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Effect of L-Methionine and L-Lysine HCL supplementation in minimum standard feed requirements on the performance of KUB (Kampung Unggul Balitbangtan) chickens

Pengaruh suplementasi L-Metionin dan L-Lisin HCL pada standar kebutuhan pakan minimum terhadap performa Ayam KUB (Kampung Unggul Balitbangtan)

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Abstract. This study will determine the effect of supplementing L-methionine, and L-lysine HCl to a minimum diet based on KUB (Kampung Unggul Balitbangtan) chickens standards body weight, weight gain, and Feed Conversion Ratio of KUB chicken at the grower phase. A total of 240 Eight weeks-old KUB chickens were used in this study. The KUB chickens were divided into 3 treatments with 4 replications. The dietary treatments were: R0 (ration based on minimum diet standard), R1 (ration based on minimum diet standard + 0.25% L-Methionine+ 0.25% L-Lysine HCl), R2 (ration based on minimum diet standard + 0.5% L- Methionine + 0.5% L-Lysine HCl). The data collected were body weight, weight gain, and feed conversion ratio of KUB chickens aged 8 weeks. The result of this study for R0, R1 and R2 showed that body weight of chickens were 516.25±34.07^{a}; 519.75±31.25^{a}; 502±47.45^{b}g/bird, weights gain were451.58±39.54^{a}; 443.08±35.74^{ab}; 424.83±57.73^{b}g/birds and feed conversion ratio were3.76±0.31^{a}; 3.83±0.29^{a}; 4.05±0.63^{b}respectively. The results showed that supplementation of L-Methionine and L-Lysine HCl using minimum diet standard gave no significant effect (P<0.05) on body weight, weight gain, and Feed Conversion. The result concluded that supplementing 0.25% to 0.5% L-methionine and l-lysine HCl did not increase body weight and weight gain and did not affect the Feed Conversion of KUB chickens. Furthermore, the minimum diet standard for KUB chicken already has a basic diet requirement. We suggested not adding the combination of L-Methionine (0.25% to 0.5%) and L-Lysine HCl (0.25% to 0.5%) in the minimum diet standard KUB chicken..

Keywords: minimum standard diet, L-Methionine, L-Lysine HCl, KUB Chicken, supplementation

Abstrak. *Penelitian ini bertujuan untuk mengetahui pengaruh suplementasi L-metionin dan L-lisin HCl dalam ransum berdasarkan standar minimum KUB (Kampung Unggul Balitbangtan), terhadap bobot badan, pertambahan bobot badan, dan rasio konversi pakan ayam KUB fase grower. Sebanyak 240 ekor ayam KUB umur delapan minggu digunakan dalam penelitian ini. Ayam KUB dibagi menjadi 3 perlakuan dengan 4 ulangan. Perlakuannya adalah: R0 (ransum berdasarkan standar*

minimum), R1 (ransum berdasarkan standar minimum + 0,25% L - Metionin + 0,25% L - Lisin HCl), R2 (ransum berdasarkan standar minimum + 0,5% L- Metionin + 0,5% L-Lisin HCl). Data yang dikumpulkan adalah bobot badan, pertambahan bobot badan dan rasio konversi pakan ayam KUB umur 8 minggu. Hasil penelitian untuk R0, R1 dan R2 menunjukkan bahwa: bobot badan ayam adalah 516,25±34,07^{a}; 519.75±31.25^{a}; 502±47,45^{b} g/ekor, pertambahan bobot badan 451,58±39,54^{a}; 443.08±35.74^{ab}; 424,83±57,73^{b} g/ekor dan Rasio Konversi Pakan adalah 3,76±0,31^{a}; 3.83±0.29^{a}; 4,05±0,63^{b}. Hasil penelitian menunjukkan bahwa suplementasi L-Metionin dan L-Lisin HCl menggunakan ransum standar minimum tidak memberikan pengaruh yang nyata (P<0,05) terhadap bobot badan, pertambahan bobot badan, dan Konversi Pakan. Hasil penelitian menyimpulkan bahwa suplementasi L-metionin dan l-lisin HCl 0,25% sampai 0,5% tidak meningkatkan bobot badan, pertambahan bobot badan serta tidak mempengaruhi Konversi Pakan ayam KUB. Selanjutnya, ransum standar minimal ayam KUB sudah memiliki persyaratan kebutuhan dasar. Disarankan untuk tidak menambahkan kombinasi L-Methionine (0,25% sampai 0,5%) dan L-Lysine HCl (0,25% sampai 0,5%) pada ransum standar minimum ayam KUB.

