



Effect of sex on slaughter performance and meat quality of Ermellinata di Rovigo chickens

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ABSTRACT - In this trial male and female chickens belonging to a dual-purpose Italian breed, Ermellinata di Rovigo (ER), were reared under a free-range production system (June-October) from 47 days of life until slaughter age, at 138 (I age) and 168 (II age) days of age. At both ages, the final body weight, the dressing-out percentage and the ready-to-cook carcass weight were higher ($P<0.01$) in males. At II age the female carcass showed higher ($P<0.01$) proportion of breast and lower ($P<0.01$) proportion of leg. At both ages, the redness index (a^*) of breast and thigh were lower ($P<0.01$) in females, whereas the yellowness index (b^*) showed the opposite trend; the females showed higher lipids in breast meat ($P<0.05$), thigh meat ($P<0.01$) and skin ($P<0.01$). The breast tenderness did not change. The results indicate that the ER birds have a different live body weight, slaughter performance and meat quality according to sex, both at I and II age. At 168 days, under the studied environmental conditions, the chickens were in prepubertal period and the sex affected the dressing-out percentage, meat colour and skin lipids in particular.

Key words: Chicken, Sex, Slaughter performance, Meat quality.

Introduction – There is an increasing demand for organic and free-range meat, as an unconventional production and respecting the well-being of the animals (Castellini *et al.*, 2008). In Italy, in addition to hybrid chickens intensively reared under indoor conditions, some Italian local breeds still exist, mainly in the Veneto region, which has an important poultry tradition. The knowledge of genetic variability, productive performance and slaughter performance of these Italian breeds (De Marchi *et al.* 2006; Rizzi *et al.*, 2007; Rizzi *et al.*, 2008) that could be reared under extensive production systems is limited.

Material and methods – The trial was carried out on 42 females and 42 males belonging to Ermellinata di Rovigo (ER) breed. This breed was created during the 1950s in the Veneto region. ER has ermellinate plumage and comes from Sussex and Rhode Island breeds. The experimental period started in June when the animals were 47 days old and lasted until October. The animals were provided both outdoor and indoor spaces; the outdoor space contained perches and shaded space. The outdoor temperature varied from 23 to 15°C and the relative humidity ranged from

70 to 75%, from summer to autumn, respectively. A pellet feed was fed to the birds *ad libitum*. At 138 (I age) and 168 (II age) days of age, 22 females and 22 males were slaughtered (Rizzi *et al.*, 2007). Ultimate pH (pHu) and colour measurements (CIElab colour space, CIE, 1976) were performed on *Pectoralis major* and *Semitendinosus* muscles at 24 hours after slaughter. Chemical analyses (AOAC, 2000) were performed on breast (*Pectoralis major*) and thigh (all muscles) meat and breast skin. Meat cholesterol was analysed by HPLC. Shear force (WBSF) was measured by means of an Instron texture analyzer provided with a Warner-Bratzler apparatus on cooked breast muscle.

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

Results and conclusions – In Table 1 the live body weight and the slaughter performance of the chickens are presented. Body weight significantly differed ($P<0.01$) between males and females at both ages. The dressing-out percentage was higher ($P<0.01$) in males since the females showed a developing reproductive apparatus. Ready- to-cook carcass weight was lower ($P<0.01$) in females. Sex affected the carcass conformation (% of ready-to-cook carcass) since breast % was higher ($P<0.01$) in females at both ages, whereas leg % was lower ($P<0.01$). The drumstick meat/bone (M/B) ratio was higher ($P<0.05$) in females at I age, whereas at II age no difference was observed.

Pectoralis major and *Semitendinosus* pHu (Table 2) did not differ at both ages. L* value was

Table 1. Live body weight, slaughter performance and carcass conformation.

