Italian market chicken breeds: exploring biodiversity through macroscopic analysis of colorful eggs

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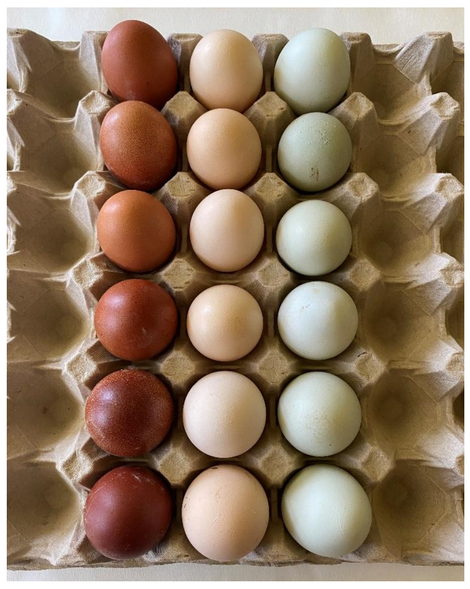
INTRODUCTION

Consumer choices for food products are often based on appearance; one of the most important aspects is the color [1]. It is generally believed that the color of eggs from local breeds are better than those obtained from industrial poultry farms [1].
In addition, there is an important interest for consuming eggs from a more natural raising system using native breeds [2].
Lately, the consumer growing demand for organic and alternative products led to the increased interest for chicken biodiversity, especially for their characteristics, such as the eggshell and yolk color [2].



AIM

The aim of our preliminary study was to describe the macroscopic egg characteristics in 16 chicken breeds reared in Italy to promote a possible commercial purpose, while valorizing alternative poultry farming systems and to make the consumer appreciate chicken biodiversity.

MATERIAL AND METHODS

For egg quality parameters analysis, 10 eggs per breed were collected among the 16 considered breeds [Polverara bianca (PB), Robusta Maculata (RM), Millefiori di Lonigo (ML), Ermellinata di Rovigo (ER), Robusta Lionata (RL), Padovana Dorata (PD), Padovana Camosciata (PC), Pepoi (Pp), Polverara Argentata (PA), Polverara Nera (PN), Araucana (A), Marans (M), Bianca di Saluzzo (BS), Bionda Piemontese (BP), Lohmann White (LW), Lohmann Brown (LB)]. The egg weight, the shape index (SI = 100 x equator diameter/egg height) and the eggshell color were registered before recording the weights of the albumen, yolk and eggshell. Data were analyzed by one-way ANOVA and LSD post-hoc, considering the breed as main factor of variation.

RESULTS

The shape index did not display any significant differences among breeds. For what concerns the egg weight, RL registered the highest value, whereas PN the lowest ($p<0.001$). Interestingly, the latter one displayed the highest value for the yolk percentage, while LB registered the lowest ($p<0.001$). Surprisingly, M registered the highest albumen percentage ($p<0.001$). Focusing on the eggshell color, the highest value for brightness (*L) was that of LW ($p<0.001$). Instead, M showed the highest values for redness (*a) and yellowness (*b) ($p<0.001$).

Table 1. Effect of breed on the quality characteristics of eggs.

