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Research Article

Utilization Black Soldier Fly (*Hermetia illucens*) Maggot Flour in Feed on the Performance of Superior Native Chickens (KUB)

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ABSTRACT

This study aimed to ascertain the influence of black soldier fly (BSF*; Hermetia illucens*) maggot flour in rations on the performance of KUB chickens. This study used 60 KUB chickens aged 5 weeks, which were maintained until they were 12 weeks old and were placed in 20 boxes measuring 115 cm × 85 cm × 85 cm, each containing three KUB chickens. This investigation used a randomized block design (RBD) with four groups and five treatments. The treatments used in this study were A (0% BSF maggot meal from 15% fish meal), B (25% BSF maggot meal from 15% fish meal), C (50% BSF maggot meal from 15% fish meal), D (75% BSF maggot meal from 15% fish meal), and E (100% BSF maggot meal from 15% fish meal). The treatment rations were formulated with 17.5% isoproteins and 2800 kcal/kg isoenergy. Feed conversion, body weight gain, dietary intake, and income over feed cost (IOFC) were measured. The results indicated that the addition of BSF maggot meal to KUB chicken rations had no significant effect ($P>0.05$) on feed consumption and feed conversion but had a significant effect ($P<0.05$) on body weight gain. In conclusion, providing 25% BSF maggot flour from 15% fish flour in the ration can maintain the appearance of KUB chickens.

Keywords: BSF maggot meal, fish meal, IOFC, KUB chicken, performance

INTRODUCTION

The demand for animal-based foods increases annually. According to the Food and Agricultural Organization (FAO) in 2015, animal-based food production must increase by 60–70% by 2040 to meet global demand. Poultry is a commodity with significant potential for development to meet the population's animal protein needs. Free-range chickens, a local Indonesian chicken variety, have significant potential for development and are well known among Indonesians as a source of animal protein.

Native chickens are widely cultivated in rural areas, resulting in a population that tends to increase annually (Akbar, 2021). According to the Indonesian Statistics Agency (2022), the free-range chicken population in Indonesia has increased over the past three years, reaching 301,761,386 in 2019, 305,444,937 in 2020, and 317,054,290 in 2022. However, free-range chickens have disadvantages, such as relatively slow growth compared to broiler chickens and a high feed conversion ratio for achieving weight gain (Darwati et al., 2015). Various types of free-range chickens can be cultivated in Indonesia, one of which is the *Kampung Unggul Balitbangtan* (KUB) chicken.

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KUB chicken is a type of native chicken that has undergone recombination by the Agricultural Research and Development Agency, Ciawi Bogor, resulting in a new strain of native chicken that is more resistant to disease, has a lower mortality rate, fast growth, and high egg production, namely 45–50% hen-hey and broody nature that has been reduced by 90%. KUB chicken has another advantage over native chicken, namely fast body weight growth, reaching an average body weight of 1 kg at the age of 12 weeks, while ordinary native chickens need 20 weeks to reach a body weight of 1 kg (Sartika, 2016).

An important factor to consider in KUB chicken farming is feed. Feed is a crucial aspect in any livestock business, especially in the poultry industry. According to Budiansyah (2010), feed costs contribute 60–70% of the total production costs incurred by farmers. This high cost is due to the relatively high price of protein feed sources, such as fish meal and other feed ingredients that are still imported. Therefore, a new breakthrough is needed to find alternative, affordable, readily available, and nutrient-rich feed sources. One such effort is the use of black soldier fly (BSF) (*Hermetia illucens*) maggot meal as a protein source to replace fish meal in poultry rations (Sugiyono et al., 2015). BSF maggot meal can be added to rations at a concentration of 15% to match the need for fish meal. The need for fish meal in rations usually ranges from 10–15%, or one-third of the total ration protein (Anggorodi, 1985).

