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# Chemical composition, technological and organoleptic characteristics of meat from chicken broilers, fed with supplement of rose petal meal

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## Abstract

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Many evidences have been accumulated about the positive influence of rose oil and rose petal meal, as well as their antioxidant, antimicrobial, anti-inflammatory, spasmolytic and other beneficial effects on health. The aim of this study to evaluated the efficacy of the rose petal meal, as one of the ingredients in pelleted feed for chickens ROSS 308 on the chemical composition, meat quality and organoleptic characteristics. A total of 60 male one-day old broilers (ROSS 308) were allocated in three dietary groups: in control group broilers received standard broiler feed (C), the first experimental group (RPM25) which were fed a standard feed supplemented with 0.25% rose petal meal (Herbacon, Gellschaft m.b.H., Germany) and second (RPM50) with 0.50% rose petal meal. Broilers were slaughtered and samples were taken from *Musculus pectoralis superficialis*. There no significant effect on the proximate composition, only the lipid and ash contents of breast muscle of broiler chickens from RPM 50 was lower than control group. The results of technological quality showed meat from control group had a lower *a** and *b**, compared with that from RPM50 broilers. No significant difference was found in organoleptic attributes, but according of degustators the flavour, juiciness and tenderness were more pronounced in RPM50 fed broilers than in control group. Including of the rose petal meal in pelleted feed, influenced of broiler meat and they had higher ratings in organoleptic characteristics.

*Keywords:* broiler chicken; meat; chemical composition; organoleptic attributes; Rose petal; meal

## Introduction

Rose (*Rosa damascena* Mill.) or Damask Rose belongs to the family *Rosaceae*, which includes more than 100 different species. Bulgaria and Turkey being the main sources of rose oil and rose petal processing in the world (Ginova et al., 2013). Many evidences have been accumulated about the positive influence of rose oil and rose petal meal, as well as their antioxidant, antimicrobial, anti-inflammatory, spasmolytic and other beneficial effects on human health (Fernandes et al. 2017). In Bulgaria the experiments conducted with people and developed and marketed medicinal products are lot (Maleev et al., 1987; Boyanova and Neshev, 1999), but there are few of studies on this subject with animals like as swine (Lazarova et al., 2018), fish (Sandeva et al., 2018; Zapryanova et al., 2019) and chickens (Balev et al., 2015). In recent years, the poultry sector has been heightened research in developing new natural dietary supplements, which promoted growth performance, health status, carcass and meat quality. Rose petal meal is still a novelty in broiler feed strategies, but with a high potential for future application.

The aim of this study to evaluated the efficacy of the rose petals meal, as one of the ingredients in pelleted feed for chickens ROSS 308 on the carcass and meat quality.

## Material and Methods

In this experiment, 60 day-old male chicks (ROSS 308) were reared in cages at experimental base of Department of Animal nutrition, Faculty of Agriculture, Trakia University, Bulgaria. The experiment was conducted over a period of forty-two days and birds were divided into 3 groups according to the ration. The offered isocaloric and isoprotein compound feeds in control and experimental group were in line with the Ross 308 hybrid requirements (Aviagen, 2009). The first experimental group (GROUP II) was fed extruded feed with rose petal meal at dose rate of 25 $g.kg^{-1}$. The second experimental group (GROUP III) received the same feed as control group and was also supplemented with the rose petal meal at 50 $g.kg^{-1}$. At the end of study, 6 broilers from different groups were sacrificed and meat was collected for proximate analysis. The samples were prepared AOAC (2006; method 983.18) and subjected to moisture analyses using air drying AOAC (1997; method 950.46). Crude protein content was calculated by converting the nitrogen content by multiplying by 6,25 due to the fact protein is 16 percent nitrogen (100/16 = 6,25), determined by Kjeldahl's method using a semi-automatic Kjeldahl system (UDK-139, Velp Scientifica, Italy). Lipid content was determined by the method of the Soxhlet (AOAC 2006; method 960.39). The pH value at first ($pH_{01}$) and twenty-four ($pH_{24}$) hours post mortem were determined using a pH meter (pH meter Testo 205, Testo SE & Co. KgaA, Germany) equipped with glass electrode and a temperature probe. Meat colour indices *L**, *a** and *b** were determined at room temperature with a Minolta Colorimeter (Chroma meter CR-410, Minolta Co., Ltd., Japan) on 24h post mortem. The hydrophilic properties of meat were determined through by the classic method of Grau and Hamm (1956). Thermal cooking losses were determined by roasting the meat samples at 150°C for 20 min.