	Indigenous chicken breeds/Commercial layers[1]																Significance	
Egg charactreristics	PB	RM	ML	ER	RL	PD	PC	Pp	PA	PN	A	M	BS	BP	LW	LB	SEM	P
Egg components																		
Whole egg (g)	48,39^{e,f}	57,69^{a,b,c,d}	50,64^{d,e,f}	60,32^{a,b}	60,97^{a}	50,78^{d,e,f}	52,57^{b,c,d,e,f}	48,09^{e,f}	51,58^{c,d,e,f}	47,85^{f}	51,03^{d,e,f}	52,57^{b,c,d,e,f}	56,22^{a,b,c,d,e}	53,37^{a,b,c,d,e,f}	59,81^{a,b}	59,47^{a,b,c}	0,531	<0,001
Shell (%)	13,45^{a,b,c}	12,97^{a,b,c}	14,06^{a}	10,69^{d,e}	11,09^{d,e}	13,23^{a,b,c}	12,06^{c,d}	12,99^{a,b,c}	13,63^{a,b,c}	13,63^{a,b,c}	11,21^{d,e}	10,23^{e}	13,05^{a,b,c}	12,29^{b,c,d}	13,61^{a,b,c}	13,94^{a,b}	0,124	<0,001
Yolk (%)	32,96^{a,b,c}	32,87^{a,b,c}	33,77^{a,b}	32,22^{a,b,c,d}	29,01^{c,d,e}	34,08^{a}	34,04^{a}	31,20^{a,b,c,d}	30,912^{a,b,c,d}	34,19^{a}	30,01^{b,c,d}	29,64^{c,d,e}	28,39^{d,e}	29,77^{c,d,e}	28,43^{d,e}	25,99^{e}	0,270	<0,001
Albumen (%)	51,87^{f,g}	53,45^{e,f,g}	51,01^{g}	55,22^{c,d,e,f}	59,19^{a,b}	54,01^{e,f,g}	52,74^{f,g}	54,63^{d,e,f,g}	54,53^{d,e,f,g}	50,88^{g}	58,78^{a,b,c}	60,95^{a}	56,92^{b,c,d,e}	57,93^{a,b,c,d}	57,33^{a,b,c,d,e}	59,09^{a,b,c}	0,306	<0,001
Egg quality traits																		
Shape Index (%)	77,82^{a,b}	75,76^{a,b,c}	76,50^{a,b,c}	72,45^{c}	74,23^{a,b,c}	76,03^{a,b,c}	75,54^{a,b,c}	74,95^{a,b,c}	73,76^{a,b,c}	73,72^{a,b,c}	75,31^{a,b,c}	74,51^{a,b,c}	72,66^{b,c}	74,89^{a,b,c}	75,39^{a,b,c}	78,31^{a}	0,285	0,007
L shell	90,99^{a,b,c}	73,95^{h}	88,15^{b,c,d}	80,81^{f,g}	86,25^{c,d,e}	90,99^{a,b,c}	92,25^{a,b}	82,44^{e,f,g}	90,87^{a,b,c}	90,40^{a,b,c}	80,44^{f,g}	50,28^{l}	78,85^{g}	83,83^{d,e,f}	94,98^{a}	59,13^{i}	0,969	<0,001
a* shell	-5,09^{g}	4,55^{c}	-4,22^{f,g}	0,01^{d}	-2,54^{e,f}	-5,01^{f,g}	-5,11^{g}	-1,4^{d,e}	-4,60^{f,g}	-4,88^{f,g}	-9,90^{h}	18,72^{a}	3,03^{c}	-1,40^{d,e}	-5,15^{g}	16,17^{b}	0,612	<0,001
b* shell	10,55^{h,i}	25,57^{b,c}	12,86^{g,h}	23,32^{c,d}	16,29^{f,g}	9,41^{h,i}	8,14^{i}	20,47^{d,e}	9,49^{h,i}	9,27^{h,i}	12,96^{g,h}	28,78^{b}	22,53^{c,d,e}	19,02^{e,f}	6,79^{i}	34,36^{a}	0,667	<0,001

[1]Eggs from different breeds and commercial hybrid genotype.
[a,b]Means with no common superscripts are different ($P<0.005$).
Abbreviations: SEM, Standard error of mean.

CONCLUSIONS

Preliminary results show how the mentioned chicken breeds should be considered as a valid choice in alternative farming systems, with unique products characteristics that have the potential to dynamize the egg market with their colorful contribution. Indeed, the macroscopic analysis indicated that eggs from these native breeds match or supersede the quality of a commercial product in many characteristics.

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