BSF maggots have a high crude protein content and are potential feed substitutes for fish meal. Maggots contain amino acids, fatty acids, and minerals comparable to other animal protein sources. Based on laboratory examination of the diet of non-ruminants at the Faculty of Animal Husbandry, Andalas University, Padang (2020), the nutritional value of BSF maggots is 12.38% water content, 3062.6 Kcal/kg metabolic energy, 38.82% crude protein, 2.00% crude fiber, 15.32% crude fat, 13.12% ash, 1.84% calcium, and 1.00% phosphorus. The amino acid content of methionine is 0.83%, and that of lysine is 2.21% (Newton et al., 2005).

However, maggots have limitations as animal feed ingredients because they contain a high amount of chitin, namely 7% (Caligiani et al., 2018). According to Kobayashi et al. (2006), the consumption of chitosan or chitin at a level of 5% has not influenced ration consumption, body weight gain, and ration efficiency in broiler chickens because chickens can digest 10%–15% of chitin in the ration.

Maggots are the larvae of *Hermetia illucens*, the black soldier fly, often referred to as black soldier flies. They can be used as a good and economical source of protein because they can be produced easily and quickly. Maggot cultivation can be performed using media derived from organic waste, such as by-products of agro-industrial activities, both from agriculture and livestock waste, thereby preventing environmental pollution. Chicken manure is one such medium for producing maggots from livestock waste. According to Nurfitriani et al. (2014), chicken manure contains 12.27% protein, 0.35% fat, 29.84% carbohydrates, and 57.54% ash, making it a suitable growing medium for maggots. Coconut dregs are another agricultural waste source. Wulandari (2017) reported that coconut dregs contain 5.6% crude protein, 38.1% carbohydrates, 16.3% crude fat, 31.6% crude fiber, 2.6% ash, and 5.5% water. Both media are rich in nutrients, particularly as sources of protein and carbohydrates, and contain sufficient organic matter for BSF maggot growth.

Maggot flour is produced by drying and grinding black soldier fly (BSF) larvae, which contain 40.2% crude protein, 28% crude fat, 2.36% calcium, and 0.88% phosphorus (Dengah et al., 2016). According to Oliver (2004), a high or low protein content in maggots depends on the growth medium used. The protein content in maggots has advantages, including being easily digested, which can accelerate growth in native chickens. The nutritional content of maggot flour can

substitute fish meal up to 50%, and it can produce good production performance in quail (Widjastuti et al., 2014). Dengah et al. (2016) reported that maggot flour in broiler rations can replace fish meal by 75% without having a negative effect on the efficiency of the ration. Feed consumption, weight gain, feed conversion, and income over feed cost (IOFC) are all influenced by the nutritional content of the ration. In addition to its high nutritional content, maggot meal is relatively inexpensive compared to fish meal when used as animal feed (Pesik et al., 2016).

MATERIAL AND METHODS

Sixty KUB Superior Free-Range chickens aged 5 weeks were used in this study; they were selected from a total of 120 provided. The chickens were raised for seven weeks. The research method used in this study was a randomized block design (RBD) with five treatments and four groups based on the age of the KUB chickens, each composed of three KUB chickens as the experimental unit.

Feeding Treatment

The treatment rations in this study included different levels of BSF maggot meal, which replaced 15% of the fish meal requirement in the KUB chicken ration. The rations were A: 0% BSF maggot meal from 15% fish meal; B: 25% BSF maggot meal from 15% fish meal; C: 50% BSF maggot meal from 15% fish meal; D: 75% BSF maggot meal from 15% fish meal; and E: 100% BSF maggot meal from 15% fish meal (Table 2). The feed given to KUB chickens in this study was BSF maggot meal at levels of 0%, 3.75%, 7.50%, 11.25%, and 15% in the ration. This BSF maggot meal was then formulated with other feed ingredients, such as ground corn, fine bran, soybean meal, fish meal, and B12 minerals (Table 1). The ration formulation was composed of 17.5% protein and 2800 kcal/kg energy (Livestock Research Institute, 2019; Table 3).

