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EFFECTS OF INCLUSION OF STAR GOOSEBERRY DRIED LEAF EXTRACT IN RATION ON EGG ORGANOLEPTIC VALUES OF LOCAL DUCK

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ABSTRACT

Duck egg is known to have an unpleasant fishy odor which often becomes a factor reducing its acceptance in public. This odor is resulted from lipid oxidation which can be avoided by using an antioxidant. This study was aimed at assessing the effects of the inclusion of star gooseberry (*Sauropus androgynus*) dried leaf extract in ration on egg organoleptic quality of local duck. The study was conducted in a completely randomized design with 4 treatments and 4 replicates. Sensory test by 60 semi-trained panelists and hedonic quality and hedonic tests were conducted. Data were subjected to a Kruskal-Wallis test. Results showed that treatments gave significant effects ($P < 0.05$) on aroma (hedonic), yolk color, and aroma (hedonic quality). It was concluded that the inclusion of star gooseberry dried leaf extract by 1,5% in ration improved the quality of egg yolk color, egg aroma, and consumers' preference. A further study on the effects of DSGLE on meat quality and protein digestibility in ducks was recommended.

1. INTRODUCTION

Duck egg is a potential food providing animal protein. However, consumer's acceptance of it is not quite satisfying and this is suspected to be caused by its off odor. This off odor is related to body fat content of ducks which is higher than that of chickens. The off odor in eggs is affected by lipid bonds in egg yolk which contains hundreds of volatile components (Linden, G. and Lorient, 1999). Oxidation of fat molecules containing saturated fatty acid radicals produces odor (Winarno, F.G. dan Koswara, 2002). Lipid derivatives found in duck meat include aldehydes, alcohols, ketones, carboxylic acids, and hydrocarbons (Hustiany, 2001)

Lipid oxidation can be effectively prevented by antioxidants. Star gooseberry is an herbaceous plant that contains flavonoid antioxidants (Loan et al., 2017) Flavonoids can fight hydroxyl radicals, superoxide anions, and peroxy fatty radicals. (Mulyana et al., 2013) reported that giving star gooseberry leaf infusion at a dose of 25 ml and 50 ml reduced triglyceride levels in goat blood serum.

Egg production is affected by genetic and environmental factors. Genetic factor determines sexual maturity age and environmental factors include feed, health condition, and environmental temperature. Improvement of egg production and quality can be done through feeding treatments. This study was aimed at assessing the effects of star gooseberry dried leaf extract (SDGLE) inclusion in ration on egg organoleptic quality of local duck.

2. METHODS

2.1. Animals

One-hundred-twelve local ducks were evenly allocated into 16 battery cages (7 ducks per cage) in a completely randomized design with 4 treatments and 4 replicates. Cages and the laboratory floor were cleaned with detergent and sprayed with disinfectant 5 days prior to duck arrival.

2.2. Preparation of dried star gooseberry leaf extract

Wilted star gooseberry leaves (SGL) were further dried in an oven at 50ºC for 24 hours. Dried leaves were ground by using a blender. The ground leaves were sieved, and the finer SGL meal was collected. Extraction was conducted by adopting the method used by (Suprayogi et al., 2015). SGL meal (2 kg) was diluted in 13 liters of ethanol (80%) solution. The mixture was stirred up for 30 minutes before it was macerated for 24 hours. The macerated mixture was then filtered through a flannel fabric and filter paper and the filtrate was collected. Extraction was conducted 3 times until the solution was relatively clear. The filtrate was evaporated by using a rotary evaporator at 50ºC and the evaporated filtrate was referred to as DSGLE.

2.3. Treatment rations

All animals were fed basal rations. DSGLE was included in treatment rations consisting of basal ration + 0% DSGLE (R0, control), basal ration + 0.5% DSGLE (R1), basal ration + 1.0% DSGLE (R2), and basal ration + 1.5% DSGLE (R3).

