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EVALUATION OF QUANTITATIVE AND QUALITATIVE TRAITS OF MEAT PRODUCTION IN ROSS 308 BROILER CHICKENS

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Abstract

Poultry meat occupies an essential place in human nutrition due to its superior quality attributes. Compared to meat from other species, poultry meat offers major advantages: low in calories, rich in high-quality protein, characterized by a fine structure that facilitates mastication and digestion. Market demand shows a clear consumer preference for breast meat. The present study aimed to characterize this anatomical region in the Ross 308 hybrid. The analyses focused on several quantitative and qualitative parameters of the pectoral muscles (Pectoralis superficialis and Pectoralis profundus), comparing two slaughter ages: 35 and 42 days. Birds were reared under identical housing and feeding conditions, with a standardized diet. Differences in slaughter age resulted in significant variations in live weight (1985.11 ± 45.09 g at 35 days vs. 2788.63 ± 54.26 g at 42 days), which were reflected in breast weight with bone and skin, as well as in its proportion within the carcass. The study highlights notable differences between the two age groups and concludes that, from a quantitative standpoint, slaughtering Ross 308 broilers at 42 days is more economically efficient.

Key words*: food quality, meat quality, meat production, poultry, Ross 308.*

INTRODUCTION

The poultry sector represents an emblematic branch of animal husbandry, important due to the possibility of exploiting numerous domestic species (chickens, ducks, geese, turkeys, guinea fowl) and semi-domestic species (pheasants, partridges, ostriches), in accordance with each breeder's capacities (Usturoi et al., 2025).

Meat, the main product generated by poultry farming, holds an important place in human nutrition due to its outstanding qualities. Compared to other species, poultry has the advantage of providing always fresh meat, supported by the short time required to raise hybrids and the opportunities for advanced technological development of farms (Davidescu et al., 2025).

From a culinary point of view, it is a product that is quick and easy to prepare and possesses numerous remarkable organoleptic and nutritional properties (low calorie content, high protein content, and a fine structure that makes it easy to chew and digest). Its dietary qualities recommend it for all age groups, from children to the elderly and convalescents. In general, poultry meat is characterized by a low cholesterol content, contains all essential amino acids necessary for human nutrition, and, through its organs, provides a rich source of minerals and vitamins.

Assessing global consumption, poultry meat holds a very important position among foods of animal origin, mainly due to its nutritional qualities as well as the relatively low costs of production and processing (Tudorache et al., 2023).

Although the concept of poultry meat, in a broad sense, includes the entire skeletal musculature along with connective tissues, consumers' desire to include healthier products in their diets has made them increasingly selective, including with regard to the nutritional properties of each muscle consumed. For this reason, in the current context, an important role is played by "white meat," characteristic of the pectoral muscles. Based on this premise, the present paper aims to provide a quantitative and qualitative

characterization of the pectoral musculature from one of the most widely used commercial hybrids for meat production, namely Ross-308.

MATERIALS AND METHODS

The biological material studied consisted of the commercial hybrid Ross-308. A total of 80 specimens were selected randomly from the rearing hall after stocking and were divided into two equal groups, which were raised until 35 and 42 days of age, respectively. The birds were raised under industrial conditions, in a windowless house, on the floor with permanent litter. Throughout the research, efforts were made to comply with the microclimate conditions specified in the rearing guide, and the feeding regimen was standardized, as recommended by the genetic material producer. Slaughtering was carried out in a specialized facility, and the slaughter results were processed; laboratory analyses were performed in accordance with current standards.

Slaughter parameters - live weight, hot carcass weight, and cold carcass weight were recorded, followed by calculations to determine hot and cold dressing percentages.

Proportion of anatomical portions - the carcasses were cut into anatomical parts, and determinations focused on establishing both the weight and the proportion within the carcass for three components: breast with bone and skin, breast without bone and skin, and thighs.

Dimensional aspects of pectoral muscles - the pectoral musculature was measured by determining lengths, widths, and thicknesses of the regions, after which average values were calculated.

Chemical composition - aimed at the qualitative characterization of the pectoral muscles. Accordingly, analyses targeted the characteristics of the deep pectoral muscle and the superficial pectoral muscle.

Water content - determined by the oven-drying method to constant weight (SR ISO 936:2009; SR ISO 1442:2010).

Dry matter - determined by drying the samples in an oven at controlled temperature until constant weight was reached. This determination allows the evaluation of the total solid content of the analyzed tissue.