Statistical Analysis

Analysis of data the knowledge that was provided from the research go through statistical analysis using the application of analysis of variance. Significant analysis of variance results ($P<0.05$ or $P<0.01$) were further tested using Duncan's multiple range test (DMRT) based on the theory of Steel and Torrie (1995). Data that were not significant ($P>0.05$) were not further tested.

Parameters

The variables observed in this study were feed consumption, body weight gain, feed conversion, and income over feed cost (IOFC).

a. The amount of feed consumed was calculated by determining the difference between the amount of feed given to KUB chickens during the study and the remaining amount of feed, divided by the number of KUB chickens. This was calculated using the chicken ration consumption formula (g/chicken/week).
b. Body weight gain was calculated by weighing the chickens each week and subtracting the weight from the previous week.
c. The ration conversion factor was calculated by dividing the amount of ration consumed by the increase in body weight.
d. Income Over Feed Cost (IOFC) is the ratio of sales to feed costs.

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Table 1. Metabolic energy (Kcal/kg) and nutritional content (%)

Feed Ingredients	CP (%)	CL (%)	Fiber (%)	Ca (%)	P (%)	Metionin (%)	Lisin (%)	ME (Kcal/kg)
Crude corn[a]	8.25	3.90	3.23	0.03	0.11	0.18[c]	0.20[c]	3350[d]
Huls[a]	10.55	11.35	13.82	0.11	0.47	0.29[e]	0.77[e]	1630[d]
Soybean[b]	21.00	5.00	5.00	0.90	0.60	0.40[c]	1.05[c]	2240[d]
Maggot flour[h]	38.82	15.32	7.05	1.84	1.00	0.83[i]	2.21[i]	3281.25
Fish flour[f]	49.81	2.83	3.90	3.10	1.88	0.68[c]	1.12[c]	2580[d]
Mineral B12[g]	-	-	-	49.00	14.00	-	-	-

Note: [a]Romi (2021); [b]Nasution (2022); [c]Scott (1976); [d]NRC (1994); [e]Mathius dan Sinurat (2001); [f]Yusra (2021); [g]Label Kemasan Produk PT. Eka Farma; [h]Ikhsan (2022); [i]Newton et al. (2005)

Table 2. Treatment feed composition (%)

Feed Ingredients	A	B	C	D	E
Grounded corn	57.00	58.00	54.00	55.00	53.00
Fine bran	12.00	11.00	16.00	15.00	17.00
Soybean meal	15.00	15.00	14.00	14.00	14.00
Maggot meal	0.00	3.75	7.50	11.25	15.00
Fish meal	15.00	11.25	7.50	3.75	0.00
B12 Mineral	1.00	1.00	1.00	1.00	1.00
Total	100.00	100.00	100.00	100.00	100.00

Table 3. Nutritional content (%) and metabolic energy (Kcal/kg) of treatment rations (A-E)

Nutrition content (%)	A	B	C	D	E
Crude protein	17.68	17.69	17.51	17.52	17.56
Ether extract	4.43	4.78	5.60	5.99	6.53
Crude fiber	4.34	4.56	5.08	5.13	5.50
Calsium	1.03	0.98	0.93	0.88	0.84
Phospor	0.60	0.56	0.54	0.50	0.47
Methionin	0.50	0.47	0.43	0.40	0.36
Lysin	1.42	1.30	1.19	1.08	0.10
ME (kkal/kg)	2816.70	2859.10	2812.19	2855.49	2847.79

RESULTS AND DISCUSSION

Feed Consumption, Body Weight Gain, and Feed Conversion

The typical quantity of feed consumed by KUB chickens in each treatment group is shown in Table 4. The average feed consumption of KUB chickens during the study ranged from 385.55 to 418.51 g/head/week. Analysis of variance showed that the use of BSF (*Hermetia illucens*) in the ration and inclusion of maggot flour had no significant effect (P>0.05) on KUB chicken feed consumption. The insignificant difference in feed consumption between treatments indicated that the use of up to 15% BSF maggot flour in the KUB chicken ration did not significantly affect feed consumption. This is because the feed energy content provided in the ration for each treatment in this study was the same, which was approximately 2800 kcal/kg; therefore, the analysis results showed that the treatment had no significant effect on feed consumption. In addition to the lack

of significant variation in the amount of feed consumed by the treatments, this was due to the palatability of the rations provided.

