Effect of Diets Supplemented with Fenugreek, Garden Cress and Mung Bean on Sensory Evaluation of Broiler Chicken Breasts

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Abstract- Broiler chicken (a total of 30 birds) were fed on diets containing Fenugreek (Trigonella foenum-graecum), Garden Cress (Lepidium sativum) and Mung Bean (Vigna radiate) in concentrations of 0.5 – 2.5% for a period of 45 days. The birds then were slaughtered, defeathered eviscerated and cut. Breast muscle was chosen and cuts weighing about 20g were obtained, cleaned and water boiling cooked in a ratio of 1:2 w/v (meat: water) for 40 min. The cuts then were hot served for sensory evaluation. Twenty- five panelists form students and staff members of College of Agriculture and Veterinary Medicine, Qassim University, Saudi Arabia were sensory evaluated the cuts for colour, taste, flavour, juiciness and overall acceptability on a 9-point hedonic scale (1 = dislike extremely, 5 = neither like nor dislike, 9 = like extremely). The results revealed that all chickens fed on supplemented had significantly ($p < 0.05$) taster and juicier breast meats than control chickens fed on standard diet (no supplementation). The chicken fed with garden cress in concentration of 2.5% had the best ooverall acceptability followed by chicken fed with mung bean in concentration of 1.5%. Supplementation of standard diets with garden cress in the concentration of 2.5% is highly recommended for better chicken meat sensory quality.

Index Terms- Broiler chicken, Sensory Evaluation, Fenugreek, Garden Cress, Mung Bean

I. Introduction

Poultry meat production is increased in last few years all over the world. It is well recognized that the quality of poultry meat especially chemical composition as well as sensory quality characteristics such as colour, tenderness, juiciness and flavour and overall acceptability are affected by poultry diets. It was reported that when evaluating sensory attributes of chicken meat consumers or sensory panelists respond based on their perceptions [1]. There are many attempts dedicated with the objective of evaluating quality of different types of meat using various methods [2-7]. According to [8] sensory acceptance is considered as the key criterion for consumers judging the freshness of chicken meat. Especially prior to any preparation the sensory impression is the deciding factor for further processing or any form of consumption. Sensory attributes, such as taste, texture, appearance, odor and flavor of foods detectable by human senses, are normally used to evaluate food quality. These characteristics may also serve as references during the selection of such foods [9]. It was reported that when evaluating sensory attributes of chicken meat consumers or sensory panelists respond based on their perceptions [1]. Chicken breast is considered as an important part consumers used for judging the quality of chicken meat. Chicken diets were investigated for their effects on the quality of chicken meat in several researches [10-14]. The objective of this research was to sensory evaluate broiler chicken breast cuts fed on diets formulated using selected medicinal plants with different concentrations.

II. Materials and Methods

2.1. Feeding scheme

Broiler chickens were divided into four groups, and fed a single diet throughout the experiment for 45 days. Each group consisted of 10 chickens. Standard mixture was based on corn, crushed soybeans which bought from General Organization for Grains, Saudi Arabia. The content and nutritional value of the standard ration mixture are shown in Table 1. Group I - control (fed with standard mixture); Group II- (fed with standard mixture supplemented with fnugreek in concentration of 0.5% – 2.5%; Group III- (fed with standard mixture supplemented with garden Cress in concentration of 0.5% – 2.5% and Group IV (fed with standard mixture supplemented with mung Bean in concentration of 0.5% – 2.5%.

2.2. Preparation of samples

A total of 30 birds was slaughtered, defeathered, eviscerated and the whole carcasses was dissected in slaughter house located in the Animal Breeding Field, Qassim University, Saudi Arabia. The carcasses were transported from the breeding field to the Meat Laboratory, Department of Food Science and Human Nutrition, Qassim University and stored in a refrigerator adjusted to about 2°C for one day. Next day the carcasses were washed, cut and breast of each carcass was obtained and divided to small cuts each of them weighing approximately 25g.

Table 1: Contents and percent of standard mixture used for control diet

S. No.	Name of the item	Concentration
1	protein	20.5%
2	fat	6%
3	crude fibre	3.3%
4	ash	5.5%
5	calcium	0.9%
6	salt	0.35%
7	phosphorus	0.65%
8	vitamin A	10 mg/ g
9	vitamin D	3 mg/g
10	vitamin K	25 mg/g

2.2. Sensory evaluation

The cuts were cooked in boiled water in a ratio of 1:2 w/v (meat: water) for 40 min. and then hot served in dishes marked with random numbers. The staff members and the students of the College of Agriculture and Veterinary Medicine, Qassim University, Saudi Arabia (Twenty- five panelists) who are frequently consuming chicken meat were chosen to evaluate the chicken cuts for taste, color, flavour, juiciness and overall acceptability attributes on a 9-point hedonic scale (1 = dislike extremely, 5 = neither like nor dislike, 9 = like extremely). Good light was put on in sensory evaluation room and plane water was provided in between tests to remove the remaining flavor. The panelists given evaluation scores were collected and analysed.