Protein content - determined using the Kjeldahl method (SR EN ISO 937:2007), which involves measuring the total nitrogen in the sample and converting it into protein content using a specific conversion factor.

Lipid content - determined by extraction with organic solvents using the Soxhlet method (SR ISO 1443:2008). This method enables the quantification of the total lipid fraction in the sample.

Mineral content - determined by incinerating the samples in a furnace at high temperatures (approximately 550°C) until ash is obtained, a method commonly used to estimate total mineral content.

Nitrogen-free extract substances - calculated indirectly by difference, by subtracting the protein, lipid, and mineral content from the dry matter. These represent mainly carbohydrates and other non-protein soluble components.

Data interpretation - the obtained results were statistically processed by calculating mean values and variability indicators. Comparative analysis between groups allowed the identification of significant differences and the formulation of conclusions regarding the influence of the studied factors.

RESULTS AND DISCUSSIONS

Slaughter Yield

The live weight of the birds recorded average values of 1985.1±75.1 g at 35 days of age, with variations ranging between 1910.2 g and 2060.1 g. The coefficient of variation was 16.7, indicating a medium homogeneity of the studied trait. At 42 days of age, the average body weight was 2788.6±84.3 g, with minimum values of 2701.4 g and maximum values of 2869.2 g. The calculated coefficient of variation (V = 13.4%) also indicated medium homogeneity (Table 1).

Hot carcass weight at 35 days averaged 1586.3±66.3 g, while at 42 days it reached 2267.8±76.2 g. The recorded values ranged from 1519.3 g (35 days) to 2190.6 g (42 days) for minimums, and from 1643.3 g (35 days) to 2344.2 g (42 days) for maximums. The trait showed medium homogeneity (V% = 15.2 and 11.6) (Table 1).

Cold carcass weight averaged 1555.2±54.1 g at 35 days, with values between 1502.1 g and 1609.4 g. In the second control period (42 days), the average value was 2233.1±46.2 g, with a minimum of 2186.3 g and a maximum of 2279.5 g (Table 1).

The hot dressing percentage averaged 79.91±1.9% at 35 days and increased to 81.3±0.8% at 42 days.

The cold dressing percentage recorded an average value of 78.34±1.3% for birds raised to 35 days, while for those slaughtered at 42 days it reached 80.1±1.1% (Table 1).

Weight and Proportion of Anatomical Regions

As the study focused on the pectoral musculature, measurements targeted this region, considering two commercially important cuts: breast with bone and skin, and boneless, skinless breast. At the same time, thigh weight and proportion were determined, as these represent the second most preferred portion and an important component of the carcass.

The average weight of breast with bone and skin at 35 days was 459.1±21.3 g, while at 42 days significantly higher values were obtained (641.1±20.1 g). The coefficients of variation indicated slightly higher homogeneity at 42 days (V % = 12.5 vs. 14.6) (Table 2).

These values corresponded to carcass proportions of 29.5±1.1% at 35 days and 29.7±0.9% at 42 days.

Boneless, skinless breast weight averaged 364.1±18.5 g at 35 days and increased to 538.2±18.1 g at 42 days (V% < 10 in both cases, indicating good homogeneity). The proportion was 23.4±0.9% at 35 days and 24.1±0.8% at 42 days.

Thigh weight averaged 384.1±16.2 g at 35 days, representing 24.7±0.5% of the carcass. At 42 days, the average weight increased to 562.8±15.8 g, with a proportion of 25.2±0.6%

Table 1. Live weight, carcass weight and slaughter yields recorded by the Ross-308 hybrid

Specification	Both sexes							
	35 days				42 days			
	$\bar{X} \pm s_{\bar{x}}$	Min.	Max.	V%	$\bar{X} \pm s_{\bar{x}}$	Min.	Max.	V%
Live weight (g)	1985.1±75.1	1910.2	2060.1	16.7	2788.6±84.3	2701.4	2869.2	13.4
Hot carcass weight (g)	1586.3±66.3	1519.3	1643.3	15.2	2267.8±76.2	2190.6	2344.2	11.6
Cold carcass weight (g)	1555.2±54.1	1502.1	1609.4	14.6	2233.1±46.2	2186.3	2279.5	9.2
Hot yield (%)	79.91±1.9	78.01	81.8	10.5	81.3±0.8	80.6	82.1	8.3
Cold yield (%)	78.34±1.3	77.04	79.6	10.4	80.1±1.1	78.9	81.2	8,2

