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Faculty of Animal Husbandry, Sam Ratulangi University, Manado North Sulawesi
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CONTENTS

INFLUENCE OF SHRIMP WASTE, KATUK LEAF (*Sauropus androgynus L. Merr.*), BROMELAIN ANDGARLIC POWDER ADDITION ON PERFORMANCE AND EGG QUALITY OF QUAIL

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ABSTRACT

This experiment aimed to study effect of addition of shrimp waste, katuk leaf, garlic powder, and bromelain on performance, egg weight quality, and physical composition of the egg. This experiment used 160 quail pullet reared 10 weeks and divided into five treatments and four replicates. The experimental diets were P0 (control), P1 =P0+ 31.1 ppm bromelain, P2 = P0+ 0.45% waste shrimp powder, P3 = P0+10% katuk leaf powder, and P4 = P0+1% garlic powder. This study used a completely randomized design. The results showed that egg weight and yolk color score were significantly different ($P<0.05$) among the treatments. Egg production, feed consumption, feed conversion, egg white percentage, egg yolk percentage, egg shell percentage, index of eggs and Haugh Unit were not significantly different. All eggs were classified into AA quality. All treatments produced higher ($P<0.05$) egg weight compared to control. Egg yolk color score of katuk leaf powder group was significantly higher ($P<0.05$) than other groups. It is concluded that the addition of bromelain, shrimp waste powder, katuk leaf powder, and garlic powder did not affect performance. But those had significant different effect on egg quality.

Keywords: *Quail egg, Egg quality, Shrimp waste, Katuk leaf, Garlic, Bromelain*

INTRODUCTION

Quail have a high potential to produce eggs. Quail egg farms are able to produce proteins that help meet the needs of the people of Indonesia. Quail small body size gives the advantage because the land requirement is not too wide for maintaining them in large numbers. Another advantage is their very fast grow and mature, ie at the age of 35-42 days have started laying eggs. Their eggs production capable of reaching 200-300 eggs/year with a weight of 10 grams/egg. Based on data from the Directorate General of Livestock (2012) quail egg production in Indonesia in 2011 reached 16.926 million tons.

The most important factor in the maintenance of quail is feed. Quail nutritional needs should be met within the feed. Needs amount of feed for quail is usually more than 10% of their body weight. Shrimp waste is a waste of frozen shrimp processing industry that have potential and relatively high nutritional value. Garlic has a wide range of active substances in it. Katuk leaves contain high nutrients and bromelain is one of the sulfhydryl protease enzyme capable of hydrolyzing the bond polypeptides into amino acids.

Enzyme bromelain is a proteolytic enzyme such as renin (rennet), papain and fisin which has the properties of protein hydrolysis. Enzyme bromelain from pineapple weevil is one of the alternatives in order to utilize waste sehinggqa pineapple can provide added value for pineapple in addition to reducing the pollution problems of waste on the environment (Sebayang, 2006).

Shrimp heads flour can be used as animal feed ingredients. advantage of shrimp heads flour is a waste product of fisheries that have a fairly continuous availability, the price is quite stable and nutritional able to compete with conventional feed ingredients (Wanasuria, 1990). Berda- sarkan Syukron research (2006) the best Taraf administration shrimp heads in the ration of broiler chickens is as much as 6% .According Mawaddah study (2011), granting 10% katuk leaf meal in the diet of quail produce quality meat and eggs are better than the product quail. The treated extract katuk leaf meal at the same level. Garlic is thought to be able to optimize the metabolic functions of food ingredients so as to improve the efficiency of feed utilization. Each 2 kg of fresh ingredients, garlic produces 600 g of dry matter (Wiryawan *et al*., 2005).

Katuk leaves, waste shrimp, garlic, and bromelain contains good nutrition and still rarely used as animal feed. In addition, the availability can be obtained throughout the year. Some feed materials can be added to the feed of quail to supplement the nutritional needs of quail. The content of nutrients in each feedstuff is expected to give a good effect on the performance and quality of quail eggs. Therefore, it is necessary to study the effect of addition, bromelain, flour shrimp waste, katuk leaf flour and garlic powder to the quality of quail eggs. This study aimed to evaluate the effect of adding shrimp waste flour, flour leaves katuk (*Sauropus androgynus* L. Merr.), Garlic powder, and bromelain on the performance and quality of eggs (egg shell weight percentage, the percentage weight of egg yolk, egg white weight percentage , thick egg shell and yolk color) quail.

