

THE MEAT YIELD AND PHYSICOCHEMICAL COMPOSITION OF WILD TURKEY (*MELEAGRIS GALLOPAVO* L.) MEAT RAISED IN A SEMI-WILD MANNER

Peter Haščík¹ , Martin Fik² , Bučko Ondřej² , Adriana Pavelková¹ 

¹ Slovak University of Agriculture in Nitra, Faculty of Biotechnology and Food Sciences, Institute of Food Sciences, Tr. A. Hlinku 2, 949 76 Nitra, Slovakia

² Slovak University of Agriculture in Nitra, Faculty of Agrobiological and Food Resources, Institute of Animal Husbandry, Tr. A. Hlinku 2, 949 76 Nitra, Slovakia

Link to this article: <https://doi.org/10.11118/actaun.2025.018>

Received: 17. 6. 2025, Accepted: 5. 8. 2025

Abstract

Wild turkeys (*Meleagris gallopavo* L.) are considered a promising source of high-quality poultry meat. The aim of this study was to evaluate the meat yield and selected physicochemical properties of semi-wild wild turkeys, including water, protein, fat and cholesterol content, amino acid and fatty acid profiles and meat colour. The average carcass yield without head was 79.56%. The water content ranged from 69.25 (breast) to 71.39 g/100 g (thigh), the protein content from 23.19 (thigh) to 26.24 g/100 g (breast) and the fat from 0.95 (breast) to 2.03 g/100 g (thigh). Cholesterol content was lower in breast (41 mg/100 g) and higher in thigh (56 mg/100 g). Significant differences ($P \leq 0.05$) in amino acid composition were found between breast and thigh muscles. Fatty acid composition was significantly different ($P \leq 0.05$), especially in DHA, EPA, omega-3, omega-6, PUFA and SAFA levels. Breast muscle showed higher lightness ($L^* = 41.03$) and lower redness ($a^* = 1.27$) and yellowness ($b^* = 6.56$) compared to thigh ($P \leq 0.05$). The results confirm that wild turkeys raised in semi-wild conditions produce nutritionally valuable meat with desirable physicochemical properties, making them suitable for sustainable and functional poultry meat production.

Keywords: wild turkey, meat yield, physical-chemical composition, amino acid, fatty acid

INTRODUCTION

The domestic turkey (*Meleagris gallopavo*) is one of the most economically significant poultry species globally, primarily due to the high quality and nutritional value of its meat. Most of the world's turkey production relies on intensively reared commercial hybrids selected for rapid growth, high slaughter yield, and large breast muscle development (Wegner *et al.*, 2025). However, rising interest in ecological sustainability and the preservation of genetic diversity has renewed the relevance of indigenous and wild turkey strains, particularly in traditional and low-input production

systems (Portillo-Salgado *et al.*, 2022). Wild turkeys, originally from North America, continue to hold ecological and cultural importance in many regions. In Mexico, native turkeys (*M. g. gallopavo*) are recognized as a valuable genetic resource due to their adaptability, natural disease resistance, and ability to produce high-quality meat under minimal management and extensive conditions (Portillo-Salgado *et al.*, 2022). These birds forage freely and consume a diverse natural diet, which positively influences the sensory and nutritional properties of their meat (Portillo-Salgado *et al.*, 2022). Turkey meat is widely regarded as one of the healthiest meat options, rich in high-quality, easily digestible



This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

proteins that contain all essential amino acids, particularly lysine, methionine, and leucine (Gálvez *et al.*, 2018). In addition to its protein content, turkey meat has low total fat, a favourable fatty acid profile dominated by monounsaturated fatty acids (MUFA), and relatively low cholesterol concentrations – typically below 45 mg/100 g in breast meat (Wegner *et al.*, 2025). These features make it suitable for weight-reducing diets, cardiovascular health, and functional nutrition (Al-Baidhani and Al-Qutaifi, 2021). The chemical composition of wild turkey meat reflects its genotype and natural rearing environment. Moisture content in the breast muscle generally ranges from 72% to 75%, protein values often exceed 23%, and fat content in breast meat is commonly below 1%, even in females (Apetroaei *et al.*, 2012; Ribarski and Oblakova, 2016). These results support the classification of wild turkey meat as lean and nutritionally dense. The amino acid profile remains stable across rearing systems, while the fatty acid composition is influenced by diet and exercise; wild turkeys often have higher oleic acid content and a more favourable omega-6 to omega-3 ratio (Solaesa *et al.*, 2024). Meat colour, a key sensory and technological attribute, is darker in wild turkeys than in commercial broilers or hybrids. Wild turkeys exhibit lower L* (lightness) values and higher a* (redness) values, largely due to elevated myoglobin content and oxidative muscle metabolism (Portillo-Salgado *et al.*, 2022). Although darker meat may be less preferred by some consumers, it is positively associated with antioxidant potential, higher iron content, and longer shelf-life (Solaesa *et al.*, 2024).

Despite having lower total carcass yield than commercial hybrids, wild turkeys provide a favourable proportion of edible meat, with dressing percentages averaging 70–72% and breast and thigh muscles contributing significantly (Solaesa *et al.*, 2024). Research has also confirmed that age and sex significantly affect meat quality traits; females typically exhibit higher intramuscular fat in thighs and more desirable texture attributes (Portillo-Salgado *et al.*, 2022). Given the increasing emphasis on ecological agriculture, sustainability, and food quality, wild turkeys represent a valuable genetic and nutritional resource for local and traditional animal production systems. Their meat offers not only sensory appeal but also superior nutritional quality, aligning with modern consumer trends and health-conscious dietary choices (Gálvez *et al.*, 2018; Solaesa *et al.*, 2024).

Despite these favourable characteristics, the meat quality of native or semi-wild turkeys remains poorly studied, especially in terms of achieved meat yield and physicochemical parameters (e.g. colour, moisture, protein, fat, cholesterol, etc.). Understanding how these alternative turkey genotypes perform in extensive or semi-natural production systems could provide insight into the development of sustainable and health-promoting poultry products, which was also the goal of our research.