		I age			II age		
		male	female	SEM ¹	male	female	SEM ¹
Live body weight	g	2532 ^{Aa}	1840 ^{Bb}	185	2735 Aa	2054 Bb	149
Dressing-out percentage	%	82.3 ^{Aa}	77.6 Bb	4.64	78.9 Aa	71.3 Bb	2.06
Ready-to cook-carcass	g	1680 ^{Aa}	1207 Bb	144	1776 Aa	1246 Bb	104
Breast	%	19.8 ^{Bb}	22.9 Aa	0.95	20.2 Bb	23.4 Aa	1.10
Leg	%	40.8 ^{Aa}	35.6 Bb	1.36	41.4 Aa	36.0 Bb	1.52
Drumstick M/B ratio		2.62 ^b	2.85 ^a	0.234	2.99	3.05	0.266

a, b: $P<0.05$; A, B: $P<0.01$.; 1 observations (n) of each group (I-II age): 20-21.

not affected by sex; a* value was higher ($P<0.01$) in males at both ages and in both muscles. The opposite was observed for b* value, which was higher ($P<0.01$) in females.

The chemical composition of breast, thigh and skin is summarized in Table 2. Breast protein did not differ between sexes at both ages; lipids were higher ($P<0.05$) in females at I and II age. Cholesterol was similar between groups at both ages. Thigh protein did not change, whereas lipids were higher ($P<0.01$) in the females, at both ages. Breast skin showed lower ($P<0.01$) protein and higher lipids at I and II age. Thigh and skin cholesterol was not affected by sex. The cholesterol value differs between breast and leg (Azcona *et al.*, 2008) and according to the age of the birds. The WBSF did not change between sexes.

The ER breed shows a relevant body dimorphism according to sex both at 138 and 168 days of age. Under the studied environmental conditions, similar differences were observed between sexes at both ages; in particular, some parameters such as dressing-out percentage and skin lipid content were notably affected by sex at II age, as a consequence of a prepubertal condition.

Table 2. Chemical and physical characteristics of breast, thigh and skin.

	I age			II age			
	male	female	SEM ¹	male	female	SEM ¹	
<i>Pectoralis major</i>							
pHu	5.71	5.69	0.098	5.67	5.68	0.116	
L*	56.5	56.6	3.58	57.5	57.6	3.38	
a*	2.13 ^{Aa}	0.574 ^{Bb}	0.874	2.81 ^{Aa}	-0.344 ^{Bb}	0.731	
b*	0.412 ^{Bb}	2.88 ^{Aa}	1.078	-1.25 ^{Bb}	2.49 ^{Aa}	1.517	
<i>Semitendinosus</i>							
pHu	5.86	5.85	0.179	5.80	5.85	0.113	
L*	51.4	51.82	3.19	49.2	50.9	3.21	
a*	6.86 ^{Aa}	4.19 ^{Bb}	1.43	8.10 ^{Aa}	4.49 ^{Bb}	1.21	
b*	0.101	1.47	1.48	-2.49 ^{Bb}	0.653 ^{Aa}	1.06	
Breast ²							
- protein	%	20.9	21.2	0.807	22.5	22.7	0.778
- lipids	%	0.366 ^b	0.501 ^a	0.112	0.158 ^b	0.263 ^a	0.065
- cholesterol	mg/100 g	41.9	37.8	4.02	41.0	41.4	6.31
Thigh ²							
- protein	%	19.6	19.9	1.15	19.4	17.7	3.07
- lipids	%	3.14 ^{Bb}	5.88 ^{Aa}	1.09	2.97 ^{Bb}	5.57 ^{Aa}	1.31
- cholesterol		70.4	75.8	11.3	59.7	56.3	13.9
Skin ²							
- protein	%	17.5 ^{Aa}	13.6 ^{Bb}	1.32	20.6 ^{Aa}	11.9 ^{Bb}	1.84
- lipids	%	21.3 ^{Bb}	44.2 ^{Aa}	4.95	19.3 ^{Bb}	50.5 ^{Aa}	3.53
- cholesterol	mg/100 g	226	250	30.6	198	177	31.0
Breast WBSF	kg/cm ²	2.13	1.75	0.596	1.61	1.73	0.398

^{a, b}: $P < 0.05$; ^{A, B}: $P < 0.01$; ¹observations (n) of each group: 10 (pH and colour), 7 (meat composition and tenderness); ²: on as is basis.

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