

Evaluation Of Antioxidant Activity In Indigenous Afkir Female Tegal Ducks

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Abstract: Antioxidant activity of duck's leg and breast meat was investigated in Animal Science Faculty, Diponegoro University Semarang. Duck's leg and breast meat of 24 month female Tegal's duck was analyze using free radical scavenging 2,2-diphenyl-1-picrylhydrazyl (DPPH) methods to estimate antioxidant activity. Total lipid was estimate using soxhlet method and peroxide value was estimate using thiobarbituric acid method. Antioxidant activity of leg's meat was higher than breast meat (7,54 % : 6.09 %). Investigation of total lipid showed that leg's meat total lipid (10.46 %) was higher than breast's meat (9,36 %). Peroxide value of leg's meat (1.03) are higher than breast meat (0.86).

INTRODUCTION

Duck meat serves as a source of fat and protein for humans. The high fat and protein availability makes duck meat prone to oxidation, which poses a risk of rapid spoilage. The oxidation process can lead to the formation of various new compounds harmful to human health, known as free radicals. Free radicals are compounds or molecules that contain one or more unpaired electrons in their outer orbitals. The presence of unpaired electrons makes these compounds highly reactive, as they seek to pair up by attacking and binding to the electrons of nearby molecules (Soetmaji, 1998).

Oxidation can be prevented by antioxidant compounds, thus preventing the formation of harmful compounds. According to Winarsi (2007), oxidants are compounds that accept electrons or can attract electrons. Fresh duck meat contains very few antioxidant compounds, making it unable to prevent oxidation at ambient temperatures. Some compounds classified as endogenous antioxidants include tocopherol, carnosine, lipoic acid, and various enzyme systems (Decker and Mei, 1996).

The amount of antioxidant compounds is influenced by the nutrient availability in a food material, so differences in fat or protein content can lead to variations in antioxidant compound levels. The primary targets of antioxidants are proteins, unsaturated fatty acids, lipoproteins, and DNA elements, including carbohydrates

(Winarsi, 2007). A study conducted by Purba et al., 2010, showed that adding antioxidants to feed can affect lipid oxidation in boiled duck meat.

The parts of duck meat commonly consumed are the thigh and breast. Previous studies have shown that the thigh and breast contain different levels of total fat, suggesting that their antioxidant contents may also differ. The factors affecting poultry meat quality are divided into two: live poultry quality factors and post-slaughter factors. The live poultry quality factors include age, sex, genetics, nutrition, and environment (Richardson and Mead, 1999).

A study on the antioxidant properties of four-month-old local male duck meat was conducted at the Faculty of Agriculture and Animal Husbandry, Diponegoro University. This study aimed to determine which part of the duck meat has the highest antioxidant activity, as the first step in developing functional foods based on local livestock products.

RESEARCH METHODS

The research aims to determine the type of duck and the part of meat with the highest antioxidant activity. Materials used in the study include thigh and breast meat from 24-month-old female Tegal ducks, DPPH reagent, methanol, distilled water, TBA reagent, and Soxhlet equipment.

The research variables observed include antioxidant activity, total fat, and peroxide value, which were analyzed using the thiobarbituric acid assay. Antioxidant activity was analyzed using the DPPH free radical scavenging method. The DPPH solution (diphenyl picryl hydrazyl hydrate) at 0.004% in ethanol (standard reagent) must always be freshly prepared. Two mg of meat extract were dissolved in 4 ml of deionized water, then 1 ml of DPPH solution (1mM) was added. The mixture was homogenized and left at room temperature for 30 minutes before measuring absorbance. Absorbance was measured using a spectrophotometer at a wavelength of 517 nm.

The steps for peroxide value analysis are as follows: Five grams of meat were mixed with 15 ml of trichloroacetic acid solution (75 g TCA/l, 1 g propyl gallate/l, 1 g EDTA/l) and homogenized in an Ultra Turrax homogenizer (Jankel-Kunkel, Breggau, Germany). The dispersion was then filtered through a Whatman 41 filter (Whatman, Maidstone, England). Five ml of the filtrate was mixed with 5 ml of thiobarbituric acid

solution (2.88 g/l). Afterward, it was heated at 100°C for 40 minutes, and absorbance was measured at 532 nm. For TBARS concentration calculations, a standard solution of 1,1,3,3-tetraethoxypropane (0-3.75 µmol/l) was used. The data are expressed as µmol/kg of meat, with the analysis conducted in duplicate.

