62	2.58	3.44
C_1K_3	Cobb + 45 ml FWK/L of W	1.51	2.62	3.13
C_1K_4	Cobb + Commercial Probiotic	1.67	2.73	3.55
C_2K_0	Ross + Without Supplementation	1.73	2.66	3.37
C_2K_1	Ross + 15 ml KWK/L of W	1.62	2.72	3.36
C_2K_2	Ross + 30 ml FWK/L of W	1.63	2.53	3.01
C_2K_3	Ross + 45 ml FWK/L of W	1.66	2.58	3.28
A_2B_4	Ross + Commercial Probiotic	1.70	2.86	3.56
Levels of Sig.	(C)	ns	ns	ns
	(K)	ns	ns	ns
	(CK)	ns	ns	ns
cv (%)		6.11	8.62	8.16

^{ns}Not signficant at 5% level of probability

Table 5 showed the feed conversion ratio of meat-type chicken strains supplemented with different concentrations of fermented water kefir (FWK). Both strains recorded an identical mean FCR value (1.69), indicating similar efficiency in converting feed into body weight under the experimental conditions.

The treatment with 15 ml FWK treatment produced the lower numerical FCR (1.66), suggesting slightly better feed efficiency. The control group with commercial probiotic recorded the higher numerical FCR (1.71). However, all FCR values remained within a narrow range (1.66 to 1.71), and these numerical differences were not statistically significant.

Both Cobb and Ross strains showed a similar pattern of response to FWK inclusion. The better numerical FCR was observed in Ross chickens supplemented with 15 ml FWK (1.65), showed efficiency in converting feed into weight while the higher FCR occurred in Cobb chickens in control group receiving commercial probiotic supplementation (1.72). These differences did not result in significant strain-specific effects.

The results conformed to the result of the study conducted by Kandir (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) that inclusion fermented water kefir (FWK) supplementation showed no significant effects on the feed conversion ratio of broiler chickens and rejected the result of the study of Fahrodil et al, (2025) on the effect the use of coconut water kefir supplementation on the performance, carcass, and gastrointestinal tract of broiler chicken which had a significant difference in terms of feed conversion ratio and feed efficiency ratio.

Table 5. *Feed Conversion Ratio (FCR) of Meat-type Chicken Strains Supplemented with FWK*

FACTORS A x B		
		FCR
FACTORS A x B		
Factor A: Meat-type Chicken Strains		
C_1		
C_2	Cobb	1.69
Factor B: Concentrations of Fermented Water Kefir	Ross	1.69
K_0		
K_1	Without Supplementation	1.70
K_2	15 ml FWK/1 L Water	1.66
K_3	30 ml FWK/1 L Water	1.70
K_4	45 ml FWK/1 L Water	1.70
Interaction Effect	Commercial Probiotic	1.71
C_1K_0		
C_1K_1	Cobb + Without Supplementation	1.69
C_1K_2	Cobb + 15 ml KWK/L of W	1.66
C_1K_3	Cobb + 30 ml FWK/L of W	1.68
C_1K_4	Cobb + 45 ml FWK/L of W	1.70
C_2K_0	Cobb + Commercial Probiotic	1.72
C_2K_1	Ross + Without Supplementation	1.70
C_2K_2	Ross + 15 ml KWK/L of W	1.65
C_2K_3	Ross + 30 ml FWK/L of W	1.72
C_2K_4	Ross + 45 ml FWK/L of W	1.70
Levels of Sig.	Ross + Commercial Probiotic	1.69
	(C)	ns
	(K)	ns
cv (%)	(CK)	ns
		3.08

[ns]Not signficant at 5% level of probability

Water conversion ratio of meat-type chicken strains supplemented with different concentrations of fermented water kefir (FWK). Cobb chickens recorded a mean WCR (4.28), while Ross chickens recorded (4.32) WCR. This indicates that both strains utilized water with comparable efficiency for body weight gain under the experimental conditions.

