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GROWTH AND CARCASS RESPONSES OF THREE LINES OF LOCAL CHICKENS AND ITS CROSSING TO DIETARY LYSINE AND METHIONINE [1]

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Abstract

Testing upon lines of local chickens has been continuing to gather more information in order to built commercial lines for either meat or egg producers. There were 120 day old chicks (doc) of PelungxPelung, KeduxKedu, KampungxKampung, PelungxKampung and 80 doc KeduxKampung raised intensively in wire cage. Four experimental rations, formulated to contain 2900 kkal ME/kg with 150 g protein/kg, were differentiated to contain: 1) 8.5 g lysine with 3. 2 g methio[1]nine/kg; 2) 12.8 g lysine/kg with 3.2 g methionine/kg, 3) 12.8 g lysine/kg with 4.8 g lysine/kg and 4) 17 g lysine/kg with 4.8 g methionine/kg. Each cell of treatment contained three times of 10 unsexed-doc. At the age of 12 weeks two birds per cage were killed for carcass evaluation. Results at the age of 12 weeks showed that there was no significant effect of dietary amino acids on growth of birds, showing figures about 870-966 g/bird. Total consumption (2900-3400 g/bird) and FCR (3.2 – 3.5) were not statistically different between lines or between experimental rations. Empty bodyweight (525 – 691 g/kg bodyweight, BW), chest girth (26 cm/bird) and length of breast-bone (8-9 cm/bird) were not significantly affected by lines nor by dietary amino acids. Breast meat (around 115-134 g/kg BW) for PelungxPelung and KeduxKampung tended to decrease with the increase in amino acids content, but other lines tended to increase or unchanged with the increase in dietary amino acids. Leg meat (around 155-188 g/kg BW) of KeduxKedu line decrease with increase in dietary amino acids, whilst for other lines revealed slightly increase. In general, there were no convincing parameters' responses to increased dietary lysine and methionine to manipulate meat growth of native chickens.

Key words: Lines of local chickens, Dietary lysine and methionine, Breast and thigh meat.

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Introduction

In line with the institutional efforts of making improvement of local chicken, series of research on the improvement of Pelung x Kampung chickens have been reported (Gunawan and Sartika, 1999; Iskandar *et al*, 1998a, 1998b, and 1999). In addition, there are so many indigenous breeds, which are claimed to have superiority compared to Kampung chicken, and then the exploration was extended to include another one local breed, which was Kedu chicken. Kedu chicken has been known as local chicken with relatively high in egg production (Hardjosubroto and Atmodjo (1977).

The experiment was to observe growth respon of three local breeds with their crosses to diets with increase in level of lysine by 1,5 fold and 2 fold combined with methionine at level of 1 fold and 1.5 fold of NRC lysine and methionine requirements (NRC, 1984) for growing broiler chicken.

Materials and Methods

There were 120 day old chicks of each breed Pelung, Kedu, Kampung, with their crosses (PelungxKampung and KeduxKampung) allocated to 4 experimental diets, 3 replications with 10 unsexed chicks per replicate. Experimental diets contained 2900 kcal ME/kg and 15 % protein, with other ingredients formulated to reach level of NRC requirements for growing broiler chicken (NRC, 1984) except lysine and methionine.

Experimental basal diet was formulated to consist of yellow corn (508 g/kg), cassava flour (126 g/kg), rice bran (30 g/kg), coconut meal (80 g/kg), soybean meal (155 g/kg), fish-meal (40 g/kg), vegetable oil (30 g/kg), salt (2.5 g/kg) and vitamins-minerals premix [1] (2.4 g/kg). L-lysine and Dl-methionine were added to diet 1 to contain 8.5 (L1) and 3.2 (M1) g/kg, to diet 2 to contain 12.8 (L1.5) and 3.2 (M1) g/kg, to diet 3 to contain 12.8 (L1.5) and 4.8 (M1.5) g/kg and to diet 4 to contain 17.0 (L2) and 4.8 (M1.5) g/kg, respectively.

The chicks were caged in wire cage placed in concrete building ventilated with exhaust fans and heating lamps. Feed and water were given *ad libitum*.. Bodyweight, feed consumption were measured weekly. At the age 12 weeks, two birds were sacrificed for carcass analysis, following the measurement of girth and length of breastbone. The data were then analysed statistically with analysis of variance (Steel and Torrie 1993).