Table 2. The share of the main cut portions in the composition of the carcasses of the Ross-308 hybrid

Specification	Both sexes							
	35 days				42 days			
	$\bar{X} \pm s_{\bar{x}}$	Min.	Max.	V%	$\bar{X} \pm s_{\bar{x}}$	Min.	Max.	V%
Breast weight with bone and skin	459.1±21.3	437	481	14.6	641.1±20.1	620	663	12.5
% of carcass	29.5±1.1	28.3	30.7	11.1	29.7±0.9	28.7	30.7	11.2
Breast weight without bone and skin	364.1±18.5	345	383	9.7	538.2±18.1	519	557	8.8
% of carcass	23.4±0.9	22.5	24.5	9.2	24.1±0.8	23.3	24.9	8.3
Thigh weight	384.1±16.2	367	410	7.7	562.8±15.8	547	578	7.1
% of carcass	24.7±0.5	24.1	25.3	5.6	25.2±0.6	24.6	24.9	6.7

Dimensional Characteristics of Pectoral Muscles

Given the increasing demand for marketing pectoral muscles separately (superficial and deep), several dimensional parameters were evaluated, including length, width, and thickness.

The average length of the superficial pectoral muscle was 179±5 mm at 35 days and 197±6 mm at 42 days, while the deep pectoral muscle measured 138±6 mm and 146±4 mm, respectively.

The average width of the deep pectoral muscle was 37±4 mm at 35 days and 39±3 mm at 42 days, while the superficial muscle measured 76±3 mm and 82±4 mm, respectively.

The average thickness of the deep pectoral muscle was 14±3 mm at both ages, while for the superficial muscle it was 29±4 mm at 35 days and 33±5 mm at 42 days (Table 3).

Table 3. Dimensional aspects of the pectoralis superficialis and pectoralis deepis muscles in the Ross-308 hybrid

Specification	Average length (mm)	Average width (mm)	Average thickness (mm)
35 days			
Superficial pectoral	179±5	76±3	29±4
Deep chest	138±6	37±4	14±3
42 days			
Superficial pectoral	197±6	82±4	33±5
Deep chest	146±4	39±3	19±3

Chemical Composition of Pectoral Musculature

The chemical composition analysis aimed to determine water, dry matter, lipids, proteins, nitrogen-free extract substances, and mineral content (Hudák et al., 2021).

In the first control period (35 days), for the superficial pectoral muscle, the average water content was 74.9±0.1%, with very narrow variation limits (74.7-75.0%), indicating very high homogeneity.

Correspondingly, dry matter averaged 25.1±0.1%, also showing very high homogeneity (V = 1.1).

The average lipid content was 0.92±0.01%, with values between 0.91 and 0.93%, indicating very high homogeneity.

Protein content averaged 22.22±0.02%, with minimal variation, resulting in a very low coefficient of variation.

Nitrogen-free extract substances averaged 0.94±0.01%, while mineral content was 1.02±0.03%.

In the second control period (42 days), for the superficial muscle, water content averaged 74.1±0.6%, and dry matter 25.9±0.5%.

Protein content reached 22.29±0.05%, while lipids showed a slight increase to 1.12±0.03%.

Mineral substances averaged 1.49±0.05%, and nitrogen-free extract substances reached 1.01±0.03%.

For the deep pectoral muscle at 35 days, water content was 75.3±0.3%, and dry matter 24.7±0.2%.

Protein content averaged 22.25±0.15%, while lipid content was 0.79±0.01%.

Mineral substances averaged 1.05±0.02%, and nitrogen-free extract substances 0.63±0.05%.

At 42 days, for the deep pectoral muscle, water content averaged 75.2±1.2%, while dry matter was 24.8±0.3%, both showing very good homogeneity (V = 1.2 and 0.7).

Protein content ranged between 22.05% and 22.25%, with an average of 22.15±0.10% and a very low coefficient of variation (V = 1.3).

Lipid content averaged 0.99±0.02%, with values between 0.97% and 1.01% (V = 2.9), indicating high homogeneity.

Mineral substances represented 0.98±0.01%, while nitrogen-free extract substances averaged 0.66±0.05% (Table 4).

