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Phenotypic characterization of two native Italian turkey breeds: a comparative study

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INTRODUCTION and OBJECTIVE

Italy's native poultry breeds, such as the **Romagnolo (RO)** and **Ermellinato di Rovigo (ER)**, are part of the country's rich agrobiodiversity heritage. However, since the 1970s, these breeds have been progressively marginalised due to the rise of industrial turkey hybrids, putting their survival and associated genetic resources at risk.

The **Romagnolo** is a small-sized turkey originating from the Emilia-Romagna region, valued for its **hardiness**, **cold tolerance**, and **resistance to diseases**. The **Ermellinato di Rovigo**, from the Veneto region, is slightly larger and recognised for its **early sexual maturity** and **rapid feathering**.

This study was conducted within the framework of the **TuBAvI-2 project**, which seeks to **preserve and promote Italy's poultry biodiversity** by generating scientific data to support **effective conservation breeding programs**.
The objective of the study was to perform a **comparative phenotypic characterization** of the RO and ER turkey breeds by evaluating the following parameters:

- Growth performance
- Laying traits
- Egg quality
- Morphological characteristics
- Innate immune response

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MATERIALS AND METHODS

Animals: 20 Romagnolo and 15 Ermellinato di Rovigo turkeys, both males and females

Housing: Outdoor pens under semi-natural conditions

Growth monitoring: Weekly body weight from hatch (day 1) to 180 days

Egg collection: Recorded from the start of laying in January until the end of the reproductive period.

Egg quality: Total egg weight, yolk weight

Morphometry: Live weight, body length, chest circumference

Immunological markers: Lysozyme (*LYZ*), Complement C3, Immunoglobulin Y (*IgY*) levels in blood plasma

RESULTS

Growth Performance

Breed	Age	Males (Mean ± SD)	Females (Mean ± SD)
RO	Day 1	53.79 ± 4.82	50.20 ± 2.74
	1st month	395.46 ± 82.57	381.11 ± 38.24
	2nd month	1024.69 ± 174.76	769.38 ± 153.90
	3rd month	1867.27 ± 249.48	1521.38 ± 374.37
	4th month	2547.56 ± 373.11	2076.38 ± 320.51
	5th month	3923.33 ± 786.60	2682.25 ± 377.01
	6th month	4883.22 ± 1012.98	3489.25 ± 372.07
ER	Day 1	66.67 ± 2.31	49.00 ± 11.31
	1st month	457.67 ± 14.98	365.00 ± 16.06
	2nd month	715.00 ± 95.00	675.00 ± 47.48
	3rd month	790.00 ± 240.62	696.77 ± 63.63
	4th month	1203.33 ± 187.70	1150.56 ± 70.54
	5th month	–	–
	6th month	–	–

Innate immune response

Breed	Sex	Lysozyme (ng/mL)	Complement (µg/mL)	IgY (mg/mL)
RO	Male	408.2 ± 46.9^{b}	430.2 ± 82.3^{a}	4.4 ± 1.2^{a}
	Female	188.4 ± 19.6^{c}	295.3 ± 40.2^{a}	4.1 ± 1.7^{a}
ER	Male	694.4 ± 82.1^{a}	400.9 ± 29.4^{a}	2.4 ± 0.5^{a}
	Female	391.2 ± 76.8^{b}	269.3 ± 62.7^{a}	2.8 ± 0.4^{a}
Breed effect		p = 0.003	p = 0.737	p = 0.156
Sex effect		p = 0.002	p = 0.053	p = 0.920
Breed * Sex interaction		p = 0.912	p = 0.893	p = 0.751

Eggs Quality

TRAIT	Romagnolo (Mean ± SD)	Ermellinato di Rovigo (Mean ± SD)	p-value
Egg weight (g)	80.64 ± 5.27^{a}	72.58 ± 8.81^{b}	0.022
Albumen weight (g)	45.61 ± 3.88^{a}	45.98 ± 4.93^{a}	0.842
Yolk weight (g)	27.22 ± 2.50^{a}	18.93 ± 3.61^{b}	0.001
Shell weight (g)	7.82 ± 0.55^{a}	7.68 ± 0.80^{a}	0.640
Egg length (mm)	67.43 ± 2.28^{a}	62.41 ± 2.85^{b}	0.001
Egg width (mm)	47.15 ± 1.01^{a}	45.31 ± 2.52^{a}	0.051

Morphological characteristics

Breed	Trait	Males (Mean ± SD)	RANGE (min - max)	Females (Mean ± SD)	RANGE (min - max)
RO	Adult live weight (g)	6430 ± 1280	5528 – 7895	3560 ± 75	3490 – 3640
	Body length (cm)	60.80 ± 4.10	56.80 – 65.00	52.90 ± 4.25	50.30 – 57.80
	Chest circumference (cm)	57.60 ± 1.05	56.50 – 58.60	42.73 ± 3.28	40.50 – 46.50
	Tarsus length (cm)	13.60 ± 0.35	13.20 – 13.80	11.80 ± 0.87	11.30 – 12.80
	Tarsus circumference (cm)	6.60 ± 0.10	6.50 – 6.70	5.53 ± 0.15	5.40 – 5.70
	Wingspan (cm)	57.03 ± 1.62	55.30 – 58.50	50.57 ± 4.95	45.70 – 55.60
ER	Adult live weight (g)	5661 ± 915	4605 – 6205	3094 ± 627	2650 – 3538
	Body length (cm)	58.40 ± 1.21	57.70 – 59.80	51.50 ± 0.14	51.40 – 51.60
	Chest circumference (cm)	57.23 ± 2.48	55.20 – 60.00	43.65 ± 7.00	38.70 – 48.60
	Tarsus length (cm)	13.07 ± 0.59	12.40 – 13.50	11.35 ± 0.64	10.90 – 11.80
	Tarsus circumference (cm)	6.60 ± 0.20	6.40 – 6.80	5.55 ± 0.07	5.50 – 5.60
	Wingspan (cm)	55.50 ± 1.00	54.50 – 56.50	47.75 ± 6.15	43.40 – 52.10

Different superscript letters within the same column indicate statistically significant differences ($p < 0.05$); values are expressed as mean ± standard error.

Software: IBM® SPSS® Statistics 27.0

CONCLUSION

The Romagnolo breed exhibited superior growth rates and egg characteristics, indicating a more favorable productive performance under extensive farming systems.
In contrast, the Ermellinato di Rovigo, despite its slower growth, displayed noteworthy innate immune potential, suggesting a possible advantage in terms of disease resilience.
These results highlight the complementary value of both breeds in biodiversity conservation initiatives and emphasize their strategic role in promoting sustainable poultry farming, particularly in marginal or low-input agricultural areas.

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