RESPONSE OF OFFERED FERMENTED PURPLE SWEET POTATO *(Ipomoea batatas* L) SKIN AS ANTIOXIDANT COMPOUND IN DIETS IMPROVED MEAT QUALITY OF BALI DUCK

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ABSTRACT

This experiment was carried out to study the response of offered fermented purple sweet potato(*Ipomoea batatas* L) skin as antioxidant compound in diets on quality meat quality of bali duck. Five treatment diets were used in a completely randomized design (CRD) consisted of control diet A (diet without containing purple sweet potato skin), diet B containing 10% purple sweet potato skin, diet C containing 10% fermented purple sweet potato skin, diet D containing 20% purple sweet potato skin and diet E containing 20% purple sweet potato skin. Each treatment consisred of four replications and each replication consisted of five ducks. Variable s observed in this study meat quality with obyective method consisted meat colour, water concentration, water holding capacty (WHC), pH, and cooking loss. Organoleptic quality consisted colour, smell, taste, texture, and to receive of whole. Anthocyanin, protein and crude fibre consumption. In general, the showed that offered fermented purple sweet potato skin in diets were significantly (P<0,05) increased the meat colour, water holding capacity, and pH, but on water concentration was not significantly (P>0,05) and on cooking loss was deceased significantly P<0,05). also could be increased organoleptic meat quality were colour, smell, taste, texture, and to receive of whole(P<0,05). Offered fermented purple sweet potato skin in diets could be increased anthocyanin and crude protein consumption. However, crude fibre consumption did not affected compared with the treament in A diet. It was concluded that the fermented purple sweet potato (*Ipomoea batatas L)* in diets could improve meat quality of Bali duck.

Keywords : fermented purple sweet skin, antioxidant, meatquality, and Bali duck

INTRODUCTION

Duck is poultry that is very productive to produce meat and eggs are rich in animal protein (Anggorodi, 1984) Meat ducks have a distinctive taste, but has had a smell fishy, rancid or the other is called *off-odor*, causing the quality of the meat to be down. Gray *et al.,* (1996) suggest that the lipid oxidation produces the rancid odor (rancid) and is a major factor in the decrease in the quality of the meat. Effect of lipid oxidation in addition produce odor and flavor that deviate from normal, nutritional content also be decreased. Hustainy (2001) reported a fishy smell in the flesh is the result of lipid oxidation. Duck meat contains unsaturated fatty acids is high (56.71%). Unsaturated fatty acid is a material that is susceptible to oxidation. The process of oxidation of fat will produce free radicals. The formation of free radicals resulting in the emergence of peroxides. Peroxides produce compounds such as aldehydes, alcohols,

aceton, carboxylic acids, and hydrocarbons having a characteristic odor. Lipid oxidation can be prevented by administering a substance which contains a compound which are antioxidants one of them is skin purple sweet potato *(Ipomoea batatas* L) fermented. Yadnya *et a*l., (2013) found that giving jalarungu fermented cassava in the ration can meperbaiki meat quality, good organoleptic, physical and texture of duck meat Bali age of 32 weeks. Rukmiasih *et al.,* (2011) reported beluntas, vitaminC and Esebagai antioxidants can reduce the intensity of *off-odor* and Cihateup Albio duck meat. Purba *et al.,* (2009) suggest that supplementation 150ppm santoquin + 400IU of Vitamin E + 250 mg of Vitamin C in feed containing fish meal been able to reduce the intensity of *off-odor* in the duck meat fresh or boiled expected to improve the sensory quality of duck meat locally Supplementation of antioxidants can inhibit lipid oxidation of meat stew.

Based on the description above, it is necessary to research titled "Response offered fermented purple sweet potato *(Ipomoea batatas* L) skin in diets as a source of antioxidants can improve the meat quality of Bali duck".

MATERIAL AND METHODS

Place and Period of Experiment

This experiment was conducted et Guwang village, Gianyar district,Province of Bali for 10 weeks. Test of antioxidant capacity was carried out at Microbiologycal and Chemistry Laboratory, Faculty of Technology Agriculture, Udayana University, Carcass test was carried out at at Nutrition Laboratory, Faculty of Animal Science, Udayana university for 4 weeks.

