

THE EFFECT OF ADDING GTG HERBAL SOLUTION IN DRINKING WATER ON BODY WEIGHT GAIN, FINAL BODY WEIGHT, FEED EFFICIENCY, AND INCOME OVER FEED COST OF LOCAL DUCKS

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Abstract

Ginger, turmeric and garlic are commonly used herbs and widely recognized for their health benefits. The GTG solution, comprising equal proportions of water, ginger juice, turmeric juice, and garlic juice, is a potential feed additive. This research aims to determine the effect of adding GTG herbal solution to drinking water as a feed additive on body weight gain, final body weight, ration efficiency, and income over feed cost local ducks. Sixty male local ducks were divided into 4 treatment groups, each with 5 pen replications containing 3 birds per pen, and reared from 1 to 45 days old. The treatments include: P0 = drinking water + 0% GTG solution, P1 = drinking water + 0.5 % GTG solution, P2 = drinking water + 1% GTG solution and P3 = drinking water + 1.5% GTG solution. The findings indicated that adding 1% GTG solution into drinking water resulted in the highest body weight gain, final body weight, feed efficiency, and income over feed cost in local ducks.

Keywords: body weight gain, final body weight, feed efficiency, Income Over Feed Cost, local ducks, GTG

PENGARUH PENAMBAHAN LARUTAN HERBAL GTG DALAM AIR MINUM TERHADAP PERTAMBAHAN BOBOT BADAN, BOBOT BADAN AKHIR, EFISIENSI RANSUM DAN INCOME OVER FEED COST ITIK LOKAL

Abstrak

Jahe, kunyit dan bawang putih merupakan herbal yang banyak digunakan masyarakat karena banyak bermanfaat bagi kesehatan tubuh. Larutan GTG adalah larutan yang terdiri dari air, sari jahe, sari kunyit dan sari bawang putih dengan perbandingan yg sama. Penelitian ini bertujuan untuk mengetahui pengaruh penambahan larutan GTG dalam air minum terhadap pertambahan bobot badan, bobot badan akhir, efisiensi ransum dan Income Over Feed Cost pada itik lokal. Penelitian menggunakan anak itik lokal Jantan sebanyak 60 ekor yang dibagi menjadi 4 kelompok perlakuan dengan 5 pen sebagai ulangan dan 3 ekor itik per pen. Itik dipelihara dari umur 1 hari hingga 45 hari. Perlakuan ada 4 yaitu P0= air minum + 0% larutan GTG, P1= air minum + 0,5% larutan GTG, P2 =air minum + 1% larutan GTG dan P3= air minum + 1,5% larutan GTG. Data dianalisis Sidik Ragam untuk mengetahui pengaruh perlakuan dan selanjutnya di Uji Duncan untuk membedakan setiap perlakuan. Hasil penelitian menunjukkan bahwa penambahan larutan GTG sebanyak 1% ke dalam air minum memberikan pertambahan bobot badan, bobot badan akhir, efisiensi ransum dan Income Over Feed Cost yang tertinggi pada itik lokal.

Kata Kunci: Pertambahan bobot badan, bobot akhir, efisiensi ransum, Income Over Feed Cost, itik lokal, GTG

INTRODUCTION

Indonesia, characterized by its vast agricultural area, provides an ideal environment for waterfowl, particularly ducks, traditionally raised in harvested rice fields. However, escalating water pollution due to industrialization has rendered paddy fields unsafe for ducks' grazing. Consequently, many duck breeders have transitioned to cage rearing. In conventional duck farming, high feed costs and suboptimal growth often undermine

expectations. Duck farmers are turning to traditional herbs such as turmeric (*Curcuma domestica*), ginger (*Zingiber officinale rosc*), and garlic (*Allium sativum L.*) to enhance growth since the prohibition of antibiotics as growth promoters. These herbs, known for their medicinal properties, are combined in equal proportions to create the GTG solution, comprising water, ginger juice, turmeric juice, and garlic juice. Adding this herbal solution to ducks' drinking water is expected to enhance

their performance. This study aims to investigate the impact of incorporating GTG solution into drinking water as a feed additive on body weight gain, final body weight, feed efficiency, and income over feed cost in local ducks.

