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The influence of food supplements and calcium fumarate on chemical composition and energy value of poultry meat



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Rustam Kh. Ravirov, Ali Kh. Volkov, Ellada K. Papunidi,* Galiya R. Yusupova, Laysan F. Yakupova, Fazil A. Medethanov, Olga A. Gracheva

ABSTRACT

The satisfaction of needs of the population in quality food is the most important social problem in modern society. Meat is of great importance in human diet because of its nutritional value due to biologically complete and easily digestible protein content. The world production of poultry meat exceeds the production of meat of other animals by more than 2.7 times over the past two decades. Poultry meat is a dietary product; it is a healthy and delicious source of easily digestible proteins, vitamins, and fatty acids. The development and

introduction of new means for prevention of poultry diseases and improvement of the quality of poultry products are a priority in the development strategy. The inclusion of succinic acid, food supplements "Vita" and "Extrafit" in the diet of poultry helps increase the amount of protein in muscle tissue improving the nutritional value of meat. Poultry meat has excellent organoleptic properties which show positive dynamics in their application and comply with the standards for the high-quality poultry which indicate its biological safety.

Keywords: poultry, chemical composition, energy value, food supplements, calcium fumarate

Cite This Article: Ravirov, R.K., Volkov, A.K., Papunidi, E.K., Yusupova, G.R., Yakupova, L.F., Medethanov, F.A., Gracheva, O.A. 2017. The influence of food supplements and calcium fumarate on chemical composition and energy value of poultry meat. *Bali Medical Journal* 6(2): 354-356. DOI:10.15562/bmj.v6i2.517

Faculty of Veterinary Medicine, Bauman Kazan State Academy of Veterinary Medicine, Sibirsky Trakt Street 35, Kazan, 420029, Russia

INTRODUCTION

The poultry industry is growing rapidly. Products produced on poultry farms make a significant contribution to food security of the country as they contain high-quality animal protein, the proportion of which in the daily diet of Russians is about 40% due to the consumption of dietary eggs and poultry.⁷ The world production of poultry meat exceeds the production of meat of other animals by more than 2.7 times over the past two decades. 70% of the total poultry production is broiler meat production.¹

It is necessary to develop and include food supplements in the diet of poultry to get high quality and safe products.^{11,13}

MATERIALS AND METHODS

The study was conducted on OJSC "Poultry farm "Kazanskaya" (the Republic of Tatarstan, Russia) in 20 Hubbard F15 broiler chickens of the age of 24 days with the average live weight of 978.20 ± 6.78 g. The chickens were divided into 5 groups. There were 4 chickens in each group. The chickens of the first group were given succinic acid at a dose of 25 mg/kg, the chickens of the second group - calcium fumarate at a dose of 25 mg/kg, the chickens of the third group - food supplement "Vita" at a

dose of 2% of the diet and the chickens of the fourth group - food supplement "Extrafit" at a dose of 2% of the diet. The fifth group was control; the chickens were given a balanced diet without any food supplements. Feeding was carried out according to established zootechnical standards. The experiment lasted 30 days.

At the end of growing, the chickens of all groups were slaughtered to conduct a comprehensive study on the meat quality which included organoleptic analysis, bacterioscopy, and chemical composition analysis of the meat to determine the content of vitamins, macronutrients, and micronutrients. Samples were examined according to GOST R 52702-2006. The organoleptic study was used to assess the fatness of dressed chickens, their smell, color, skin condition, and skeletal system.

RESULTS AND DISCUSSION

The veterinary and sanitary expertise of dressed chickens and their internal organs in the control and experimental groups did not show any visible pathological changes, the degree of bleeding was good, the color and size of all organs were without any apparent abnormalities.² According to the standard technique organoleptic properties of the chicken meat of the first, second, third and fourth experimental groups were determined.