MATERIALS AND METHODS

Experimental Design

From day 1 to days 70 fattening, wild turkeys had unlimited access to pasture, feed mixture HYD-13 (Tab. I) and drinking water, i.e. ad libitum. Subsequently, until the end of fattening (240 days), wild turkeys were kept on pasture and supplemented with wheat, corn, barley and sunflower ad libitum. The feed rations were formulated to provide the nutritional needs of turkeys according to the recommended reference levels (Bulletin MARD SR, 2004). The feed mixture was prepared by Biofeed, Inc. (Kolárovo, Slovak Republic). To determine the nutrient content and energy value of the feed mixture, an analysis was performed at the Institute of Nutrition and Genomics of the Slovak University of Applied Sciences in Nitra. The feed mixture was produced without any antibiotics and coccidiostats.

I: Composition of basal diet and nutrient content

Ingredients (%)	Starter (HYD-13) (day of age 1–70)
Wheat	13.00
Maize	48.20
Soybean meal (48% CP)	33.40
Ground limestone	0.60
Monocalcium phosphate	1.40
Fodder salt	0.10
Sodium bicarbonate	0.15
Lysine	0.05
Methionine	0.50
Palm kernel oil Bergafat	2.10
Premix Euromix 0.5 % ¹	0.50
Nutrient content (g/kg)	
Crude protein	265.76
Lysine	17.50
Ash	24.24
Ca	13.16
P usable	7.56
Mg	1.41
Linoleic acid	13.51
ME _N (MJ/kg)	12.32

Note: ¹active substances per kilogram of premix: vitamin A 2,500,000 IU; vitamin E 20,000 mg; vitamin D₃ 800,000 IU; niacin 12,000 mg; D-pantothenic acid 3,000 mg; riboflavin 1,800 mg; pyridoxine 1,200 mg; thiamine 600 mg; menadione 800 mg; ascorbic acid 20,000 mg; folic acid 400 mg; biotin 40 mg; cobalamin 8 mg; choline 100,000 mg; betaine 50,000 mg; Mn 20,000 mg; Zn 16,000 mg; Fe 14,000 mg; Cu 2,400 mg; Co 80 mg; I 200 mg; Se 50 mg

The biological material for the validated experiment was 20 female wild turkeys (*Meleagris gallopavo* L.). The animals were from semi-farm breeding and were 240 days old. Following a legally approved method of euthanasia and slaughter, the animals were sent to SUA Nitra's Institute of Food Sciences in cooling boxes. After that, we performed flawless slaughter on the wild turkey cadavers. Ethics clearance was not needed.

Slaughter and Measurements

We then subjected the carcasses of wild turkeys (*Meleagris gallopavo* L.) to perfect slaughtering. The wild turkeys were slaughtered by conventional neck cut, bled, feathers removed, and eviscerated. Examined parameters in experiment were as follows: live body weight (BW) at the end fattening period (240 d); head; shanks; carcass weight (CW); inedible offal weight; liver weight; stomach weight; heart weight; neck weight; abdominal fat; stomach fat weight; heart fat weight; total fat weight; breast part weight; thigh part weight; breast muscle weight; thigh muscle weight; back weight; wings part weight (all in g); weight of the digestive system, and carcass yield (CY) (%).

All animals used in this study were handled following the national legislation on animal welfare (DL n. 126, 07/07/2011, EC Directive 2008/119/EC). Wild turkeys were slaughtered in compliance with Regulation 1099/2009 of the European Union on the protection of animals at the time of killing.

Chemical Composition

The elemental chemical composition of the turkey meat (water, crude protein, crude fat, and cholesterol content) was examined using the INFRATEC 1265 instrument (Germany), which uses transmittance mode to operate at intervals of 2 nm from 850 to 1 050 nm. After being homogenized, the 50 g samples were put into a 90 × 90 × 15 mm glass cup and scanned twice. Each sample's spectrum was calculated as $\log 1/T$ (T = transmittance) and represented the average of five scan locations. The results are given in g/100 g. Every determination was made three times.

Amino Acid Composition

According to the methods employed by Straková *et al.* (2015), the Automatic Amino Acid Analyzer AAA 400 (Ingos a.s., Prague, Czech Republic) was used to determine the content of amino acids after acid hydrolysis in 6 N HCl at 110 °C for 24 hours. This was based on the colour-forming reaction of AA with the oxidative agent ninhydrin. After being recalculated to 100% dry matter, the resultant AA values were represented as grams of AA content per 100 grams of muscle. There were two sets of determinations.

Fatty Acid Composition

Using Soxhlet extraction with petroleum ether, the total fat content was measured in accordance with ISO 12,966-2:2017: synthesis of methyl esters of fatty acids, animal and vegetable fats, and oils. According to Bobková *et al.* (2022), the individual profile was analysed using gas chromatography of fatty acid methyl esters. Three duplicates of the samples were used.

Determination of Colour

To measure the turkey breast and thighs meat colour characteristics (L^* : lightness a^* : redness, and b^* : yellowness), a Chroma Meter CM-2600d colour meter (Konica Minolta Sensing Inc., Japan) was used. When examining the colour of breast and thigh muscles, we employed the L^* , a^* , and b^* values without gloss (SCE) in the analysis. Three duplicates of the samples were used.

Statistical Analysis

All results were reported as means $\pm$ standard deviations of measurements. Data were analysed using Student test at a significance level of $P \leq 0.05$ to test for differences between mean values. Data were analyses using XLSTAT® software (version 2018.5.52280, Addinsoft, New York).

RESULTS

Meat Performance

The meat performance results of wild turkey's females are shown in Tab. II.

The average live weight of female wild turkeys (*Meleagris gallopavo* L.) was 3676.27 $\pm$ 678.41 g, with a minimum of 2903.10 g and a maximum of 4917.20 g. After removal of the head and inedible parts, the average carcass weight was 2417.70 $\pm$ 494.30 g, corresponding to a carcass yield of 79.56 $\pm$ 4.16%, with the highest recorded value reaching 88.20%.