Results and Discussion

Bodyweight (BW) gain, consumption and feed conversion ratio of birds responded to dietary treatments were presented in Table 1. According to statistical analyses, there was no significant (P>0.05) interaction effect of breed time dietary treatments, nor the breeds and diets to the parameters measured. However, there pure Pelung gained slightly higher (995 g/bird/12 weeks), followed by Kedu x Kampung cross (966 g/bird/12 weeks), whilst pure Kedu reached gain of 879 g/bird/12 weeks) followed by Pelung x Kampung and pure Kampung. The bodyweight gain response was actually expected to have above pattern, although it was not statistically different among them. The bodyweight gain of Kedu x Kampung was also indicated some times ago by Hardjosubroto and Atmodjo (1977) to be higher than pure Kampung or pure Kedu and this seems to be heterosis effect of two local breeds of chicken. Therefore, there is an advantage of crossing Kedu as a male to Kampung as a female for having increase in meat production. Mature size of pure Pelung chicken however could reach more than 2.5 kg/bird for the female and more than 4 kg/bird for the male. The drawback is the lower prolificacy of Kampung and Pelung chickens as reported by Creswell and Gunawan (1982) and Sartika *et al* (1999).

Table 1. Mean values of body weight gain, feed consumption and conversion ratio of three local chickens and its crosses given diets different in lysine and methionine content up to 12 weeks of age

Factors	Bodyweight (BW) gain (g/bird/12 weeks)	Feed consumption (g/bird/12 weeks)	Feed conversion ratio (g feed/ g BW gain)
Breeds (B)			
PelungxPelung	995	3183	3.22
KeduxKedu	879	2965	3.41
KampungxKampung	870	2848	3.31
PelungxKampung	872	2998	3.46
KeduxKampung	966	3420	3.53
Diets (D)			
Diet 1 (L1,M1)	943	3129	3.34
Diet 2 (L1.5,M1)	939	3285	3.51
Diet 3 (L1.5,M1.5)	909	2977	3.29
Diet 4 (L2,M1.5)	876	2956	3.39
Interaction			
BxD	ns	ns	ns

L=Dietary Lysine, M=Dietary methionine, ns=not significant (P>0.05)

The pure Kampung chicken consumed feed at least 2848 g/bird/12 weeks or about 3.31 kg feed required to increase 1 kg of bodyweight gain, whilst the cross Kedu x Kampung consumed at the most of 3420 g feed/bird/12 week or about 3.53 kg feed required to gain 1 kg bodyweight. This economic indicator is still in the

range of the ones reported by Iskandar *et al* (1999) and Sartika *et al.* (1999) in crossed Pelung x Kampung in the same period of observation.

Although there was no significant difference in the response of weight gain to dietary lysine, the trend was declining as the increase in lysine and methionine content. This indication was also reported by Iskandar *et al.* (1997), Lecrercq (1998) and Venita (2002). It is no point to increase dietary lysine and nor dietary methionine for these native chickens for the increase in growth rate.

Empty bodyweight, chest girth and the length of chest bone (Table 2), which was assumed to be responding parameters to diets and breeds factors, were in fact did not show significant differences in response to dietary lysine and/or methionine, neither to breeds nor its interaction. Empty bodyweight was slightly highest in KeduxKedu (674 g/kgBW) and the lowest was PelungxKampung (611 g/kg BW). Chest girth was highest in KeduxKampung (27 cm) and the lowest was PelungxKampung (25.2 cm). Chest bone length was highest in PelungxPelung (8.96 cm) and the lowest was in KeduxKampung (8.54 cm). These three later parameters were much more following the response of growth rate to breeds and dietary lysine and methionine.