Material and Equipment

A total of male ducks of 12 weeks old with homogenous live weight bought from duck farmer I Ketut Hermanto at Gianyar regency were used in this experiment. Skin of purple sweet potatoes *(Ipomoea batatas* L) obtain at Gianyar, where as *Aspergillus niger* from the Institute of Agriculture Technology (BPTP), Denpasar. The diets composed were based on nutrient content which recommended in Scott et al.(1982) using yellow corn, coconut meal, soybean, skin of purple sweet potato, premix and NaCl. Materials and composition were presented in Table 1 and Table 2. Diets and water were feed in *ad libitum* with source of water taken from the local drinking water pam (PDAM)

This study was using ducks and treatments in a completely randomized design. The treatment were (A) control treatment; (B) diet containing 10 % purple sweet potatoes skin, (C) diet containing 10% fermented purple sweet potatoes skin, (D) diet containing 20% unfermented purple sweet potatoes and (E) diet containing 20% fermented purple sweet potatoes. Each treatment consisted of four replication consisted of five ducks with homogenous age and live weight.

Fermentation Purple Sweet Potato (*Ipomoea batatas* L) Skin

Before the fermentation process takes place purple sweet potato skin implemented fist activation proces *Aspergillus niger.*

The activation process require tools include a clean plastic tub, aerator, whereas the necessary ingredients are sugar, and urea 1% NPK as much of the volume of water.
Water that used well that containts no Chloride. To maintain sterility boiled water first reach the temperature of 1000 C, then cooled, last entered *Aspergillus niger* seed as much as 1% (Guntoro, 2008). Skin of purple

sweet potatoes (*Ipomoea batatas* L) are already in form of flour sack place on a bed on placed on top of the bambu strips, then spayed with *Aspergillus niger* that has been activated until the water solution 50% (when first are not broken) The cover then covered by a sack and left for 7 days, after fermentaion for 7 days and then dried in the sun, so it is ready to be used in the treatment. Variables measured in this study were physical meat quality were based on USDA (1977), meat cooking loss, measured with heat method (Soeparno, 2005), water holding capacity (WHC) measured with centripuge Element 2000 (Soeparno, 2005) ; Organoleptic meat quality observation was based on subjected method (Larmond, 1977), and anthocyanin, crude protein, crude fibre consumption and meat antioxidant capacity (Yadnya, *et al*., 2013).

Statistica Analysis

The data were analyzed using analysis of variance (Steel and Torrie, 1989). When the analysis was found significant, analysis was continued by using Duncan's Multiple Range test to find out which treatment means were significantly different (P<0.05).

RESULT AND DISCUSSION

Physical Meat Quality

The variables of physical meat quality characteristic observed were meat colour, water concentration, water holding capacity (WHC) and cooking loss (CL).

Meat colour was determined by using USDA (1977). The study showed that meat colour in control treatment (A) was 3.76 (see Tabel 2). The score of meat colour in treatment B, C, D , and E were significantly increased compared to control treatment (P<0.05).Fermented or without fermented purple sweet potato contain *antthocyanin* and *carotenoid* pigment which could increase myoglobin accumulation in the tissue that can lead to more red meat colour (Ratih , 2010) The presence of carotenoid pigment in the tissue causes reddish meat colour. Besides the meat oksimyoglobin causing colour to red meat (Purnomo and Palaga, 1989), meat colour is influenced by the type of themyoglobin of meat (Lawrie, 1995).

It showed that in Table 2, offered fermentedor without fermented treatment (B, C, D, and treatment) could be increase water holding capacity was significantly (P<0,05), but that on cooking loss (CL) of the meat could be decrease (P<0,05) compared with control treatment (A), especiely with offered 20% fermentedpurple sweet potato in diets (Treatment E). WHC effected meat containing protein pH (Soeparno, 2005). Increase of WHC coud apply water to meat which causes an increase of protein, so it could also improve WHC. Meat has its capability to bring water molecule, depend on the amount of protein activity (Purnomo and Plaga, 1989). Cooking loss could be measured when there was decrease of WHC value. Lawrie (1995)reported that high cooking loss could produce more nutrients loss during the process of boiling.

Table 1. Feed Composition and Chemical Composition of ducks (12 -22 weeks of age)

Inggedients (%)	Treatment				
	A	B	C	D	E
Yellow corn	55,36	49,98	42,32	49,98	42,32
Soybean	9,37	12,45	13,88	12,45	13,88
Coconut meal	11,31	9,82	7,28	9,82	7,28
Fish meal	10,13	8,10	10,20	8,10	10,20
Rice bran	13,26	9,00	5,08	9,00	5,08
Purple sweet potato skin	-	10	20	-	-
Fermented purple sweet potato skin	-	-	10	20	
Premix	0,50	0,50	0,50	0,50	0,50
NaCl	0,15	0,15	0,15	0,15	0,15
Oil coconut	-	-	-	2,00	2,00
Chemical Composition					
Metabolic Energy (Kcal/kg)	2900,00	2926,18	2926,25	2928,90	29,35,18
Crude Protein (%)	18,28	17,93	18,18	17,86	18,08
Ether Extract (%)	5,94	5,46	5,42	5,84	5,45
Crude Fiber (%)	4,80	5,46	4,38	4,52	4,32
Calsium (%)	1,40	1,21	1,04	1,14	0,91
Phosphor available (%)	0,73	0,71	0,69	0,71	0,50