Among the evaluated carcass components, the thighs (815.18 $\pm$ 145.67 g) and breasts (720.83 $\pm$ 183.29 g) contributed the most to total body weight. The muscle mass was detected in the thigh muscles (538.78 $\pm$ 141.34 g) and breast muscles (504.85 $\pm$ 133.69 g). These differences in muscle distribution were consistent among individuals, as shown by moderate standard deviations. The percentage of valuable meat parts (thighs plus breasts) from the slaughtered carcass without the head was 63.53% (33.72% + 29.81%, respectively) and in the case of muscle meat from these parts, 43.17% (22.29% + 20.88%, respectively). Internal organs, the liver (81.92 $\pm$ 17.76 g), heart (20.13 $\pm$ 3.59 g) and stomach (143.15 $\pm$ 22.96 g), also contributed to total edible yield. Total body fat showed large individual variability (91.98 $\pm$ 50.22 g), indicating differences in fat deposition among sampled turkeys.

II: Meat performance of wild turkey female meat (g)

Parameter	Min.	Mean + SD	Max.
Live weight	2903.10	3676.27 ± 678.41	4917.20
Head	74.30	90.30 ± 11.61	105.80
Shanks	80.80	102.30 ± 15.95	120.50
Carcass weight without head	1841.50	2417.70 ± 494.30	3244.00
Thigh part	634.20	815.18 ± 145.67	1022.40
Thigh muscle	320.00	538.78 ± 141.34	703.90
Breast part	537.80	720.83 ± 183.29	1037.50
Breast muscle	333.50	504.85 ± 133.69	705.30
Back	366.20	510.88 ± 113.07	715.90
Wings	248.60	322.93 ± 51.75	381.90
Carcass yield without head (%)	75.07	79.56 ± 4.16	88.20
Heart	14.20	20.13 ± 3.59	23.40
Liver	58.60	81.92 ± 17.76	113.70
Stomach	11.40	143.15 ± 22.96	179.60
Neck	189.70	268.75 ± 64.96	373.00
Inedible offal	377.00	513.92 ± 104.93	689.70
Abdominal fat	24.10	45.55 ± 33.99	120.50
Stomach fat	29.30	44.65 ± 18.07	80.30
Heart fat	0.70	1.78 ± 0.52	2.20
Σ Fat	55.60	91.98 ± 50.22	202.60
Digestive system	198.90	241.52 ± 31.36	275.10

Notes: Mean ± SD (standard deviation); Min. (minimum); Max. (maximum)

Although carcass traits were not subjected to inferential statistical analysis in this study (no P-values reported), the observed variation among individuals suggests a high degree of phenotypic diversity in the wild population.

Chemical Composition of Muscle Tissue

Significant differences ($P \leq 0.05$) were found between the chemical composition of breast and thigh muscles (Tab. III). Breast muscle exhibited a significantly higher protein content (26.24 ± 1.39 g/100 g) compared to thigh muscle (23.19 ± 0.94 g/100 g, $P = 0.001$). In contrast,

III: Chemical composition of the most valuable parts of wild turkey meat (g/100 g)

Parameter	Part	Min.	Mean + SD	Max.	P-value
Water	Thigh	67.82	71.39 ± 1.36 ^a	73.84	0.001
	Breast	67.23	69.25 ± 0.91 ^b	70.81	
Total Protein	Thigh	20.50	23.19 ± 0.94 ^b	24.42	0.001
	Breast	23.21	26.24 ± 1.39 ^a	27.54	
Crude Fat	Thigh	1.30	2.03 ± 0.94 ^a	4.47	0.004
	Breast	0.29	0.95 ± 1.11 ^b	3.65	
Cholesterol (mg/100 g)	Thigh	0.40	56 ± 0.12 ^a	0.83	0.005
	Breast	0.22	41 ± 0.16 ^b	0.79	

Notes: Mean ± SD (standard deviation); Min. (minimum); Max. (maximum). Different superscript letter in column (a-b) indicate statistically significant differences ($P \leq 0.05$)

the fat content was significantly higher in the thighs (2.03 ± 0.94 g/100 g) than in the breasts (0.95 ± 1.11 g/100 g, $P = 0.004$). These findings confirm a statistically relevant differentiation in nutritional value between anatomical parts. Water content also differed significantly, with higher moisture in thigh meat (71.39 ± 1.36 %) than in breast meat (69.25 ± 0.91 %, $P = 0.001$), while cholesterol was more abundant in the thighs (56 ± 0.12 vs. 41 ± 0.16 mg/100 g, $P = 0.005$). All values indicate statistically robust tissue-specific variation based on one-way ANOVA.

Amino Acid Composition

All amino acids measured showed highly significant differences ($P \leq 0.05$) between thigh and breast meat (Tab. IV). For example, lysine content was higher in breast (1.81 ± 0.24 g/100 g) than in thigh (1.19 ± 0.24 g/100 g), and the same trend was confirmed for other amino acids such as methionine, isoleucine, valine, leucine and arginine. These statistically significant differences support the conclusion that breast meat is superior in terms of essential amino acid density and therefore in terms of biological value.

Fatty Acid Composition

The comparison of fatty acid profiles between breast and thigh muscles revealed several statistically significant differences ($P \leq 0.05$). Breast muscle contained significantly higher amounts of omega-3 (0.58 ± 0.06 g/100 g vs. 0.48 ± 0.05 g/100 g, $P = 0.001$) and omega-6 fatty acids (11.35 ± 1.59 g/100 g vs. 8.98 ± 1.51 g/100 g, $P = 0.001$). Similarly, the sum of polyunsaturated fatty acids (Σ PUFA) was significantly higher in breast muscle (13.95 ± 1.76 g/100 g) compared with thigh muscle (12.12 ± 1.70 g/100 g, $P = 0.004$). The results are shown in Tab. V. Statistical analysis confirmed significant differences for several individual fatty acids, such as myristic acid ($P = 0.001$), stearic acid ($P = 0.003$), linoleic acid ($P = 0.001$), eicosenoic acid ($P = 0.001$), and arachidonic acid ($P = 0.021$). Some fatty acids (e.g. palmitic, oleic) did not differ significantly between muscle types ($P > 0.05$), suggesting that their distribution is less influenced by anatomical origin or diet.

