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PERFORMANCE OF PADJADJARAN QUAILS GROWER PERIOD FEED WITH DIFFERENT ENERGY AND PROTEIN LEVELS

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Abstract
This study aimed to determine the recommended energy and protein level of the Padjadjaran quail's broiler feed for a 3-6 weeks growth period on its production performance. The treatments applied were nine ratios with different energy and protein levels, consisting of P1=(ME 2800 kcal/kg, protein 20 %); P2=(ME 2800 kcal/kg, protein 22 %); P3=(ME 2800 kcal/kg, 24 % protein), P4=(ME 2900 kcal/kg, 20 % protein); P5=(ME 2900 kcal/kg, 22 % protein); P6=(ME 2900 kcal/kg, 24 % protein); P7=(ME 3000 kcal/kg, 20 % protein); P8=(ME 3000 kcal/kg, 22 % protein); P9=(ME 3000 kcal/kg, 24% protein). Each treatment was replicated three times, and each replicate consisted of four quails. The results of the data were processed using analysis of variance. The observed variables included ratio consumption, weight gain, FCR, carcass weight, and abdominal fat. The results showed that the protein energy level of the ratios was not significantly different (P>0.05) on ratio consumption, body weight gain, FCR, carcass weight, and abdominal fat. Differences in diet protein and energy levels did not significantly affect the performance of the Padjadjaran quail's broiler during the growth period. The recommended diet for the growth period is a feed containing EM 2900 kcal/kg and 20% protein, as it resulted in the highest body weight gain and carcass weight and more efficient feed intake.
Keywords : Padjadjaran Quail, Performance, Energy, Protein

PERFORMA PUYUH PADJADJARAN PEDAGING PERIODE PERTUMBUHAN YANG DIBERI RANSUM DENGAN TINGKAT ENERGI DAN PROTEIN BERBEDA

Abstrak
Penelitian ini bertujuan untuk mengetahui rekomendasi energi dan protein ransum puyuh Padjadjaran pedaging periode pertumbuhan umur 3 – 6 minggu terhadap performa produksi. Perlakuan berupa 9 ransum dengan tingkat energi protein berbeda, terdiri atas P1=EM 2800 kkal/kg, PK 20 %; P2=EM 2800 kkal/kg, PK 22 %; P3=EM 2800 kkal/kg, PK 24 %, P4=EM 2900 kkal/kg, PK 20 %; P5=EM 2900 kkal/kg, PK 22 %; P6=EM 2900 kkal/kg, PK 24 %; P7=EM 3000 kkal/kg, PK 20 %; P8=EM 3000 kkal/kg, PK 22 %; P9=EM 3000 kkal/kg, PK 24%. Perlakuan berjumlah sembilan dan diulang sebanyak tiga kali, setiap ulangan terdapat empat ekor puyuh. Hasil data diolah menggunakan analisis ragam. Peubah penelitian meliputi konsumsi ransum, pertambahan bobot badan, FCR, bobot karkas dan lemak abdominal. Hasil penelitian menunjukkan tingkatan energi protein ransum tidak memberikan pengaruh nyata (P>0,05) terhadap konsumsi ransum, pertambahan bobot badan, FCR, bobot karkas dan lemak abdominal. Dapat disimpulkan perbedaan tingkatan energi protein ransum tidak menghasilkan pengaruh yang nyata terhadap performa puyuh Padjadjaran pedaging periode pertumbuhan, rekomendasi ransum untuk periode pertumbuhan adalah kandungan EM 2900 kkal/kg dan PK 20% menghasilkan pertambahan bobot badan dan bobot karkas tertinggi namun cukup efisien dalam penggunaan ransum.
Kata kunci: Puyuh Padjadjaran, Performa, Energi, Protein

INTRODUCTION

Quail holds promising prospects as a source of meat and eggs. It provides a viable alternative for fulfilling animal protein needs due to its relatively lower meat price and high availability. The annual production of quail meat shown a steady increase, from 1,259 tons in 2019, to 1,598 tons in 2020, and 1,679 tons in 2021 (Directorate General of Livestock and Animal Health, 2021), indicating continuous development in quail farming every year. The large market demand coupled with a limited small number of quail breeders creates opportunities for further growth, especially considering the potential of quail meat as an alternative protein source.