Kata kunci: *pakan* standart minimun, L-Methionine, L-Lysine HCl, ayam KUB, suplementasi

INTRODUCTION

Chicken has a significant role in meeting the protein needs of animal origin for the community; This is because chickens have both male and female broiler types that are kept intensively and can produce meat optimally. The advantages of chicken include having an affordable price, fast harvesting age, soft meat, smooth and soft skin, high feed efficiency, and relatively fast weight gain. In addition to having advantages, chickens also have several disadvantages, such as being easily stressed, more susceptible to disease infections, maintenance must be careful, challenging to adapt to the environment, and feed given both quality and volume must be better. Therefore, the Research and Development Agency of the Ministry of Agriculture carries out a breeding program by selecting chickens to produce superior chickens.

KUB chickens are superior free-range chickens in agricultural R&D from the selection of Indonesian free-range chickens. KUB chickens have advantages in producing more eggs, more consistent growth, and more efficient feed use compared to native chickens. Genetic and environmental factors influence the growth and development of chickens. Environmental factors include temperature, cage maintenance management, disease prevention, and feed. One of the most important environmental factors is feeding. Feed is food given to livestock that can be absorbed by the animal's body and does not interfere with the health of livestock. Feed is an essential part of the growth of chickens because chickens require sufficient nutrients for the growth and development of livestock as well as livestock production and reproduction. The feed given to livestock must be of quality, quantity, and continuity.

One of the crucial nutrients is energy and protein with a balance of amino acids because protein is composed of several essential amino acids and non-essential amino acids, which are used for the growth and formation of animal body tissues. In contrast, energy sources are used for production and animal body activities. Essential amino acids are amino acids that are important for the body of livestock and are critical but cannot be produced entirely in the body, so they must be added to the feed. Commonly added essential amino acids in the chicken feed are methionine and lysine because these amino acids are the 2 primary limiting amino acids in feed. One of the critical nutrients is energy and protein with a balance of amino acids because protein is composed of several essential amino acids and non-essential amino acids, which are used for the growth and formation of animal body tissues.

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Methionine is an amino acid that is usually used in the process of protein biosynthesis. Methionine is an essential amino acid with metabolites in fundamental biological processes such as protein deposition and immune responses(Eklund, Mosenthin, Tafaj, & Wamatu, 2006). In addition, methionine functions as a methyl group donor (CH_3) and produces S-adenosyl methionine (Ratriyanto, Mosenthin, Bauer, & Eklund, 2009). Methionine administration needs to pay attention to feed ingredients' protein level, physical form, and palatability. In addition, because methionine is known as an amino acid that is toxic if excessive, its administration must be considered carefully. Methionine also reduces oxidative stress in the body by increasing antioxidant compounds such as glutathione. In tropical areas such as Indonesia, chickens generally experience heat stress because the daily temperature is more than 240C. One way to reduce stress is to increase methionine in the feed. Another advantage of methionine is strengthening the body's condition, improving growth, and increasing body weight.

L-lysine HCl is a precursor for carnitine biosynthesis, while carnitine stimulates the -oxidation process of long-chain fatty acids in the mitochondria. The increase in the formation of carnitine due to the addition of L-lysine HCl in the feed causes the amount of oxidized body fat. Thus the fat and cholesterol content of the meat becomes low (Susandari, 2004). In preparing the ratio, adding L-lysine HCl needs to be considered carefully because L-lysine HCl as the primary limiting amino acid was followed by methionine as the second limiter. L-lysine HCl is said to be the primary limiter because of its availability in animal feed in small or small amounts. L-lysine HCl has a very vital role in metabolism because L-lysine HCl can be used to synthesize proteins and other essential components used for metabolism. L-lysine HCl can help the absorption of calcium (Ca) which is needed in forming bones or a framework to increase growth(Si, Fritte, Burnham, & Waldroup, 2001). The availability of L-lysine HCl in chicken rations must be sufficient and balanced.

Supplementation of L-Methionine and L-lysine HCl can increase the growth rate of chickens. With an increasing growth rate, the resulting product also increases. So to find out the resulting product can be done by measuring body weight, first body material, and feed conversion ratio.

This study aimed to determine the effect of L methionine and L-lysine HCl supplementation in feed on the performance of KUB chickens.

