

# SLAUGHTERING PERFORMANCE AND CARCASS QUALITY OF THREE ITALIAN CHICKEN BREEDS

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## Summary

Live body weight, slaughtering performance and carcass characteristics of three Italian slow-growing breeds were compared. The trial was carried out on 50 females and 50 males belonging to Ermellinata di Rovigo (ER), Robusta lionata (RL) and Robusta maculata (RM) breeds. The birds were reared outdoors, on grass, from 50 to 150 days of age (June-October). A pellet feed was fed to the animals *ad libitum*. ER chickens showed a lower ( $P<0.01$ ) live body weight, dressing percentage, ready-to-cook carcass and breast, leg and wing weights. Carcasses were different among the breeds: RM had the highest ( $P<0.01$ ) breast percentage and ER showed the lowest ( $P<0.01$ ); leg percentage was higher ( $P<0.05$ ) in ER and lower in RL and RM ( $P<0.05$ ). RL legs showed a higher ( $P<0.01$ ) muscle/bone ratio than ER. From 50 to 150 days of age RL and RM showed a daily growth 21% higher than that of ER. At 150 days of age, the ER birds had reached 81% of adult body weight, whereas the RL and RM had reached 75 and 71%, respectively. Throughout the last 30 days of age, the breast and leg growth were 7.00, 17.3 and 13.0% and 12.3, 25.0 and 15.1% of body growth in ER, RL and RM, respectively. The ER breed reached commercial weight earlier than the other breeds.

Keywords: chicken, slow-growing strain, slaughtering performance

## Introduction

Organic production system (European Union, 1999) encourages the rearing and diffusion of purebreds or local genotypes as these have been widely replaced by hybrids, reared intensively under indoor conditions during the last fifty years. Previous investigations have shown that the use of slow-growing strains under organic production system has a positive repercussion on both animal welfare and meat quality and appearance perceived by consumers (Castellini et al., 2008). Other authors have found differences between genotypes with different growth rates and raised under alternative production systems (Fanatico et al., 2007). In Italy, some local breeds still exist, mostly in the Veneto region, which has an important poultry tradition. The data of the productive and slaughtering performance of these Italian breeds (Rizzi et al., 2007; Rizzi et al., 2008) that may be reared under extensive production systems are still limited.

## Materials and methods

The trial was carried out on males and females belonging to dual-purpose chicken breeds, Ermellinata di Rovigo (ER – 92 birds), Robusta lionata (RL – 52 birds) and Robusta maculata (RM – 48 birds). The ER, RL and RM birds were provided by the regional farm which preserves these breeds with financing from the Veneto regional government (De Marchi et al., 2006). These local genotypes were created in Veneto (Italy) during the 1950s, using Sussex and Rhode Island (ER breed) and Brown Orpington and White America (RM and RL breeds) purebreds. They have been maintained as purebreds in the conservation program (Zanetti et al., 2007).

The experimental period started in June when the animals were 50 days old and lasted until October. The animals had access to both outdoor (grassy) and indoor spaces; the outdoor space contained perches and shaded areas. The outdoor temperature varied from 23 to 15°C and the relative humidity ranged from 70 to 75%, from summer to autumn, respectively. The birds were fed *ad libitum* a commercial feed (crude protein = 22% d.m.; ether extract = 4.93 d.m.). At 150 days of age a sample of 44 males and 44 females per genotype were slaughtered following Romboli et al. (1996) procedures.

The data were submitted to one-way ANOVA with breed as main effect (SAS, 2001). Differences between means were tested using Duncan's multiple range test (SAS, 2001).

## Results and discussion

Table 1 shows the live body weight of the chickens at 50 and 150 days of age and the body gain throughout the last 30 days of life. At 50 days of age RL breed showed a higher ( $P<0.01$ ) live weight in comparison to the other two breeds. At 150 days the ER birds showed a body weight lower ( $P<0.01$ ) than RL and RM. The body gain throughout the last 30 days of age was significantly ( $P<0.05$ ) lower in ER than in RL, whereas RM was intermediate. From 50 to 150 days of age, RL and RM showed a daily growth 21% higher than that of ER.

The growth rate, over the first few weeks of life and beyond, of these slow-growing breeds is not comparable with the body gain of hybrid broilers that reach commercial body weight in much less time and much earlier than reaching sexual maturity. It is worth mentioning that purebreds have been replaced by hybrids and no notable genetic selection has been made on these genotypes throughout these years. On the contrary, the growth rate of commercial broilers has changed tremendously over the past 45 years and the majority of the change has been brought about by the quantitative selection practiced by commercial breeding organisations (Havenstein et al., 2003) that assessed growth, feed conversion, carcass characteristics and yield.

When the live body weight of the animals of different ages was compared to the adult body weight reported by literature (Veneto Agricoltura, 2002), it was observed that at 50 days of age the ER chickens had reached 21% of adult body weight, whereas RM showed the lowest ( $P<0.01$ ) values (15%); RL was intermediate and different ( $P<0.01$ ) from the other groups.

At five months of life the three breeds showed a similar trend with significant ( $P<0.01$ ) differences: the ER chickens had reached almost 81% of adult body weight, whereas the RL and RM birds had reached about 75 and 71% of adult body weight, respectively.

