MAO POMACE SUPPLEMENTATION IN BROILER DIET ON GROWTH AND LIPIDS OXIDATION IN MEAT

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***Abstract*—**The aim of this study was to investigate the influence of mao pomace (MP) supplementation in broiler diet on growth performance and lipid oxidation in meat. A total of 24, 35 day-old male broiler chicks (Arbor Acres). Feed and water were freely at all time. Experimental diets were formulated to 2 levels of MP (0% and 1%MP). The experimental treatments were subjected to Completely Randomized Design (CRD). At 56 day-old, 6 birds randomly selected from each treatment (2 per replicate) and were slaughtered, and carcasses were immediately trimmed for breast, thigh meat, and liver. Lipid oxidation was determined thiobarbituric acid (TBA) and peroxide value (POV). Results was shown that MP diet did not affect on growth performance ($P>0.05$). Lipid oxidation in thigh meat was reduced (4.54 and 4.33 ($P=0.007$); 2.10 and 1.87 ($P=0.013$), respectively) however, breast meat and liver there were no significant difference ($P>0.05$). In conclusion, MP supplementation in diet could be used without any affect on growth performance moreover, reduce lipid oxidation in thigh meat to improve meat quality.

Key words: mao pomace, broiler chicken, lipid oxidation

I. INTRODUCTION

Mao pomace (MP) is the residue left after juice extraction by pressing Maos in the wine industry. In Thailand especially in Sakon Nakhon province, over 150 ton per year of this by product (constituted by seeds, skins, and stem) are used as animal feed (with low nutritional value). Recent investigations have stressed the importance of this by-product from wine processing as plant material particularly rich in a wide range of polyphenols (Alonso et al., 2002). Mao pomace is rich source of anthocyanin. Studies have shown anthocyanin have the capacity to act as powerful antioxidant action (Marja and Heinonen, 2003).

Anthocyanin has been proven to processes powerful antioxidant properties (Gonzalez-Paramas et al., 2004; Yilmaz and Toledo, 2004; Ruberto et al., 2007). Apart from their coloring effects in fruit, anthocyanins show ability to prevent lipid oxidation in different lipid environments such as human low-density lipoprotein (LDL) in vitro and liposome (Satue-Gracia et al., 1997) and scavenging activity against various artificially generated free redicals (Wang et al., 1997; Rice-Evans et al., 1996; Vinson et al., 1995).

Poultry meat is relatively rich in polyunsaturated fatty acids and is, therefore, readily susceptible to oxidative deterioration (Kanner, 1994). Increasing the unsaturation degree of the muscle membrane by dietary manipulation enhance the susceptibility of chicken meat to oxidative deterioration during storage (Enberg et al., 1996), and as a consequence, flavor and nutritional value are decreased (Goni al., 2007)

The objective of this study was to evaluate the effect of dietary MP on broiler chicken performance and antioxidant activity of breast, thigh meat and liver.

II. MATERIALS AND METHODS

A total of 24, 35 day-old male broiler chicks (Arbor Acres) were obtained from a commercial hatchery. Diets in mash form and water were provided for *ad libitum* consumption. Chemical composition of experimental diets was showed in Table 1. Chicks were allocated to 6 cages, each cage containing 4 chicks, to receive 2 dietary treatments with 3 replicates of each treatment. The experimental treatments were subjected to Completely Randomized Design (CRD). At 56 day-old, 6 birds were randomly selected from each treatment (2 per replicate) were slaughtered, and carcasses were immediately trimmed for breast, thigh meat, and liver (Goni al., 2007).

Table 1 Chemical composition in experimental diets

Item	Experimantal diets	
	Control	1%MP
Dry matter	93.12	93.01
Crude protein (N x 6.25)	16.81	17.12
Ether extract	3.34	3.04
Crude fiber	6.51	7.14
Ash	3.28	3.78

Lipid oxidation was determined thiobarbituric acid (TBARS) using the procedure described by Salih et al., (1987) and peroxide value (POV) described by AOAC (1995). Data were subjected to ANOVA (Steel and Torries, 1980). Significant differences among treatment means were determined at $P<0.05$ by duncan's multiple range test.

III. RESULTS AND DISCUSSION

Growth performance

The addition of MP in the chicken diets did not impair average daily gain (ADG) and feed conversion ratio (FCR). However, feed consumption per day was increased in MP diet. NRC (1994) reported that amount of feed consumption of broiler chickens follows by energy utilization in diet. It might be due to energy utilization was diluted when addition of MP in diet so that feed consumption of MP diet was enhanced (Table 2).

Table 2 Effect of Mao pomace on growth performance parameter

Items	Mao pomace in diet		P-values
	Control	1%MP	
Average daily gain, g/b/d	54.12	54.11	0.97
Feed consumption/day, g	105.51[a]	108.42[b]	0.04
Feed efficiency ratio	1.91	2.11	0.10

[a, b]Means in lows with no common superscript differ significantly ($P<0.05$)

Lipid oxidation in breast, thigh meat and liver

Lipid oxidation in MP diet exhibited significant higher anti-lipid oxidation in thigh for both paprameter (POV and TBARS) than control diet. The dietary treatment did not affect the antioxidant value measured on breast meat and liver (Table 3).

Table 3 Lipid oxidation of breast, thigh meat and liver of broiler chicks (56 d) fed containing mao pomace

Item	Mao pomace in diet		P-values
	Control	1%MP	
Breast meat			
POV	4.33	3.96	0.260
TBA	2.22	1.85	0.205
Thigh meat			
POV	4.54[a]	4.33[b]	0.007
TBA	2.10[a]	1.87[b]	0.013
Liver			
POV	4.15	3.88	0.372
TBA	1.30	1.11	0.318

[a-b] = significant different
POV = Peroxide Value (meq/kg)
TBA = Thiobarbituric Acid (mg MDA/g of fat)
MDA = Malonaldehyde

From results do agree with Goni et al. (2007) shown lower lipid oxidation in thigh meat of broiler chicks fed diet containing grape pomace (GP) was used as antioxidant source in diet than control diet.

IV. CONCLUSION

The results presented in this study showed that MP supplementation in diet did not impair ADG and FCR however feed consumption was enhanced. Lipid oxidation values of thigh meat samples receiving the diet supplemented with MP was increased. So that MP supplementation in broiler diet could be used without any negative effect on growth performance and also improve meat quality.

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