MATERIALS AND METHODS

Time and place

This research was carried out in the cage of the Karya Tani 1 Farmer Group, Tegalongok Village, Koronocong District, Pandeglang, Banten. This research took place for 8 weeks, from January 31, 2018, to March 15, 2018.

Research Material

The chickens used were 240 Kampung Unggul Balitbangtan (KUB) chickens without male and female separation. The KUB chickens are maintained intensively with a litter system. The type of feed used in this research is AS100 commercial feed produced by PT. Sierad Produce, rice bran, vitamin premix, and L-Methionine and L-lysine HCl according to the treatment used. Drinking water is provided ad libitum in the cage. The nutrient composition of AS100 feed is shown in Table 1.

Table 1. Nutrient composition of feed AS100

Ingredients	Value
Water (%)	12
PK (%)	23
ME (Kcal/kg)	3050
Ca (%)	0.8
P av (%)	0.6
Methionine (%)	0.5
Lysine (%)	1.3
Tryptophan (%)	0.2

Source: PT. Sierad Produce Indonesia tbk.

The raw materials used are corn, bran, pollard, corn gluten meal (CGM), distillers dried grains with solubles (DDGS), soybean meal, corn flour, bone, and crude palm oil (CPO), canola, vitamins, and minerals.

The cage used in this study was a single-liter cage measuring 1 x 1 m with a total of 12 units. Each cage unit is provided with a pad of rice husk and lime as litter with a thickness of 5-7 cm. KUB chickens reared for 14 days in communal cages were weighed and then divided into 12 cage units, each containing 20 KUB chickens according to treatment.

The experimental design used in this study was a Randomized Block Design (RBD) consisting of 3 treatments and 4 replications; The treatments were R0 (KUB chicken feed according to the minimum standard requirement or control feed that was not given additional L-Methionine and L-Lysine), R1 (control feed fed with additional L-Methionine 0.25% and L-lysine HCl 0.25 %), R2 (control feed fed with additional L-Methionine 0.50% and L-lysine HCl 0.50%). The composition of the treatment feed is presented in Table 2.

Table 2. Composition and nutrient content of the feed

Feed Ingredients	Treatment		
	R0	R1	R2
US Sierad 100 (%)	60	60	60
Fine bran 2 (village)	39	39	39
premix	1	1	1

L-Methionine		0.25	0.5
L-Lysine		0.25	0.5
Amount	100	100	100
Nutrient Content			
PK (%)	17.12	17.12	17.12
ME (kcal/kg)	2955.93	2955.93	2955.93
Ca (%)	0.56	0.56	0.56
P av (%)	0.79	0.79	0.79
Methionine (%)	0.42	0.67	0.92
Lysine (%)	1.01	1.26	1.51
Tryptophan (%)	0.20	0.20	0.20
Price (Rp)/kg	5820	6320	6820

Research variable

The research variables observed in this study included: weight gain (g/bird), body weight gain during maintenance (g), Feed Intake, and Feed conversion ratio (FCR).

Data analysis

The data were analyzed using analysis of variance and if the results showed a significant difference (P>0.05) followed by Duncan's New Multiple Range Test (Duncan New Multiple Range Test).

RESULTS AND DISCUSSION

Effect of treatment on live weight gain in body weight of KUB chickens

The average body weight of KUB chickens reared for 8 weeks with L-methionine and L-lysine HCL supplementation in the feed is shown in Table 3. The highest average body weight in the R1 treatment was 519.75+31.25^{a} g/bird, followed by the R0 treatment of 516.25+34.07^{a} g/bird and R3 of 502+47.45^{b} g/bird. Duncan's test showed that treatment R2 was significantly different from treatment R1 and R0, while treatment R1 was not different from R0. So the Duncan test results show that the treatment R1 gives the best results, followed by R0, and the lowest is R2. Table 3 shows that supplementation of 0.25% (L-methionine and L-Lysine HCL) in the feed (R1) increased body weight by 0.58% compared to the diet without the addition of L-methionine and L-Lysine HCL (R0). However, in R2 feed, 0.5% supplementation (L-Methionine and L-Lysine HCL) did not increase the body weight of KUB chickens. So that the supplementation of L-Methionine and L-Lysine HCL in KUB chickens was more effective at the level of 0.25%; this indicated that adding 0.25% L-methionine and L-lysine HCL was able to increase the live weight of KUB chickens.

