American Journal of Engineering Research (AJER)
e-ISSN: 2320-0847 p-ISSN : 2320-0936
Volume-10, Issue-05, pp: 99-104
www.ajer.org
Research Paper Open Access

The Use of Red Fruit Dregs Supplementation to Physical and Chemical Quality of Quail Egg

Selly Wijaya[1], Sjofjan O[2], and Junaidi I H[3*]
[1]*Postgraduate Student, Faculty of Animal Science, University of Brawijaya, Malang 65145, Indonesia*
[2]*Lecture of Animal Nutrition and Food Science, Faculty of Animal Science, University of Brawijaya, Malang 65145, Indonesia*
[3]*Lecture of Animal Nutrition and Food Science, Faculty of Animal Science, University of Brawijaya, Malang 65145, Indonesia*

ABSTRACT : *This research aimed to discover the phytochemicals profile of red fruit dregs using GC-MS instrument and red fruit dregs supplementation to quail egg's chemical and physical quality. The applied materials are red fruit dregs for laboratory analysis, while field research applied 200 laying quails aged at 30 days old. The method used is experimental with a completely randomized design grouped into 5 treatments and 4 replications using 10 quails in every single experiment. The tested treatments were P0 (basal feed), red fruit dregs additions to feed P1 (0.25%), P1 (0.5%), P2 (0.75%) and P4 (1%). The result of GC-MS interpretation was subsequently served to the 10 highest compounds based on its area. The variables used are specific gravity, yellow volume, white volume, Haugh Unit, total cholesterol and antioxidant content. Data were analyzed using ANOVA and continued with Duncan Multiple Range Test if it has significant results. The GC-MS analysis found formic acid compound filled the largest order of area; formic acid 51.42%, dimethylamine 3.69%, and antrachen 3.02%. The result showed that red fruit dregs significantly affected (P<0.01) physical and chemical quality of egg in specific gravity value, albumen weight, yolk weight, and antioxidant energy, also provided significant influence (P>0.05) to the chemical and physical quality of egg in cholesterol content and Haugh Unit. The research concluded providing 1% red fruit dregs can increase physical egg quality in specific gravity, albumen, and yolk, and providing 0.25% red fruit dregs can decrease the cholesterol level of a quail egg.*
KEYWORDS: *red fruit dreg, chemical quality, physical quality, laying quail, quail egg*

Date of Submission: 27-04-2021 Date of acceptance: 11-05-2021

I. INTRODUCTION

Feed is the basic need for livestock survival; therefore, the quality and quantity should be good and balance. The improvement of feed quality, especially in poultry, can be conducted through various attempts to select the best quality of feed commodities such as corn, bran, MBM, vitamin, mineral, which is selected strictly and regularly its quality test. However, there is an improvement of feed quality by adding other substances to optimize primary feed more. Based on NRC table (1994) the quail feed's nutrient needs were 2900 kcal/kg metabolism energy, 20-24% protein, 1% fat. Widodo (2017) wrote 3-5% mineral, 3.8% calcium, 3.8% phosphor and 500 ppm vitamin. Feed-in poultry ration was expected to fill standard criteria that have been made so the nutrient needs of poultry can be fulfilled in balance. The balance in feed, definitely, affected the production result of poultry, especially quails.

The research had found the good active substance content in red fruit, and its natural substance could increase and be used to support human health. Active substances in red fruit are tocopherol (vitamin E), alpha-tocopherol, and beta-carotene that functioned as an antioxidant to prevent free radicals and increase immunity (Budi., 2001). Red fruit dregs contained unsaturated fatty acid, such as oleic acid (5162.9 mg A1/100gr), linoleic acid (omega 6) (438 mg A1/100gr), linolenic acid (omega 3) (201 mg A1/100gr), based on the research result conducted by Yuanita (2009). Tocopherol (vitamin E) inside the body functioned as a natural antioxidant. At the same time, beta-carotene was an early form of vitamin A as preventing free radical that cause disease because it also had an antioxidant molecule that had identical function unsaturated fatty acid above had an essential role inside the body; for instance, omega 3 functioned to increase the health of the heart by producing "good" HDL for the body. Three components of the active substance (Tocopherol, Beta-carotene, and

unsaturated fatty acid) inside red fruit shaped suitable antioxidant compound inside the body to prevent free radical produced from the process of metabolism or environmental exposure outside the body.The quail egg was one of the cheap and procurable animal proteins, but elderly customers started to avoid it because of high cholesterol nutrients. Thus the use of red fruit dregs that contained fatty acid should be counted.