Table 2. Mean values of empty body weight, chest girth, length of chest bone of three local chickens and its crosses given diets different in lysine and methionine content up to 12 weeks of age

Factors	Empty body weight		Chest girth (cm)	Chest bone (cm)
	(g/ bird)	(g/kg BW)		
Breeds (B)				
PelungxPelung	636	638	25.7	8.96
KeduxKedu	620	674	25.6	8.81
KampungxKampung	602	659	25.8	8.92
PelungxKampung	525	611	25.2	8.70
KeduxKampung	691	659	27.0	8.54
Diets (D)				
Diet 1 (L1,M1)	596	591	24.1	8.72
Diet 2 (L1.5,M1)	644	656	25.4	9.10
Diet 3 (L1.5,M1.5)	630	652	26.5	9.24
Diet 4 (L2,M1.5)	589	648	25.5	9.06
Interaction				
BxD	ns	ns	Ns	ns

L=Dietary Lysine, M=Dietary methionine, ns=no

Breast meat and leg meat (thigh and drumstick) showed significant responses to the interaction between breeds and diets (Table 3) with the range of 115 - 138 g/kg BW and 155 – 188 g/kg BW for breast and leg meat respectively. The range values,

however, did not show a great difference, which might have been due to close relative between the breeds as it was also shown in their growth rate.

Maximum breast meat weight of Pelungxpelung (134 g/kg BW) was shown in diet 1, whilst KeduxKedu (127 g/kg BW), KampungxKampung (134 g/kg BW) and PelungxKampung (138 g/kg BW) were shown in diet 3. The KeduxKampung,s maximum breast meat weight (134 g/kg BW) was shown in diet 2 . There was slight indication of the decrease in breast meat weight in PelungxPelung and KeduxKampung chickens as the the lysine content increased, but not in other breeds, which showed a slight increase in breast weight as dietary lysine and methionine increased. Lecrercq (1998) reported in improved broiler chicken the increase in breast weight at 40 days of age from 141 g/kg LW to 171 g/kg LW as the dietary lysine increased up to 2 folds of NRC's recommended lysine requirement. There seemed that the increased in breast weight was due to increase in sensitivity of the response to dietary nutrients following the intensity of selection for growth rate. Fenita (2002) reported the maximum growth of improved broiler chicken was reached on diet containing 2 folds of lysine and 1.5 folds of methionine over NRC (1994) recommended requirements.

Table 3. Mean values of breast meat and leg meat of three local chickens and its crosses given diets different in lysine and methionine content up to 12 weeks of age

	Breeds	Experimental diets			
		Diet 1 (L1M1)	Diet 2 (L1.5M1)	Diet 3 (L1.5M1.5)	Diet 4 (L2M1.5)
Breast meat (g/kg BW)	PelungXPelung	134 [b1)]	115 [a]	125 [a]	129 [ab]
	KeduxKedu	119 [a]	126 [ab]	127 [ab]	124 [a]
	KampungxKampung	124 [a]	127 [ab]	134 [b]	129 [ab]
	PelungxKampung	120 [a]	117 [a]	138 [b]	125 [a]
	KeduxKampung	123 [a]	134 [b]	132 [ab]	122 [a]
Leg meat (g/kg BW)	PelungXPelung	179 [ab]	166 [a]	164 [a]	188 [b]
	KeduxKedu	180 [ab]	168 [a]	171 [a]	166 [a]
	KampungxKampung	158 [a]	159 [a]	162 [a]	163 [a]
	PelungxKampung	155 [a]	160 [a]	181 [ab]	166 [a]
	KeduxKampung	156 [a]	160 [a]	166 [a]	160 [a]

[1)] Values with different superscripts are significantly different ($P<0.05$)

Unlike breast meat, leg meat was just new parameter observed whether it would be influenced by the dietary lysine and methionine, since it was reported to be effected on breast meat of improved broiler chickens. Although there was significant breed x diet interaction effect, the pattern was not similar to the response pattern of breast meat. Highest leg meat weight (188 g/kg BW) of pure Pelung and pure Kampung was shown on diet 4, whilst pure Kedu (180 g/kg BW) was on diet 1 and its crossing, PelungxKampung (181 g/kg BW) and KeduxKampung (166 g/kg BW)

were on diet 3. There was no firm confirmation why the response scattered among breeds and diets.

Conclusion

The above exercise, which was aimed to gather some information on how we can manipulate the local chicken meat by utilizing the readily available feed ingredients (lysine and methionine). The response however, was not convincing, which might have been due to the lower level of genetic improvement of the local chickens compared to modern improved chickens selected for high growth rate on common corn-soybean diet. However, this exercise showed that the used of low protein diet supplemented with lysine and/or methionine leaved no harm to local chickens up to 12 weeks of age.

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