Performance and Income Over Feed Cost of Rambon Duck that Given the Ration Containing Gold Snail (Pomaceae canaliculata) and Noni Fruit (Morinda citrifolia L) Flour

W Tanwiriah¹, L Nurlina¹, D Garnida¹ and E Sujana¹

¹Animal Husbandry Faculty, Universitas Padjadjaran, West Java, Indonesia

E-mail: wi2ntanwiriah@yahoo.co.id

Abstract. The golden snail can breed very quickly and could become a pest for the plants especially rice plants. The Gold snails contains to use as duck feed. One of ducks that developed in West Java, is Rambon duck. In the maintenance of ducks, to improve productivity, usually required additional substances in ration. Noni plant which fruit is very nutritious, and contains anti-microbial that increase the productivity of livestock. This study aims to determine the level of gold snails and the Noni Fruits flour in a ration that gave the best Rambon duck performance and IOFC in the Jatigede Reservoir area. The research was done experimental and all data were analyzed statistically with Anava and further test with Duncan Test. The research used 200 DOD of Rambon duck that given 4 ration treatment containing gold snail flour (K) and noni fruit flour (M). The treatments were P1 (R1+0.45% M), P2 (R1+0.60% M), P3 (R2+0.45% M), dan P4 (R2+0.60% M). Parameters measured were feed consumption, body weight gain, feed conversion, carcass weight and IOFC. The results showed that P2 treatment (gold Snail 5%+0,60% noni fruit) gave the best Rambon duck performance with the value of IOFC Rp. 11,675.74 each bird

1. Introduction

In areas with a lot of water such as rice fields or the area around the reservoir usually live many types of snails. The gold snail (Pomaceae canaliculata) is one of many species of snails found in various places and breed very quickly, so in long time that will become pests of plants, especially can damage the rice plants. According to the research gold snails contains high enough protein, so it can be used as a source of protein for duck feed. The content of protein gold snail flour ranged from 38.9% to 51.44% and Metabolizable Energy is 2.394 kcal/kg up to 3.189 kcal/kg [1]. In around the reservoir is also suitable to be maintained waterfowl is like ducks.. One of the ducks that developed in West Java is the Rambon ducks from Cirebon. Rambon duck has a slim body shape, 45 - 50 cm high and upright steps. Male duck Rambon weights average 1.4 kg, while the female 1.2 kg. Rambon duck have shiny brown male feather in the neck, black head, black beak, and 70% have brown fur and brown thigh [2]. The use of gold snail for duck feed is good because its reduce pests and also reduce the cost of duck feed that very high about 70% of the cost production. According to the research, the use of gold snail flour up to 6% in the ration did not decrease the performance (weight gain, ration conversion, weight and percentage of carcass, abdominal fat) on MA male ducks (Mojosari-Alabio) [3]. The addition of the golden snail flour in the ration to the 9% level also did not affect the duck eggs quality including egg weight, egg white index, egg yolk index, egg yolk, HU value, eggshell weight and eggshell thickness [4]. However, fresh gold snails contain anti-nutritional that can adversely affect livestock growth. These anti-nutritional can be removed by heating or boiling. The gold snail meat flour (previously treated with boiled for 15 minutes) can be used up to 11.25% in the chicken ration without decreasing performance [5]. The snail meat flour (previously treated with soaked lime (Calcium Oxide) for 15 minutes) can be used up to 6% in broiler chicken [6].
Maintenance of ducks in the villages traditionally, rarely use chemical drugs, but replaced with herbal plants that serve as a drug and growth promote. Types of medicinal plants commonly used is noni fruits (Morinda citrifolia L). One of the active substances in the noni fruit that can improve the performance of poultry is Saponin. The use of plants containing saponins in monogastric animals can increase feed production, growth and efficiency, and improve the quality of meat [7,8]. Saponins can increase nutrient absorption in the gut [9, 10]. Noni fruit contains proxeronine alkaloids and proxeronase enzymes that will form xeronine active substances in the intestines. Xeronine's active substances can help proteins perform their functions and work well. These substances are brought to the body's cells through the blood so that the cells work more actively [11]. Xeronine will be absorbed by the body's cells to activate and maximize the function of inactive proteins, regulate the structure and form of active cells. The specific function of this xeronine substance is to protect the cell membrane, so that the cell becomes more active, healthy and there are structural and functional improvements. Including improvements in liver cells [12]. Xeronine is capable of stimulating the immune system, regulating cell function and cellular regeneration of damaged cells [13]. Xeronine can also speed up the absorption of nutrients into the digestive system and harmonize the workings of cells in the body [14]. According to the research, the addition of 3 ml/ kg ration (0.3%) Noni fruit flour in broiler feed can give a real impact in the addition of broiler chicken body weight [15]. In another research, the addition of 4.8 g / kg (0.48%) of non-fruit juice in the feed had no significant effect on final weight and percentage of carcasses, but resulted more efficient rations and lower feed conversion [16]. The aim of the research were to determine the level of gold snail (Pomacea canaliculata) and Morinda citrifolia L in the rations that produced the best Rambon duck performance at Jati Gede reservoir area in Sumedang.