Based on the description above, it needs to research to discover the use of red fruit dregs as supplementation to the chemical and physical quality of quail egg.

II. MATERIAL DAN METHOD

Material

The research applied red fruit dregs and 200 laying quails *(Coturnixcoturnix japonica)* aged 30 days old, divided into 5 treatments and 4 replications; every replication has 10 quail eggs with an approximate bodyweight of 125-127 gr/bird for field research. Feeding was conducted twice a day with the amount of feed 25g/bird/day, whereas mineral water was given *ad libitum.* Red fruit dregs with different levels were added into feed consisted of corn, wheat flavor, soybean meal, bone and meat flour, glutter, wheat bran, DDGS, palm oil, methionine, lysine, and cystine. The result of phytochemical analysis GC-MS red fruit dregs can be seen in Table 1 and Fig 1. The compound content of red fruit dreg is in Table 2.

Table.1 The Phytochemical Result of GC-MS Red Fruit Dregs

No	Chemistry Name	Molecule Formula	Retention Time	Area (%)	Compound Group	Activity
1	Formic acid	CH2O2	1.30	51.42	Organic-aliphatic	Antibacterial, feed preservative
2	Dimethylamine	C2H7N	1.63	3.69	Organic-Flavonoids	Antibacterial
3	Anthrachene	C38H19Cl3	2.15	3.02	Phenol	Antibacterial
4	2.6-Bis[5-cyano-6-(4-bromophenyl)-1,2,4-triazine-3-y1)pyridine	C25H11Br2 N9	43.48	3.02	Organic heterocyclic-pyridine derivate	Antibacterial
5	4-vinyl-1-oxa-2-thiaspiro[4.4]nonane2-oxide	C9H14O2S	32.84	2.86	Thermoplastic polymer	Antioxidant
6	Copper, (2,8,12,18 Tetraethyl-3,7,13,17-tetramethyl-21H,23H-porphionato(2-)-N21,N22,N23,N24)-,(SP-4-1)	C32H36CuN4	8.47	2.67	Metal	Formation Hemoglobin-absorption Fe
7	ZINC CHLORIDE OXIDIZED OCTAMETHYL PORPHINE COMPLEX	C28H37ClN 4OZn	8.01	2.66	Metal –aromatic organic	Antibacterial, disinfectant
8	.psi.,.psi.-Carotene	C40H56	44.74	2.58	Organic-dye	Antioxidant
9	Dibenz[a,j]antracene-14-carboxylic acid, 2.12-dibromo-7-phenyl-,methyl ester	C30H18Br2O2	11.6	2.56	Phenol	Antibacterial
10	1.4-BIS (3.5-dibromo-2-thienyl) benzene	C14H6Br4S2	5.56	2.46	Alkanoids	Antioxidant