MATERIALS AND METHOD

This study used 160 quails grower phase that are ready for production and placed in 20 pieces of battery cages. Each cage contains eight quails. Each cage is equipped with a place to eat and drink. Each plot enclosure is equipped with double rations and the drinking water. The quail is divided into five treatments and four replications and maintained for 10 weeks.

Experimental diets consisted of basal ration supplemented with bromelain, shrimp waste meal, katuk leaf meal, and garlic powder in accordance with treatment. Drinking water was given every day during the study. Experimental diets were given after 2 weeks of maintenance. The composition of experimental diets is shown in Table 1. The nutrient content of the ration experiments are presented in Table 2.

The experimental design used in this research is completely randomized design (CRD) with 5 treatments and 4 replicates. The treatments provided are: P0: Rations control, P1: P0 + bromelain 0.625 mg/head /day, P2: P0 + 0.45% shrimp waste powder, P3: P0 + 10% katuk leaf meal, P4: P0 + garlic powder 1%.

Data were analyzed by analysis of variance (ANOVA). If significantly different between treatments was tested further by Duncan's multiple range test (Mattjik and Sumertajaya, 2006).

Parameters measured were as followed: production of eggs (%), feed conversion, feed intake, consumption of metabolizable energy (kcal/head/day), consumption of protein (g/head/day), egg weight (g/egg), proportion of yolk (%), egg white proportion (%) proportion eggshell (%), egg yolk color and Haugh Units (HU).

Table 1. Compossition of experimental diets

Ingredients	P0	P 1	P2	P3	P4
	----------(%)----------				
Yellow corn	46	46	46	46	46
Rice bran	9	9	9	9	9
Soybean meal	27	27	27	27	27
Fish meal	8	8	8	8	8
CPO	3	3	3	3	3
DCP	0,8	0,8	0,8	0,8	0,8
NaCl	0,2	0,2	0,2	0,2	0,2
CaCO3	5	5	5	5	5
Premix	0,4	0,4	0,4	0,4	0,4
DL-Methionine	0,6	0,6	0,6	0,6	0,6
Total	100	100	100	100	100
Bromelain (mg/head/day)	-	0,625	-	-	-
Waste shrimp meal (%)	-	-	0,45	-	-
Katuk leaf meal (%)	-	-	-	10	-
Garlic powder (%)	-	-	-	-	1

Table 2. Nutrients content of experimental diets based on calculation

Nutrient	P0	P1	P2	P3	P4
ME (kcal/kg)	2837,50	2825	2855,34	3017,5	2878,46
Crude protein (%)	22,44	22,60	22,58	25,74	22,61
Ether extract (%)	5,49	5,01	5,53	6,49	5,50
Crude fibre (%)	3,12	4,00	3,22	3,12	3,14
Ca (%)	2,65	2,78	2,72	2,68	2,65
P (%)	0,46	0,48	0,47	0,49	0,47

Prosedur

Shrimp waste powder. Shrimp waste powder wer obtained from the Institute of Fisheries and Freshwater Aquaculture, Bogor.

Katuk leaves meal. Leaves and stems were first separated. Katuk leaves then dried in the sun. Dried katuk leaves was then processed into katuk leaves meal.

Garlic powder. First, garlic was dried in the sun, then was ground into a powder.

Maintenance of Quail and Treatment Application

Quail used in the study were randomly placed into battery cages by the treatment given. Treatments of diet were given at the second week of maintenance. In the beginning quail were fed the basal ration for 2 weeks. Maintenance of quail lasted for 10 weeks and the first 2 weeks serve as a control.

One hundred sixty quails were placed in a cage. Each treatment consisted of 4 replicates with 8 quails for each experimental unit.