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Volume 2 Issue 6 (June 2026)

Birds in the control group without supplementation and those supplemented with FWK at 15, 30, and 45 ml recorded significantly lower WCR values (4.22–4.24) indicating better water-use efficiency. In contrast, birds in the control group with commercial probiotic exhibited a significantly higher WCR (4.58), reflecting poorer efficiency in converting water intake into body weight. Among FWK treatments, 45 ml FWK produced the lowest numerical WCR (4.22), although it did not differ significantly from other FWK levels. FWK supplementation had a significant effect on water conversion ratio.

Both Cobb and Ross chickens responded similarly to FWK inclusion. Numerically, the lower WCR was observed in Cobb chickens supplemented with 45 ml FWK (4.16) and Ross chickens supplemented with 30 ml FWK/L (4.16). The highest WCR values were consistently associated with the control group with commercial probiotic in both strains, particularly in Ross chickens (4.67). No significant interaction effect was observed between chicken strain and FWK supplementation.

The results of the study conformed to the result of the study of Gangnat et al, (2021) on the effect water kefir for weaned piglets: A pilot study on its farm-scale production, its palatability and its effects on growth performance that supplementation of FWK showed higher water consumption and eventually will result to a good Water Conversion Ratio (WCR).

Table 6. *Water Conversion Ratio (WCR) of Meat-type Chicken Strains Supplemented with FWK*

FACTORS A x B		
		WCR
FACTORS A x B		
Factor A: Meat-type Chicken Strains		
C_1		
C_2	Cobb	4.28
Factor B: Concentrations of Fermented Water Kefir	Ross	4.32
K_0		
K_1	0 ml FWK/Control 1	4.24[b]
K_2	15 ml FWK/1 L Water	4.24[b]
K_3	30 ml FWK/1 L Water	4.23[b]
K_4	45 ml FWK/1 L Water	4.22[b]
Interaction Effect	Commercial Probiotic/Control 2	4.58[a]
C_1K_0		
C_1K_1	Cobb + 0 ml FWK	4.21
C_1K_2	Cobb + 15 ml KWK/L of W	4.23
C_1K_3	Cobb + 30 ml FWK/L of W	4.29
C_1K_4	Cobb + 45 ml FWK/L of W	4.16
C_2K_0	Cobb + Commercial Probiotic	4.49
C_2K_1	Ross + 0 ml FWK	4.27
C_2K_2	Ross + 15 ml KWK/L of W	4.25

C_2K_3	Ross + 30 ml FWK/L of W	4.16
C_2K_4	Ross + 45 ml FWK/L of W	4.27
Levels of Sig.	Ross + Commercial Probiotic	4.67
	(A)	ns
	(B)	**
cv (%)	(AB)	ns
**Significant at 1% level of probability		4.91

^{ns}Not signficant at 5% level of probability

Weight of Carcass, Dressing Percentage, Weight of Liver, Weight of Gizzard, Weight of Proventriculus, Weight of Small Intestine, Weight of Visceral Fats and Weight of Giblets.

Dressing Performance

Table 7 revealed the weight of carcass of meat-type chicken strains supplemented with different concentrations of fermented water kefir (FWK). Carcass weight was the same for Cobb and Ross strains (1.49 kg), indicating that strain had no main effect on carcass weight.

The higher carcass weight occurred in the control group without supplementation (1.52 kg), while the commercial probiotic produced lower carcass weight (1.45 kg). However, these differences were not statistically significant, indicating that FWK supplementation did not meaningfully alter carcass yield. Although numerical differences were observed among treatments, there was no significant effect of FWK supplementation on carcass weight.

In terms of interaction effect, although the lower carcass weight (1.42 kg) was recorded in Ross chickens with control group with commercial probiotic, and the highest among Cobb and Ross strain in control group without supplementation and Ross chicken with 15 ml FWK (1.52 kg), the difference was not statistically significant and therefore does not indicate a real interaction effect.

The results opposed to the study of Fahrodil et al, (2025) on the effect the use of coconut water kefir supplementation on performance, carcass, and gastrointestinal tract of broiler chicken that improved the carcass yield in broiler chicken and to the results of the study of Kandir et al, (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) which had a significant difference in terms of hot carcass.