Note: The research result applied GC-MS in Balitkabi Malang

Fig.1 The Phytochemical Result of GC-MS Red Fruit Dregs

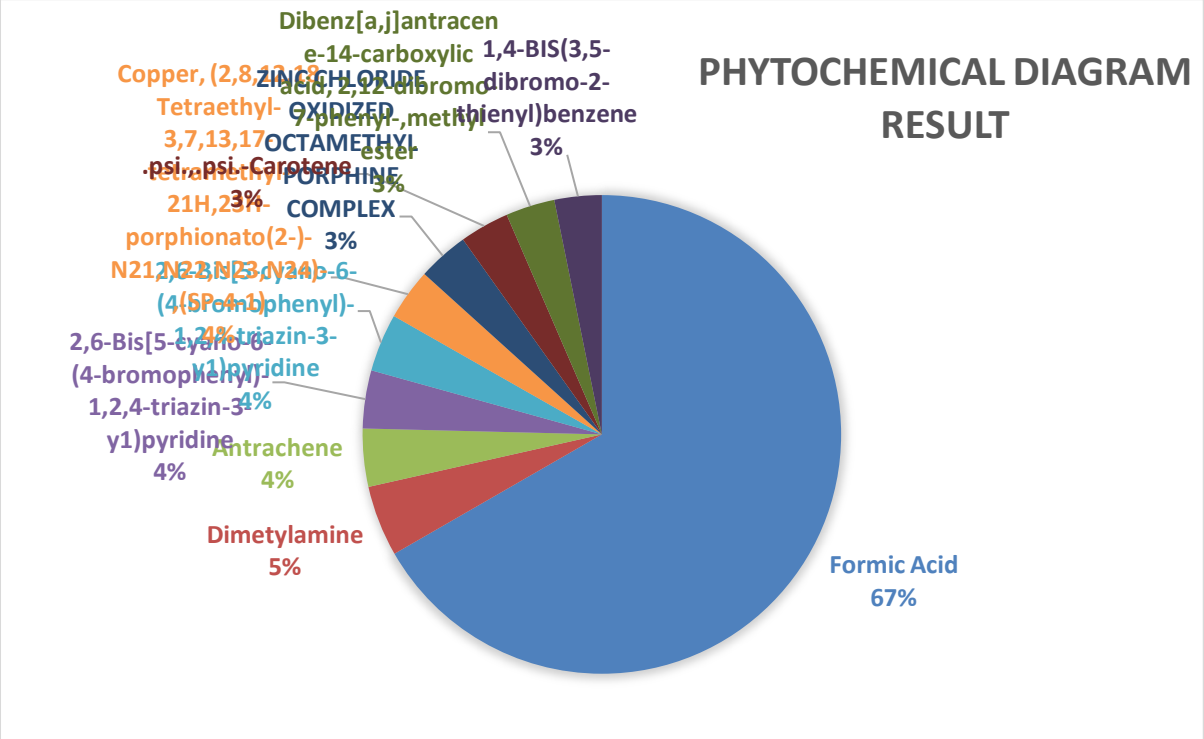

Table. **2** Active and Biochemicals Compounds of Red Fruit Dreg

Active Compound**	Total	Biochemical *	Total
Saturated Fatty acid:		β-Carotene	197.69 µg/g
Palmitic Acid (mg/100g)	3188.5	Carotene Total	276.54 µg/g
Stereate Acid (mg/100g)	147.8	Anthocyanin	33.74 mg/100gr
Unsaturated Fatty Acid:		Antioxidant IC50	5.282 µg/ml
Oleic Acid (mg/100g)	5162.9		
Linoleic Acid (mg/100g)	438		
Linoleic Acid (mg/100g)	201		

Sources: ** YuanitaIis (2009)

* 1. The antioxidant analysis in the Laboratory of State Polytechnic of Malang

2. The beta-carotene carotene total analysis in food and nutrition laboratory of Gajah Mada University of Yogyakarta

3. The Anthocyanin analysis in the Laboratory of BB Pascapanen Bogor

Method

The method applied field experiment using completely randomized design using ANOVA which classified into 5 treatments and 4 replications. If there is a significant difference in the research result, it should be conducted Multiple Distance Duncan Test. Every replication has 10 quails with giving red fruit dregs to feed as follows:

P0 = Basal feed

P1 = Basal feed + 0.25% red fruit dregs

P2 = Basal feed + 0.5% red fruit dregs

P3 = Basal feed + 0.75% red fruit dregs

P4 = Basal feed + 1% red fruit dregs

The applied variables were specific gravity value, albumen weight (gr/item), yolk weight (gr/item), Haugh Unit, total cholesterol, and antioxidant content.