Table 3. Average live weight of KUB chickens aged 8 weeks (g/bird)

Replication	Treatment		
	R0	R1	R2
1	505.00+29	498.00+11	480.50+17
2	510.00 +41	526.00+21	463.00+35
3	532.00+35	529.00+41	508.50+42
4	518.00+23	526.00+32	556.00+27
mean	516.25+34.07^{a}	519.75+31.25^{a}	502+47.45^{b}

^{ab}Different superscripts on the same row showed significant differences (P<0.05)

Table 4. Average body weight gain of KUB chickens aged 8 weeks (g/bird)

Replication	Treatment		
	R0	R1	R2
1	474.32+29.29	467.32+11.05	449.82+17.61
2	442.00+48.51	426.00+32.51	363.00+50.69
3	456.00+42.35	437.00+47.36	428.50+42.46
4	434.00+22.57	442.00+30.37	458.00+38.33
mean	451.58+39.54[a]	443.08+35.74[ab]	424.83+57.73[b]

[ab]Different superscripts on the same row showed significant differences (P<0.05)

The highest average weight gain of KUB chickens was found in the R0 treatment, namely 451.58+39.54[a] g/bird and followed by treatment R1 (443.08+35.74[ab]g/bird and the lowest was in treatment R2 (424.83+57.73[b]g/bird). Duncan's test results showed that L-methionine and L-lysine supplementation were not significantly different overall. However, it was significantly different in R2 feed, supplementing 0.5% L-methionine and 0.5% L-lysine HCL. Table 3 shows that L-methionine and L-lysine HCL supplementation had a negative effect: a decrease in body weight gain; this illustrates that 0.25% to 0.5% L-methionine and L-lysine HCL supplementation is not suitable for KUB chicken body weight gain.

Feed Consumption

The average daily feed consumption of KUB chickens reared for 8 weeks with L-Methionine and L-lysine HCL supplementation in the feed is shown in Table 5. The average feed consumption of KUB chickens is evenly distributed throughout the treatments because this study used a standard minimum feed requirement so that no feed given left

Table 5. Average Feed Intake of KUB Chicken (g/bird)

Replication	Treatment		
	R0	R1	R2
1	1820	1820	1820
2	1645	1645	1645
3	1645	1645	1645
4	1645	1645	1645
mean	1688.75+87.5	1688.75+87.5	1688.75+87.5

[ab]Different superscripts on the same row showed significant differences (P<0.05)

Feed Conversion Ratio

Feed conversion or Feed Conversion Ratio (FCR) is the ratio between feed consumption and weight gain or expressed as feed efficiency, namely the ratio of body weight per unit of feed consumption. The lowest value in feed conversion indicates better feed efficiency. The average conversion of chicken feed is shown in Table 6.

Table 6. The average feed conversion ratio of KUB chickens reared for 8 weeks

Replication	Treatment		
	R0	R1	R2
1	3.85+0.22	3.90+0.09	4.05+0.16
2	3.77+0.43	3.88+0.30	4.64+0.87
3	3.64+0.34	3.81+0.43	3.88+0.40

4	3.80+0.19	3.74+0.24	3.62+0.32
mean	3.76+0.31[a]	3.83+0.29[a]	4.05+0.63[b]

[ab]Different superscripts on the same row showed significant differences (P<0.05)

The lowest KUB chicken feed conversion average in the R0 treatment is 3.76+0.31[a], followed by R1 and R2 treatments of 3.83+0.29[a] and 4.05+0.63[b]. Duncan's analysis showed that treatment had no significant effect on treatment R1 and significantly affected treatment R2 (P<0.05). The higher the level of L-methionine and L -Lysine HCL in the feed, the more feed conversion increases or decreases the feed efficiency of KUB chickens; this shows the increasing supplementation of L-methionine and L-Lysine HCL, the more inefficient in producing body weight. Duncan's test showed that the best feed conversion in treatment R0 was compared to R1 and R2; this shows that the feed without L-methionine and L-Lysine HCL supplementation resulted in the best conversion.

The efficiency of the use of feed can be seen from the conversion value of the feed given. The minor feed conversion is an indicator of the higher feed efficiency. On the other hand, higher feed conversion is an indicator of lower feed efficiency (Lisnahan, Zuprizal, & Sri Harimurti, 2018).