Organoleptic evaluation (sensory analysis) of meat was done by conducting a "consumer test" aimed at determination of preferences and approval of consumers with regard to tested poultry meat (AMB, 2017). Sensory analysis was performed by 14 non-trained panelists divided into 2 groups – up to 35 years of age and over 35 years of age, each with 7 members.

Samples were prepared as followed: meat samples from *m. Pectoralis superficialis,* with size of 3×3×3 cm were roasted in an oven previously warmed to 150°C for 20 min. Each group of samples was roasted separately without adding any supplements. Immediately after removal from the oven, samples were placed in closed containers and offered to panelists with a sample-specific code. Thus, they were not aware what group of samples was subject to evaluation. Between separate evaluations, each panelist was provided with distilled water for mouth washing, the main parameters of individual samples evaluated by panelists was the appearance, aroma, tenderness, juiciness and flavour.

## Results and Discussion

**Chemical composition of meat from chickens broilers**

Table 1 depicts the results from the proximate analysis of meat from broiler chickens whose diet was supplemented with different proportions of rose petal meal by post mortem hour 24. The analysis of data showed that there were no statistically significant differences in the water, protein and ash content of meat among the groups. Insignificantly higher water content was observed in both experimental groups (77.16% and 77.07%) compared to control group (77.02%). With regard to ash content, higher percentage was exhibited by the control group (1.16%) vs both experimental groups (1.02% and 1.07%).

**Table 1. Chemical composition of meat from chickens broilers, 24 h post mortem**

| Traits | Group I – control | Group II – 0,25% | Group III – 0,5% |
|---|---|---|---|
| Water, % | 77.02±0,31 | 77.16±0.45 | 77.07±0.42 |
| Protein, % | 21.96±0.45 | 21.61±0.42 | 22.04±0.43 |
| Lipids, % | 1.49±0.11** | 0.99±0.15** | 1.33±0.23 |
| Ash, % | 1.16±0.05 | 1.02±0.06 | 1.07±0.14 |

*Note*: ** – statistically significant at $P < 0.01$

A substantial difference ($p < 0.01$) was found out in meat fat content, that was statistically significant lower in the experimental group fed 0.25% rose petal meat as compared to control group (0.99% vs 1.49% respectively). Group III also had lower meat fat content than non-supplemented group (1.33%) but statistically significant difference was not present.

In conclusion, it could be affirmed that the supplemented of feed of broiler chickens with rose petal meal did not have a considerable effect on meat proximate analysis. The only statistically significant difference was demonstrated in meat fat content that was lower in chickens supplemented with rose petal meal.

**Technological traits of meat from chickens broilers**

Table 2 presents the results from investigation of technological traits of meat from broiler chickens.

Meat pH values on the first post mortem hour were lower in both experimental groups (6.13 and 6.18) compared to control group (6.23). The difference is minimal and statistically insignificant. The meat pH values on the 24th post mortem hour ranged from 5.62 to 5.66 in the different groups.

**Table 2. Technological traits of meat from chickens broilers**

| Technological quality traits | Group I – control | Group II – 0,25% | Group III – 0,5% |
|---|---|---|---|
| $pH_{01}$ | 6.23±0.05 | 6.13±0.05 | 6.18±0.09 |
| $pH_{24}$ | 5.65±0.03 | 5.66±0.08 | 5.62±0.03 |
| WHC, % | 20.70±1.36 | 17.82±1.38* | 21.50±1.09* |
| Colour: L* | 59.93±1.10 | 58.82±0.73 | 59.79±1.61 |
| a* | 0.52±0.36*** | 1.54±0.48 | 2.14±0.31*** |
| b* | 7.72±0.64 | 8.33±0.44 | 8.94±0.81 |
| Cooking loss, % | 25.73±1.12** | 31.74±1.52** | 25.55±1.73** |

*Note*: * – statistically significant at $P < 0.05$;
** – statistically significant at $P < 0.01$;
*** – statistically significant at $P < 0.001$

Lower meat pH at the 1st post mortem hour was reported also by other researchers in different types of meat. Vlahova-Vangelova et al. (2019) established lower pork meat pH (45 min post mortem) obtained from pigs fed rose petals compared to control group.