Table 4. Dimensional aspects of the pectoralis superficialis and pectoralis deepis muscles in the Ross-308 hybrid

Age	Parameter	Superficial pectoralis muscle				Deep pectoralis muscle			
		$\overline{X} \pm S_{\overline{x}}$ (%)	V %	Min. (%)	Max. (%)	$\overline{X} \pm S_{\overline{x}}$ (%)	V %	Min. (%)	Max. (%)
35 days	Water	74.9±0.1	1.4	74.7	75.0	75.3±0.3	1.2	75	75.8
	Dry matter (SU)	25.1±0.1	1.1	25.0	25.3	24.7±0.2	0.8	24.5	25
	Mineral substances	1.02±0.03	4.1	0.99	1.05	1.05±0.02	3.2	1.03	1.07
	Fat	0.92±0.01	5.3	0.91	0.93	0.79±0.01	4.6	0.78	0.80
	Protein	22.22±0.02	1.2	22.20	22.24	22.25±0.15	1.1	22.10	22.40
	SEN	0.94±0.01	3.3	0.93	0.95	0.63±0.05	2.6	0.58	0.68
42 days	Water	74.1±0.6	1.3	73.5	74.7	75.2±1.2	1.2	74	76.4
	Dry matter (SU)	25.9±0.5	1.1	25.4	26.05	24.8±0.3	0.7	24.5	25.1
	Mineral substances	1.49±0.05	6.4	1.41	1.54	0.98±0.01	5.4	0.97	0.99
	Fat	1.12±0.03	3.2	1.09	1.15	0.99±0.02	2.9	0.97	1.01
	Protein	22.29±0.05	1.2	22.24	22.34	22.15±0.10	1.3	22.05	22.25
	SEN	1.01±0.03	3.6	0.98	1.04	0.66±0.05	3.2	0.61	0.71

Slaughter Yield

Regarding the body weight of the studied flocks, a favorable evolution was observed in relation to growth rate. Comparison with data from the literature revealed similar or even higher average values than those reported by other authors. Thus, at 35 days of age, Hassan et al. (2021) reported body weights of approximately

1756 g, while Ribeiro et al. (2021) obtained values of 1900-1950 g.

At 42 days of age, average body weights of 2636 g were reported by Gumowski (2025), while Rajcic et al. (2024) identified values ranging between 2600 and 2900 g.

Hot carcass weight showed values comparable to those reported in the literature. Namted et al. (2025) reported values of 1500-1600 g for commercial hybrids at 35 days of age, confirming their superiority over less improved breeds (Gheorghe et al., 2022).

Similarly, Dong et al. (2024) reported values between 2200 and 2350 g for Ross 308 at 42 days of age.

Comparable results were also reported by Curea et al. (2023), who observed that improvements in genetic and nutritional performance in broilers have led to significant increases in hot carcass weight.

Regarding cold carcass weight, Hudak et al. (2021) reported ranges of 1500–1580 g at 34–36 days of age. The Aviagen guide (2022) indicates that, under commercial conditions, Ross 308 carcass weights at 42 days range between 2150 and 2300 g, confirming that the value obtained in this study (2233.1 g) falls within the optimal performance range.

Liao et al. (2022) highlighted that weight loss during chilling varies between 1.5% and 3% of hot carcass weight, supporting the differences observed in the present study.

For hot dressing percentage, the genetic supplier reports values between 78% and 82% for Ross 308, while applied research (Custură et al., 2019) emphasizes the influence of nutrition, age, sex, and slaughterhouse processing conditions. Despite these multiple influencing factors, our results fall within the reference range.

Berri (2020) reported hot dressing percentages of approximately 78.0-80.0% at 35-42 days of age, values close but slightly lower than those obtained in this study. Similar findings were reported by Benahmed et al. (2023), who noted that dressing percentage tends to increase slightly with age and muscle development.

For cold dressing percentage, the obtained values are comparable to those reported by Olkowski et al. (2001), who found values of 77-79% at 35-42 days of age. Lilburn et al. (2015) reported values of approximately 75.5-80.0%, emphasizing the influence of rearing conditions and slaughtering technology. Martínez and Valdivié (2021) demonstrated that cold dressing percentage is generally 1.5-3% lower than hot dressing percentage, due to water loss through evaporation and post-slaughter drip.

Differences compared to other studies can generally be explained by technological and environmental factors such as stocking density, nutritional level, and microclimate conditions, all recognized as having a significant impact on bird growth (Usturoi et al., 2021).

Weight and Proportion of Anatomical Regions

The weight of breast with bone and skin was similar to the values reported by Wegner et al. (2024), who found values between 430 and 500 g at approximately 35 days of age. In the same context, Fletcher (2002) and Tudorache et al. (2022) showed that intensive genetic selection in meat-type hybrids, including Ross 308, has led to significant increases in pectoral muscle mass, with the breast accounting for over 30% of carcass weight at commercial ages.