Meat Colour Evaluation

Colour parameters differed significantly between the breast and thigh muscles (Tab. VI). Breast meat was significantly lighter ($L^* = 41.03 \pm 2.62$) than thigh meat ($L^* = 36.38 \pm 3.09$, $P = 0.028$), indicating a brighter

IV: Amino acid composition of wild turkey meat (g/100 g)

Parameter/Group	Part	Min.	Mean + SD	Max.	P-value
Threonine	Thigh	0.48	0.65 ± 0.09^b	0.85	0.001
	Breast	0.65	0.85 ± 0.11^a	1.05	
Valine	Thigh	0.47	0.62 ± 0.08^b	0.78	0.001
	Breast	0.71	0.87 ± 0.09^a	1.07	
Methionine	Thigh	0.35	0.47 ± 0.07^b	0.59	0.001
	Breast	0.61	0.73 ± 0.09^a	0.94	
Isoleucine	Thigh	0.34	0.54 ± 0.12^b	0.75	0.001
	Breast	0.67	0.83 ± 0.11^a	1.07	
Leucine	Thigh	0.76	1.12 ± 0.20^b	1.50	0.001
	Breast	1.31	1.34 ± 0.21^a	2.07	
Phenylalanine	Thigh	0.39	0.57 ± 0.10^b	0.76	0.001
	Breast	0.70	0.85 ± 0.11^a	1.08	
Lysine	Thigh	0.77	1.19 ± 0.24^b	1.63	0.001
	Breast	1.46	1.81 ± 0.24^a	2.33	
Cysteine	Thigh	0.20	0.23 ± 0.02^b	0.27	0.001
	Breast	0.24	0.29 ± 0.03^a	0.36	
Histidine	Thigh	0.31	0.52 ± 0.12^b	0.72	0.001
	Breast	0.72	0.96 ± 0.16^a	1.31	
Arginine	Thigh	0.58	0.90 ± 0.18^b	1.23	0.001
	Breast	1.08	1.35 ± 0.18^a	1.72	

Notes: Mean $\pm$ SD (standard deviation); Min. (minimum); Max. (maximum). Different superscript letter in column (a-b) indicate statistically significant differences ($P \leq 0.05$)

V: Fatty acid composition of wild turkey meat (g/100 g)

Fatty acid/Group	Parameter	Min.	Mean + SD	Max.	P-value
Lauric	Thigh	0.11	0.12 ± 0.01	0.13	0.067
	Breast	0.09	0.11 ± 0.01	0.12	
Myristic	Thigh	1.27	1.27 ± 0.01 ^b	1.26	0.001
	Breast	1.23	1.33 ± 0.06 ^a	1.44	
Palmitic	Thigh	23.89	24.42 ± 0.33	25.17	0.459
	Breast	23.87	24.50 ± 0.28	24.92	
Heptadecanoic	Thigh	0.19	0.32 ± 0.06	0.41	0.823
	Breast	0.26	0.33 ± 0.05	0.43	
Stearic	Thigh	9.89	10.46 ± 0.31 ^b	10.93	0.003
	Breast	10.25	10.84 ± 0.36 ^a	11.49	
Oleic	Thigh	25.93	38.81 ± 6.86	46.61	0.733
	Breast	30.14	38.16 ± 3.54	44.58	
Vaccenic	Thigh	4.77	5.00 ± 0.14 ^a	5.31	0.001
	Breast	4.27	4.68 ± 0.19 ^b	5.03	
Linoleic	Thigh	1.29	1.40 ± 0.05 ^b	1.52	0.001
	Breast	5.92	8.64 ± 1.47 ^a	12.62	
Conjugated linoleic	Thigh	0.11	0.14 ± 0.02	0.17	0.365
	Breast	0.11	0.13 ± 0.02	0.17	
α-Linolenic	Thigh	0.11	0.17 ± 0.03	0.23	0.711
	Breast	0.10	0.17 ± 0.04	0.23	
Eicosenoic	Thigh	0.63	0.77 ± 0.06 ^a	0.90	0.001
	Breast	0.31	0.51 ± 0.09 ^b	0.70	
Arachidonic	Thigh	1.20	1.95 ± 0.40 ^a	2.65	0.021
	Breast	1.08	1.66 ± 0.28 ^b	2.17	
Eicosapentaenoic	Thigh	0.07	0.12 ± 0.02	0.18	0.055
	Breast	0.09	0.11 ± 0.02	0.14	
Docosapentaenoic	Thigh	0.12	0.14 ± 0.01	0.16	0.609
	Breast	0.12	0.14 ± 0.01	0.18	
Docosaheptaenoic	Thigh	0.02	0.03 ± 0.01 ^b	0.04	0.001
	Breast	0.03	0.04 ± 0.01 ^a	0.05	
Omega 3	Thigh	0.40	0.48 ± 0.05 ^b	0.59	0.001
	Breast	0.46	0.58 ± 0.06 ^a	0.74	
Omega 6	Thigh	5.73	8.98 ± 1.51 ^b	10.81	0.001
	Breast	7.94	11.35 ± 1.59 ^a	15.14	
Σ SAFA	Thigh	31.59	33.88 ± 1.43 ^b	37.04	0.028
	Breast	31.36	35.43 ± 2.38 ^a	40.88	
Σ MUFA	Thigh	45.04	49.04 ± 2.50	53.96	0.436
	Breast	47.00	49.62 ± 1.79	53.08	
Σ PUFA	Thigh	8.52	12.12 ± 1.70 ^b	14.48	0.004
	Breast	10.94	13.95 ± 1.76 ^a	17.76	

Notes: Mean ± SD (standard deviation); Min. (minimum); Max. (maximum). Different superscript letter in column (a-b) indicate statistically significant differences ($P \leq 0.05$)

VI: Colour evaluation of wild turkey meat

Group/Parameter	<i>L</i> *	<i>a</i> *	<i>b</i> *
Thigh	36.38 ± 3.09 ^b	8.68 ± 1.12 ^a	8.88 ± 1.04 ^a
Breast	41.03 ± 2.62 ^a	1.27 ± 0.68 ^b	6.56 ± 1.31 ^b
P-value	0.028	0.001	0.011

Notes: Mean ± SD (standard deviation); Min. (minimum); Max. (maximum). Different superscript letter in column (a-b) indicate statistically significant differences ($P \leq 0.05$)

appearance. On the other hand, thigh meat showed significantly higher redness ($a^* = 8.68 \pm 1.12$) compared to breast meat ($a^* = 1.27 \pm 0.68$, $P = 0.001$), and higher yellowness ($b^* = 8.88 \pm 1.04$ vs. 6.56 ± 1.31 , $P = 0.011$). These differences were statistically validated, again using ANOVA, and reflect anatomical and biochemical differences in pigment and fat content.