Also it indicates the dressing percentage of meat-type chicken strains supplemented with fermented water kefir (FWK). Dressing percentage was comparable between Cobb and Ross strains (68.80 and 68.89%).

As to the concentration, birds received 30 ml FWK and 45 ml FWK showed slightly higher dressing yields (69.21 and 69.07 %), while the control group with commercial probiotic resulted in lower value (67.53 %). Although numerical differences were observed among treatments, FWK supplementation did not significantly affect dressing percentage.

The higher dressing percentage (69.39 %) was observed in Ross chickens supplemented with 45 ml FWK. The lowest values occurred in Ross chickens given 15 ml FWK and control group with commercial probiotic (68. 33 and 68.32 %). Both strains responded similarly across supplementation levels, confirming the absence of interaction. The interaction between chicken strain and FWK concentration was not significant.

The results opposed to the results of study of Fahrodil et al, (2025) on the effect of the use of coconut water kefir supplementation on performance, carcass, and gastrointestinal tract of broiler chicken that improved the production performance and carcass yield in broiler chicken and to the study of Kandir et al, (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) which had a significant difference in terms of carcass parameters.

Also, it was revealed in the table, the weight of liver of meat-type chicken strains supplemented with fermented water kefir (FWK). The Cobb strain recorded the heavier weight of liver (0.5 kg) compared to Ross strain (0.4kg).

As to the concentration, a lower numerical reduction in liver weight was observed at 45ml FWK levels and with the control group with commercial probiotic (0.04 kg), suggesting a tendency toward more efficient metabolic activity, though this was not statistically supported. Supplementation with fermented water kefir or commercial probiotic did not significantly influence liver weight.

Numerically, the lower liver weight was observed in Ross chickens supplemented with commercial probiotic (0.03 kg). Both strains showed a similar response pattern, confirming the absence of a meaningful interaction effect. The interaction between chicken strain and FWK concentration was not significant.

The results opposed to the results of study of Kandir et al, (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) which had a significant difference in terms of liver weight but aligned to the results of study of Cetingul et al, (2019) on the effects of dietary supplementation of kefir on body measurements, weight of visceral organs, and gut morphology in geese, which had no significant influence in terms of visceral organs.

Moreover, it was reflected in the table, the weight of gizzard of meat-type chicken strains supplemented with fermented water kefir (FWK). Both the Cobb and Ross strains recorded the same weight of gizzard (0.04 kg).

As to the concentration, mean values were uniform across treatments (0.04 kg), indicating that gizzard size remained stable regardless of supplementation level. Supplementation with fermented water kefir or commercial probiotic did not significantly influence gizzard weight.

Slightly lower gizzard weights were observed in Cobb and Ross chickens supplemented with 30 ml FWK and control group with commercial probiotic (0.03 kg) compared to other treatments and control group (0.04 kg), but these differences were minimal and biologically insignificant. The interaction between chicken strain and FWK concentration was not significant.

The results contradicted to the result of the study of Kandir et al, (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) which had a significant difference in terms of gizzard weight but aligned to the result of the study of Cetingul et al, (2019) on the effects of dietary supplementation of kefir on body measurements, weight of visceral organs, and gut morphology in geese which had no significant influence in terms of visceral organs.

In addition, it was revealed in the table, the weight of proventriculus of meat-type chicken strains supplemented with fermented water kefir (FWK). Both the Cobb and Ross strains recorded the same weight of proventriculus (0.01 kg).

As to the concentration, mean values were uniform across all treatments (0.01 kg), suggesting that proventriculus size remained stable regardless of supplementation level. Supplementation with fermented water kefir or commercial probiotic did not significantly affect proventriculus weight.

The lack of variation among interaction means confirms that both Cobb and Ross strains responded similarly to FWK and commercial probiotic supplementation (0.01 kg), with no detectable effect on proventriculus development. There was no significant difference in terms of interaction effect.

The results conformed to the result of the study Cetingul et al, (2019) on the effects of dietary supplementation of kefir on body measurements, weight of visceral organs, and gut morphology in geese that had no significant results in terms of weight of visceral organs and showed no interaction effects.