III. Finding and Discussion

The result of the use of red fruit supplementation in feed to the physical quality of quail egg consisted of specific gravity value, albumen volume (gr/item), yolk volume (gr/item), Haugh Unit, and the chemical quality consisted of cholesterol level and quail egg antioxidant (µg/gr) can be seen in Table 3.

Table 3. Physical and Chemical Quality Results of Quail Eggs

Variable	Treatments				
	P0	P1	P2	P3	P4
Specific Gravity	1.0527 ± 0.0001[a]	1.0529 ± 0.00009[b]	1.0530 ± 0.00005[b]	1.0533 ± 0.0001[c]	1.0537 ± 0.00009[d]
Albumen Weight (g/item)	5.082 ± 0.297[a]	5.485 ± 0.133[a]	5.438 ± 0.276[a]	6.002 ± 0.162[b]	6.317 ± 0.181[b]
Yolk Weight (g/item)	2.913 ± 0.238[a]	2.999 ± 0.179[ab]	3.216 ± 0.088[ab]	3.310 ± 0.077[b]	3.459 ± 0.082[b]
Haugh Unit	98.84 ± 1.77[b]	93.24 ± 2.47[ab]	92.33 ± 2.82[ab]	91.31 ± 1.84[ab]	89.24 ± 1.83[a]
Total Cholesterol (gr/100 gr)	1.034 ± 0.14[ab]	0.933 ± 0.313[a]	1.204 ± 0.066[ab]	1.116 ± 0.026[ab]	1.324 ± 0.019[b]
Antioxidant IC50 (mg/gr)	209.5 ± 0.643[c]	207.1 ± 0.728[b]	216.3 ± 1.124[d]	218.8 ± 1.248	197.4 ± 0.866[a]

Note: - Superscript notation (a-c) on the same line shows a substantial distinctness (P<0.01) and (P>0.05).

The Influence of the Treatments

Specific Gravity

The statistical analysis results in Table 3 showed that adding red fruit dregs on feed had an actual difference (P<0.01). Value in Table 3 showed that the highest specific gravity of egg was obtained on treatment P4 (1.0537 ± 0.00009[d]) by adding 1% red fruit dregs. The highest value of specific gravity showed eggshell pores that were not opened widely yet that affected albumen quality and caused the depreciation of egg weight. The higher values of specific gravity showed the thicker eggshell. The highest value of specific gravity described high calcium carbonate content ($CaCO_3$); therefore, eggshell would have high quality. Harmayanda et al. (2016) stated that shell thickness positively influenced specific gravity. It was due to the positive influence of calcium consumption in the ratio. The research of Satria et al. (2016) stated that giving supplementation of moringa leaf flour to ration of laying chicken successfully increased the appearance of production and chicken egg quality where 2% of its addition produced a better quality of the egg.

Albumen Weight

The variance analysis result showed that the use of red fruit dregs on laying quail feed provided significant influence (P<0.01). In Table 3, the highest value was obtained on treatment P4 (6.317±0.181[b]) gr/item by adding 1% red fruit dregs. It showed that 1% supplementation of red fruit dregs could increase albumen weight. Campbell et al. (2003) stated albumen consisted of four layers that are outer thin white, thick white, inner thin white, thick white around yolk or chalaziferous layer. According to Heranita's research (1998) with treatment of fatty acid concentrates Omega-3, the albumen average can be obtained 47.5%. While Wiradimaja et al. (2004) measured the average of albumen added 50.2% rations containing katuk leaf flour (Sauropusandrogynus L. Merr) on quail aged at 4 weeks old.