Table 4. Average ration consumption, increasing body weight gain and ration conversion

Treatments	Feed consumption (g)^{ns}	Body weight gain (g)	Feed conversion^{ns}
A	410.29	102.57^{a}	4.43
B	418.51	103.16^{a}	4.08
C	414.34	97.06^{a}	4.56
D	387.30	87.47^{b}	4.70
E	385.55	73.21^{b}	5.63

Note: ns = non-significant (P>0.05); ab = Different superscripts in the same column indicate a significantly different effect (P<0.05); SE = Standard Error

The same treatment was used for each treatment, and the type of livestock used in this study was also the same; therefore, there was little variation in the quantity of ration consumption. This is in accordance with Wahyu (2004), who stated that ration quality, ration palatability, livestock type, management, and livestock movement influence ration consumption in livestock.

Based on the statistical analysis, the treatment results did not differ significantly in terms of ration consumption. However, when viewed from the ration consumption figures obtained, there was a decrease in ration consumption figures with an increasing level of BSF maggot flour provision. The provision of BSF maggot flour at the highest level (15%) in the ration (E) had the lowest average ration consumption. This was influenced by the chitin content of BSF maggot flour. According to Dengah et al. (2016), substitution of BSF maggot flour above 50% of fish meal or 7.50% in the ration reduced ration consumption in the finisher phase broiler chickens, allegedly due to an increase in chitin in the ration, which caused a decrease in ration palatability.

Furthermore, the decrease in ration consumption may be attributed to the relatively high crude fiber content in BSF maggot flour (7.05 %) (Ikhsan, 2022) and fine bran (13.82 %) (Romi, 2021). When the percentage of BSF maggot flour and fine bran in the ration increased in the E treatment, the total crude fiber in the E treatment ration was higher than that in the other treatments. This is in line with Hatta (2005), who stated that rations containing high crude fiber can reduce ration consumption. The increase in crude fiber in the E treatment caused a decrease in the ration consumption rate. According to Rasyaf (2011), the crude fiber content in chicken rations ranges from 3% to 5%.

In this study, KUB chicken ration consumption ranged from 385.55 to 418.51 g/head/week. The results of the ration consumption obtained were greater than the final results of the study by Amizar et al. (2023), who used BSF maggot flour up to a level of 28% in the ration of KUB chickens aged 6 – 12 weeks, and the ration consumption ranged from 393.52 to 398.03 g/head/week. However, it was lower than the ration consumption obtained from Irawan's (2017) study on the performance of KUB chickens in the finisher period when given rations with different protein levels, which ranged from 404.55 to 418.11 g/head/week. This is because the ration consumption of livestock can be affected by different ration qualities and maintenance management.

As shown in Table 4, the highest average weight gain was observed in treatment B (103.16 g/head/week), whereas the lowest weight gain was observed in treatment E (73.21 g/head/week). Analysis of variance showed that providing BSF maggot flour at different levels in KUB chickens had a significantly different effect (P<0.05) on the weight gain of KUB chickens.

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Further tests based on the DMRT findings showed that the B treatment (3.75% BSF maggot flour) was not significantly different (P>0.05) from the A treatment (0% BSF maggot flour), C (7.50% BSF maggot flour), and D treatment (11.25% BSF maggot flour) but was significantly different (P<0.01) higher than the E treatment (15% BSF maggot flour). The increase in body weight in the A treatment (0% BSF maggot flour) showed no significant difference (P>0.05) from the C (7.50% BSF maggot flour) and D (11.25% BSF maggot flour) treatments but was significantly different (P<0.01) higher than the E (15% BSF maggot flour) treatment. The increase in body weight in the C treatment (7.50% BSF maggot flour) showed no significant difference compared to the D treatment (11.25% BSF maggot flour) and was significantly different (P<0.05) compared to the E treatment (15% BSF maggot flour). The increase in body weight in the D treatment (11.25% BSF maggot flour) showed no significant difference (P>0.05) compared to the E treatment (15% BSF maggot flour).