Feed additives, as defined by Sinurat et al. (2009), are substances mixed into livestock feed to enhance productivity, health, and nutrient absorption, rather than fulfilling nutritional needs. The use of medicinal herbs has a long history in human practices, serving both as medicine and stamina enhancers. Herbal medicines are often a combination of various herbs, leveraging the synergistic effects of their active substances. In this study, three herbs, ginger, turmeric, and garlic, were utilized.

According to Septiatin (2008), ginger plays a role in the digestive process due to its protease and lipase enzyme content. It also contains active substances such as essential oils, zingiberol, bisabolena, gingerol, filandrene, and bitter resin. Studies have indicated that ginger possesses high antioxidant properties (Abolaji et al., 2017), enhancing immunity in livestock. Mushawwir et al. (2022) reported that turmeric, another antioxidant-rich herb, contains essential oils, curcumin, starch, and resin. Essential oils in turmeric prevent excessive stomach acid and reduce strong intestinal peristalsis, while curcumin acts as an antimicrobial compound. Garlic, containing allicin with sulfur, functions as an antiseptic and antibacterial agent (Mushawwir et al., 2021). Garlic is recognized for its stamina-boosting properties and immunity enhancement against diseases. Suharti (2004) suggested that garlic increases ration efficiency by slowing down peristalsis in the intestine, leading to enhanced nutrient absorption. Muhamad (2008) highlighted garlic's role in reducing bacterial populations, and improving nutrient absorption in the intestine.

Presearch results by Karangiya et al. (2016) showed that the use of ginger and garlic as feed additives at 1% each gaveroper dosage is crucial when using herbal mixtures as feed additives, as excessive or insufficient amounts can have adverse effects on animal performance. Research by Karangiya et al. (2016) indicated that a 1% dosage of ginger and garlic as feed additives yielded optimal results. Safa's research (2014) demonstrated that specific levels of red and black pepper

improved overall quality in broiler chickens. The present study anticipates that the addition of GTG solution will enhance the performance of local ducks, thereby increasing breeder income. The expected performance improvements include body weight gain, final body weight, ration efficiency, and Income Over Feed Cost (IOFC).

Research on the use of turmeric herbs in drinking water has been conducted previously, Awang et al. (2008) demonstrated that a 0.5% turmeric flour level in drinking water increased feed consumption and body weight gain in broilers. This aligns with Sultan's (2003) opinion that a 0.5% turmeric supplementary feed in a 0.5% feed ratio resulted in the highest body weight gain and the lowest feed conversion value, indicating high feed efficiency.

The animals' final body weight at the end of the rearing period plays a crucial role in income determination. Feed efficiency indicates the quality of the ration, reflecting how effectively animals utilize the provided feed for meat production. A well-known term in animal husbandry, Income Over Feed Cost (IOFC), measures the profit based solely on ration expenditure, which is the most substantial cost in livestock production. According to Supriyati et al. (2003), in intensive livestock farming, feed costs can account for up to 70% of total production costs, emphasizing the significant impact of feed ingredient prices on overall production costs.

Ducks' drinking behavior, involving frequent water consumption after ingesting food, significantly influences the high water consumption needs in ducks. This study aims to determine the optimal dosage of GTG solution added to drinking water, resulting in the highest body weight gain, final body weight, feed efficiency, and Income Over Feed Cost in local ducks.

MATERIALS AND METHOD

Animal Sample

A total of 60 ducks from Tasikmalaya were divided into 4 groups with 5 replicate cages, each containing 3 birds. The cage dimensions were 100 cm x 90 cm x 60 cm. Each cage was initially equipped with a 40-watt lamp as a heater for the first week, after which the lamp served solely as a lighting source.

Additionally, each cage was furnished with a feeder and water drinking system. The necessary equipment included digital scales and sanitation tools. The cage floor was constructed with bamboo slats to facilitate the cleaning process.

Treatment and Animal Rearing

GTG solution is a blend of three herbs: ginger (*Zingiber officinale* rose), turmeric (*Curcuma domestica*), and garlic (*Allium sativum* L.). The solution was prepared by mixing water, ginger juice, turmeric juice, and garlic juice in equal proportions, stirring thoroughly. The treatment involved administering GTG solution to ducks at varying doses in their drinking water. There were four treatments: P0 = drinking water without GTG solution; P1 = drinking water + 0.5% GTG solution; P2 = drinking water + 1.0% GTG solution; P3 = drinking water + 1.5% GTG solution.