Furthermore, it was revealed in the table, the weight of small intestine of meat-type chicken strains supplemented with fermented water kefir (FWK). Both the Cobb and Ross strains recorded the same weight of small intestine (0.08 kg).

As to the concentration, all treatments showed the same data in terms of weight of small intestine (0.08 kg) at the end of the study. Based on the statistical analysis, supplementation of FWK to meat-type chicken in terms of weight of small intestine showed no significant result.

As to the interaction effect of FWK, although a slight numerical reduction in small intestine weight (0.07 kg) was observed in some treatment combinations in Cobb strain with 30 ml FWK and Ross strain with 30 and 45 ml FWK compared to other treatments with FWK supplementation and control group, these differences were minimal and biologically negligible. The interaction between chicken strain and FWK concentration was not significant.

The results conformed to the result of the study of Cetingul et al, (2019) on the effects of dietary supplementation of kefir on body measurements, weight of visceral organs, and gut morphology in geese that had no significant results in terms of weight of visceral organs and showed no interaction effects.

Similarly, it also indicates the weight of visceral fats of meat-type chicken strains supplemented with fermented water kefir (FWK). Both the Cobb and Ross strains recorded the same weight of visceral fats (0.02 kg).

As to the concentration, slightly higher visceral fat weights were observed at 15 and 45 ml FWK (0.03 kg) compared to other treatment and control group (0.02 kg), but these differences were small and biologically negligible. FWK and commercial probiotic supplementation did not significantly affect visceral fat weight.

A slight numerical increase in visceral fat was observed in Ross chickens supplemented with 15 and 45 ml FWK (0.03 kg), but these changes were minimal and did not indicate a consistent interaction pattern compared to other treatments and control group. The interaction between chicken strain and FWK concentration was not significant.

The results opposed to the result of the study of Kandir et al, (2015) on the effects of kefir on growth performance and carcass characteristics in pekin ducks (*Anas platyrhynchos domestica*) which had a significant difference in terms of abdominal fat parameters and Fahrodil et al, (2025) on the ffect the use of coconut water kefir supplementation on performance, carcass, and gastrointestinal tract of broiler chicken that has significant difference in terms of abdominal fats.

As reflected in the same table, also showed the weight of giblets of meat-type chicken strains supplemented with fermented water kefir (FWK). Both the Cobb and Ross strains recorded the same weight of giblets (0.20 kg).

Numerically, a slightly higher giblets weights were observed at 15 and 45 ml FWK (0.21 kg) than of other treatments (0.20 kg), but the differences were minimal. FWK supplementation did not significantly affect giblets weight.

Although, some numerical variation was observed—such as lower giblets weight in Ross chickens in control group without supplementation (0.18 kg) and higher values at 15 and 45 ml FWK (0.21 kg). These differences were inconsistent and did not indicate a meaningful interaction. The interaction between chicken strain and FWK concentration was not significant.

The results conformed to the result of the study of Cetingul et al, (2019) on the effects of dietary supplementation of kefir on body measurements, weight of visceral organs, and gut morphology in geese that had no significant results in terms of weight of visceral organs and showed no interaction effects. Likewise, recent studies have indicated that the influence of probiotics and kefir-based supplements on internal organ development is often minimal, with organ weights remaining comparable across treatment groups despite improvements in gut health and microbial balance (Jha et al., 2020; Khalid et al., 2022). These findings suggest that kefir supplementation may support physiological functions without markedly altering the development of visceral organs.