The findings of the analysis revealed that B treatment did not show any significant difference compared to A, C, and D treatments. This indicates that there was no difference in body weight gain resulting from the provision of BSF maggot flour up to 11.25%, due to the amino acid content of lysine and methionine in each ration of treatments A to D being able to meet the needs of KUB chickens. According to the Livestock Research Institute (2019), the amino acid requirements for methionine and lysine in KUB chickens are 0.40% and 0.90%, respectively, in the ration. Body weight gain in chickens can be influenced by the amino acids lysine and methionine, which play roles in the growth of body tissues. This is in line with Rasyaf's (2011) opinion that genetic and non-genetic factors, such as the content of food consumed, environmental temperature, velocity, and health, can affect chicken weight gain. According to Newton et al. (2005), maggot flour contains 2.21% lysine and 0.83% methionine.

However, treatments B (3.75% BSF maggot meal) and E (15% BSF maggot meal) resulted in significant differences in body weight gain. A decrease in body weight gain was observed in the E treatment, indicating that the provision of 15% BSF maggot meal resulted in lower body weight gain than in the other treatments. This was related to the crude fat content of the diet. Based on the nutrient content, the crude fat content in the E treatment ratio was higher than that in the other treatments at 6.53%, thus disrupting chicken growth. The high crude fat content in treatment E was due to the high crude fat content of the fine bran feed ingredients (11.35%) and BSF maggot meal (15.32%), both of which increased in treatment E. This aligns with Wahyu (2004), who found that a high fat content in feed can reduce body weight gain in chickens.

In addition, a high percentage of BSF maggot flour in the E treatment ration can affect nutrient absorption by chickens. BSF maggots cannot be optimally utilized as feed ingredients because their outer skin contains anti-nutritional substances, namely chitin. These anti-nutritional substances can affect feed components before consumption and inhibit the absorption of nutrients, especially protein, vitamins, and minerals (Kumar, 2003). Similar to the study by Kanto et al. (2019), there was 17.93% chitin in the bodies of the BSF maggots. The chitin content in the E treatment ration (15% BSF maggot flour) was 2.68%. According to Reddy et al. (1996), a chitin content of > 2.32% in chicken rations interferes with the growth of chickens.

Chitin is the least soluble alkaline biopolymer after sulfate and is abundantly available. According to Hidayat (2018), two factors contribute to the high digestibility of crude protein in maggots: first, the presence of non-protein nitrogen components, and second, the presence of chitin, which can form complex bonds with protein, preventing chickens from digesting it in the digestive tract. Nutrients consumed by chickens simply pass through the digestive tract, making them unavailable for use in meat formation. The chitinase enzyme produced in the chicken

proventriculus is necessary for digesting chitin; however, chitinase produced by chickens has limited ability to utilize chitin (Sanchez et al., 2014).

Furthermore, treatment A did not show a significant difference from treatments C and D. This indicates that the provision of up to 11.25% BSF maggot flour did not have a significant effect on body weight gain when compared to the control treatment. However, treatment A showed a significantly higher difference than treatment E due to the unbalanced content of lysine and methionine amino acids in treatments A and E. The use of 15% BSF maggot flour in the E treatment ration did not match the lysine and methionine amino acid content in the A treatment ration (0% BSF maggot flour). The lysine and methionine contents in treatment A were 0.50% and 1.42%, respectively. In contrast, the lysine and methionine contents in treatment E were lower at 0.36% and 0.10%, respectively, thus affecting the increase in chicken body weight. This is supported by Wahyu (2004), who stated that the amino acids methionine and lysine play a role in the process of meat formation in chickens, and by the Livestock Research Center (2019), who reported that the amino acid requirements for methionine and lysine in KUB chickens are 0.40% and 0.90%, respectively, in the ration.

