EFFECT OF HERBAL COCKTAIL (*CAPSICUM* SPP., *CURCUMA LONGA* AND *ALLIUM SATIVUM*) POWDER DIETARY SUPPLEMENTATION ON MEAT QUALITY OF BROILERS

Kornkamon Hanchai[1*], Patipan Jaipeng[1], Rachakris Lertpatarakomol[1] and Jamlong Mitchaothai[2]

[1]Faculty of Veterinary Medicine, Mahanakorn University of Technology, Bangkok 10530, Thailand

[2]Department of Animal Production Technology and Fisheries, Faculty of Agriculture Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand

*Corresponding author email: kpaditporn@gmail.com

I. INTRODUCTION

Thailand has a rapidly developing poultry industry. It is exported in many countries around the world. Therefore, the production of chicken meat to meet the needs of consumers is important. Recently, supplementation of natural components in poultry ration to improve production performance is widely adopted in the world [1]. Several studies have reported effects with inconsistent results of herbal cocktail powder in feeding experiments conducted with broiler [2]. Chili, turmeric and garlic are local plant of Thailand that can be improve meat quality [3, 4]. The aim of this study was to determine the effect of diet supplementation with a herbal cocktail on meat pH, water holding capacity and abdominal fat of broilers. The herbs used as herbal cocktail powders in this study were chili (*Capsicum* spp.), turmeric (*Curcuma longa*) and garlic (*Allium sativum*).

II. MATERIALS AND METHODS

Ninety six 1-day old broilers chicks, mixed sex (Ross 308) were obtained from a commercial hatchery and randomly allotted into 3 groups with 4 replications for each (1 x 1 m^2, 8 birds per replication). The dietary period was divided in two phases: starter (0 to 3 week of age) and grower (3 to 5 week of age). The dietary treatments consisted of 1) the basal (control) diet (C), 2) the basal diet supplemented with recommended dose of herbal cocktail powders (chili 3.04, turmeric 7.00 and garlic 4.00 g/kg diet); Treatment 1 (T1) and 3) the basal diet supplemented with half recommended dose of herbal cocktail powders (chili 1.52, turmeric 3.50 and garlic 2.00 g/kg diet); Treatment 2 (T2). Feed and water were available *ad libitum*. All the birds were provided the same management conditions (floor space, temperature, relative humidity, ventilation, light and vaccination program). At the end of experiment, two birds from each replicate were randomly chosen and slaughtered. The abdominal fat was weighted and calculated as percentage of live body weight. Three pieces of meat from each left musculus pectoralis major (PM) was removed for proximate analysis, water holding capacity (WHC) and immediately weighed. The pH was measured at 45 min (after stunning and bleeding) postmortem in the right PM. Samples were placed in a special container equipped with lid to avoid evaporation, storage at 4 °C for 24 hrs and drip loss was determined by weighing. One piece of sample was storage at -20°C overnight and left into 4 °C for 24 hrs, thawing loss was determined by weighing. Cooking losses, boiled in a water bath in sealed bags until an internal temperature of 85°C was reached, cool down and weighing. Data from all experiments were analyzed by using the ANOVA procedure with Duncan multiple comparison tests to detect a significant level at $P \leq 0.05$.

III. RESULTS AND DISCUSSION

The results are shown in Table1. The pH values measured in the right PM at 45 min was not significantly different among studied groups. All pH values were within the range expected for normal chicken [5]. For abdominal fat, there is tended to decrease from the treatment groups compare to the control group. These results were in agreement with other studies [3, 6], possibly by the curcuminoids stimulated lipid

metabolism [7]. However, the mechanism of reducing abdominal fat by the herbs may be through increasing the secretion of lipase and secondary bile acids, reducing accumulation of fatty acid in abdominal cavity [8]. WHC was observed in the current study that there were no significant differences among all treatments ($P > 0.05$). However, the values of WHC of the PM in the treatment group were better than those of in the control group. The enhancement of water holding capacity might have been caused by the improvement of antioxidant in muscle [9] because the chili, turmeric and garlic have antioxidant properties [10]. In addition, proteolysis and even protein oxidation directly affects the water holding capacity in muscle tissue [11].

Table 1 Mean±SD for meat quality of the experiment

Variable	Control	T1	T2
pH 45 min	6.03 ± 0.01	6.06 ± 0.16	6.11 ± 0.13
Abdominal fat, %	1.94 ± 0.54	1.44 ± 0.74	1.34 ± 0.43
Drip loss, %	4.38 ± 1.60	3.38 ± 1.06	3.13 ± 1.36
Thawing loss, %	10.97 ± 2.50	10.89 ± 4.38	10.85 ± 3.59
Cooking loss, %	27.69 ± 9.35	22.96 ± 4.74	27.79 ± 10.08

IV. CONCLUSION

The dietary herbal cocktail powder supplementation at recommendation dose for broiler chickens improved percentage of abdominal fat, drip loss and thawing loss.

ACKNOWLEDGEMENTS

The authors would like to sincerely thank Mahanakorn University of Technology for financial support.

REFERENCES

1. Abdel, S. M. & El-Tazi, W. (2014). Response of broiler chicken to diets containing different mixture powder levels of red pepper and black pepper as natural feed additive. Animal and Veterinary Sciences 2(3): 81.
2. Amad, A. A., Männer, K., Wendler, K. R., Neumann, K. & Zentek, J. (2011). Effects of a phytogenic feed additive on growth performance and ileal nutrient digestibility in broiler chickens. Poultry Science 90: 2811–2816.
3. Hussein, S.N. (2013). Effect of Turmeric (*Curcuma longa*) powder on growth performance, carcass traits, meat quality, and serum biochemical parameters in broilers. Journal of Advanced Biomedical & Pathobiology Research 3(2): 25-32.
4. Choi, I. H., Park, W. Y. & Kim, Y. J. (2010). Effects of dietary garlic powder and {alpha}-tocopherol supplementation on performance, serum cholesterol levels, and meat quality of chicken. Poultry Science 89(8): 1724-1731.
5. Kim, Y. J., Jin, S. K. & Yang, H. S. (2009). Effect of dietary garlic bulb and husk on the physicochemical properties of chicken meat. Poultry Sciences 88(2): 398-405.
6. Emadi, M. & Kermanshahi, H. (2006). Effect of turmeric rhizome powder on performance and carcass characteristics of broiler chickens. International Journal of Poultry Science 5(11): 1069-1072.
7. Ammon, H. P. & Wahi, M. A. (1991). Phamacology of *Curcuma longa*. Plantamedica, 57: 1-7.
8. Najafi, S. & Taherpour, K. (2014). Effect of dietary ginger (*Zingiber ofjicinale*), Cinnamon (*Cinnamommum*), synbiotic and antibiotic supplementation on performance of broilers.Journal of Animal Science Advances 4(1): 658-667.
9. Wang, S., Zhang, L., Li, J., Cong, J., Gao, F. & Zhou, G. (2017). Effects of dietary marigold extract supplementation on growth performance, pigmentation, antioxidant capacity and meat quality in broiler chickens. Asian-Australasian Journal of Animal Sciences 30(1): 71-77.
10. Kempaiah, R. & Srinivasan, K. (2004). Influence of dietary curcumin, capsaicin and garlic on the antioxidant status of red blood cells and the liver in high-fat-fed rats. Annals of Nutrition and Metabolism 48: 314-320.
11. Huff-Lonergan E. & Lonergan, S.M. (2005). Mechanisms of water-holding capacity of meat: The role of postmortem biochemical and structural changes. Meat Science 71: 194–204.