While quail is commonly known as an egg-producing poultry, crossbreeding Japanese

and Malon breeds has increased its productivity as a broiler. The Padjadjaran quail is the result of a selective breeding process of pure brown and black fur lines to improve meat production performance in male quail. The development of quail feeds considers the quail dual purpose of meat and eggs production. As feed cost can contribute up to 70% of the total poultry production cost, feed protein and energy in the ration must be formulated efficiently.

This research addresses the need for precise recommendations of protein energy requirements in the Padjadjaran broiler quail feed during the growth period. Meeting these requirements is essential for optimizing productivity, as the nutritional content of the ration significantly influences growth, particularly the protein and energy needed to sustain quail activity. Inadequate nutrient supply can lead to reduced meat production, while the growth rate depends on the feed's quality and quantity. Proper adjustment of energy content in the feed is crucial to prevent excess fat accumulation in quail and preserve meat quality.

This study aims to determine the recommendations for energy and protein levels in the Padjadjaran broiler quail ration during the growth period of 3 – 6 weeks to achieve optimal growth performance. Research on protein and energy levels for quail during the starter – finisher period has been widely published. For instance, the research by Sujana, (2020) suggests that a ration with 22% protein content and 3,000 kcal/kg of metabolic energy produces the best performance for superior broiler quail (MJ). Dowarah and Sethi (2014) recommend finisher rations containing 20% protein and 3000 kcal/kg of metabolic energy to affect the body weight gain, ration consumption, and feed conversion. Gheisari et al., (2011) propose that starter ration contains with 22% protein and 2700 kcal/kg of energy contribute to optimal growth performance and improved feed conversion. Hyánková et al., (1997) report that Japanese quail fed with 21% protein during the growth period indicates good rations consumption and conversions. To achieve the best quail performance, the ration should contain 20 – 24% protein with metabolic energy ranging between 2,700 – 3,100 kcal/kg.

MATERIALS AND METHODS

This research involved 108 Padjadjaran broiler quails and was conducted from October to December 2022 at the Quail Breeding Center, Faculty of Animal Husbandry, Padjadjaran University. During the period one-day-old quail to three weeks old, the quails were housed in brooding cages measuring 150 cm in length, 60 cm in width and 30 cm in height. The starter period feed ratio was formulated to include a metabolic energy content of 2900 kcal/kg and 22% crude protein.

Quails aged three to six weeks were housed within a multilevel battery system, consisting of two battery cages with four levels each. Each level had a dimension of 120 cm in length, 30 cm in width, and 30 cm in height. Each battery enclosures were equipped with rations and drinking water. The treatment comprised nine types of rations, with metabolic energy levels of 2800 kcal/kg, 2900 kcal/kg, and 3000 kcal/kg and 20%, 22%, and 24% crude protein. The feed, provided in the mashed form, included ingredients such as yellow corn, soybean meal, fish meal, rice bran, bone meal, coconut oil, grit, and premix. Tables 1, 2 and 3 sequentially present the nutrient content of feed ingredients, the results of ration formulations, and the content of food substances in the rations.

Table 1. Metabolic Energy and Nutrient Content of Feed Ingredients for Quail Ration Growth Period

Feed Ingredients	EM kcal/Kg	Nutrient Content in Feed Ingredients					
		PK (%)	LK (%)	SK (%)	Ca (%)	P (%)	Lisin (%)
Yellow Corn	3,412**	7.24*	2.24*	2.00**	0.02**	0.10**	0.20**
Soybean Meal	3,349**	47.50*	0.55*	6.00**	0.32**	0.29**	2.90**
Fish Flour	2,353**	47.58*	4.35*	1.00**	7.70**	3.90**	6.50**
Rice Bran	3,358**	8.08*	5.19*	12.00**	0.12**	0.21**	0.71**
Coconut Oil	8,600**	0.00	100**	0.00	0.00	0.00	0.00
Premix	0.00	0.00	0.00	0.00	10.00**	5.00**	0.30**
Grit	0.00	0.00	0.00	0.00	40.00**	0.00	0.00
Bone Meal	0.00	0.00	0.00	0.00	23.30**	18.00**	0.00

Source: (*) Analytical Results from Indo Genetech 's Saraswanti Laboratory (2022)
(**) Analytical Results of Ruminant Animal Nutrition and Chemistry Laboratory of Animal Feed, Faculty of Animal Husbandry, Padjadjaran University (2011)

Note: EM = Metabolic Energy; PK = Crude Protein; LK = Crude Fat; SK = Crude Fiber; Ca = Calcium; P = Phosphorus.