DISCUSSION

This study provides detailed insight into the meat performance and nutritional composition of wild turkeys (*Meleagris gallopavo* L.) reared under semi-wild conditions. The results demonstrate that this alternative rearing system can produce meat of high biological and technological value, comparable to or exceeding that of conventional commercial turkeys and other poultry species.

Carcass and Yield Characteristics

Wild turkeys represent a valuable genetic resource with potential for sustainable poultry meat production, especially in ecological or organic systems. These birds, like the native Mexican *guajolote* (*M. g. gallopavo*), are characterised by excellent muscle development and minimal carcass fat, though they exhibit slow growth due to the lack of selective breeding over generations (Juarez-Caratachea, 2004; Portillo-Salgado *et al.*, 2022). Despite this, their meat productivity is of interest, particularly for niche markets focusing on quality and natural rearing conditions. As reported by Ribarski and Oblakova (2016), 112-day-old wild turkeys achieved an average live weight of 2.18 kg in males and 1.70 kg in females, with corresponding carcass yields of 66.84% and 67.13%, respectively. These values, while lower than those of commercial breeds, fall within the expected range for extensively raised birds (Ribarski *et al.*, 2016). Similar values were recorded in native Mexican turkeys, where males at 300–360 days reached a carcass yield of 65.4% (Portillo-Salgado *et al.*, 2023).

In contrast, commercial broiler turkeys demonstrate markedly higher slaughter yields. For example, fattened BUT-9 hybrid turkeys attained slaughter weights of 7.3 kg in females with a carcass yield of 78.24% at 112 days of age (Oblakova, 2004). Other authors have reported yields between 70% and 79.5% in broiler genotypes (Hristakieva, 2006), while top-performing lines under industrial conditions can reach 85% to 87% (Šiler, Kníže and

Knížetová, 1980). Roberson *et al.* (2004) found an average slaughter yield of 75.9%, and a breast meat proportion of 28.6%, confirming the impact of intensive selection on meat productivity.

The differences in carcass yield between wild and commercial turkeys underscore the influence of genotype, selection, and rearing system on meat traits (Onk *et al.*, 2019; Baeza *et al.*, 2022). Wild turkeys, being unselected, prioritise survival traits overgrowth efficiency. However, the proportion of edible internal organs (heart, liver, gizzard) is relatively higher in wild turkeys (e.g., 7.75% in females) compared to North Caucasian Bronze females (4.70%), suggesting differences in physiological development and adaptation to natural conditions (Ribarski *et al.*, 2015). According to Oblakova *et al.* (2009), turkey meat productivity is not only assessed by growth rate and feed conversion, but critically by slaughter traits, such as carcass yield and proportion of edible parts. This makes wild turkeys a relevant candidate for ecological production systems, where intensive feed efficiency is secondary to natural meat quality, animal welfare, and biodiversity conservation.

In summary, although wild turkeys do not match the high carcass yields of commercial hybrids, they exhibit stable and acceptable meat productivity for extensive and organic systems. With dressing percentages around 66–67%, they offer sufficient yield for value-added production targeting health-conscious and sustainability-oriented consumers. Their lower fat content, robust muscle structure, and adaptation to natural environments further enhance their suitability as an alternative source of high-quality poultry meat.

Chemical Composition

The chemical composition of meat is one of the key indicators of its nutritional and dietary value. In the case of female wild turkeys (*Meleagris gallopavo silvestris*), this evaluation is particularly important, as the species is reared under natural or semi-wild conditions, which may significantly influence meat quality compared to intensively raised hybrids. The main parameters reflecting nutritional quality include water, protein, fat, and cholesterol content.

The water content in the breast meat of female wild turkeys reached 73.31%, and 72.87% in the thigh (Ribarski *et al.*, 2016). These values are slightly lower than those reported for hybrid turkeys (e.g., Hybrid Optima), where moisture

in the breast muscle was 75.4% and in the thigh 74.6% (Gálvez *et al.*, 2018). Broiler chickens typically show values around 74–76%, depending on age and sex (Mozdziak, 2019). Similar values were observed by Oblakova *et al.* (2016), who reported 72.72% moisture in the breast and 73.77% in the thigh of broiler turkeys. The slightly lower water content in wild turkeys may be related to a higher density of muscle fibers and lower fat content. This corresponds with their higher physical activity and natural feeding behaviour, contributing to better dry matter concentration in muscle tissue.

The protein content in female wild turkey meat was notably high, reaching 24.65% in the breast and 22.36% in the thigh (Ribarski *et al.*, 2016). These results are equal to or exceed values observed in hybrids, where protein content was 24.3% in the breast and 20.6% in the thigh (Gálvez *et al.*, 2018). Comparable results were reported by Apetroaei *et al.* (2012), with 21.18% protein in breast muscle and 17.9% in the thigh of commercial BUT Big 6 turkeys. Interestingly, wild turkey meat also demonstrated a high proportion of essential amino acids, including lysine (9.69%) and methionine (2.50%), surpassing typical values found in broiler chickens (Mozdziak). The high-quality protein fraction was also confirmed in the study by Portillo-Salgado *et al.* (2023), who highlighted the nutritional importance of native Mexican wild turkeys. This high biological value makes wild turkey meat particularly suitable for athletes, children, the elderly, and individuals with elevated protein needs.

In terms of fat content, the meat of female wild turkeys is significantly leaner. Fat levels in the breast were only 0.91%, while the thigh contained 3.54% (Ribarski *et al.*, 2016), considerably lower than in commercial hybrids (2.87% breast; 4.24% thigh; Gálvez *et al.*, 2018). In broiler chickens, fat levels typically range from 3% to 9%, and in ducks up to 6–7% (Mozdziak, 2019). Oblakova *et al.* (2016) also observed higher fat levels in broiler turkey thighs, ranging from 4.35% to 4.47%, depending on rearing conditions, which further supports the lean character of wild turkey meat. The low-fat content makes it ideal for weight control, dietary regimes, and cardiovascular health.