The laboratory analysis data are presented descriptively and interpreted according to the research objectives.

RESULTS AND DISCUSSION

Data on the antioxidant activity of duck meat is presented in Table 1.

Table 1. Antioxidant activity data of afkir female Tegal duck meat.

Meat Part	Antioxidant Activity
Thigh	7.54%
Breast	6.09%

The data in Table 1 indicates that the antioxidant activity in the thigh part of duck meat is higher than in the breast part. The difference in nutrient content between thigh and breast meat accounts for the variation in antioxidant activity values. The degradation of fats and proteins forms new components capable of functioning as antioxidants.

According to Soeparno (2011), the chemical composition of meat is influenced by genetic factors, such as species, breed, and sex. Furthermore, environmental factors like nutritional intake and livestock handling before and after slaughter also impact the chemical composition of meat.

Total fat content data for the thigh and breast parts of afkir female Tegal duck meat is presented in Table 2.

Table 2. Total fat data of afkir female Tegal duck meat

Meat Part	Total Fat
Thigh	10.46%
Breast	9.36%

The fat content in the thigh of the afkir female duck is higher than in the breast. The differences in the activity levels of the duck’s body parts during its life affect the fat content of the meat. According to Baeza (2006), genotype, diet, and age similarly influence fat content.

The rate of fat oxidation post-slaughter can affect total fat. Fatty acid oxidation will produce hydroperoxides and aldehydes, which contribute to protein oxidation (Estevez et al., 2009).

Peroxide values for thigh and breast meat of afkir female Tegal ducks are presented in Table 3.

Table 3. Peroxide value data of afkir female Tegal duck meat

Meat Part	Peroxide Value (mg malonaldehyde/kg)
Thigh	1.03
Breast	0.86

The peroxide value in the thigh meat of duck is higher than in the breast meat. Differences in peroxide values occur due to variations in total fat between meat parts. The higher total fat content in the thigh meat leads to faster oxidation or degradation.

CONCLUSION

The study concludes that the thigh meat of 24-month-old female Tegal ducks has a higher antioxidant activity compared to the breast meat. Additionally, the total fat content in the thigh meat is greater than in the breast meat, which influences the overall peroxide value. Consequently, the peroxide value is also higher in the thigh meat than in the breast meat of the same duck group. These findings suggest that the antioxidant properties, fat content, and oxidation potential vary significantly between different parts of the duck, highlighting the importance of meat selection based on desired nutritional and chemical properties.

REFERENCE

- Baeza, E. 2006. Effects of genotype, age and nutrition on intramuscular lipid and meat quality. Symposium COA/INRA Scientific Cooperation in Agriculture, Tainan. Taiwan.
- Estevez, M., D. Morcuende and S. Ventanas. 2009. Handbook of Processed Meat and Poultry Analysis : determination of oxydation. CRC Press. USA.
- Purba, M., E. B. Laconi, P.P. Ketaren, C.H. Wijaya dan P. Hardjosworo. 2009. Kualitas sensori dan komposisi asam lemak daging itik jantan lokal dengan suplementasi santoquin, Vitamin E dan C dalam ransum. JITV Vol 15No. 1 Tahun 2010 : 47-55. Bogor
- Richardson R.I. dan G.C. Mead. 1999. Poultry Meat Science. CAB International. United

Proceedings The 2nd Annual Dharmawangsa International Conference:
“Digital Technology And Environmental Awareness In Promoting Sustainable Behavior
In Society 5.0”

Kingdom.

Soeparno. 2011. Ilmu nutrisi dan gizi daging. Gadjah Mada University Press.
Yogyakarta.

Soetmaji, D.W. 1998. Peran Stres Oksidatif dalam Patogenesis Angiopati Mikro dan
Makro DM dalam : Medica. 5(24) : 318-325.

Winarsi, H. 2007. Antioksidan alami dan radikal bebas. Kanisius. Yogyakarta.