Table 2. Ration Formulation in this Research

Feed Ingredients	Formulation (%)								
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**Q7**	**Q8**	**Q9**
Yellow Corn	51,00	47,00	44,00	52,00	48,00	44,95	55,00	50,00	46,61
Soybean Meal	23,75	26,00	29,75	25,35	26,45	29,50	22,75	25,00	30,00
Fish Flour	8,75	11,00	12,25	7,00	11,00	12,70	9,75	13,00	12,59
Rice Bran	15,00	14,50	12,50	12,15	11,85	10,00	9,00	8,00	6,55
Coconut Oil	0	0	0	1,00	1,20	1,35	2,00	2,50	2,75
Premium X	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
Grit	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Bone Meal	0	0	0	1,00	0	0	0	0	0
Total	100	100	100	100	100	100	100	100	100

Table 3. Nutrients and Metabolic Energy Levels in Quail Rations during the Growth Period

Feed Ingredients	Formulation (%)								
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**Q7**	**Q8**	**Q9**
Metabolic Energy (kcal/kg)	2869	2855	2842	2901	2934	2933	3021	3037	3028
Crude Protein (%)	20,35	22,16	24,16	20,12	22,23	24,12	20,15	22,33	24,14
Crude Fat (%)	5,23	5,21	5,12	6,03	6,30	6,38	7,08	7,54	7,65
Crude Fiber (%)	4,40	4,44	4,39	4,15	4,17	4,10	3,72	3,70	3,75
Calcium (%)	1,10	1,25	1,34	1,37	1,24	1,36	1,15	1,36	1,35
Phosphor (%)	0,60	0,64	0,64	0,67	0,60	0,61	0,54	0,59	0,56
Lysine (%)	0,83	0,89	1,00	0,87	0,91	1,00	0,81	0,88	1,02
Total	100	100	100	100	100	100	100	100	100

The research method used was experimental Complete Random Design. Table 3 presents the treatment of 9 types of rations. The treatment was analyzed for variance. In case of a significant effect ($P<0.05$) on the variable, further analysis would be conducted using the Duncan Test. The measured variables measured included ration consumption, body weight gain, ration conversion, carcass weight, and abdominal fat.

RESULTS AND DISCUSSION

The Effect of Treatment on the Performance of 3-6 Weeks Old Padjadjaran Broiler Quail

Based on the results presented in Table 4, the study found that treatments P1, P2, P3, P4, P5, P6, P7, P8 and P9 had no significant effect ($P>0.05$) on weight gain body, ration consumption, ration conversion, carcass weight, and abdominal fat percentage of Padjadjaran quail broiler during the growth period (3-6 weeks old). The lowest feed consumption was observed in treatment P8 (3000 kcal/kg of metabolic energy), while the highest average feed consumption was in treatment P1-P3 (2800 kcal/kg of metabolic energy content). The variance in ration consumption was influenced by the metabolic energy content, ranging between 2800 – 3000 kcal/kg. This result aligns with Wahju (2004), who noted that ration consumption increases with lower energy content and decreases with higher energy content.

Quail able to regulate their energy needs by increasing their consumption and will reduce consumption when these needs are met. During their growth phase, animals need more energy to accommodate mechanical activity such as moving their muscles and to form new tissues. Ration quality and quantity (nutrition, energy consumption, feed form), genetic factors, livestock activity, age (growth rate), production level, palatability, and management affect ration consumption (Wahju, 2004).

