

THE INFLUENCE OF REARING SYSTEMS ON BASIC TISSUE SHARE AND MUSCLE CHEMICAL STRUCTURE IN BROILERS

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Background

Modern poultry production with all industrial production qualities has greatly put the traditional poultry meat and egg production into the background. This tendency had a result of poorer production quality, higher expenses and unnatural way of farming. Because of this fact, "return to nature" approach is becoming widely accepted; in some countries poultry products from half-intensive way of keeping are more common at the market, gaining more supporters among researchers as well as producers and customers.

With this fact in mind, the research topic in this theme was the analysis of basic tissue share and muscle chemical structure of basic parts in broilers reared in two different ways (intensive, industrial or half-intensive). In that sense, the objective of this research was to justify the application of one half-intensive way of keeping broilers from the point of better quality characteristics meat production.

Objectives and methods

The material at the start of this experiment consisted of 400 one-day old chickens of line hybrid Hybro. The fattening was organized in two different ways, intensive and half-intensive. In the first two weeks the rearing was conducted within a deep-covered floor object. Then, at 14 days, the experimental chickens were divided into two groups and moved. One group was reared within a closed object, with population density of 18 broilers per square metre, and the conditions adequate to intensive production. The same area was provided for the other group within enclosed space, but these broilers were provided with outlets, i.e. a way of half-intensive rearing system.

After a seven-week fattening period, 30 broilers (15 male and 15 female) were slaughtered from each experimental group chosen at random, with the objective of examining meat quality characteristics in the first part of the experiment. Dissection of processed carcasses into basic parts (thighs, drumsticks, breasts, wings, pelvises and backs) was performed at the slaughter line. Furthermore, thigh, drumstick and breast (the first category meat parts) dissection was performed, into basic and muscle tissue, bones and skin, for the purpose of this research. After the measuring, muscle tissue samples were taken for chemical analysis.

The analysis of the information obtained in this research was conducted by using the usual variation statistics methods.

Results and discussions

Dissection results, that is the information on basic tissue share in thigh, drumstick and breast mass, as well as the total mass of the parts mentioned, i.e. the first category meat, are presented in chart 1.

On the basis of the information in chart 1 it may be concluded that the intensive reared broilers showed 1.44% higher muscle tissue share; 0.58% lower bone share and 0.59% lower skin share when compared to half-intensive reared broilers.

However, outlet-reared broilers showed the characteristic of 3.20% higher muscle tissue share in drumstick mass, 2.43% in breast mass when compared to the intensive reared broilers. These differences were statistically important. Higher muscle tissue share in these basic carcass parts is accompanied by lower bone content (1.29% in drumsticks, 1.17% in breasts) and skin content (1.78% in drumsticks, 0.89% in breasts).

If we analyze the basic tissue share in total thigh, drumstick and breast mass, i.e. the first category meat, we may conclude that the intensive reared broilers showed 1.90% lower muscle tissue share, 1.17% higher bone share, 0.79% higher skin share when compared to the half-intensive reared broilers.

The results of this research point to the conclusion that broiler production organization in two different ways, in closed i.e. confined and dark space with controlled microclimate on one hand and outlet-rearing i.e. natural conditions (daily light, pure air, less populated, temperature and air humidity) on the other hand, probably caused differences in biochemical level of metabolism as a result; also indirectly in physiological and structural tissue and organ manifestations.

The information on basic chemical structure in breast, drumstick and thigh muscles of broilers reared in two different ways are presented in chart 2.

On the basis of the information in chart 2 we may notice, among other things, that the lowest lipid but the highest protein contents were determined in breast muscles (2.64% for the intensive reared, 2.27% for half-intensive reared broilers). On the other hand, in drumstick muscles in both groups of broilers we determined the highest lipid share (8.18% i.e. 7.08%) but the lowest protein share (18.62% in the intensive, 19.21% in half-intensive reared ones).

From the point of the way of rearing influence, we may conclude from the information in this chart that all three basic carcass parts muscles in intensive reared broilers contained higher lipid but lower protein share when compared to the outlet-reared broilers.

Lower lipid i.e. higher protein share in half-intensive reared broiler muscles could be the result of faster lipid and carbohydrate metabolism as a consequence of specific points in outlet rearing.

That could be said, above all, for the processes in the organism caused by more active part of certain muscles and body parts in

providing more explicit moving function for these broilers. This conclusion is supported by the research results of Ricardo(1989), who stated lower lipid contents in broilers reared in groups with less population density per square metre of floor space; but also the research of Abaseikong(1989), whose results did not prove important high temperature influence.

In the end, we should point out that the results of this research concerning water, lipid and protein contents in white and red meat are the closest to the results obtained by.... Dakić(1968), Ristić(1977), Sekiz(1968), Schon and Ristić(1978).

Conclusions

On the basis of the research results concerning the way of rearing(intensive and half-intensive) influence on basic tissue share and muscle chemical structure in broilers, we may draw the following conclusions:

--intensive reared broilers had higher muscle tissue but lower bone and skin share in thigh mass when compared to the half-intensive reared ones. However, in drumstick and breast mass, as well as the total basic carcass parts mass included in the first category meat, outlet-reared broilers had higher muscle tissue but lower bone and skin share. From the chemical structure of thigh, drumstick and breast muscles point of view, we may conclude that half-intensive reared broilers had lower lipid but higher protein share in all three basic carcass parts.

In the end, this research results point to the conclusion that the application of half-intensive way of rearing was justified in the aspect of basic tissue share and muscle chemical structure of processed carcasses.

Pertinent Literature

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Chart 1. Muscle tissue(A), bone(B) and skin(C) share in basic carcass parts (%)

| Rearing system | Tissue | Thighs | Drumsticks | Breasts | Total |
|----------------|--------|--------|------------|---------|-------|
| In | A | 59.18 | 69.31 | 66.64 | 65.73 |
| | B | 28.70 | 17.33 | 23.77 | 23.43 |
| | C | 10.56 | 11.66 | 8.80 | 9.72 |
| Pi | A | 57.74 | 72.51 | 69.07 | 67.63 |
| | B | 29.28 | 16.04 | 22.16 | 22.26 |
| | C | 11.15 | 9.88 | 7.91 | 8.93 |

Chart 2. Muscle chemical structure in breasts(G), drumsticks(K) and thighs(B) (%)

| Rearing system | | Water | Non-organic dry matter at 105 ⁰ | Ashes | Organic part | Lipid | Nitrogen | Proteins |
|----------------|---|-------|--|-------|--------------|-------|----------|----------|
| In | G | 73.58 | 26.42 | 0.55 | 99.05 | 2.64 | 3.65 | 22.84 |
| | K | 72.22 | 27.78 | 1.12 | 98.88 | 8.18 | 2.98 | 18.62 |
| | B | 73.14 | 26.86 | 1.02 | 98.98 | 5.21 | 3.31 | 20.70 |
| Pi | G | 73.32 | 26.68 | 0.90 | 99.10 | 2.27 | 3.77 | 23.55 |
| | K | 72.88 | 27.12 | 1.04 | 98.96 | 7.08 | 3.07 | 19.21 |
| | B | 72.47 | 27.53 | 1.01 | 98.99 | 4.86 | 3.48 | 21.75 |