Table 1. Live body weight and growth rate

	ER	RL	RM	SEM (d.f.)
Live body weight, g				
- at 50 d	576 <sup>Bb</sup>	658 <sup>Aa</sup>	541 <sup>Bb</sup>	95 (288)
- at 150 d	2283 <sup>Bb</sup>	2725 <sup>Aa</sup>	2616 <sup>Aa</sup>	499 (288)
Body gain *, g	300 <sup>b</sup>	356 <sup>a</sup>	337 <sup>ab</sup>	103 (144)
% of adult body weight:				
- at 50 d	20.7 <sup>Aa</sup>	18.2 <sup>Bb</sup>	14.8 <sup>Cc</sup>	2.75 (288)
- at 150 d	81.2 <sup>Aa</sup>	74.5 <sup>Bb</sup>	70.5 <sup>Cc</sup>	7.56 (288)

<sup>a, b, c</sup>: P<0.05; <sup>A, B, C</sup>: P<0.01; \*|last 30 days of life

Table 2 shows the slaughtering performance of the three breeds. The dressing percentage was lower (P<0.05) in ER birds than in RM, because of the development of the reproductive apparatus, particularly in the females. The ER chickens showed a lower (P<0.01) weight of ready-to-cook carcass and breast, wing and leg weights in comparison to the other groups.

The RM chickens showed the highest (P<0.01) breast percentage and the ER showed the lowest (P<0.01). Wing percentage was higher (P<0.01) in RM and lower (P<0.01) in RL, whereas ER was intermediate; leg percentage was higher (P<0.05) in ER and lower (P<0.05) in RL and RM.

RL leg showed a higher (P<0.01) muscle/bone ratio than ER.

Table 2. Slaughtering performance

	ER	RL	RM	SEM (d.f.)
Dressing percentage, %	75.46 <sup>b</sup>	76.21 <sup>ab</sup>	76.66 <sup>a</sup>	3.49 (248)
Ready-to-cook carcass, g	1475 <sup>Bb</sup>	1773 <sup>Aa</sup>	1730 <sup>Aa</sup>	344 (248)
Commercial cut weight, g				
- breast	315 <sup>Bb</sup>	418 <sup>Aa</sup>	421 <sup>Aa</sup>	62.1 (248)
- wing	167 <sup>Bb</sup>	198 <sup>Aa</sup>	197 <sup>Aa</sup>	38.3 (248)
- leg	574 <sup>Bb</sup>	668 <sup>Aa</sup>	645 <sup>Aa</sup>	163 (248)
% of carcass <sup>1</sup> :				
- breast	18.4 <sup>Cc</sup>	20.5 <sup>Bb</sup>	21.4 <sup>Aa</sup>	1.93 (248)
- wing	9.67 <sup>ABb</sup>	9.61 <sup>Bb</sup>	9.89 <sup>Aa</sup>	0.613 (248)
- leg	32.7 <sup>a</sup>	32.1 <sup>b</sup>	32.0 <sup>b</sup>	1.84 (248)
Leg muscle/bone ratio	3.78 <sup>Bb</sup>	4.15 <sup>Aa</sup>	3.94 <sup>ABb</sup>	0.378 (99)
% of body growth <sup>2</sup> :				
- breast	7.00 <sup>Cc</sup>	17.3 <sup>Aa</sup>	13.0 <sup>Bb</sup>	5.75 (144)
- wing	0.190 <sup>Cc</sup>	3.75 <sup>Aa</sup>	2.49 <sup>Bb</sup>	1.68 (144)
- leg	12.3 <sup>Bb</sup>	25.0 <sup>Aa</sup>	15.1 <sup>Bb</sup>	11.1 (144)

a, b, c: P<0.05; A, B, C: P<0.01; <sup>1</sup> with head, neck and feet; <sup>2</sup> throughout last 30 days of life

Throughout the last 30 days of rearing, the breast growth and its percentage of the body growth was significantly (P<0.01) different among the three breeds, with the highest (P<0.01) values in RL and the lowest values in ER. A similar trend was observed in wing, whereas the leg percentage of body growth was higher (P<0.01) in RL than in ER and RM. As expected, wing percentage was lower than breast and leg percentage. It is worth noting that RL had a breast and leg percentage about twice than that of ER ones; this trend was also observed between RM and ER but only for breast. The differences observed among the three breeds indicate that the growth of the commercial cuts throughout the last 30 days of age are 19% in ER, 31% in RM and 46% in RL; the RM breed is in an intermediate position in particular regarding the males, whereas the females showed values similar to those of RL (data not shown). In the remaining part of body growth, the reproductive apparatus and fatty tissue are to be considered; in the development of these tissues an interaction between genotype, diet and environmental conditions may be involved. Some data on the RM breed (% commercial cut of body growth and % of adult body weight) seem to be contradictory, and more knowledge is needed since the adult body weight reported in literature may have been modified by selection over the past years.

The results point out that the three Italian dual-purpose purebreds have different carcass characteristics and show a different physiological state at the same age. The ER breed reached the adult body weight earlier than the other breeds, and the carcass was lighter and had a lower percentage of breast than the other two breeds.

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