THE EFFECT OF UTILIZATION OF DRIED AZOLLA MEAL IN THE LAYER DIETARY ON CHOLESTEROL CONTENT AND COLOR INTENSITY OF YOLK

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ABSTRACT

The experiment was conducted to determine the effects of dried *Azolla microphylla* meal in the layer diet on cholesterol content and color intensity of yolk. One hundred (100) layer of Lohmann Brown strain at 26 weeks old were used in this study, and randomly devided into 5 treatments. Those were treatments I, II, III, IV and V contained 0%, 5%, 10%, 15% and 20% dried Azolla meal, respectively. The experiment was replicated 5 times. All experimental animals were confined in the battery individual cages. Cholesterol content was tested by Lyberman-Burchard method (Plummer, 1977) and color intensity of yolk was determine by ANRC method cit.by Scott *et al.* (1968). The results indicated that cholesterol content of yolk in treatments I, II, III, IV and V were 9.77, 9.62, 9.40, 9.23 and 8.85 mg/g , respectively. Statistically analyzed was not significant difference, however, the average of cholesterol consumption of layer diet was significantly higher ($P<.01$) with increasing of Azolla dried meal level. The average of absorbance value to show color intensity of yolk was found 0.2109, 0.2452, 0.2876, 0.3815 and 0.4067. The average of absorbance value in treatment II and III were significantly higher than treatment I and significantly lower compare to treatment IV and V. Conclusion, The utilization of dried *Azolla microphylla* meal in the layer diet did not affect on cholesterol content, however, increased color intensity of yolk.

Key word: *Azolla microphylla*, Cholesterol content, Yolk color

INTRODUCTION

Development of livestock industry especially for poultry production faced on increasing of the price of feed ingredient, because there are competition with human need. To solve these problems, we need to develop unconventional feed, for instance dried Azolla meal (DAM). The *Azolla pinnata* have crude protein 25,9 % (Soemitro, 1985). Azolla produce 8-15 ton/ha in fresh condition for 7-20 days, it contained 20-40 kg N/ha (Sing, 1978). Dietary 7-8% crude fiber (CF) decrease cholesterol concentration of the blood (Pilliang, 1990). Those were supported by McNoughton (1978) and crude fiber decrease cholesterol in the yolk about 1.28 mg/g. Azolla contain high caroten and xanthophyl and influence intensity color of yolk and shank (Querubin *et al.*, 1986). *Azolla mycrophilla* contain xanthophyl as much as 304 mg/g. Absorbtion of xanthophyl by yolk depended on fat concentration in the dietary. Absorption of xanthophyl increases with increasing concentration of fat in the dietary (Hattab, 1986). Hypothesis, increasing level of Dried Azolla meal in the layer dietary will decrease cholesterol content, however increase color intensity of yolk.

MATERIAL AND METHOD

One hundred (100) layers of Lohmann Brown strain at 26 weeks old were used in this study, and randomly devided into 5 treatments. Those were treatments I, II, III, IV and V contained 0%, 5%, 10%, 15% and 20% dried *Azolla mycrophylla* meal, respectively. All experimental animals were confined in battery individual cages. Feed and water were given *ad libitum* and the

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Table 1. The composition and quality of layer dietary at different level of dried azolla meal during experiment

Nutrient value (%)	Level of dried azolla meal in the layer dietary (%)				
	0	5	10	15	20
Moisture (%)	14.00	13.85	13.31	13.33	11.83
Crude protein(%)	16.38	15.25	15.73	15.17	15.14
Fat (%)	3.80	4.18	4.70	4.75	5.05
Crude fiber (%)	5.34	5.51	5.70	6.16	6.52
Ash (%)	9.18	9.30	9.61	9.41	9.38
Calcium (%)	3.11	2.96	3.20	3.15	2.30
Phosphorus (%)	0.62	0.44	0.56	0.33	0.33
ME (Kcal/kg)	2862.57	2856.47	2829.53	2834.00	2835.39
Cholesterol (mg/g)	1.30	1.29	1.27	1.32	1.32
Xanthophyl (mg/g)	0.01	0.03	0.04	0.06	0.07

composition and quality of the layer dietary as indicated in Table 1.Cholesterol contentwas tested by Lieberman-Burchard method (Plummer, 1977). Egg sample for cholesterol tested was taken at the 28th day after feeding dried Azolla meal. Color intensity of yolk was determine by ANRC method cited by Scott *et al.* (1968) using spectrophotometer spectronic 20.