Table 7. *Dressing Performance of Meat-type Chicken Strains Supplemented with FWK.*

FACTORS A x B								
Factor A: Meat-type Chicken Strains								
C_1								
	Wt. of carcass (kg)	Dressing (%)	Wt. of liver (kg)	Wt. of gizzard (kg)	Wt. of proventriculus (kg)	Wt. of small intestine (kg)	Wt. of visceral fats(kg)	Wt. of giblets (kg)

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Volume 2 Issue 6 (June 2026)

C_2									
Factor B:Concentrations of Fermented Water Kefir	Cobb	1.49	68.80	0.05	0.04	0.01	0.08	0.02	0.20
K_0	Ross	1.49	68.89	0.04	0.04	0.01	0.08	0.02	0.20
K_1									
K_2	Without Supplementation	1.52	68.80	0.05	0.04	0.01	0.08	0.02	0.20
K_3	15 ml FWK/1 L Water	1.50	68.62	0.05	0.04	0.01	0.08	0.03	0.21
K_4	30 ml FWK/1 L Water	1.48	69.21	0.05	0.04	0.01	0.08	0.02	0.20
Interaction Effect	45 ml FWK/1 L Water	1.50	69.07	0.04	0.04	0.01	0.08	0.03	0.21
C_1K_0	Commercial Probiotic	1.45	67.53	0.04	0.04	0.01	0.08	0.02	0.20
C_1K_1	Cobb + Without	1.52	68.56	0.05	0.04	0.01	0.08	0.02	0.21
C_1K_2	Supplementation								
C_1K_3	Cobb + 15 ml FWK/L of W	1.47	68.91	0.05	0.04	0.01	0.08	0.02	0.20
C_1K_4	Cobb + 30 ml FWK/L of W	1.49	69.05	0.05	0.03	0.01	0.07	0.02	0.20
C_2K_0	Cobb + 45 ml FWK/L of W	1.48	68.74	0.04	0.04	0.01	0.08	0.02	0.20
	Cobb + Commercial Probiotic	1.48	68.74	0.04	0.04	0.01	0.08	0.02	0.21
C_2K_1	Ross + Without	1.52	69.03	0.05	0.04	0.01	0.08	0.02	0.18
C_2K_2	Supplementation								
C_2K_3	Ross + 15 ml KWK/L of W	1.52	68.33	0.04	0.04	0.01	0.07	0.03	0.21
C_2K_4	Ross + 30 ml FWK/L of W	1.47	69.36	0.04	0.04	0.01	0.08	0.02	0.19
	Ross + 45 ml FWk/L of W	1.52	69.39	0.04	0.04	0.01	0.08	0.03	0.21
Levels of Sig.	Ross + Commercial	1.42	68.32	0.03	0.03	0.01	0.07	0.02	0.19
	Probiotic								
	(C)	ns	ns	ns	ns	ns	ns	ns	ns
cv (%)	(K)	ns	ns	ns	ns	ns	ns	ns	ns
	(CK)	ns	ns	ns	ns	ns	ns	ns	ns
		4.91	0.87	17.53	15.26	32.58	13.60	22.80	8.16

[ns]Not signficant at 5% level of probability

Return on Investment

Table 8 revealed the return on investment (ROI) of meat-type chicken strains supplemented with fermented water kefir (FWK). Gross income varied among treatments and between chicken strains, largely reflecting differences in carcass weight and edible by-products. Cobb chickens, total gross income ranged from Php 308.60 to Php 318.60, with the highest gross income recorded in the control group without supplementation while Ross chickens, gross income ranged from Php 294.60 to Php 317.60, with the highest gross income observed at 45 ml FWK. FWK treatments generally produced slightly lower carcass revenue than the control, consistent with the minimal differences observed in carcass weights and dressing percentage.

Total production costs were relatively similar across treatments, ranging from Php 171.99 to Php 178.02 per bird. Feed cost accounted for the largest share of total expenses across all treatments. FWK supplementation increased variable costs moderately, particularly at 30 and 45 ml FWK, due to the added cost of FWK preparation. The control group with commercial probiotic treatment incurred additional cost (Php 1.94–1.99), increasing total expenses without corresponding improvement in growth or carcass traits. Water and electricity costs were slightly higher in treatments with increased water intake, particularly in the commercial probiotic groups.

Net income followed a pattern similar to gross income and cost structure. For Cobb chickens, net income ranged from Php 132.07 to Php 140.58, with the highest net income observed in the control group without supplementation while Ross chickens, net income ranged from Php 122.61 to Php 142.00, with the highest net income recorded at 15 ml FWK. The lowest net income in both strains was consistently associated with the control group with commercial probiotic supplementation, due to higher costs and lower carcass revenue.