2.3 Statistical analysis

The obtained data was then analyzed by ANOVA (Analysis of Variance) which performed using Minitab statistical software version 16. Significant differences among attributes means ($p < 0.05$) were determined by LSD (least significant difference).

III. Results and Discussion

The results of ANOVA of the sensory evaluation scores conducted by 25 panellists explaining the effects of the different medicinal plants and their concentrations are shown in Table 1 and Figure 1. The breast of chicken sample fed on diet containing garden cress in concentration of 2.5% had the highest values of colour, flavour, juiciness and overall acceptability comparing to the other samples and the control one. The chicken breast fed on garden cress in concentration of 1.5% gave higher score for taste comparing to other the control and sample treated with fenugreek with the same concentration. The chicken breast fed on diet formulated using mung bean in concentration of 1.5% was taster followed by the sample fed on diet containing fenugreek in concentration of 2.5%. The same trend is given by the sample fed on garden cress in concentration of 1.5%. Control sample had the lowest value in this regard. The overall acceptability attribute was not distinguished significantly between control sample and the sample fed on garden cress in concentration of 0.5% which means feeding chickens with garden cress in this concentration might has no effect on overall acceptability of the chicken meat sample. Although the chicken breast sample fed fenugreek 2.5% gave taster and juicier chicken breast but the colour and flavour attributes of this sample had the lowest values which resulted in the lowest overall acceptability among all the evaluated sample including control. No significant effect of diets on taste or overall acceptability was determined on chicken sample fed on 1.5% of garden cress and chicken breast fed on mung bean 1.5% ($p < 0.05$) after 3 months storage, but there was a clear lower significance ($p > 0.05$) in the same mentioned attributes when chicken fed on diet containing fenugreek in the concentration of 1.5%. Generally, the chicken fed on diet containing garden cress 2.5% gave promising chicken meat in all attributes and could be the target meat.

Table 2: Values of sensory evaluation attributes of different chicken cuts

Variables and concentrations	Sensory evaluation attributes of the chicken breast cuts				
	Taste	Colour	Flavour	Juiciness	Overall acceptability
Control	**6.0**	**6.5**	**6.0**	**5.0**	**7.0**
Fenugreek 0.5%	**7.5**	**5.5**	**5.6**	**6.5**	**6.4**
Fenugreek 1.5%	**6.5**	**5.8**	**5.4**	**6.8**	**6.0**
Fenugreek 2.5%	**7.6**	**5.2**	**5.0**	**7.8**	**5.0**
Garden Cress 0.5%	**6.2**	**7.5**	**7.8**	**6.0**	**7.0**
Garden Cress 1.5%	**7.8**	**7.8**	**7.2**	**7.0**	**8.2**
Garden Cress 2.5%	**7.0**	**8.2**	**7.9**	**8.5**	**8.9**
Mung Bean 0.5%	**7.0**	**7.0**	**7.0**	**7.5**	**8.1**
Mung Bean 1.5%	**7.8**	**7.5**	**7.5**	**7.2**	**8.5**
Mung Bean 2.5%	**7.2**	**7.6**	**6.9**	**7.5**	**8.0**