RESULTS AND DISCUSSION

Cholesterol Content of Yolk

The average of yolk at different level of dried Azolla meal in the layer dietary stated in Table 2. Statistically analyzed were not significant differences. However, the cholesterol content of yolk tends to decrease with increasing level of dried Azolla meal in the ration. Those related to cholesterol consumption in treatments 0%, 5%, 10%, 15% and 20% dried Azolla meal were 134.28, 143.33, 161.32, 165.21 and 167.00 mg/head/day and statistically analyzed showed significant difference ($P<.005$). Naber (1976) stated that 2/3 part of cholesterol of yolk originally comes from animal body and 1/3 part comes from feed ingredient. While, increasing of cholesterol consumption was not followed by increasing cholesterol content of yolk, because cholesterol content of yolk was more influence by crude fiber content of feed ingredient (Noughton, 1978). Where, crude fiber in the intestine will fix empedu salt and

Table 2.The average cholesterol content (mg/g yolk) at different level of dried *Azolla microphylla* meal in the layer dietary during the experiment

Replication	Level of dried *Azolla microphylla* meal (%)				
	0	5	10	15	20
1	9.89	8.47	9.36	9.28	7.98
2	11.37	9.77	10.37	9.56	8.24
3	9.18	10.77	9.49	9.82	9.09
4	9.27	9.24	8.59	8.75	9.16
5	9.15	9.86	9.18	8.76	9.78
Average ns	9.77	9.62	9.40	9.23	8.85

ns : non significant

Table 3. The average of absorbance value for determining color intensity of yolk at different dried Azolla meal during the experiment

Replication	Level of dried *Azolla microphylla* meal (%)				
	0	5	10	15	20
1	0.1648	0.3057	0.2862	0.3200	0.4653
2	0.1828	0.2599	0.3109	0.3971	0.4685
3	0.2032	0.2261	0.2773	0.4164	0.3224
4	0.2542	0.2292	0.2953	0.4149	0.4132
5	0.2514	0.2500	0.2683	0.3589	0.3639
Average	0.2109^{a}	0.2542^{b}	0.2876^{b}	0.3815^{c}	0.3639^{c}

^{abc} Superscript that different at the same line show highly significant (P<.01)

out together with feces and to substitute empedu salt more cholesterol will be changed into empedu salt. Crude fiber known as hypocholesterolemic. Crude fiber decrease cholesterol in the yolk about 1.28 mg/g. Azolla contains high carotene and xanthophyl and influence intensity colors of yolk and shank (Querubin *et al.*, 1986). *Azolla mycrophilla* contain xanthophyl as much as 304 mg/g. Absorption of xanthophyl by yolk depended on fat concentration in the dietary. Absorption of xanthophyl increases with increasing concentration of fat in the dietary (Hattab, 1986). Hypothesis, increasing level of Dried Azolla meal in the layer dietary will decrease cholesterol content, however increase color intensity of yolk.

Color Intensity of Yolk

The average of absorbance for determining of color intensity of yolk were stated in Table 3, and indicated that absorbance value in treatments 20% and 15% dried Azolla meal in the layer dietary were significantly higher (P<.01) than treatments 10% and 5%, then followed by treatment 0 % .The increasing absorbance value, indicated increasing of xanthophyl concentration in yolk (North, 1984). However, treatments 20% vs. 15% and10% vs. 5%, dried Azolla meal were not significant difference, those were influenced by egg production.

CONCLUSION

Color intensity of yolk was significantly influenced by level of dried Azolla meal in the layer dietary. Increasing level of dried Azolla meal in the layer dietary did not affect on cholesterol content of yolk.

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