RESULTS AND DISCUSSION

Feed Consumption, Eggs Production and Ration Conversion

Feed intake did not show significantly different results. The value of feed intake in the control treatment, administration of bromelain, shrimp waste powder, flour katuk leaves, and garlic powder are respectively 22.76 ± 2.12; 22.22 ± 1.59; 22.84 ± 1.89; 24 ± 3.22; and 23.16 ± 6.07 g / head / day. Factors affecting feed intake is the large body of livestock, livestock activity, ambient temperature, quality and quantity of ration (NRC, 1994).

The production value of eggs in each treatment showed significantly different results. Egg production in the control treatment, administration of bromelain, flour shrimp waste, katuk leaf, and garlic respectively in the amount of 32.25 ± 3.86%; 34.61 ± 6.88%; 36.16 ± 2.41%; 40.04 ± 8.91%; and 39.50 ± 5.90%. According Listyowati and Roospitasari (2004) Production of quail eggs is influenced by genetic and environmental factors such as diet, cage, temperature, environment, disease, and stress. Factors affecting feed intake is the large body of livestock, livestock activity, ambient temperature, quality and quantity of ration (NRC, 1994).

Feed conversion showed no significantly different results. Feed conversion in the control treatment, administration of bromelain, shrimp waste powder, flour katuk leaves, and garlic powder respectively is 9.13 ± 1.11; 7.43 ± 2.45; 7.57 ± 1.51; 7.37 ± 1.65; and 7.20 ± 3.30. This suggests that the efficiency of feed utilization on all treatments are the same (average 7.74). Widjastuti and Kartasudjana (2006) states that the balance between feed consumed by the production of eggs produced in each treatment causes no different feed conversion.

Egg Production, Energy Consumsed, Protein Consumsed, and Percentage Weight Components of Quail Eggs

The average weight of quail eggs in each treatment showed significantly different results. Giving bromelain produces the greatest egg weight from other treatments that is equal to 9.09 ± 0,31g. Bromelain has a high protein content. Quail egg weight is not only influenced by the quantity of feed consumed but also by the quality of feed, especially protein content (Mozin, 2006). Protein deficiency will result in a large decrease in the number of eggs and egg albumen (Amrullah, 2003).

Egg weight on the addition garlic powder and shrimp waste powder showed not significantly different results, and each has an eggs weight of 8.60 ± 0,37 g and 8.47 ± 0,53 g. On the addition of bromelain treatment showed a highest egg weight than the other treatment that was equal to 9.09 ± 0.31 g but the control treatment had the smallest egg weight of 7.84 ± 0,82 g. Results of the study had a lower weight value than that of Kul and Seker (2004) who obtained results of egg weight (g) of 11.28 ± 0,06g.

Consumption of protein and metabolizable energy used to meet the maintenance, growth and egg production (Widjastuti and Kartasudjana, 2006). The magnitude of the weight of the eggs produced by the addition of bromelain treatment can be caused due to consumption of protein and metabolizable energy used to meet maintenance and growth are fulfilled, so that the remainder is used to produce large eggs. Requirement for maintenance and growth in the control treatment that has not been fulfilled resulting in the consumption of protein and metabolizable energy is not widely used for the production of eggs, so the weight of eggs produced is low.

The percentage of egg whites on all treatments showed no significantly difference, i.e. ranging 54.06 – 55.59%. Hazim et al. (2011) measures the egg whites percentage of

53.10%. Kul and Seker (2004) obtained the higher egg whites percentage of 59.83. Likewise, the percentage of egg yolk and eggshell were not significantly different. Kul and Seker (2004) reported that the percentage of yolk 32.71 ± 0.12% and the percentage of eggshell 7.47 ± 0.04%. According to Song et al (2000) quail egg yolk has a percentage of 29.42 to 33.38%, from 58.88 to 63.52% egg white, and eggshell 6.61 to 7.99%.