2. Experimental Details
This Research used 200 DOD of Rambon duck. Each duck is given a wingtag and then put randomly into the cage and maintained for 8 weeks. Duck is placed on a bamboo cage that a length x width x height is 2 m x 1.5 m x 0.5 m. Each cage is occupied by 10 ducks. Each cage has one round feeder and waterer. For the first 2 weeks of the study each cage was given one 60 watt lamp as a brooder. Feed ingredients are corn, rice bran, soybean meal, fish meal, coconut oil and gold snail powder. The content of nutrients and metabolizable energy of the rations based on the need of pekin duck [17] are ME 2900 kcal / kg and protein 17%. Before used gold snails was boiled for 15 minutes, then dried and ground. Noni fruits was taken in a fairly mature so the fruit is still a bit hard with the color is slightly yellow then dried and ground. The ration of the research can be seen in Table 1.

Research using Completely Randomized Design. There were 4 treatments ration containing gold snails (K) and Noni fruits (M) which is different level. There are 4 treatments that were P1 (R1 + 0.45% M), P2 (R1 + 0.60% M), P3 (R2+ 0.45% M) and P4 (R2 + 0.60% M), each treatment was repeated 5 times and the number of ducks 10 per cage . The parameters observed were feed consumption, weight gain, feed conversion, carcass weight and Income Over Feed Cost (IOFC). To know the effect of treatment then the data were analyzed statistically with Anava and to know the difference between treatment analyzed by Duncan Test

3. Results And Discussion
The results of research can be seen in Table 2. The feed consumption in all treatment not too differences and variant analyzed indicate that the treatment has no significant effect on the feed consumption. The ration on this research made iso protein and iso energy, so if there is an increase or decrease of consumption caused by treatment of gold snail flour and noni fruits. The result of the research was found that the use of gold snail up to 10% and 0.060% noni flour in the ration give not effect to feed consumption, so it can be said that the ration is still palatable. The palatability of the ration is one of the important factors determining the level of feed consumption that is influenced by smell, taste, texture and color of ration [18]. The use noni fruits too high is not recommended because the noni fruit contains kaporat acid and kapirik acid that gives the typical smell [19]. Indeed, many
factors that influence the feed consumption are environmental temperature, genetic, health, ration form, balance of nutritional rations, stress, body size, growth rate and egg production [20].

Table 1. Ration of the Research

| Feeds           | R1     | R2     |
|-----------------|--------|--------|
| Corn            | 51.00  | 51.00  |
| Soybean Meal    | 10.00  | 10.00  |
| Fish Meal       | 6.00   | 3.00   |
| Rice Bran       | 24.00  | 22.00  |
| CaCO₃           | 1.50   | 1.50   |
| Cornel oil      | 2.00   | 2.00   |
| Premix          | 0.50   | 0.50   |
| Gold Snails Flour | 5.00  | 10.00  |

The contains of the Rations

|                    | R1     | R2     |
|--------------------|--------|--------|
| ME (Kkal/kg)       | 2835   | 2839   |
| Crude Protein (%)  | 17.11  | 17.31  |
| Crude Fat(%)       | 8.57   | 8.56   |
| Crude Fiber (%)    | 8.35   | 8.24   |
| Calcium (%)        | 0.89   | 0.83   |
| Phosphor (%)       | 0.72   | 0.67   |
| Lysin (%)          | 0.85   | 0.70   |
| Methionin (%)      | 0.33   | 0.27   |
| Met + Systin (%)   | 0.54   | 0.47   |