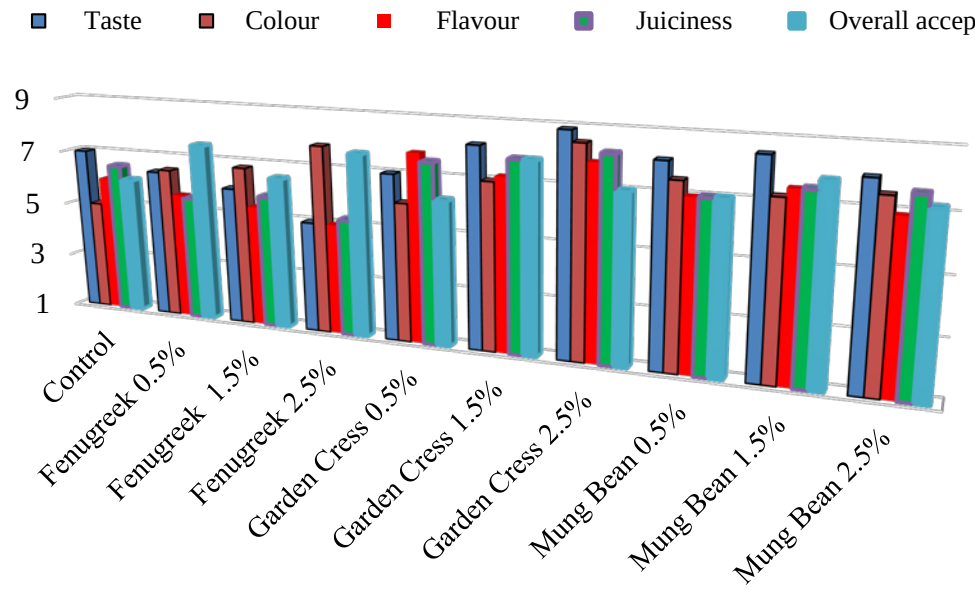

Fig. 1: Values of sensory evaluation attributes of different chicken cuts

IV. Conclusion

In conclusion, it was noticed feeding broiler chicken with enriched standard diet with fenugreek, garden cress and mung bean in concentrations of 0.5 – 2.5% for a period of 45 days gave good result for sensory evaluated breast chicken meat. In general, the chicken fed with garden cress in concentration of 2.5% had the best Overall acceptability followed by chicken fed with mung bean in concentration of 1.5%. Therefore, garden cress in concentration of 2.5% in this condition is highly recommended for enriching chicken diets.

References

[1] Sow, T. M. A. and Grongnet, J.F. Sensory characteristics and consumer preference for chicken meat in Guinea. Poult Sci., 89: 2281–2292.

[2] Mohammad, J. and Naimeh, K. 2011. Effects of storage time on some characteristics of packed camel meat in low temperature. International Journal of Animal and Veterinary Advances, 3: 460 – 464.

[3] Hamid, R. G. and Vahid, R. R. 2012. Antioxidative and antimicrobial effects of garlic in ground camel meat. Turk. J. Vet. Anim. Sci., 36: 13 – 20.

[4] Jouki, M. and Khazaei, N. 2012. Lipid Oxidation and Color Changes of Fresh Camel Meat Stored Under Different Atmosphere Packaging Systems. Journal of Food Processing and Technology, 3:189.

[5] Hamid, R., Gheisari, R. F. and Behrokh, M. 2014. Effect of mixed curing on microbes in camel meat. Online Journal of Veterinary Research, 18: 253 – 259.

[6] Sajid, M., Aisha, A., Kusaimah, M., Aysha, A. and Isam T.K. 2015. Lipid oxidation, protein degradation, microbial and sensorial quality of camel meat as influenced by phenolic compounds. LWT - Food Science and Technology, 63: 953 – 959.

[7] Hussein, M.A. El–Ghareeb, W.R. and Lotfy, O.O. 2012. Shelf Life Improvement of camel meat treated with Potassium Sorbate 0.3%. Journal of American Science, 8: 507 – 511.

[8] Franke, C., Höll, L., Langowski, H.-C., Petermeier, H., Vogel, R.F. 2017. Sensory evaluation of chicken breast packed in two different modified atmospheres. Food Packaging and Shelf Life, 13: 66 –75.

[9] Lyon, B.G. and Lyon, C.E. Meat quality: sensory and instrumental evaluations. In: Sams AR, editor. Poultry Meat Processing. CRC Press; New York, USA: 2001. pp. 97–120.

[10] Miezeliene, A., Alencikiene, G., Gruzauskas, R., Barstys, T. 2011. The effect of dietary selenium supplementation on meat quality of broiler chickens. Biotechnol. Agron. Soc. Environ., 15: 61 – 69.

[11] Kalio, G., A., Manilla, H. A., Wariboko, O. N., Okafor, B.B. 2014. Mineral profiling, carcass quality and sensory evaluation of broiler chicken fed basal proprietary diets supplemented with leaf meals. African Journal of Livestock Extension, 14: 77 – 83.

[12] Teye, M., Apori, S.O. and Ayeida, A. A. 2015. Carcass Parameters and Sensory Characteristics of Broiler Chicken Fed Diets Containing Palm (Elaeis guineensis) Kernel Oil Residue International Journal of Current Microbiology and Applied Sciences, 4: 1030 – 1038.

[13] Li, X., Wang, J., Wang, C., Zhang, C., Li, X., Tang, C. and Wei, X. 2016. Effect of dietary phosphorus levels on meat quality and lipid metabolism in broiler chickens, In Food Chemistry, 205: 289 – 296.

[14] Kong, Y., Yang, X., Ding, Q., Zhang, Y., Sun, B., Chen, H. and Ying Sun, Y. 2017. Comparison of non-volatile umami components in chicken soup and chicken enzymatic hydrolysate, Food Research International, in Press.

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