The weight gain of KUB chickens in this study ranged from 73.21 to 103.16 g/head/week. These results are lower than those of Amizar. et al. (2023) who reported that the use of BSF maggot meal on the performance of KUB chickens aged 6 to 12 weeks ranged from 93.01 to 96.48 g/head/week. However, they are higher than the study by Urfa et al. (2017), which found that the average weight gain of native chickens during the grower period ranged from 65.5 to 72.75 g/head/week.

Table 4 shows that the average feed conversion ratio for KUB chickens in this study ranged from 4.08 to 5.63. Analysis of variance showed that the use of BSF maggot meal in the ration had no significant effect ($P>0.05$) on the feed conversion ratio of KUB chickens. This was related to the direct relationship between feed consumption and weight gain in the KUB chickens. Increased feed consumption also increases body weight gain, resulting in a good feed conversion ratio.

Ration conversion is the total weight of the ration consumed to obtain 1 kg live body weight. A low ration conversion value indicates better nutrient absorption and optimal meat weight. The ratio conversion results obtained in this study ranged from 4.08 to 5.63. This figure is higher than the ration conversion results reported by Amizar et al. (2023) on the effect of BSF maggot meal on the performance of KUB chickens in the finisher period aged 6 to 12 weeks, where the ration conversion ranged from 4.13 to 4.23.

This can be influenced by the form of feed given during this study, which was in the form of flour (mash), so that the feed is easily scattered because the chickens eat by pecking, scratching, and dropping the feed, such that not all nutrients are consumed by the chickens. In addition, chickens tend to sort out the grains in the form of mash feed, namely larger particles such as grains, so that the nutritional intake is not evenly consumed by the chickens, which can reduce ration efficiency (Zang, et al., 2009). Meanwhile, according to Wicaksono (2015), native chickens raised with an intensive system produce ration conversion values ranging from 4.90 to 6.40, which is higher than the results of Rajulani et al. (2022), who obtained an average conversion result for KUB chickens in the starter phase of 4.11–4.73.

The high feed conversion rate obtained in this study indicates that the quality of the ration used is not optimal for converting into body weight gain. This is related to suboptimal nutrient absorption due to poor ration quality. This is suspected to be due to the presence of antinutrients, such as chitin, in BSF maggot flour, which is indigestible by chickens, resulting in the rapid excretion of consumed nutrients from the digestive tract. Consequently, only a small amount of

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nutrients are absorbed by the digestive tract. This results in an empty digestive tract, causing chickens to consume more rations without achieving optimal weight gain, which leads to a high feed conversion ratio. This is supported by Ryla et al. (2017), who stated that a high feed conversion ratio in chickens could be caused by increased feed consumption but decreased weight gain.

Ration conversion reflects the efficiency with which the ration used produces good weight gain in chickens. This aligns with Rasyaf's (2011) opinion, who states that ration conversion is the ratio of the amount of ration consumed over a certain period to the body weight achieved during the same period. Furthermore, conversion is also influenced by husbandry management, feed quality, and the physiological condition of livestock. This aligns with Hakim's (2005) opinion that factors influencing ration conversion include livestock genetics, ration type and quality, sanitation, and management.

Income Over Feed Cost (IOFC)

The average income over feed cost (IOFC) of KUB chickens for each treatment during the study is shown in Table 5.