Table 2. The Effect of Treatment on Rambon Duck Performance

| No.   | Parameter          | P1      | P2      | P3      | P4      |
|-------|--------------------|---------|---------|---------|---------|
| 1.    | Feed Consumption (g) | 4,414.81 | 4,478.44 | 4,676.84 | 4,500.68 |
| 2.    | Body Weight gain(g)  | 1,169.03 b | 1,236.45 c | 1,132.77 ab | 1,122.91 * |
| 3.    | Feed Conversion     | 3.78 ab  | 3.63 *  | 4.14 c  | 4.02 bc |
| 4.    | Carcass Weight (g)   | 665.50 a | 751.30 b | 682.50 ab | 655.80 a |
| 5.    | Percentage of Carcass (%) | 54.57 | 60.97   | 57.00   | 55.61   |
| 6.    | Income Over Feed Cost (Rp) | 10,218.80 | 11,675.74 | 7,955.15 | 9,292.75 |

Note: The different letter at the same line show the treatment significant different

The increase of Rambon duck body weight gain range from 1,122.9 – 1,236.45 g at 8 weeks of age. This result is lower than the results of Ahmad Subhan et al. research in ducks that were given 6% of snail flour that is 1462.63 g. This is because of the different types of ducks namely Mojosari ducks. The highest Rambon duck is achieved by P2 with ration treatment containing 5% gold snail flour and 0.06% noni fruits addition. The treatments of the research gave significant effect (P< 0.05) to body weight gain and Duncan test showed that the treatment P2 (5% K + 0.60% M) was significantly higher than P1, P3 and P4. Body weight gain. P1 treatment was significantly higher than P4, but did not differ from P3 and P3 was not different from P4. The best treatment was P2 that was combination of 5% gold snails and 0.06% noni fruits. The use of 0.60% noni fruits has been enough to give all the
benefits, while the use of 0.45% not effective to promote growth. This is in line with previous research that the giving of noni fruit of 0.48% in ration did not give a real effect on body weight gain due to lack of dose [16]. Giving noni fruits increase body weight, this is because of the compound of noni fruits. According to [21] active substances compounds in noni fruits including xeronine, proxeronin, proxeronase, serotonin, vitamin C, anti-oxidants, minerals, proteins, enzymes, alkaloids, and fitronutrien others, are very active in strengthening the immune system, improve cell function and accelerate the regeneration of damaged cells. In addition, the use of plants containing saponins in monogastric animals can increase the production, growth and feed efficiency, and improve the quality of meat [7,8]. Saponins can increase nutrient absorption in the gut [9,10]. In this study the best use of gold snails is 5%, because the use of 10% to tend the decrease of body weight. This is because the gold snail contains anti-nutritional substances, so it should be used less than 10%. The use of more gold snails than 6%, feed consumption and body weight gain decreased and feed conversion increased [5]. Similarly, the results of research in [22] that the replacement of fish meal (10% in ration) with gold snails only 25-75%, that is 2.5% to 7.5%, gives a good influence on individual daily growth rate, feed efficiency, protein retention and fat retention in fish. The results of [3] research argues that the use of 6% golden snail flour in the ration produce a performance that is proportional to feed conversion.

The lowest of Rambon duck feed conversion was achieved by the P2 (5% K+0,60% M) treatment and the highest of feed conversion by P3 treatment. In general, the conversion of rations in ducks is still very large, this happens because of the way of eating of ducks that is after taking the food then immediately drink, so many rations are wasted to the water. As is the case in other studies, the result that the feed conversion of duck is 4.49 – 5.31 [23]. In this study the feed consumption is not different so that the difference is the result of its body weight gain. The highest body weight gain is P2 treatment, so resulting the lowest feed conversion. Feed conversion is the ratio of the amount of feed consumed to body weight gain, when the smaller is more efficient. Feed conversion is influenced by large body and nation, production level, energy ration and environmental temperature [24]. In animal husbandry the value of feed conversion is minimally influenced by three factors of ration quality, feeding management, mortality rate. The key to successful business in broiler farming (livestock) is the feed conversion [25]. According to [26, 27], the size of feed conversion is influenced by feed quality and livestock's ability to convert food into meat, feed balance, body size, environmental temperature, live weight, physical form of feed, strain and sex.

The carcass weight of the research ranged from 665.50 to 751.30 grams. This result is lower than the research by [3] at the 8 weeks old in male ducks that ranged from 854.76 to 954.90 gram. The highest carcass weight in this research is achieved by P2 treatment. This is in line to the final body weight because carcass weight is related to the final body weight. Carcass weight is influenced by age, species of livestock, ration and body weight or body size [28]. The result of ANAVA indicated that the treatment had significant effect (P< 0.05) on carcass weight. Duncan test showed that the carcass weight of Rambon duck in P2 treatment was significantly higher than P1, P3 and P4 treatments. This is in line with body weight P2 which also higher, because carcass weight is the largest part of the body of the ducks.