The analysis of hydrophilic traits of broiler chicken meat allows affirming that the best water holding capacity was that of meat from Group II (17.82%), whereas the lowest one was found out in Group III (21.50%) with statistically significant difference. It could be concluded that the addition of a small amount of rose petals improved the water holding capacity of meat whereas the higher amounts had a negative impact on this parameter.

Feed supplementation with rose petal meal has an influence on the colour of meat from broiler chickens (Table 2). There was a statistically significant tendency towards increase in meat a* values in the meat of rose petal-supplemented experimental birds. An insignificant increase in the b* values was also noted. There were no considerable differences in L* values of meat – from 58.82 in Group II to 59.93 in Group III. Wang et al (2017) indicated that natural plant pigments increased the a* value of chicken meat, which may be linked to higher levels of hemoglobin in the tissue.

This allows concluding that as the dietary percentage of rose metal meal fed to broiler chickens increased, the redness of their meat was proportionally increased as well. As the cooking loss percentage of meat was concerned, the highest loss was found out in Group II (31.74%) vs Group III (25.55%) and control Group I (25.73%), with statistically relevant differences.

**Sensory quality of meat from chickens broilers**

Table 3 presents the results from the organoleptic evaluation of meat from broiler chickens on the 24th post mortem hour.

The appearance (meat colour, surface etc.) is the first parameter assessed by consumers of a given product. The data showed that panelists younger than 35 years of age gave the highest score to the appearance of meat from Group III, and the lowest – to that of control group. Unlike them, panelist over 35 years of age gave their preferences to controls, and the lowest score – to Group III.

As meat aroma was concerned, panelists under 35 years of age did not found any difference among groups and gave an equal score to all groups (4.71). Panelist older than 35 years of age gave the highest score to Group II (4.83), and the lowest – to control group (4.67).

With regard to meat tenderness, panelists older than 35 years of age scored the three samples higher than did panelists under than 35 years of age. Among the groups, both groups of panelists gave a relatively high evaluation of Group II. Panelist under than 35 years of age found out that Group II was with best meat juiciness (4.71), whereas panelist over than 35 years of age – group III (4.71). The scores of the other two groups were the same for both groups of panelists.

**Table 3. Sensory quality of meat from chickens broilers**

| Traits | Maximum score | Group I – control | Group II – 0,25% | Group III – 0,5% |
|---|---|---|---|---|
| | | up to 35 years old | | |
| Appearance | 5 | 4.43±0.22 | 4.57±0.32 | 4.86±0.15 |
| Aroma | 5 | 4.71±0.20 | 4.71±0.31 | 4.71±0.31 |
| Tenderness | 5 | 4.57±0.22 | 4.71±0.31 | 4.43±0.32 |
| Juiciness | 5 | 4.29±0.31 | 4.71±0.20 | 4.29±0.31 |
| Flavour | 5 | 4.00±0.33 | 4.00±0.71 | 4.29±0.32 |
| | | over 35 years old | | |
| Appearance | 5 | 4.83±0.18 | 4.67±0.23 | 4.57±0.46 |
| Aroma | 5 | 4.67±0.23 | 4.83±0.18 | 4.71±0.31 |
| Tenderness | 5 | 4.67±0.24 | 4.83±0.18 | 4.86±0.15 |
| Juiciness | 5 | 4.67±0.25 | 4.67±0.23 | 4.71±0.20 |
| Flavour | 5 | 4.67±0.26 | 4.50±0.25 | 4.71±0.31 |

The flavour of a foodstuff is the most important criterion used by consumers to approve or disapprove a product. The analysis of data for this parameters revealed that both groups of panelist gave the highest score to the flavour of meat from Group III. This allowed affirming that the dietary supplementation of rose petals to broiler chickens had the strongest effect on poultry meat flavour.

## Conclusions

The analysis of results for meat quality allowed concluding that the increase in dietary proportion of rose petal meal in poultry feed resulted in higher values of meat colour coordinates (a* and b*). Furthermore, meat fat and ash content decreased whereas the water holding capacity of meat was improved. The sensory analysis of meat exhibited a tendency of higher scores assigned by panelist over 35 years of age as compared to panelist under 35 years of age, with most pronounced difference with respect to meat flavour

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