Table 3. Feed consumption, egg production, feed conversion, nutrient intake, egg weight and percentage weight components of quail eggs given experimental diets

Parameters	Treatments				
	Control	*Bromelain*	Shrimp waste	Katuk leave	Garlic
Feed intake (g/head/day)	22,76±2,12	22,22±1,59	22,84±1,89	24±3,22	23,16±6,07
Egg production (%)	32,25±3,86	34,61±6,88	36,16±2,41	40,04±8,91	39,50±5,90
Feed conversion	9,13±1,11	7,43±2,45	7,57±1,51	7,37±1,65	7,20±3,30
Energi intake (kcal/head/day)	64,86±4,94	62,77±4,48	65,23±5,39	72,42±9,72	66,65±17,49
Protein intake (g/head/day)	5,13±0,37	5,02±0,36	5,16±0,43	6,18±0,83	5,23±1,37
Egg weight (g)	$7,84^{c}$±0.82	$9,09^{a}$±0,31	$8,47^{ab}$±0,53	$8,15^{b}$±0,84	$8,60^{ab}$±0,37
Albumin (%)	54,06±0.44	55,59±0,84	55,59±0,88	55,19±0,85	54,88±0,63
Yolk (%)	30,02±0.62	29,56±0,76	30,45±0,70	30,63±0,54	30,5±0,97
Shell (%)	9,79±0,10	9,81±0,39	9,47±0,21	9,75±0,21	9,78±0,08

Remark: different superscript within the same row indicate significantly different (P <0.05)

Table 4. Quail egg quality given experimental diets

Parameters	Treatments				
	Control	*Bromelain*	Shrimp waste	Katuk leave	Garlic
Egg index	78.81±4.36	0,80±0,71	0,81±1,19	0,80±1,11	0,81±1,11
Yolk colour score	$4,13^{b}$±0.91	$4,10^{b}$±0,20	$4,17^{b}$±0,21	$6,10^{a}$±0,43	$4,24^{b}$±0,27
Shell thickness (mm)	$0,168^{a}$±0.01	$0,167^{a}$±0,01	$0,155^{b}$±0,01	$0,158^{ab}$±0,01	$0,165^{ab}$±0,01
Haugh Unit	92.64±1.01	91,67±0,49	91,95±1,58	91,24±1,02	91,67±1,04

Remark: different superscript within the same row indicate significantly different (P <0.05).

Egg Quality

The quality of the eggs is a collection of factors that affect the valuation and tastes of consumers on the quality of the eggs. Consumers are always looking for fresh eggs, with standard weight, good eggshell quality, yolk color attractive (yellow) and a relatively thick egg white (Yuwanta, 2010). In this study, the egg index was not significantly different between treatments. This shows the shape of eggs in each treatment is more rounded than the results Kul and Seker (2004), ie with an index of 0.75 ± 0.22 eggs.

Scores yolk color in this study was significantly different. In the treatment of leaf powder katuk have egg yolk color score highest than the others, namely 6.10 ± 0.43. In the administration of bromelain treatment, waste flour shrimp, garlic, and controls were not significantly different. Hulshoff *et al*. (1997) reported that among the vegetables and fruits were studied in Indonesia, the highest katuk leaf contains carotene. This shows that the carotene pigment found in leaves katuk have a role in improving the yolk color scores.

Eggshell thickness was significantly different in all treatments. Control treatment and administration of bromelain has the thickest shell, each of which is 0.168 mm and 0.167 mm. Treatment by administering powdered shrimp waste has the most thin shell that is 0.155 ± 0.01 mm. Eggshell thickness in treatment provision garlic powder and leaves katuk respectively 0.165 mm and 0.158 mm. Kul and Seker (2004) obtaining eggshell thickness values higher than this study is 0.231 mm.

Haugh unit in this study showed no significantly different results for all treatments and eggs belong to the quality of the AA indicated by HU value >91.24, i.e. above 72 (USDA, 2000). Haugh unit quail eggs on research Kul and Seker (2004) was 85.73 ± 0.15 was lower than HU in this study.

CONCLUSION

All treatments can provide a high quail egg weight compared with the control. The percentage weight of the composition of quail eggs are not affected by the provision of treatment. Giving katuk leaves can increase the value of yolk color scores and maintain a quail egg production. The addition of bromelain, flour shrimp waste, katuk leaf, and garlic does not affect performance and can maintain the quality of quail eggs.

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