Yolk Weight

The yolk is part of the egg that is round, yellow until orange, and on the egg's middle. The yolk is covered by a thick membrane called membrane vitellin. The statistical analysis result showed that red fruit dregs on laying quail feed provided actual different influence (P<0.01). The highest value was on treatment P4 with adding 1% red fruit dregs precisely (3.459 ± 0.082[b]) gr/item. According to Sihombing et al. (2006), the percentage average of yolk given treatment of zeolite addition until 10% in bran with quail aged at 6 weeks or ready to lay eggs was 29.67%. Wiradimaja et al. (2004) measured the albumen's average added 31.2% ratio containing katuk leaf flour (Sauropusandrogynus L. Merr) on quail aged at 4 weeks old. Komala (2008) stated that protein is the most significant component of albumen yolk arrangement besides water and fat (on yolk). It was strengthened by Saerang's (1995) research result about the use of coconut oil in quail feed that could increase yolk weight from 4.20 g to 4.92 g. It is compatible with this research that the addition of red fruit dregs can increase yolk weight from 2.9 gr to 3.4 gr.

Haugh Unit

The statistic analysis result showed that giving red fruit dregs to quail feed had a significant influence (P<0.05) on the Haugh Unit of a quail egg. Arif et al. (2003) stated that egg weight could influence HU because from calculation formula HU = 100 logs (H + 7.57 – 1.7w0.37) where: HU = Haugh Unit, H = albumen height, W = egg weight (g), therefore it can be said that the heavier egg, the smaller HU. The highest result of HU was obtained on treatment P0 (98.84 ± 1.77^{b}), control treatment, and it was also compatible with the previous statement where control treatment of egg relatively had the lightest weight among all treatments. According to Parizadian et al. (2011) the HU value of quail egg was 92.88.

Total Cholesterol

The research showed that giving red fruit dregs to laying quail's feed provided strong influence (P<0.05); the result of the print analysis appeared to be a difference of significant value. The best treatment was P1 (0.933 ± 0.313^{a}), where it occurred the reduction of cholesterol level compared to control P0, by giving 0.25% red fruit dregs to feed. The influence of level reduction was caused by level of fatty acid contained in red fruit dregs in omega 3 and omega 6. The best dose was showed in P1. It was found that giving 0.5%-1% red fruit dregs occurred increment of cholesterol level than control. One of the enhancements of cholesterol level to quail given 0.5%-1% red fruit dregs assumed because of good metabolism from quail consuming its red fruit dregs. Satria et al. (2016) stated that the addition of 2% moringa leaf flour could decrease 2.56% cholesterol level of control treatment, moringa leaf flour contained high crude fiber and vitamin C could degrade triglycerides therefore decrease content of egg cholesterol.

Antioxidant Level IC50

The statistic analysis result showed that giving red fruit dregs to feed provided significant influence (P<0.01), the best antioxidant power in Table 3 was shown in Treatment P4 (197.4 ± 0.866^{a}), where the lower IC50 value, the more substantial antioxidant power of material. It was based on the determination of antioxidant activity in Table. 4 below:

Intensity	IC_{50} Value
Over powering	<50 ppm
Strong	50-100 ppm
Medium	100-150 ppm
Weak	>200 ppm

Source: Mardawati, et al. (2008)

It could be concluded that antioxidant activity in this research was in the weak category because total consumption on feed mixed relatively low and was at a rate of 0.25%-1%; therefore, it did not influence the increase of antioxidant power in the quail egg.

IV. CONCLUSION

The GC-MS analysis found that formic acid compound occupied the most significant order of its area; formic acid 51.42%, dimethylamine 3.69%, and anthracene 3.02%. The result showed that red fruit dregs can increase the egg's physical and chemical quality, particularly in specific gravity, albumen weight, yolk weight, and antioxidant energy, also content of egg cholesterol and Haugh Unit. In sum, providing 1% of red fruit dregs can increase egg's physical quality in specific gravity, albumen, and yolk, and providing 0.25% red fruit dregs can decrease the cholesterol level of a quail egg.