Although direct cholesterol data for wild turkeys is lacking, studies on hybrid females report cholesterol content of 39.7 mg/100 g in breast meat and 40.9 mg/100 g in thigh meat (Gálvez *et al.*, 2018). These values are notably lower than those typically found in chicken (64–91 mg/100 g) or duck meat (77 mg/100 g) (Mozdziak, 2019). According to Chizzolini *et al.* (1999), poultry meat with lower intramuscular fat content tends to contain less cholesterol, due to the reduced proportion of membrane-bound polar lipids. These values remain well below the recommended daily intake limit of 300 mg (American Heart Association, 2008), reinforcing the role of turkey meat as a heart-healthy food.

Overall, the meat of female wild turkeys presents an exceptionally favourable nutritional profile. Compared to other poultry species such as broiler chickens, commercial turkeys, and ducks, wild turkey meat offers higher protein content, lower fat and cholesterol levels, and acceptable moisture content. These characteristics make it particularly well-suited for health-conscious consumers, dietary programs, and functional nutrition. Moreover, its natural origin and lower degree of production intensification further enhance its appeal as an ecological and nutritionally sound alternative to conventional meat products.

Amino Acid and Fatty Acid Composition

The meat of female wild turkeys (*Meleagris gallopavo silvestris*) shows strong potential as a high-quality animal protein source, especially in the context of nutritional and dietary value. It stands out not only for its high essential amino acid content but also for its low-fat levels and favourable technological properties. When compared to other species of wild game birds - such as pheasant (*Phasianus colchicus*), Japanese quail (*Coturnix coturnix japonica*), partridge (*Perdix perdix*), or chukar partridge (*Alectoris chukar*) - wild turkey meat offers a superior balance of nutrients, particularly in the breast muscles (Straková *et al.*, 2016).

A detailed amino acid analysis revealed that breast muscle from female wild turkeys contains a high proportion of essential amino acids, including lysine (9.69%) and methionine (2.50%) (Ribarski *et al.*, 2016). These amino acids are critical for human metabolism and muscle development and are often considered limiting in dietary protein sources. The lysine content in wild turkey meat surpasses values observed in other wild bird species, where levels typically range from 7.6% to 8.4% on a dry matter basis (Straková *et al.*, 2016). Methionine, vital for detoxification and antioxidant defence, was also found in higher amounts than in most comparable game bird meats.

Branched-chain amino acids (BCAAs), especially leucine and isoleucine, were also well represented in the wild turkey's breast meat. These play an important role in muscle protein synthesis and energy metabolism. For instance, leucine content reached approximately 18%, with isoleucine around 10% - figures that align closely with those found in slow-growing domestic lines like the Broad-Breasted Bronze turkey (Czech *et al.*, 2024). In contrast, similar values in species such as pheasant and quail are generally lower (Straková *et al.*, 2016).

The essential to non-essential amino acid ratio (E/NE) in wild turkey breast meat further supports its nutritional quality. This ratio was higher than that reported in pheasants or grey partridges, pointing to a well-balanced protein profile suitable for human consumption (Straková *et al.*, 2016). Interestingly, the wild turkey's protein quality is comparable - even superior in some respects - to that of specialized

slow-growing domestic turkey lines raised under extensive systems (Czech *et al.*, 2024).

In terms of fat content, breast meat from female wild turkeys had remarkably low levels – only 0.91% – making it suitable for dietary and health-conscious uses (Ribarski *et al.*, 2016). Despite this low-fat content, the lipid fraction contains valuable unsaturated fatty acids. Previous studies on similar genotypes (e.g. bronze turkeys) indicate a high proportion of monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA), often exceeding 68% of total fatty acids (Czech *et al.*, 2024). Additionally, wild turkey meat has a favourable fatty acid profile, with a higher proportion of monounsaturated fatty acids (MUFA) and a beneficial n6/n3 ratio (Gálvez *et al.*, 2018). These contribute positively to cardiovascular health and the overall balance of fatty acids likely leads to low atherogenic and thrombogenic indices, as observed in traditional or free-range poultry systems.

Colour Determination

Meat colour is a key sensory attribute influencing consumer perception of meat quality. In wild or semi-wild turkeys (*Meleagris gallopavo* L.), muscle colour has important technological and marketing implications. Meat colour is commonly expressed using the CIELAB colour space parameters: L^* (lightness), a^* (redness), and b^* (yellowness), which reflect complex physiological and biochemical factors including myoglobin content, postmortem pH, and oxidative status.

In a study by Portillo-Salgado *et al.* (2022), female wild turkeys (*M. g. gallopavo*) raised under extensive conditions exhibited significantly lower L^* (lightness) and a^* (redness) values in breast meat compared to males. The L^* (lightness), value at 24 hours postmortem in females was approximately 44.9, whereas in males it reached 46.8, indicating darker meat in females. Similarly, the a^* (redness) and b^* (yellowness) values were also lower in females, likely associated with reduced physical activity and *post mortem* muscle metabolism differences. A comparable trend was reported by Wegner *et al.* (2025), who evaluated two commercial genetic lines (BUT 6 and Hybrid Converter) after the reproductive phase. They found that breast meat colour was significantly influenced by sex - females exhibited higher L^* (lightness) and a^* (redness) values,

indicating lighter and more reddish meat than males. Furthermore, female meat had higher water content and lower collagen levels, contributing to its lighter appearance and softer texture. It is well-established that poultry raised in organic or extensive systems often produces darker meat than that from intensive systems. This is related to higher myoglobin content due to increased locomotor activity and lower stress levels at slaughter. In a study by Solaesa *et al.* (2024), breast meat from organically reared female turkeys showed L^* (lightness) values around 55.2, with a^* (redness) of 4.12 and b^* (yellowness) of 3.89. Interestingly, no significant differences were observed compared to conventionally reared birds, although organic meat showed greater individual variation, which may result from heterogeneous diets and increased movement in natural environments. Compared to common broiler chickens, which typically exhibit very light meat with L^* (lightness) values exceeding 60 and low a^* (redness) values, the meat of wild turkeys is darker and more intensely coloured. This darker colour is due to higher myoglobin levels and increased oxidative metabolism, correlating with improved oxidative stability and shelf-life. Although this may be less attractive to some consumers who associate light colour with freshness, it reflects beneficial technological and nutritional attributes (Mozdziak, 2019). The influence of age and sex on meat colour has been consistently demonstrated across studies. Males tend to have darker meat with lower L^* (lightness) and higher a^* (redness) values, which is likely due to higher muscle mass, activity, and pigment concentration. Females show higher L^* (lightness) and lower a^* (redness), which may be advantageous for commercial raw meat presentation. However, darker meat is often associated with higher antioxidant capacity and longer shelf-life, traits valued in high-quality meat production (Portillo-Salgado *et al.*, 2022; Solaesa *et al.*, 2024). In conclusion, the colour of wild turkey meat is shaped by multiple factors, including sex, age, rearing system, and genotype. Compared to intensively raised hybrids or broilers, wild turkey meat tends to be darker, less bright (lower L^*), and richer in pigment, which can be beneficial from a nutritional and technological standpoint. While market preferences may favour lighter-coloured meats, the traits of wild turkey meat support its positioning as a natural high-quality product.