Carcass Percentage of the research ranged from 54.57% to 60.97%. This result is higher than the results of [19] research that ranged from 52.0 to 55.7%, but lower than the results of [3] in male duck that is range from 59.70% to 61.10% from live weight. The results of ANAVA showed that the treatment had no effect on the percentage of carcass. This is because at the age of 8 weeks the ducks grow has not maximal yet, so at this age the grown only just the body frame. Ducks already look big but the muscle in the chest is still thin. So on all ducks non-carcass parts such as head, neck, legs and inside part have developed first. The percentage of carcasses shows the proportion of the body part. Differences in the proportion of carcass occurs when there is a different grow of muscle, especially in the chest area at the same age. According [29] percentage of carcass is influenced by growth rate and quality of feed. Growth rates are indicated by the increase of live weight and the increase percentage of carcass.
The results of the highest Income Over Feed Cost (IOFC) was obtained at the P2 treatment that is Rp. 11,675.74 per head. This occurs because of the P2 has high body weight gain, while the amount of feed consumption is relatively the same. IOFC is one of the way to know the economic value in livestock business that is the income of duck sale, reduction with feed cost in one period of duck raising. The more efficient in feed conversion into life weight (its mean the feed conversion is low), the better of IOFC value [24]. IOFC is a barometer to see that the feed cost is the biggest cost in the livestock business [30]. Feed is the primary cost of the livestock business in intensive system where feed costs reaches about 70% of the total production cost, therefore the feed ingredient price greatly affects the production cost [31]. Factors influencing the value of IOFC are feed consumption, final body weight, price per kg of ration and price per kg of live weight [24].

4. Conclusions
The level of gold snails (Pomacea canaliculata) and Noni Fruits (Morinda citrifolia L) in the ration had an effect on body weight gain, feed conversion and carcass weight, but had no effect on feed consumption and carcass percentage. The level of gold snails 5% and noni fruit 0.06% in the ration produced the best Rambon duck performance with the value of Income Over Feed Cost Rp. 11,675.74 per head.

Acknowledgements
The authors would like to thank to the Rector of Universitas Padjadjaran who has funded this research through the Internal Grants of Unpad and to Nanda, Rizki, Yusita, Fakhri, Gumilar, Dimas and Fauzan who have assisted the research.