ROI values clearly illustrate the economic efficiency of each treatment. Cobb strain ROI ranged from 74.69 to 79.29% and the highest ROI was achieved with 15 ml FWK (79.29 %), slightly higher than the control. Higher FWK inclusion levels (30 and 45 ml) resulted in reduced ROI, reflecting increased costs without proportional gains. In Ross strain, ROI ranged from 71.29 to 81.33% with the highest ROI (81.33 %) of the entire study was recorded in Ross chickens supplemented with 15 ml and the control group with commercial probiotic produced the lowest ROI (71.29 %).

Low-level supplementation of 15 ml FWK improved profitability, particularly in Ross chickens, by balancing average supplementation cost with stable production output. Higher FWK levels (30 and 45 ml) increased production costs without enhancing carcass yield, thereby reducing ROI. Control group with commercial probiotic supplementation was economically inferior to FWK and the control group without supplementation under the conditions of this study.

Table 8. *Return on Investment of Meat-type Chicken Strains Supplemented with FWK*

Item	C1					C2				
	K_0	K_1	K_2	K_3	K_4	K_0	K1	K2	K3	K4
A. Gross Income										
wt. of carcasss[1]	1.52	1.47	1.49	1.48	1.48	1.52	1.52	1.47	1.52	1.42
wt. of proventriculus[2]	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
wt. of gizzard[3]	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03
wt. of small intestine[4]	0.08	0.08	0.07	0.08	0.08	0.08	0.07	0.08	0.08	0.07
wt. of liver[5]	0.05	0.05	0.05	0.04	0.04	0.05	0.04	0.04	0.04	0.04
wt. of giblets[6]	0.21	0.20	0.20	0.20	0.21	0.18	0.21	0.19	0.21	0.19
wt. of visceral fats[7]	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02
Sales of; (PhP)										

	Carcass[8]	273.60	264.60	268.20	266.40	266.40	273.60	273.60	264.60	273.60	255.60
	Proventriculus[9]	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
	Gizzard[10]	6.00	6.00	4.50	6.00	6.00	6.00	6.00	6.00	6.00	4.50
	small intestine[11]	8.00	8.00	7.00	8.00	8.00	8.00	7.00	8.00	8.00	7.00
	Liver[12]	7.50	7.50	7.50	6.00	6.00	7.50	6.00	6.00	6.00	6.00
	Giblets[13]	21.00	20.00	20.00	20.00	21.00	18.00	21.00	19.00	21.00	19.00
	visceral fats[14]	1.00	1.00	1.00	1.00	1.00	1.00	1.50	1.00	1.50	1.00
	Total (PhP)	318.60	308.60	309.70	308.90	309.90	315.60	316.60	306.10	317.60	294.60
B.	Expenses (PhP)										
	Fixed Cost;										
	Interest in Cap.[15]	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
	Land Rentals[16]	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
	Housing[17]	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
	Cages[18]	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
	Feeding Trough[19]	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
	Water Trough (PVC)[20]	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
	Water[21]	2.03	1.98	2.04	1.94	2.12	2.07	2.05	1.91	2.01	2.17
	Electricity[22]	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77
	Variable Cost;										
	Labor[23]										
	Maintenance[24]	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
	Marketing[25]	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
	Chicks[26]	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00	37.00
	Feeds[27]										
	Chick Booster	29.61	29.61	29.61	29.61	29.61	29.61	29.61	29.61	29.61	29.61
	Chick Starter	66.91	63.55	65.04	64.67	65.42	68.03	64.67	66.91	64.67	62.80
	Chick Grower	36.39	32.66	33.90	33.90	34.21	35.14	33.90	32.34	34.52	32.34
	FWK[28]	0.00	1.24	2.54	3.63	0.00	0.00	1.29	2.40	3.75	0.00
	Commercial Probiotic[29]	0.00	0.00	0.00	0.00	1.94	0.00	0.00	0.00	0.00	1.99
	Total	178.02	172.12	176.21	176.83	176.38	177.93	174.60	176.25	177.64	171.99