The ducks were fed with commercial feed, specifically BR21 E produced by PT. Sprot Prima Feedmill. The raw materials included yellow corn, MBM, SBM, CGM, palm oil, essential amino acids, minerals, premixes, and vitamins. The BR 21 E feed was provided in crumble form, with the following nutrient composition: metabolic energy (ME) with a maximum of 12% water; 21-23% crude protein, 4-8% crude fat, 4% maximum crude fiber; 8% maximum ash, 0.9-1.2% calcium, and 0.7-1.0% phosphorus. Ducks were given the rations ad libitum and checked three times daily. Newcastle Disease (ND) vaccination was administered via eye drops on the fourth day.

Parameters measured included body weight gain, final body weight, feed efficiency, and Income Over Feed Cost (IOFC). Body weight gain was recorded weekly, with final body weight determined at the conclusion of the 45-day maintenance period. Ration efficiency was calculated by dividing the body weight gain at 45 days by the amount of ration consumed at 45 days, multiplied by 100%. IOFC was calculated using the formula: (final weight (kg) multiplied by the selling price of chicken per kg) minus (ration consumption (kg) times ration price per kg). Ration consumption was monitored weekly and totaled at the study's conclusion. Body weight gain was determined

by subtracting the initial weight from the final weight. Statistical analysis was performed using ANOVA to assess the treatment effects, followed by Duncan's test for further treatment comparisons.

RESULTS AND DISCUSSION

Observations on body weight gain, final body weight, ration efficiency, and Income Over Feed Cost (IOFC) results in this study can be seen in Table 1.

Body Weight Gain

Body weight gains in treatment R0 (not given GTG solution) was significantly lower than in treatments R1, R2 and R3 (0.5 – 1.5% GTG solution). This result is line with the finding by Widjastuti et al., (2021), that 0.5 – 1.0% level of mixed red ginger and turmeric in the ration can increase body weight gain, while at 1.5%, there is a decrease. Another researcher suggested that adding ginger can increase body weight (Afifah and Lentera, 2002). The increase in body weight gain observed in this research is a positive effect of the bioactive substances in ginger, turmeric, and garlic. As noted by Widjastuti et al. (2021), the active substances in ginger and turmeric stimulate the gallbladder to release bile and the pancreas to release enzymes, improving the digestion of feed ingredients. The highest body weight gain was observed in ducks given 1% GTG solution, indicating that this dose is optimal as an increase to 1.5% resulted in decreased body weight gain. This aligns with the findings of Widjastuti et al. (2021), emphasizing the importance of the right dose for optimal results.

Final Body Weight

The ducks' final body weight ranged from 1,354 – 1,607.87 g. The difference in the addition of the GTG solution dose had a significant effect on each treatment ($P < 0.05$). Ducks treated with P2 (drinking water with 1% GTG solution) exhibited the highest final body weight, while P0 (drinking water without GTG solution) showed the lowest. The addition of GTG solution from 0.5% to 1.5% significantly increased the final weight of the ducks.

Table 1. Research Results of Adding GTG Solution on Local Ducks

No.	Parameter	P0	P1	P2	P3
1.	Body weight gain (g)	215.83 ^a	242.68 ^c	258.06 ^d	229.94 ^b
2.	Final Weight (g)	1,354.00 ^a	1,516.33 ^c	1,607.87 ^d	1,439.33 ^b
3.	Feed Efficiency (%)	25.47 ^a	26.84 ^b	28.90 ^c	25.96 ^{ab}
4.	IOFC (Rp.) / duck	8,345.20 ^a	11,750.93 ^b	16,035.07 ^c	9,690.33 ^{ab}

Description: Letters that are not the same towards the row means there was significant difference (P<0.05). P0 = without added GTG solution; P1=plus 0.5% GTG; P2 =plus1% GTG; P3=plus 1.5% GTG

At an additional dose of 0.5 % GTG solution in drinking water, the active substances from ginger, turmeric and garlic have worked but not optimally. The optimal dose for the highest final body weight was 1% GTG solution. An excessive dose of 1.5% resulted in the lowest final body weight, even below the ducks treated with 5% GTG solution. This suggests a potential adverse impact on the ducks due to overconsumption of active substances, possibly leading to poisoning. This result is in line with the opinion of Karangiya et al. (2016) that the addition of affixes feed exceeding 1% could have a negative impact on livestock.