*Corresponding author: Ellada K. Papunidi, Faculty of Veterinary Medicine, Bauman Kazan State Academy of Veterinary Medicine, Sibirsky Trakt Street 35, Kazan city, 420029, Russia
vsekgavm@mail.ru

Received: 2017-03-04

Accepted: 2017-04-30

Published: 2017-05-1

Table 1 Chemical composition (%) and energy (kcal) of muscle tissue of broiler chickens

Indicators	Groups, n=5				
	Group 1	Group 2	Group 3	Group 4	Group 5
White meat					
Protein	19.62±0.45	19.31±0.44	19.51±0.45	19.42±0.53	19.02±0.48
Fat	9.29±0.63	9.37±0.23	9.42±0.63	9.45±0.58	9.51±0.35
Ash	5.87±0.09	5.82±0.13	5.89±0.07	5.89±0.09	5.57±0.14
Water	71.57±0.59	72.73±0.59	71.94±0.65	73.08±0.37	71.05±0.72
Energy	141.45	140.30	141.98	140.56	139.08
Red meat					
Protein	17.25±0.56	17.23±0.42	17.03±0.56	17.41±0.53	17.00±0.41
Fat	12.19±0.49	12.27±0.53	12.18±0.49	12.64±0.51	11.78±0.39
Ash	6.07±0.10	6.00±0.31	6.01±0.24	6.06±0.16	5.89±0.17
Water	74.75±0.49	73.02±0.73	73.24±0.74	74.03±0.40	73.52±0.53
Energy	147.33	149.78	148.45	142.16	140.24

A well-developed muscle tissue, minor skin abrasions and a slight desquamation of the epidermis were observed that is allowed for the meat of broiler chickens of Class A. The meat of chickens in the first, third and fourth groups had a good degree of bleeding, firm texture, pale pink color. The meat of the chickens of the second group had a normal degree of bleeding, pink color with a reddish tinge, firm texture. The broth from the meat of chickens of the experimental groups was transparent, fragrant with large drops of fat on the surface.

The organoleptic study of the meat of chickens in the control group showed normal development of muscles, the absence or a small number of stumps, not more than three skin tears up to a length of 2cm each, abrasions, slight desquamation of the epidermis. The dressed chickens were with clean skin, without feathers, bruises, abrasions, and breaks in the skin that is allowed for Class B. Bleeding was normal, the colour of the meat was pinkish-red, the texture was dense, and the broth was transparent, fragrant, with minor flakes and droplets of fat on the surface.

The results of the organoleptic study of the broiler chickens of all experimental groups conducted according to the rules of veterinary inspection of animals slaughtered for food and veterinary and sanitary expertise showed that meat and meat products met the requirements for high-quality meat.

The results of chemical analysis of red and white muscle tissue of broiler chickens are presented in Table 1.

The studies revealed that the meat of broiler chickens of all experimental groups that were given food supplements is similar to the meat of the chickens of the control group in the chemical

composition. However, the main indicators in the experimental groups were higher than those in the control group.

The protein content in white and red muscle tissue of chickens in the first group is higher than in the control group by 0.59% and 0.52%; in the second group - by 0.28% and 0.23%; in the third group - by 0.49% and 0.03%; in the fourth group - by 0.4% in the white meat and by 0.41% in the red meat.

The amount of fat in the white meat of chickens in the first group is less than in the control group by 0.22% and in the red meat - more by 0.41%; in the second group - less by 0.14% in the white meat and more by 0.49% in the red meat; in the third group - less by 0.09% in the white meat and more by 0.4% than in the red meat; in the fourth group - less by 0.06% than in the white meat and more by 0.86 % in the red meat.

The calorie content of white and red meat in 100 g of a product was 141.45 and 147.33 kcal in the first group; 140.3 and 149.78 kcal in the second group; 141.98 and 148.45 kcal in the third group; 140.56 and 142.16 kcal in the fourth group, respectively. The calorie content of white and red meat was 139.08 and 140.24 kcal in the control group.

The acid number of the subcutaneous and visceral fat of dressed broiler chickens in the experimental and control groups was in the range of 0.71±0.01 to 0.87±0.01 mg KOH; the peroxide number was in the range of 0.002±0.001 to 0.003±0.001 mg KOH.

CONCLUSION

The meat of broiler chickens that were given succinic acid, food supplements "Vita" and "Extrafit" in addition to their diet has excellent organoleptic properties which show positive dynamics in their application. The meat of chickens in the control group that were given fumaric acid has a slight deviation from standards. The addition of food supplements to the basic diet also has a positive effect on the chemical composition of meat and its energy value.

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