REFERENCES

[1]. Arif A., Irfan H Djunaidi., and O Sjofjan. 2013. Efek Penggunaan Ajitein dalam Pakan terhadap Kualitas Telur Ayam Petelur. Jurusan Ilmu Nutrisi Ruminansia. Universitas Brawijaya Malang. Malang .
[2]. Budi IM. 2001. Kajian Kandungan Zat Gizi dan Sifat Fisiko Kimia Berbagai Jenis Minyak Red fruit (Pandanusconoideus) Hasil Ekatraksi Secara Tradisional di Kab.Jayawijaya Irian Jaya. Thesis. IPB. Bogor
[3]. Campbell, N.A., Reece, J.B., & Mitchell, L.G. (2003). Biologi. Jilid 2. Edisi Kelima. Alih Bahasa: Wasmen. Jakarta: Penerbit Erlangga.
[4]. Harmayanda P.O.A., Rosyidi .D., Sjofjan .O., (2016). Evaluasi Kualitas Telur Dari Hasil Pemberian Beberapa Jenis Pakan Komersial Ayam Petelur. J-PAL , Vol.7, No. 1, 2016. ISSN:2087-3522.E-ISSN:2338-1671
[5]. Heranita, N . A. 1998. Pengaruh Penggunaan Konsentrat Asam Lemak Omega-3 dan sumber Lemak Lain dalam Ransum terhadap Konsentrasi Kolesterol, Komponen Asam Lemak Telur dan Performans Puyuh Petelur. Skripsi. Fakultas Peternakan. Institutete Pertanian Bogor. Bogor.
[6]. Komala, I. 2008. Kandungan Gizi Produk Peternakan. Student master Animal Science, Fac. Agriculture-UPM

[7]. Mardawati, E; F. Filiantydan H. Marta.2008. Kajian Aktivitas Antioksidan Ekstrak Kulit Manggis (Garciniamangostana L) Dalam Rangka Pemanfaatan Limbah Kulit Manggis Di Kecamatan Puspahiang Kabupaten Tasikmalaya. Fakultas Teknologi Industri Pertanian Universitas Padjadjaran. Bandung
[8]. NRC. 1994. Nutrient requirements of Poultry. 9th revised edition.National Academic Press. Washington DC
[9]. Parazadian, B.,Y. J. Ahangari, M. S. Sharg,and A. Sardarzadeh. 2011.Effects of Different Levels of L-carnitine Supplementation on egg Quality and Blood Parameters of Laying Japanese Quail. International Journal Poultry Science. 10(8):621-625, 2011.ISSN 1682-8356.
[10]. Satria, W. E. Sjofjan. O. and Djunaidi. H. I. 2016. Effect Of Moringa (*Moringa oleifera*) Leaf Meal Supplementation In Layer Chicken Diets On Production Performance And Egg Quality. Buletin Peternakan Vol. 40(3): 197-202, Oktober 2016. ISSN-0126-4400. E-ISSN-2407-876X. Malang.
[11]. Saerang, J. L. P. 1995. Pengaruh minyak nabati dan lemak hewani dalam ransum puyuh petelur terhadap performans, dayatetas, kadar kolesterol telur, dan plasma darah. Pascasarjana Universitas Gadjah Mada, Yogyakarta. (Tesis
[12]. Widodo, Eko. 2017. Ilmu Nutrisi Unggas. Cetakan Pertama. Malang : UB Press
[13]. Wiradimaja, Rachmat, et al. 2004. Performans Kualitas Telur Puyuh Jepang yang diberi Ransum Mengandung Tepung Daun Katuk (Sauropusandrogynus, L.). Seminar Nasional. Fakultas Peternakan. Universitas Padjajaran. Bandung.
[14]. Yuanita, I., S. Murtini., and Imam Rahayu. 2009. Performa dan Kualitas Karkas Ayam Pedaging yang Diberi Pakan Tambahan Ampas Red fruit (Pandanusconoideus). Seminar Nasional Teknologi Peternakan Dan Veteriner 2009. Hal. 586-593.

Selly Wijaya, et. al. " The Use of Red Fruit Dregs Supplementation to Physical and Chemical Quality of Quail Egg."*American Journal of Engineering Research (AJER)*, vol. 10(5), 2021, pp. 99-104.