Ginger's ability to increase appetite, improve digestion, and strengthen the stomach likely contributed to the observed results. Ginger takes out essential oils that can stimulate the mucous membranes of the intestines. This stimulation causes the stomach to empty quickly, so the animal will consume feed more often (Setyanto, et al. 2012). Previous studies support the positive effects of ginger on livestock productivity, feed palatability, digestibility, and appetite stimulation (Owen and Amakiri, 2012).

Feed Efficiency

Feed efficiency in ducks treated without the addition of GTG solution to drinking water and ducks treated with an additional dose of 1.5 % GTG solution was not significantly different. However, they were significantly lower than ducks treated with the addition of 1% GTG solution. The inclusion of 0.5% GTG solution in drinking water did not affect the feed efficiency compared to the addition of 1.5% GTG solution. The addition of GTG solution in drinking water to ducks at a dose of 1% provides the highest ration efficiency. This outcome is attributed to the presence of digestive enzymes in ginger and turmeric, which increases the ration digestibility. As

noted by Septiatin (2008) and Nurmalia (2020), herb facilitate the digestive process in livestock by providing digestive enzymes, specially protease and lipase. The primary components in ginger, including gingerols, gingerdiols, and gingerdiones, play a pivotal role in stimulating digestive enzymes, influencing microbial activity, and possessing antioxidant abilities (Mohammed et al., 2012).

Turmeric significantly contributes to increased feed digestibility in animals, as curcumin supplementation stimulates the secretion and activity of enzymes such as lipase, amylase, and protease, which have an important role in metabolism and accelerated digestive process (Ernadi and Kermanshahi, 2007). The essential oils in turmeric further enhance the function of the digestive tract by stimulating the secretion of digestive enzymes (Sugiharto et al., 2011). Zomrawi et al. (2010) and Mushawwir et al. (2018) highlight that the use of ginger in rations results in better feed conversion compared to its absence. Durrani et al. (2006) explained that the addition of turmeric in the ration significantly improves feed conversion in both the starter and finisher phases. Furthermore, the administration of garlic to livestock serves as an antibacterial and antifungal agent, contributing to the overall health and improved performance of ducks. In a previous study by Jiwandini (2020), the growth of the bacteria *Penicillium* sp. was effectively inhibited by the allicin content in garlic, and Kulsum (2014) emphasized the anti-fungal activity of garlic extract due to its allicin content.

Income Over Feed Cost

The administration of 1% JKBP solution leads to a high final weight and feed efficiency, which resulted in the highest Income Over Feed Cost value. The IOFC value for ducks without the GTG solution treatment did not differ significantly from those treated with 1.5% GTG

solution. Similarly, the IOFC value for ducks treated with 1.5% GTG solution was not significantly different from those treated with 0.5% GTG solution. Income Over Feed Cost (IOFC) is derived from the proceeds of livestock sales, accounting for expenses incurred for rations. Livestock sales are calculated by multiplying livestock production by the price of livestock at that time (in kilograms), while feed costs entail the amount of feed used by livestock to produce live weight, multiplied by the ration price per kilogram at that time. The lower the ration conversion rate, the more efficient the livestock is in converting the ration into meat, thus the higher the IOFC value (Rasyaf, 2011). Prawirokusumo (1990) stated that Income Over Feed Cost is the difference between the total revenue from sales and the costs incurred for rations during livestock raising. According to Kompiang (2001), feed efficiency is a critical factor influencing the IOFC value, with efficient feed utilization leading to reduced feed costs.

CONCLUSION

The inclusion of 1% herbal solution (ginger, turmeric, garlic) in drinking water results in the highest body weight gain, final body weight, ration efficiency, and Income Over Feed Cost.

SUGGESTION

It is suggested that the addition of GTG herbal solution (Ginger Turmeric Garlic) into drinking water at a dose of 1% can provide the highest final weight, ration efficiency, and Income Over Feed Cost value.

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