Table 5. Average IOFC for each ration/head during the study

Treatment	Average BW (Kg)	Feed cost (Rp)	Profit (Rp)	IOFC (Rp/head)
A	0.1026	3,524	4,103	578
B	0.1032	3,417	4,126	709
C	0.0971	3,335	3,883	547
D	0.0878	2,954	3,513	559
E	0.0732	2,798	2,928	130

Note: The selling price of KUB chicken is IDR 40,000/Kg

As shown in the table, the average IOFC value of KUB chickens raised for 7 weeks ranged from Rp 130 to Rp 709/head. The highest IOFC value was obtained with treatment B (3.75% BSF maggot flour), which was Rp 709/head, and the lowest value was obtained with treatment E (15% BSF maggot flour), which was Rp 130/head. The high IOFC value in treatment B was due to the lower feed conversion value and higher body weight gain than those in treatments A, C, D, and E. In accordance with Yamin (2008), who stated that the resulting body weight gain can affect the IOFC value, the greater the body weight gain obtained, the higher the IOFC value, and vice versa.

The IOFC value generated in treatment E (15% BSF maggot flour) was Rp130/head, which was lower than that of the other treatments because of the low body weight gain obtained; therefore, the income obtained would also be low. This is supported by Nova et al. (2002), who stated that the IOFC value is calculated by comparing the income obtained with the feed costs incurred.

The IOFC value is obtained by finding the difference between the total income and total ration costs incurred during maintenance (Suprayogi et al., 2017). The income results are obtained from chicken sales during the study, which are calculated by multiplying the body weight gain (kg) by the selling price of chicken/kg. The average body weight gain of the RB treatment (3.75% BSF maggot flour), amounting to 0.1032 kg, multiplied by the chicken price of IDR 40,000/kg, yields IDR 4,103 as income. The price of the FB treatment ration (3.75% BSF maggot flour) of IDR 8,165 multiplied by the average ration consumption of 0.42 kg yields IDR 4,317. Subsequently, the

results of the IOFC calculation are subtracted from the income and ration costs, resulting in an IOFC value of IDR 709/head.

The IOFC values obtained in this study indicate that the higher the level of BSF maggot flour supplementation in the E treatment ration (15% BSF maggot flour), the lower the IOFC value. This is in line with the low ration consumption and body weight gain in the E treatment group. This was supported by Saleh et al. (2006), who stated that the IOFC value is determined by livestock body weight gain, ration consumption, feed price, and chicken selling price. If the resulting body weight gain is high, the selling price of livestock will also be high, which can increase the IOFC value.

CONCLUSION

Based on the research conducted, it can be concluded that the use of BSF maggot meal (*Hermetia illucens*) in KUB chicken rations can reach up to 11.25%. The use of 3.75% BSF maggot meal in the diet can sustain KUB chicken performance.

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REFERENCES

Hakim, L. (2005). Evaluasi pemberian feed additive alami berupa campuran herbal, probiotik, dan prebiotic terhadap performa, karkas dan lemak abdominal serta HDL dan LDL daging broiler. Skripsi. Fakultas Peternakan. Institut Pertanian Bogor. Bogor.

Hidayat, C. (2018). Pemanfaatan Insekta sebagai Bahan pakan dalam Ransum Ayam Pedaging. Jurnal WARTAZOA. Vol. 28 No. 4 Hal. 161-174.

Ikhsan, A. A. (2022). Pengaruh Penggunaan Tepung Maggot BSF (Black Soldier Fly) dalam Ransum terhadap Performa (Konsumsi ransum, Pertambahan bobot badan, Konversi ransum) Ayam KUB pada periode Finisher. Tesis. Fakultas Peternakan Universitas Andalas. Padang.

Irawan, H. (2017). Performa ayam KUB periode finisher (9-12 minggu) pada pemberian ransum dengan kadar protein berbeda. Skripsi. Fakultas Pertanian. Universitas Lampung. Lampung.

Kobayashi, S. Y., Terashima, H. Itoh. (2006). The effects of dietary chitosan on liver lipid concentrations in broiler chickens treated with propylthiouracil, Research Note. J. of Poult. Sci. 43:162-166.

Mathius, I. W., Sinurat, A. P. (2001). Pemanfaatan Bahan Pakan Inkonvensional untuk Ternak. Wartazoa 11 (12) : 20-31.