CONCLUSION

The results of this study provide a detailed assessment of carcass yield and selected physicochemical properties of female wild turkeys (*Meleagris gallopavo* L.) reared under semi-wild conditions. The average carcass yield reached 79.56%, with breast and thigh muscles representing the most valuable portions of the carcass. Statistically significant differences were observed between breast and thigh muscles in terms of moisture, protein, fat, and cholesterol content, as well as in amino acid and fatty acid profiles. Breast muscle was characterized by higher protein content and significantly greater concentrations of essential amino acids, including lysine, methionine, and branched-chain

amino acids, indicating its high biological value. The fatty acid profile of breast meat contained significantly higher levels of omega-3, omega-6, and total polyunsaturated fatty acids compared to thigh meat. These attributes underline the potential of wild turkey meat for health-oriented nutrition. Significant differences in colour parameters between anatomical parts reflect muscle-specific metabolic properties and may influence consumer acceptance. Overall, the findings confirm that wild turkeys reared under semi-wild conditions can produce nutritionally valuable meat with favourable technological characteristics. These results support the inclusion of such genetic resources in sustainable and alternative poultry production systems. Further studies should focus on sensory attributes, oxidative stability, and market potential.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgements

This work was supported by [APVV] under grant [No. 23-0077].

REFERENCES

- AL-BAIDHANI, A. M., AL-QUTAIFI, H. K. 2021. Nutritional and Industrial Value of Turkey Meat „*Meleagris Gallopavo*“: Review. *Al-Qadisiyah Journal For Agriculture Sciences*. 11(2), 114–125. <https://doi.org/10.33794/qjas.2021.132315.1016>
- AMERICAN HEART ASSOCIATION. 2008. Dietary guidelines for healthy American adults. Cholesterol. Fat. In: *Heart and Stroke Encyclopedia*. Dallas.
- APETROAEI (PETRESCU), C. A., LAZAR, R., CIOBANU, M. M. *et al.* 2012. Research on the chemical characterization of turkey meat. *Lucrări Științifice - Seria Zootehnie*. 57, 112–114.
- ATTIA, Y. A., AL-HARTHI, M. A., KORISH, M. A., SHIBOOB, M. M. 2017. Fatty acid and cholesterol profiles, hypocholesterolemic, atherogenic, and thrombogenic indices of broiler meat in the retail market. *Lipids in Health and Disease*. 16(1), 1–11. <https://doi.org/10.1186/s12944-017-0423-8>
- BAÉZA, E., GUILLIER, L., PETRACCI, M. 2022. Review: Production factors affecting poultry carcass and meat quality attributes. *Animal*. 16, 100331. <https://doi.org/10.1016/j.animal.2021.100331>
- BENKOVA, J., LUKACKA, J. 1994. Chemické a fyzikálne vlastnosti svalov 16-tyzdnových moriek Ivagal. *Journal of Farm Animal Science*. 27, 123–130.
- BOBKOVÁ, A., POLÁKOVÁ, K., DEMIANOVÁ, A. *et al.* 2022. Comparative Analysis of Selected Chemical Parameters of *Coffea arabica*, from Cascara to Silverskin. *Foods*, 11(8), 1082. <https://doi.org/10.3390/foods11081082>
- CZECH, A., DOMARADZKI, P., NIEDZIELAK, M. *et al.* 2024. Nutritional Value and Physicochemical Properties of Male and Female Broad-Breasted Bronze Turkey Muscle. *Foods*. 13(9), 1369. <https://doi.org/10.3390/foods13091369>
- DUCLOS, M. J., BERRI, C., LE BIHAN-DUVAL, E. 2007. Muscle Growth and Meat Quality. *Journal of Applied Poultry Research*. 16(1), 107–112. <https://doi.org/10.1093/japr/16.1.107>
- GÁLVEZ, F., DOMÍNGUEZ, R., MAGGIOLINO, A. *et al.* 2020. Meat quality of commercial chickens reared in different production systems: industrial, range and organic. *Annals of Animal Science*, 20(1), 263–285. <https://doi.org/10.2478/aoas-2019-0067>
- GÁLVEZ, F., DOMÍNGUEZ, R., PATEIRO, M. *et al.* 2018. Effect of gender on breast and thigh turkey meat quality. *British Poultry Science*. 59(4), 408–415. <https://doi.org/10.1080/00071668.2018.1465177>
- CHIZZOLINI, R., ZANARDI, E., DORIGONI, V. *et al.* 1999. Calorific value and cholesterol content of normal and low-fat meat and meat products. *Trends in Food Science and Technology*. 10(4–5), 119–128. [https://doi.org/10.1016/s0924-2244\(99\)00034-5](https://doi.org/10.1016/s0924-2244(99)00034-5)
- JUAREZ-CARATACHEA, A. 2004. Efecto del peso corporal en el rendimiento de la masa muscular en el pavo nativo. Mexicano. *Revista Cubana de Ciencia Agrícola*. 38(4), 405–409.
- MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT OF THE SLOVAK REPUBLIC. 2004. *Decree of Ministry of Agriculture and Rural Development of the Slovak Republic No. 2145/2004-100 of 23 August 2004 changing and amending Decree of Ministry of Agriculture and Rural Development of the Slovak Republic No. 1497/1/1997-100 of 7 October 1997 regulating laboratory testing and feed assessment as amended by Decree of Ministry of Agriculture and Rural Development of the Slovak Republic No. 149/2/2003-100 of 12 February 2003*.
- MOZDZIAK, P. 2019. *Species of Meat Animals: Poultry*. Reference Module in Food Science. Elsevier, pp. 1–6. <http://dx.doi.org/10.1016/B978-0-08-100596-5.22959-4>