At 42 days of age, Havenstein et al. (2003) and Nechitailo et al. (2024) reported breast weights (with bone and skin) ranging between 600 and 660 g.

The weight of boneless, skinless breast was consistent with the findings of Biesek et al. (2020), who demonstrated that genetic selection significantly increased the proportion of pectoral musculature, representing approximately 28-32% of carcass weight at commercial ages.

Novak et al. (2010) reported boneless breast weights of approximately 520-560 g at 42 days of age, values comparable to those obtained in the present study (538.2 g). Similarly, Lilburn. (2015) showed that pectoral muscle development accelerates toward the end of the growing period, explaining the differences observed between 35 and 42 days.

Dimensional Characteristics of Pectoral Muscles

Regarding the dimensional characteristics of pectoral muscles, Fletcher (2002) emphasized that intensive genetic selection has favored the accelerated development of the pectoralis superficialis (the main determinant of breast yield), while the pectoralis profundus remains a secondary functional muscle with slower

development. Hassan et al. (2021) demonstrated that the differences between the two muscles are due to their distinct biomechanical functions.
Similar results to those obtained in the present study were reported by Rajcic et al. (2024), who observed that in commercial hybrids, the superficial muscle shows a higher growth rate compared to the pectoralis profundus.

Chemical Composition of Pectoral Musculature

Regarding the chemical composition of the superficial pectoral muscle, Fletcher (2002) reported a water content ranging between 73% and 76%, values very close to those obtained in the present study (74.9% at 35 days and 74.1% at 42 days). Protein content reported in the literature is approximately 21-23% (Fletcher, 2002), corresponding to the values obtained (22.22% and 22.29%).
In the same context, Dalle et al. (2024), Dolis et al. (2024) reported intramuscular lipid contents ranging between 0.8% and 1.5%, which includes both values obtained in this study (0.92% at 35 days and 1.12% at 42 days). Other authors (Cojocariu et al., 2026) reported mineral contents of approximately 1.0-1.6%, confirming that the values obtained in this study (1.02-1.49%) fall within this range.
Nitrogen-free extract substances (0.94% and 1.01%) fall within the ranges reported for lean poultry meat, as Liao et al. (2022) indicated values below 1% for these compounds.
The chemical composition of the deep pectoral muscle showed that water content (75.2-75.3%) falls within the range reported by Liao et al. (2022), who identified values between 74% and 76% in broilers. Variations may be attributed to nutrition, rearing system, and slaughter age (Gheorghe et al., 2022, Martinez et al. 2021). Olkowski et al. (2001) also confirmed that deep pectoral muscle exhibits low variability in water content within the commercial slaughter range.
Dry matter values (24.7-24.8%) are similar to those reported by de Wegner et al. (2024), who found values between 23% and 26%.
Protein content (22.15-22.25%) is comparable to the results reported by Hudak et al. (2021), ranging between 21% and 23%.
Lipid content (0.79-0.99%) is consistent with the findings of Berri (2020), who reported values below 1.2% for deep pectoral muscle, highlighting its low lipid content.
Mineral content (0.98-1.05%) was similar to that reported by Dalle et al. (2024), who indicated a range of 1.0-1.4% without major differences between pectoral muscles.
Nitrogen-free extract substances (0.63-0.66%) fall within the low values reported by Havenstein et al. (2003), who showed that these components represent less than 1% in lean poultry meat, reflecting a low content of soluble non-protein compounds.

CONCLUSIONS

The results obtained highlight the extremely high productive performance of the Ross 308 hybrid, confirmed by rapid body weight gain and superior values of slaughter performance parameters recorded between 35 and 42 days of age.
Live weight and carcass weight were parameters that showed significant increases with advancing age, demonstrating efficient feed utilization and the expression of the hybrid's high genetic potential. Slaughter yields, both hot and cold, were high, with a slight increase observed at 42 days of age.
The overall analysis of carcass structure revealed a pronounced development of the breast region, especially of the pectoralis superficialis muscle, which recorded significant increases in both weight and size. This trend confirms the direction of genetic selection toward increasing the proportion of breast meat in carcass composition.
The chemical composition of the pectoral muscles showed a high and stable protein content, low lipid levels, and minimal variation in water and dry matter content, characteristics that confirm the pectoral muscle as being of superior quality

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