2.4. Statistical analyses

Sixty semi-skilled panelists were involved in the organoleptic tests. They determined their perception on the odor and gave scores to the level of quality of the eggs. In the hedonic

test, panelists' perceived likeness to the egg quality was scaled as dislike extremely (1), dislike (2), like (3), and like extremely (4) (Rahayu, 1998). In hedonic quality test, panelists' perceptions were scaled as extremely hard (1), hard (2), slightly hard (3), and not hard (4) for egg white texture; light yellow (1), yellow (2), orangish yellow (3), and orange (4) for egg yolk color; and fishy (1), slightly fishy (2), neutral (3), and not fishy (4) for egg aroma. Data obtained from hedonic and hedonic quality tests were subjected to a Kruskal-Wallis test (Gomez, K.A. dan Gomez, 2007)

3. RESULTS AND DISCUSSION

Organoleptic test is a common sensory assessment of the quality of a product. Hedonic test is conducted to assess panelists' likeness to a tested product by giving their perception based on the given criteria. Results of hedonic and hedonic quality tests in this study are presented in Table 1 and 2. Duck eggs contain high amount of saturated fatty acids including vaccenic and arachidonic acids. Oxidation and decomposition of these fatty acids result in the production of off odor. Lipid oxidation can be effectively avoided using antioxidant. Star gooseberry leaves contain flavonoids which, with their antioxidative properties, can fight hydroxyl radicals, superoxide anions, and peroxyl radicals of fats (Subekti et al., 2008)

Table 1 Panelists likeness to egg white, yolk, and aroma

Treatment	Egg White	Egg Yolk	Egg Aroma
R0	1.45 ± 0.85	3.08 ± 0.80^{a}	2.03 ± 1.05^{a}
R1	1.58 ± 0.84	2.98 ± 0.83^{a}	2.20 ± 0.99^{a}
R2	2.18 ± 0.90	3.32 ± 0.91^{ab}	2.38 ± 0.77^{a}
R3	2.55 ± 0.71	2.80 ± 0.91^{b}	2.75 ± 0.74^{b}

Remarks: different superscripts in the same column indicate significant differences (P<0.05)

Table 2 Panelists perception on the quality of eggs

Treatment	Egg White	Egg Yolk	Egg Aroma	Egg Taste	Texture	Appearance
R0	2.48 ± 0.85	2.58 ± 0.75	2.20 ± 0.85^{a}	2.93 ± 0.80	2.80 ± 0.69	2.90 ± 0.81
R1	2.50 ± 0.96	2.50 ± 0.85	2.45 ± 0.81^{ab}	2.75 ± 0.71	2.75 ± 0.67	2.68 ± 0.81
R2	2.68 ± 0.97	2.73 ± 0.85	2.30 ± 0.85^{a}	2.65 ± 0.86	2.75 ± 0.87	2.73 ± 0.85
R3	2.80 ± 0.79	2.90 ± 0.84	2.75 ± 0.54^{b}	2.83 ± 0.75	2.85 ± 0.74	2.95 ± 0.81

Remarks: different superscripts in the same column indicate significant differences (P<0.05)

Results of hedonic test were closely related to those of hedonic quality test. The inclusion of DSGLE in ration gave significant effect (P<0.05) on the aroma of egg (hedonic test). The inclusion of 1.5% DSGLE resulted in egg aroma which was most liked by the panelists. Sulfuric aroma was found to be the main aroma of boiled egg white and egg yolk. This could be attributed to the evaporation of H2S gas (Stadelman, W. J. and Cotterill, 1995). Better aroma found in egg of ducks given DSGLE might be the indication of less oxidation occurred as the ducks consumed ration with higher content of antioxidative substances. However, no measurement was taken on the antioxidative properties of DSGLE was taken in this study.

No significant effect (P>0.05) of DSGLE inclusion in ration was found on the texture of and consumers likeness to egg white. Panelists' likeness to white egg texture was about 1.45 to 2.55. The inclusion of DSGLE in ration tended to lower the elasticity of egg white. DSGLE inclusion in ration was not found to change panelists' likeness to egg white and yolk.

4. CONCLUSION

The inclusion of DSGLE could improve the color of egg yolk and suppress egg off odor. Feeding ducks with ration containing 1.5% DSGLE resulted in eggs with the best egg yolk and aroma. The inclusion of DSGLE in ration did not change the panelists' perception on egg white and egg yolk.

It was suggested that a further study on the effects of DSGLE on meat quality and protein digestibility in ducks be conducted. Measurements on the oxidative activities of rations containing DSGLE also need to be conducted for more conclusive results.

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