Table 4. Performance of Quail Padjadjaran Broiler Age 3-6 Weeks

Variable	Treatment								
	P1	P2	P3	P4	P5	P6	Q7	Q8	Q9
Ration Consumption (g/head)	510.58[a]	515.17[a]	515.08[a]	517.75[a]	514.92[a]	507.25[a]	503.58[a]	501.00[a]	502.50[a]
Increase Body Weight (g/head)	96.33[a]	95.08[a]	98.92[a]	120.75[a]	111.42[a]	110.75[a]	113,17[a]	119,17[a]	94.94[a]
Ration Conversion (g/head)	5.54[a]	5.42[a]	5,29[a]	4.30[a]	4.65[a]	4.65 [a]	4.48 [a]	4.30[a]	5.35[a]
Carcass Weight (g)	154.67[a]	163.33[a]	160.33[a]	184.33[a]	159.00[a]	174.33[a]	176.67[a]	176.67[a]	171.33[a]
Abdominal Fat (g)	1.70[a]	2.07[a]	0.55[a]	2.80[a]	1.60[a]	1.13[a]	2.43[a]	1.93[a]	2.97[a]

Note: Different superscripts on the same line indicate significant differences (P<0.05)

Treatment P4 (metabolic energy 2900 kcal/kg and PK 20%) and treatment P8 (metabolic energy 3000 kcal/kg and PK 22%) resulted in the highest weight gain, although insignificantly (P>0.05). According to research results from Reda et al. (2015), 3-5 weeks-old quail does not significantly affect growth performance. This result is consistent with research by Dowarah & Sethi (2014). The recommended feed nutritional content includes 20% protein and metabolic energy of 3000 kcal/kg for optimal performance, especially in terms of body weight gain. As feed consumption is positively correlated with body weight gain, rations must be formulated with high quality and adjusted to the livestock production purposes (Sitompul et al., 2016) to optimize growth (Uzer et al., 2013).

All treatments did no significantly affect (P>0.05) quail's ration conversion value, with treatments P4 (metabolic energy value of 2900 kcal/kg, 20% crude protein) and P9 (metabolic energy value of 3000 kcal/kg; 22% crude protein) showing the lowest feed conversion values. The highest feed conversion value was observed in treatment P1 (metabolic energy 2800 kcal/kg and PK 20%). Based on Kaur et al. (2008), the conversion of quail feed increases as the metabolic energy in the feed decreases from 3,100 to 2,900 kcal/kg. The analysis suggested that body weight gain is closely related to feed conversion, emphasizing the importance of efficient rations use for faster growth. Utomo et al. (2014) also noted that high-quality rations would lower ration conversion values, increase body weight gain, and rations consumption, as the three performance parameters are closely related.

The carcass weight of Padjadjaran broiler quail did not show significant (P>0.05) differences among treatments, although treatment P4 had the highest carcass weight, and treatment P1 had the lowest. The relationship between body weight and carcass weight was consistent with Nurhayati's (2008) statement that higher body weight corresponds to higher carcass weight, and vice versa.

Protein in rations is one of the main components of cells and body used for tissue repair, tissue growth, and enzyme structure (Sudiyono & Purwatri, 2007). Quail meat quality depends on the consumed protein from its feeds. Resnawati (2004) also states that slaughter weight, body size and conformation, fat content, age, sex, and quality and quantity of rations affect the weight of the carcass produced. The amount of abdominal fat will determine the quality of the carcass, as low-fat quail meat is often preferred.

The percentage of abdominal fat was not significantly (P>0,05) influenced by the varied protein and energy levels in the rations. Treatments P7, P8, and P9 with a metabolic energy value of 3000 kcal/kg resulted in the highest average abdominal fat. The data indicate that high-energy feed contributed to increased abdominal fat, in line with the findings by Kurniawan et al. (2015), as the body will stores excess energy as abdominal fat. Kayatun et al. (2012) added that body weight, energy level, environmental temperature and age of livestock simultaneously would increase abdominal fat. Treatment P1-P3 (metabolic energy 2900 kcal/kg) produces the lowest average abdominal fat.

CONCLUSION

Differences in protein energy levels in the rations did not significantly affect the performance of Padjadjaran broiler quail during the growth period. The recommendation ration for this phase is one with a metabolic energy content of 2900 kcal/kg and 20% crude protein, which providing optimal body weight gain and carcass weight while maintaining feed efficiency.

REFERENCES

Direktorat Jenderal Peternakan dan Kesehatan Hewan. (2021). *Statistik Peternakan dan Kesehatan Hewan*. (2021).