- OBLAKOVA, M. 2004. Study of growth potentials and slaughter analysis of BUT- 9 broiler turkey poult. *Bulgarian Journal of Animal Science*, 10, 137–142.
- OBLAKOVA, M., HRISTAKIEVA, P., LALEV, M. 2009. Slaughter analysis of poult hatched from eggs of different mass. I: *International science conference Economics and Society development on the Base of Knowledge*. 4–5 June, 2009, Stara Zagora, Bulgaria, pp. 162–167.
- OBLAKOVA, M., RIBARSKI, S., OBLAKOV, N. *et al.* 2016. Chemical composition and quality of turkey - broiler meat from crosses of layer light (LL) and meat heavy (MH) turkey. *Trakia Journal of Science*. 14(2), 142–147. <https://doi.org/10.15547/tjs.2016.02.004>
- ONK, K., YANCINTAN, H., SARI, M. *et al.* 2019. Effects of genotype and sex on technological properties and fatty acid composition of duck meat. *Poultry Science*, 98(1), 491–499. <https://doi.org/10.3382/ps/pey355>
- PÉREZ-LARA, M. A., CAMACHO-ESCOBAR, J. C., GARCÍA-LÓPEZ, S. *et al.* 2013. Mathematical modeling of the native Mexican turkey's growth. *Open Journal of Animal Sciences*, 03(04), 305–310. <https://doi.org/10.4236/ojas.2013.34045>
- PORTILLO-SALGADO, R., HERRERA HARO, J. G., BAUTISTA-ORTEGA, J. *et al.* 2022. Guajolote – A poultry genetic resource native to Mexico. *World's Poultry Science Journal*, 78(2), 467–482. <https://doi.org/10.1080/00439339.2022.2028217>
- PORTILLO-SALGADO, R., HERRERA-HARO, J. G., BAUTISTA-ORTEGA, J. *et al.* 2023. Carcass composition and physicochemical and sensory attributes of breast and leg meat from native Mexican guajolote (*Meleagris g. gallopavo*) as influenced by sex. *Archives Animal Breeding*. 66(4), 341–355. <https://doi.org/10.5194/aab-66-341-2023>
- PORTILLO-SALGADO, R., HERRERA-HARO, J. G., BAUTISTA-ORTEGA, J. *et al.* 2022. Effects of slaughter age and gender on carcass characteristics and meat quality of native Mexican Turkey (*M. g. gallopavo*) reared under an extensive production system. *Italian Journal of Animal Science*. 21(1), 1442–1452. <https://doi.org/10.1080/1828051x.2022.2121667>
- RAMÍREZ-RIVERA, E. DE J., CAMACHO-ESCOBAR, M. A., GARCÍA-LÓPEZ, J. C. *et al.* 2012. Sensory analysis of Creole turkey meat with flash profile method. *Open Journal of Animal Sciences*. 02(01), 1–10. <https://doi.org/10.4236/ojas.2012.21001>
- RIBARSKI, S., LALEV, M., OBLAKOVA, M. 2001. Physico-chemical characteristics and micromorphological feature of turkey skeleton musculature. *Zhivotnovodni Nauki (Bulgaria)/Journal of animal science*. 38(2), 106–109.
- RIBARSKI, S., OBLAKOVA, M. 2016. Slaughter yield and quality of meat from wild turkey (*Meleagris Gallopavo Silvestris Vieillot*) reared in hunting reserve in South Bulgaria. *Trakia Journal of Science*, 14(2), 135–141. <https://doi.org/10.15547/tjs.2016.02.003>
- ROBERSON, K. D., KALBFLEISCH, J. L., DRANSFIELD, D. 2004. Comparison of Growth Performance and Carcass Component Yield of a New Strain of Tom Turkeys to Other Commercial Strains. *International Journal of Poultry Science*. 3(12), 791–795. <https://doi.org/10.3923/ijps.2004.791.795>
- SOLAESA, Á. G., GARCÍA-BARROSO, C., ROMERO, C. *et al.* 2024. Nutritional composition and technological properties determining the quality of different cuts of organic and conventional Turkey meat. *Poultry Science*. 103(12), 104331. <https://doi.org/10.1016/j.psj.2024.104331>
- STRAKOVÁ, E., SUCHÝ, P., HERZIG, I. *et al.* 2016. Amino Acid Levels in Muscle Tissue of Six Wild Feathered Species. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*. 64(5), 1661–1666. <https://doi.org/10.11118/actaun201664051661>
- STRAKOVÁ, E., SUCHÝ, P., NAVRÁTIL, P. *et al.* 2015. Comparison of the content of crude protein and amino acids in the whole bodies of cocks and hens of Ross 308 and Cobb 500 hybrids at the end of fattening. *Czech Journal of Animal Science*. 60(2), 67–74. <https://doi.org/10.17221/7976-cjas>
- ŠILER, R., KNÍŽE, B., KNÍŽETOVÁ, H. 1980. *Růst a produkce masa u hospodářských zvířat*. Praha: Státní zem. naklad.
- UHLÍŘOVÁ, L., TŮMOVÁ, E., CHODOVÁ, D. *et al.* 2018. The effect of age, genotype and sex on carcass traits, meat quality and sensory attributes of geese. *Asian-Australasian Journal of Animal Sciences*. 31(3), 421–428. <https://doi.org/10.5713/ajas.17.0197>
- WEGNER, M., KOKOSZYŃSKI, D., NĘDZAREK, A. *et al.* 2025. Meat quality of turkeys after reproductive period depending on genotype and sex. *Poultry Science*. 104(6), 105094. <https://doi.org/10.1016/j.psj.2025.105094>

Contact information

Adriana Pavelková: adriana.pavelkova@uniag.sk,  <https://orcid.org/0000-0002-8275-8557> (corresponding author)

Peter Haščík: peter.hascik@uniag.sk,  <https://orcid.org/0000-0002-3402-5658>

Martin Fik: martin.fik@uniag.sk,  <https://orcid.org/0000-0001-6553-0828>

Bučko Ondřej: ondrej.bucho@uniag.sk,  <https://orcid.org/0000-0001-6942-511X>