In general, feed conversion is influenced by genetics, the type of feed used, the feed additive used in the feed, rearing management, and environmental temperature(Fouad & El-Senousey, 2014) (Kocaman, Esenbuga, Yildiz, Laçin, & Macit, 2006) (Wecke & Liebert, 2013). Generally, chicken feed based on corn and soybean meal is always deficient in essential amino acids such as methionine and lysine. When added to the feed, these amino acids can improve feed quality. (Samadi, 2012). If the quality of feed increases, it increases body weight (Lisnahan et al., 2018). However, KUB chicken feed supplemented at the level of 0.25-0.5% did not provide good feed conversion, so it was necessary to reduce the level of supplementation below 0.25%. The results of this study differ from the research on broiler chickens stated by(Son, Lisnahan, & Nahak, 2020) that the level of methionine in the feed of 0.7% had a very significant effect on increasing body weight gain and reducing feed conversion, This indicates that 0.25-0.5% supplementation in this study could not be tolerated or recommended for application in KUB chicken feed as seen from the feed conversion value.

Table 7. Growth performance of KUB chicken

Variable	Ages (weeks)	Treatment		
		R0	R1	R2
Weight Gain (g/bird)	8	451.58+39.54[a]	443.08+35.74[ab]	424.83+57.73[b]
Daily Weight Gain (g/bird/day)	8	12.90+0.51	12.66+0.50	12.14+1.23
Feed Intake	8	1688.75+87.50	1688.75+87.50	1688.75+87.50
Feed Conversion Ratio	8	3.76+0.31[a]	3.83+0.29[a]	4.05+0.63[b]

[ab]Different superscripts on the same row showed significant differences (P<0.05)

The balance of nutrients influences chicken growth in the feed, so supplementation of L-methionine and L-lysine HCL is needed to stimulate chicken growth and development. (Lisnahan et al., 2018)Moreover, it plays a role in the growth of chicken body tissue (Samadi, 2012). Supplementation of L-methionine and L-lysine HCL (0.25%) and (0.5%) gave different responses to body weight, weight gain, feed intake, and FCR of KUB chickens. Supplementation of L-methionine and L-lysine HCl in the feed increased the body weight of KUB chickens significantly, namely 0.58%, compared to feed without L-methionine and L-lysine HCL supplementation (R0). When increased L-methionine and L-lysine HCL at the level of 0.50% (R2), the body weight of KUB chickens decreased by 2.68%. In the R2 treatment, there was a decrease in body weight

caused by an excess of L-methionine and L-lysine HCL, so it had to be followed by adding other essential amino acids to make it more balanced.

Supplementation of L-methionine and L-Lysine HCL at the level of 0.25% (R1) was categorized as excessive to increase the live weight of KUB chickens. Even if given more likely, it would not increase live weight and was toxic (R2). L-methionine and L-lysine HCL are known as amino acids that are toxic when given in excess. Excess administration will harm weight gain (Amleni, Lisnahan, & Bira, 2020).