C	Net Income (PhP)	140.58	136.48	133.49	132.07	133.52	137.67	142.00	129.85	139.96	122.61
D	ROI (%)	78.97	79.29	75.76	74.69	75.70	77.37	81.33	73.67	78.79	71.29

[1]Wt. of carcass (kg), [2]wt. of proventriculus (kg), [3]wt. of gizzard (kg), [4]wt. of small intestine (kg), [5]wt. of liver (kg), [6]wt. of giblets (kg), [7]wt. of visceral fats (kg), [8]sales of carcass @ Php180.00/kg; [9]sales of proventriculus @ Php150.00/kg; [10]sales of gizzard @ Php150.00/kg; [11]sales of small intesine @ Php100.00/kg; [12]sales of liver @ Php150.00/kg; [13]sales of giblets @ Php100.00/kg; [14]sales of visceral fats @ Php50.00/kg; [15]Interest in capital 10% p.a.; [16]Land rentals 20m2=Php500/month; [17]Housing rentals =Php5100.00/month; [18]Cost of cage (Php3500.00 SV10%/LS 4yrs); [19]Cost of Feeding and [20]Watering troughs (Php7200.00SV10%/LS 10years); [21]Cost of Water (total water consumed in m3 @ Php250.00); [22]Cost of electricity (total electric bill Php1000.00 @ Php12.95kw-hr); [23]Cost of labor; [24]Maintenance @ Php450.00/man/day @ 2hrs/day; [25]Marketing @ Php300.00/man/day @ 2hrs/day; [26]Cost of chicks @ Php37.00/chick; [27]Cost of feeds; Chick booster @ Php39.48/kg; Chick starter @Php37.38/kg; Chick grower @Php31.10/kg; [28]Cost of FWK (*please see @ Appendix C) ;* [29]Cost of Commercial probiotic @Php35.00/pack

Nutrient Analysis

The nutrient analysis of fermented water kefir (FWK) was presented in Table 9. Laboratory analysis was conducted at the Department of Agriculture, Jaro, Iloilo City, Philippines. The FWK sample was collected and subjected to analysis 48 hours after fermentation. Results revealed a pH of 4.48, total nitrogen content of 0.43% N, total phosphorus content of 0.00% P_2O_5, total potassium content of 0.80% K_2O, and total organic carbon content of 9.26% OC. The analysis indicated that the fermented product was acidic, as evidenced by its pH value of 4.48, which is lower than the neutral pH level of 7.0.

Table 9. *Nutrient Analysis*

Lab. Code	Sample Description	Sample Code	pH	Total Nitrogen	Total Phosphorus	Total Potassium	Total Organic Carbon	Moisture
			unit	% N	% P_2O_5	% K_2O	% OC	%
20250225110	Concoction	Sample A	4.48	0.43	0.00	0.80	9.26	-

CONCLUSIONS

Based on the results and findings of the study, the following conclusions were drawn:

1. Fermented water kefir (FWK) can be used as water supplement to meat-type chicken strains up to 45% without detrimental effect to birds.

2. Supplementation of fermented water kefir did not influence the growth performance of meat-type chicken strains in terms of liveweight, gain in weight, feed consumption, water consumption, feed conversion ratio but a significant result was observed in terms of water conversion ratio due to chickens consumed more water to relieve heat stress due to high heat index recorded by PAGASA in Lambunao, Iloilo around 43 degree Celsius which is considered danger level and contributing factor to high water consumption and definitely affected the water conversion ratio during the conduct of the study.

3.Supplementation of fermented water kefir showed no significant results in terms of carcass weight, dressing percentage, weight of liver, weight of gizzard, weight of proventriculus, weight of small intestine, weight of visceral fats, and weight of giblets.

Recommendations

Based on the findings and conclusions of the study, the following recommendations were forwarded:

1. Use fermented water kefir (FWK) as water supplement to meat-type chicken strains.
2. Use of fermented water kefir is recommended to promote chemical free and organically raised poultry animals.
3. Conduct similar studies on the use of fermented water kefir on other meat-type chicken strains to validate results.

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