Nasution, A. W. (2022). Pengaruh pemberian campuran kulit umbi dan daun ubi kayu yang difermentasi dengan rhyzopus oligosporus dalam ransum terhadap performa broiler. Skripsi. Fakultas Peternakan Universitas Andalas. Padang.

NRC. (1994). Nutrient Requirements of Poultry, 9th ed. National Academy Press, Washington, D.C.

Oliver, P. A. (2004). The bio-conversion of putrescent wasted. ESR LLC. Washington. P. 1 – 90.

Pesik, H. C., Umboh, J. F., Rahasia, C. A., Pontoh, Ch. S. (2016). Pengaruh Penggantian Tepung Ikan dengan Tepung Maggot (Hermetia illucens) dalam Ransum Ayam Pedaging Terhadap

 DOI: https://doi.org/10.25077/alive.v3.n1.p7-16.2026

Kecernaan Kalsium dan Fosfor. ZOOTEC, 36 (2), 271. http://doi.org/10.35792/zot.36.2.2016.11499

Rajulani, C., S. Bahri, S. Zainuddin. (2022). Performa ayam kampung unggul balitnak (KUB) yang diberi ampas tahu fermentasi menggunakan microbacter alfaafa-1. Gorontalo Journal of Equatoria Animals. 1(2): 81- 86.

Rasyaf, M. (2011). Panduan Beternak Ayam Pedaging. Cetakan ke-4. Penebar Swadaya, Jakarta.

Romi, A. (2021). Potensi probiotik waretha pada berbagai imbangan protein dan energi ransum terhadap performa ayam ras petelur pada periode dara. Tesis. Fakultas Peternakan. Universitas Andalas. Padang.

Sanchez, M. M. J., Barroso, F. G., Manzano, A. F. (2014). Insect Meal as Renewable Source of Food for Animal Feeding: A Review. Journal of Cleaner Producton 65 : 16-27.

Sartika, T. (2016). Panen Ayam Kampung 70 hari. Penebar Swadaya, Jakarta. Sarwono, B. 2002. Ayam Arab Petelur Unggul. PT. Penebar Swadaya, Jakarta.

Scott, M. L., Nesheim, M. C., Young, R. J. (1976). Nutrition of the Chicken. M. L. Scott & Associates, Ithaca, New York

Steel, R. G. D. & J. H. Torrie. (1995). Prinsip dan Prosedur Statistik Terjemahan : B. Sumantri. PT. Gramedia Pustaka Utama. Jakarta.

Sugiyono, N., Elindratiningrum, Primandini, Y. (2015). Determinasi energi metabolisme dan kandungan nutrisi hasil samping pasar sebagai potensi bahan pakan lokal ternak unggas. Jurnal Agripet. 15 (1) : 41-45.

Urfa, S., Indrijani, H., Tanwiriah, W. (2017). Model Kurva Pertumbuhan Ayam Kampung Unggul Balitnak Umur 0-12 Minggu. Jurnal Ilmu Ternak, 17 (1) 59-66.

Wahyu, J. (2004). Ilmu Nutrisi Unggas. Cetakan ke-5. Gadja Mada University Press. Yogyakarta.

Wicaksono, D. (2015). Perbandingan Fertilitas, Susut Tetas, Daya Tetas, dan Bobot Tetas Ayam Kampung pada Peternakan Kombinasi. 1 (2) : 1-6).

Widjastuti, T., R. Wiradimadja, D. Rusmana. (2014). The Effect Of Substitution Of Fish Meal By Black Soldier Fly (*Hermetia illucens*) Maggot Meal In The Diet On Production Performance Of Quail (*Coturnixcoturnix japonica*). Faculty of Animal Science, Padjadjaran University. Bandung. Vol. LVII.

Yusra. (2021). Pengaruh pemberian tepung daun sirsak (*annona muricata* l.) pada ransum berbentuk pelet terhadap performa broiler. Tesis. Fakultas Peternakan Universitas Andalas. Padang.