The results obtained from this study are also supported by (Lee, Song, Loh, & Abdul Rahim, 2020), who concluded that the supplementation of lysine 0.12% and methionine 0.43% had a significant effect on improving chicken feed conversion. Continued by (Lisnahan et al., 2018) that the supplementation of 0.19% dl-methionine and 0.42% l-lysine HCl in standard cafeteria feed with a protein content of 13.20% increased the body weight performance of native chickens. In contrast to the results of this study which showed a negative effect on KUB chickens supplemented with L-methionine and L-Lysine HCL of 0.5%. This is caused by excess administration of amino acids, which results in weight loss(Carew, Evarts, & Alster, 1998). (Baker, 2006) stated that the amino acid L-methionine would be toxic if given twice as much as needed because sulfur amino acids (SAA) are well established as being among the most toxic of all amino acids. In addition, research (Balnave & Barke, 2002) states that excess of the amino acid L-lysine HCL can cause antagonism, so it is necessary to increase the amino acid arginine. This excess of L-lysine amino acid causes no benefit for weight gain in KUB chickens. (Wecke & Liebert, 2013) states that chicken body weight is influenced by the availability and balance of amino acids in their feed. Other factors that influence chickens' growth and maximum weight include the balance of nutrients in the feed and the limitations of nutrient supplementation in the feed(Ravindran, 2013). Furthermore(Ravindran, 2013) stated that the problem faced in adding protein to feed the presence of essential amino acids is unbalanced. Next (Ravindran, 2013) states that weight loss can occur, among others, due to the limited supply of nutrients and energy to support tissue growth, decreased thyroxine hormone, and decreased enzyme activity associated with protein digestion. Adding amino acids to chicken feed aims to meet the needs of livestock. For this reason, it is necessary to pay attention to the amount or number of amino acids used because adding them in large quantities will affect the growth process of livestock. The addition of amino acids must pay attention to other amino acids because if added in excessive amounts, it will cause growth disorders (Balnave & Barke, 2002),(Carew et al., 1998),(Ravindran, 2013).The increased body weight of chickens supplemented with lysine in the feed was caused by the balance of the amino acids methionine and lysine with other amino acids contained in the feed (Lisnahan et al., 2018). Methionine and lysine supplementation in feed can accelerate the growth and formation of meat in chicken breasts. In addition, supplementation of the amino acids methionine and lysine increases body weight and accelerates maximum growth. The need for methionine and lysine expressed as a percentage in the feed is determined not only by the type of chicken or its growth phase but also by body weight gain, feed conversion, protein, fat deposition, and environment.(Son et al., 2020)(Ravindran, 2013)(Balnave & Barke, 2002). Supplementation of L-methionine and l-lysine HCL R0 (0.0%), R1 (0.25%), and (R2 0.50%) gave different responses to body weight, body weight gain, and feed conversion of KUB chickens. Supplementation of L-methionine and l-lysine 0.25% (R1) can increase the body weight of KUB chickens. However, it reduces body weight gain and feeds conversion. If it is increased to the level of 0.50 (R2), there is a negative effect on body weight; body weight gain decreases by 5.92% compared to R0, and feed conversion inefficiency. Supplementation of L-methionine and L-lysine with high levels in the feed did not affect increasing body weight and feed conversion. Thus the best level at 0.25%. The high amino acids methionine and lysine in the feed can stimulate the hypothalamus, increasing the amino acids methionine and lysine in the blood. (Fagundes et al., 2020)(Wecke & Liebert, 2013)(Kocaman et al., 2006). If methionine and lysine in the blood are too high, it can reduce appetite and cause a feeling of fullness and cause a decrease in feed consumption in chickens. (Namroud, Shivazad, & Zaghari, 2008)(Alagawany et al., 2020). With the increasing age and weight of chickens during the growth period, feed consumption will continue to increase due to increased nutrient requirements for basic life and

growth (Carew et al., 1998). Energy protein balance is very influential on the amount of feed consumption. (Samadi, 2012)stated that the size and breed of chickens, environmental temperature, production stage, and energy contained in the feed can affect feed consumption. Feeds with low metabolic energy sources can encourage chickens to consume additional feed to meet their energy needs.(Baker, 2006)states that the consumption of the right protein will affect the fulfillment of the need for the metabolism of cells in the body to take place normally. The factors that can affect the level of feed consumption include body weight, strain, production level, stress level, livestock activity, the energy content in the feed, and environmental temperature (Fouad & El-Senousey, 2014), (Ravindran, 2013), (Alagawany et al., 2020). It was further emphasized that several factors influence feed consumption. In general, consumption increases with increasing age and body weight because large chickens can accommodate more food. Supplementation of L-methionine, l-lysine 0.25%, and 0.50% gave different responses to the efficiency of KUB chicken feed. L-methionine supplementation and l-lysine at the level of 0.25% (R1) in the feed reduced the feed efficiency of KUB chickens significantly, namely 1.86%, compared to feed without L-methionine and l-lysine HCl (R0) supplementation. When L-methionine and l-lysine HCl increased at the level of 0.50% (R2), KUB chicken feed efficiency decreased by 5.74% compared to R1. Feed efficiency determines the best feed quality for each treatment during the study. The average feed efficiency decreased with increasing levels of L-methionine and l-lysine. (Amleni et al., 2020) reported that the use of lysine could reduce the conversion of chicken feed or increase the efficiency of feed use. The average feed efficiency increased with increasing protein and lysine values in the feed. In principle, methionine and lysine supplementation provide complete nutrients that can accelerate chicken growth because essential amino acids such as methionine and lysine play a role in growth chicken body tissue.

CONCLUSION

Based on the results and discussion, it can be concluded that the supplementation of L-methionine and L-lysine HCl of 0.25% (R1) in KUB chicken feed is more optimal for increasing body weight. However, supplementation of L-methionine and L-lysine at 0.25-0.5% levels decreased body weight gain and increased feed conversion or decreased feed efficiency. So it was concluded that the minimum basal diet could not improve the performance of KUB chickens even though they were given the addition of 0.5% amino acids methionine and lysine.

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