Discription : A is control diet (without purple sweet potato), B is diet containing 10.0 % purple sweet potatoes , C is diet containing 10% fermented purple sweet potatoes skin, D is diet containing 20% purple sweet potatoes skin, E is diet containing 20.0% fermented purple sweet potatoes skin.

Table 2. Physical meat quality of Bali duck implemented fermented purple sweet potato skin in diets

Variables	Treatments A	B	C	D	E	SEM
Colour	3.76d	4.15c	4.35bc	4.5ob	4.84a	0.09
Water concentration(%) *	76.08	75.83	76.36	75.28	76.33	0,65
Water Holding Capacity (WHC)(%)	25,70c	24,76c	32,21ab	27,68bc	35,01a	1,93
Cooking Loss (CL)(%)	34,5a	34,a	33,5a	33,30a	31,5b	0,37

- Non significantly (P>0.05)
- The defferent superscript im the same row indecates the significantly different (P<0.05)
- SEM : "Standard Error of the treatment Means".

Organoleptic Meat Quality

Score meat colour, smell, taste, texture and receive of whole of the orgnoleptic meat quality ducks get treatment A were 3.33; 5,46; 4.90; 5.49; and 5,41(Table 3). Offered treatment B, C, D, and E can boost scores of colour, smell, texture and receive were significantly (P<0.05). Decreased smell fishy and rancid meat ducks get purple sweet potat, as inthe purple in diets contains compound which are antioxidants that can prevent oxidation by free radicals (Hustany, 2001). Rukmiasih *et al*., (2011) reported that the supply of rations containing antioxidants can reduce of odor – off on the meat duck. Scoring value with organoleptic taste of duck meat, show that offered treatment E is the most preferred treatments. This is due to shringkage of meat cooking on the lowest among ducks treatment, E ducks treatment, so the non-protein substance that dissolves in water and fat as the precusors of meat flavor that is greater than the other treatments (Soeparno, 2005).

Winarno (1986) reported that the flavour determined by smell, taste and savor with the presence of antioxidants in the diet that contained in the unfermented or fermented purple sweet potatoes could reduce oxidation by radicals. In that case, less saturated fatty acids oxidized could reduce *off-odor* intensity.

The score of duck meat texture in treatment was 5.49 (see in table 3). Offered treatment B, C, D and E could increase meat texture were significantly deffrent (P<0.05) compared with control treatment. Tenderness of meat is determined by 3 componens, such as : myofibrils and its status of contraction, connective tisse content of cross lingking, water holding capacity (WHC) of protein in meat juice (Soeparno, 2005) Yadnya *et al.,* (2013) reported that offred fermented tuber purple sweet potatoes could improve of meat texture, included colour, smell, taste and texture compare dock offered diet without fermented tuber purple sweet potato.

Table 3. Meat organoleptic quality on the duck offering fermented purple sweet potato *(Ipomoea batatas* L) in diets

Varianles	Treatments					SEM
	A	B	C	D	E	
Colour	3.33d	4.0c	4.33bc	4.66a	4.83	0.149
Smell	5.46c	5.73b	5.80ab	5.76b	5.90a	0.032
Taste	4.90b	5.47a	5.67a	5.63a	5.74a	0.084
Texture	5.49c	5.69b	5.87b	6.06a	6.15a	0.059
Total acceptance	5.41d	5.46cd	5.55b	5.52b	5.75a	0.20

- The defferent superscript im the same row indecates the significantly different (P<0.05)
- SEM : "Standard Error of the treatment Means".

The study showed that total acceptance that offred fermented or without fermented purple sweet potato *(Ipomoea batatas* L) skin in diets could increase were significantly (P<0.05 compare to treatment A. Yadnya *et al*., (2013) reported that offered purple sweet potato as diet antioxidant could improve colour, smell, taste, texure and total aceeptance. Sutji and Sulandra (1994) reported that the total acceptance is combination from some variables organoleptic test test on meat product, so existence of abetter meat variable.

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