References
[1] Laboratorium Nutrisi dan Makanan Ternak 1995 Fakultas Peternakan Universitas Padjadjaran
[2] Setioko A R, Sopa S, Tine S 2005 Identifikasi Sifat-Sifat Kwalitatif dan Ukuran Tubuh Pada Itik Tegal, Itik Cirebon dan Itik Turi Seminar Nasional Teknologi Peternakan dan Veteriner BPT. Bogor.
[3] Ahmad S, Rohaeni E S, Qomariah R 2009 Pengaruh Penggunaan Kombinasi Sagu Kukus dan Tepung Keong Mas Dalam Formulasi Pakan Terhadap Performans Itik Jantan MA Umur 1 – 8 Minggu Seminar Nasional Teknologi Peternakan dan Veteriner Balai Pengkajian Teknologi Pertanian Kalimantan Selatan.
[4] Purmananingsih A 2010 Pengaruh Penambahan Tepung Keong Mas (Pomacea canaliculata Lamarck) Dalam Ransum Terhadap Kualitas Telur Itik Skripsi Fakultas Pertanian Universitas Sebelas Maret Surakarta.
[5] Darmawan F 1996 Pengaruh Pemberian Berbagai Tingkat Tepung Daging Keong Murbei (Pomacea canaliculata) sebagai Pengganti Tepung Ikan Dalam Ransum Terhadap Performans Ayam Jantan Tipe Medium Skripsi Fakultas Peternakan Unpad Sumedang.
[6] Wirontono A 2001 Pengaruh Pemberian Ransum Yang Mengandung Berbagai Tingkat Tepung Daging Keong Mas (Pomacea canaliculata) yang Diolah Dengan Kapur Sirih, Terhadap Performan Ayam Broiler Skripsi Fakultas Peternakan Unpad Sumedang.
[7] Cheeke P R 2001 Actual and Potential of Yucca Schidigera and Quillaja Saponaria in Human and Animal Nutrition Recent Adv Animal Nutr. Aust. 13: 115-126.
[8] Miah M Y, Rahman M S, Islam M K, Monir M M 2004 Effects of Saponin and L-carnitine on The Performance and Reproductive Fitness of Male Broiler Int. J. Poutry Sci 3:530- 533.
[9] Jhonson I T, Gee J M, Price K, Culk C, Fenwick G R 1986 Influence of Saponin on Gut Permeability and Active Nutrien Transport in Vitro J Nutr,115: 2270-2277.
[10] Onning G, Q Wang, B R Westbrom, N Asp, B W Karlson 1996 Influence of Oat Saponins on Intestinal Permeability in vitro and in vivo in The Rat Br J. Nutr. 76: 141-145.
[11] Heinicke 1994 Xeronin and Cell Regeneration in scientific Research on Noni Fruit Alexandra Dittimor Frangifrut.
[12] Wijayakusuma H M 1992 Tanaman Berkhasiat Obat di Indonesia. Jilid 1 Pustaka Kartini Jakarta pp. 9
[13] Winarno R G 2003 Rahasia Morinda Citrifolia atau Noni. www.kompas.com/harian/0110/rgml.html diakses tanggal 20 Maret 2016.
[14] Djauhariya E, Rahardjo M, Ma'mun 2006 Karakterisasi Morfologi dan Mutu Buah Mengkudu. *Bul. Plasma Nutr.* **12**(1).
[15] Sujana E, Syafril D, Garnida D 2007 Efek Pemberian Ransum Mengandung Tepung Buah Mengkudu (*Morinda citrifolia* Linn) Terhadap Performa Ayam Broiler Seminar Nasional "Pengembangan Sistem Produksi dan Pemanfaatan Sumberdaya Lokal untuk Kemandirian Pangan Asal Hewan" Fakultas Peternakan Unpad Sumedang.
[16] Bintang L A K, Sinurat A P, Purwadaria T 2007 Supplementation of Morinda citrifolia waste as bioactive compound on the Performances of Broiler *JITV* **12**(1): 1-5
[17] Sinurat A P 2000 Penyusunan Ransum Ayam Burat dan Itik. *Pelatihan Proyek Pengembangan Agribisnis Peternakan* Dinas Peternakan DKI Jakarta
[18] Ensminger 1980 *Poultry Science* Second Edition The Interstate Printers & Publisher Inc. Danville Illinois.
[21] Djauhariya E, Tirtoboma 2002 Mengkudu (*Morinda citrifolia* L.) Tanaman Obat Tradisional Multi Khasiat *Warta Penelitian dan Pengembangan Pertanian* **7**: 1-7
[22] Sulistiono 2007 Keong Mas Sumber Pakan dan Obat-obatan. *Departemen Manajemen Sumberdaya Perairan* Fakultas Perikanan dan Ilmu Kelautan Institut Pertanian Bogor
[23] Bayu W, Heny Setyo P, Nuryadi 2015 Pengaruh Penambahan tepung Buah Mengkudu (*Morinda citrifolia* L.) Dalam Pakan Terhadap Penampilan Produksi Itik Hibrida *Jurnal Ilmu-Ilmu Peternakan* Fapet UB. **25**(2): 28-35. [http://jiip.ub.ac.id/]
[24] Rasyaf M 2004 Beternak Ayam Pedaging *PT Penebar Swadaya*, Jakarta
[25] Abidin Z 2002 Meningkatkan Produktifitas Ayam Kampung Pedaging *Agromedia Pustaka*
[26] Kamal M 1997 Pengaruh penambahan DL metionin sintetis ke dalam ransum fase akhir terhadap perlemanan tubuh ayam broiler *Bull Peternakan* **18**: 40 – 46.
[27] Zuprizal 1993 Pengaruh penggunaan pakan tinggi protein terhadap penampilan, karkas dan perlemanan ayam pedaging fase akhir *Bull. Peternakan* **17**: 110 – 118.
[28] Iskandar S 2005 Pertumbuhan dan Perkembangan Karkas Ayam Silangan Kedu x Arab Pada Dua Sistem Pemberian Ransum *JITV* **10**(4): 253-259
[29] Soeparno 2005 Ilmu dan Teknologi Daging Cetakan Keempat *Gadjah Mada University Press* Yogyakarta.
[30] Prawirokusumo S 1990 Ilmu Gizi Komparatif *BPFE* Yogyakarta.
[31] Supriyati, Z D, Kompiang I P, Soekanto P, Abdurachman 2003 Peningkatan Mutu Onggok Melalui Fermentasi dan Pemanfaatannya Sebagai Bahan Pakan Ayam Kampung *Pros. Seminar Nasional Teknologi Peternakan dan Veteriner* Bogor.