Dowarah, R., & Sethi, A. P. S. (2014). Various dietary levels of protein and energy interaction on growth performance of white plumage Japanese quails. *Veterinary World*, *7*(6), 398–402. https://doi.org/10.14202/vetworld.2014.398-402

Kaur, S., Mandal, A. B., Singh, K. B., & Kadam, M. M. (2008). The response of Japanese quails (heavy body weight line) to dietary energy levels and graded essential amino acid levels on growth performance and immuno-competence. *Livestock Science*, *117*(2–3), 255–262. https://doi.org/10.1016/j.livsci.2007.12.019

Kayatun, K. K. S., Mulyono, Dowarah, R., & Sethi, A. P. S. (2014). Various dietary levels of protein and energy interaction on growth performance of white plumage japanese quails. *Veterinary World*, *7*(6), 398–402. https://doi.org/10.14202/vetworld.2014.398-402

Gheisari, A., Halaji, H. A., Maghsoudinegad, G., & Toghyani, M. (2011). Effect of Different Dietary Levels of Energy and Protein on Performance of Japanese Quails (Coturnix coturnix Japonica). *2nd International Conference on Agricultural and Animal Science*, *22*, 156–159.

Hyánková, L., Dědková, L., Knížetová, H., & Klecker, D. (1997). Responses in growth, food intake and food conversion efficiency to different dietary protein concentrations in meat-type lines of Japanese quail. *British Poultry Science*, *38*(5), 564–570. https://doi.org/10.1080/00071669708418037

Sujana, E. (2020). *Kajian Performa Puyuh Malon, Puyuh Jepang Terseleksi dan Persilangannnya dalam Membentuk Bibit Puyuh Pedaging Unggul*. Disertasi. Universitas Padjadjaran.

Kurniawan, D., Widodo, E., & Halim Natsir, M. (2015). Efek penggunaan tepung tomat sebagai bahan pakan terhadap penampilan produksi burung puyuh. *Jurnal Ilmu-Ilmu Peternakan*, *25*(1), 1–7.

Nurhayati. (2008). Pengaruh Tingkat Penggunaan Campuran Bungkil Inti Sawit dan Onggok yang Difermentasi dengan *Aspergillus Niger* dalam Pakan Terhadap Bobot Karkas Broiler. *Animal Production*, 10(1), 55–59.

Reda, F. M., Ashour, E. A., Alagawany, M., & Abd El-Hack, M. E. (2015). Effects of Dietary Protein, Energy and Lysine Intake on Growth Performance and Carcass Characteristics of Growing Japanese Quails. *Asian Journal of Poultry Science*, *9*(3), 155–164. https://doi.org/10.3923/ajpsaj.2015.155.164

Resnawati, H. (2004). Bobot Potongan Karkas dan Lemak Abdomen Ayam Ras Pedaging yang Diberi Ransum Mengandung Tepung Cacing Tanah. *Seminar Nasional Teknologi Peternakan dan Veteriner 2004 BOBOT*, *2003*, 473–478.

Sitompul, S. A., Sjofjan, O., & Djunaidi, I. H. (2016). Pengaruh Beberapa Jenis Pakan Komersial terhadap Kinerja Produksi Kuantitatif dan Kualitatif Ayam Pedaging. *Buletin Peternakan*, *40*(3), 187. https://doi.org/10.21059/buletinpeternak.v40i3.11622.

Sudiyono, & Purwatri, T. H. (2007). Pengaruh Penambahan Enzim dalam Ransum terhadap Persentase Karkas dan Bagian-Bagian Karkas Itik Lokal Jantan. *J. Indon. Trop. Anim. Agric*, *32*(4), 270–277.

Utomo, J. W., Sudjarwo, E., & Hamiyanti, A. A. (2014). Pengaruh penambahan tepung darah pada pakan terhadap konsumsi pakan, pertambahan bobot badan, konversi pakan serta umur pertama kali bertelur burung puyuh. *Jurnal Ilmu-Ilmu Peternakan*, *24*(2), 41–48.

Uzer, F., Iriyanti, N., & Roesdiyanto, D. (2013). The Use of Functional Feed in Rations on Consumption and Body Weight Gain Broiler. *Faiq Uzer Dkk/Jurnal Ilmiah Peternakan*, *1*(1), 282–288.

Wahyu, J. (2004). *Ilmu Nutrisi Ternak Unggas*. Yogyakarta, Indonesia: Gadjah Mada University Press.