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[05-05]: Genetics and breeding (ID: 120181)

[Italy]

A mating scheme based on molecular parentage improves growth performance in slow-growing chickens over three generations

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The objective of this study was to assess the effect on growth traits of a mating scheme aimed to minimize progeny inbreeding using genomic information. 150 birds (75 males and 75 females) of Bianca di Saluzzo, a slow growing breed autochthonous of Piedmont region, were genotyped by a set of 14 microsatellite markers. For each subject the genetic distances were calculated. Six family lines were identified and 10 hens for each line were grouped in a single box. For each line the cock with the highest genetic variability was identified and coupled with the most distant female genetic line. 440 individuals of three generations (G0, G1 and G2) were weighted every 15 days from hatch to 180 days of age; Gompertz linear model was used to describe the growth index over the three generations. Daily growth rate significantly increased ($P < 0.001$) over successive generations in males (G0 = 16 g/d; G1 = 20 g/d; G2 = 25 g/d) and in females (G0 = 12 g/d; G1 = 14 g/d; G2 = 28 g/d). The age Inflection point significantly decreased ($P < 0.05$) in males (G0 = 101 d; G1 = 93 d; G2 = 68 d) and in females (G0 = 90 d; G1 = 87 d; G2 = 62 d). The live weight corresponding to the inflection point decreased ($P = 0.06$) over the generations in males (G0 = 1230 g; G1 = 1156 g; G2 = 1148 g) and in females (G0 = 881 g; G1 = 835 g; G2 = 794 g). The estimated weight at 180 days of age increased over the generations: +28% in cocks (G0 = 2288 g; G1 = 2470 g; G2 = 2853 g) and +13% in hens (G0 = 1758 g; G1 = 1810 g; G2 = 1988 g). In conclusion, the results showed an improvement of growth performance as the offspring heterozygosity increased and inbreeding decreased. The use of molecular parentage in mating schemes could be a reliable tool for the management of small size chicken populations and the improvement of their production.

Keywords: chicken; mating scheme; growth performance; microsatellite markers.

[05-04]: *Genetics and breeding* (ID: 120173)

[Italy]

PAX7 gene polymorphism analysis in Bianca di Saluzzo and Bionda Piemontese poultry breeds

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The polymorphism of PAX7 gene, an important transcription factor regulating myogenesis of skeletal muscle, was investigated in two slow growing chicken breeds, namely Bionda Piemontese (BP, n=108) and Bianca di Saluzzo (BS n=93) in order to detect a positive association with growth traits. The birds were raised in the same environmental conditions. Body Weight (BW) was individually measured every two weeks from hatch to 32 weeks of age. BW was significantly different between the two sexes from 6 weeks of age for both breeds, and the difference increased with age. At 32 weeks of age, the average BW was 2474 g in males and 1819 g in females for BP, and 2575 g in males and 1855 g in females for BS. The data analysis showed a significant allele association with BW in females of both breeds from the 14th week onward. The association between PAX7 and BW, with a dominant effect of G allele, was significant in BP ($P < 0.05$) from 14 to 32 weeks, except in 22th week of age. Nevertheless, a different BW among genotypes was evident already from 14 to 24 weeks, with a slowdown between 18 to 22 weeks. An incomplete dominance of allele G revealed a significant additive effect ($P < 0.05$) at week 14, 16, 24, 28 and 30. In BS, PAX7 association was evident ($P < 0,05$) only at 14, 16 and 30 weeks of age and positive dominant effect was associated with F allele. In both breeds the most frequent allele is associated with positive effect on BW: in BP G allele frequency was 0.6 with 83% of favourable genotypes (0.47 for F/G and 0.36 for G/G) while in BS allele F frequency was 0.53 with 80% of favourable genotypes (0.30 for F/F, 0.5 for F/G), even if the two allele showed very similar frequencies. As the survival of autochthonous poultry breeds is related to the marketing of their products, the selection schemes of these small size populations should consider PAX7 gene polymorphism in order to increase female body weight using the marker assisted selection on males.

Keywords: PAX7; polymorphism; growth trait; poultry; slow growing chicken.

[P2-11]: Health/housing/miscellaneous (ID: 120162)

[Italy]

Carcass yields and breast meat composition of male and female Italian slow-growing chicken breeds

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Carcass yields and chemical composition on the breast meat of two autochthonous Italian poultry breed, namely Bionda Piemontese (BP; n=64) and Bianca di Saluzzo (BS; n=64), were evaluated by a two-way ANOVA considering breed, sex and their interaction during four consecutive slaughter ages (5, 6, 7 and 8 months of age). Data were analyzed by one way ANOVA and Duncan test to investigate the differences between slaughter ages. Males showed heavier final live weight (LW; 2626 g), carcass weight (CW; 1522 g) and thigh yield (39.95%) than females (1872 g, 1026 g and 32.40%, respectively). Females displayed greater breast yield (19.11% CW on average) during the different slaughter ages ($P < 0.001$) than males (17.03% CW on average). Breeds significantly affect carcass yield at the first (60.25 vs 58.49% LW in BP and BS, respectively), third (59.56 vs 56.70% LW in BP and BS, respectively) and fourth slaughtering (57.85 vs 54.97% LW in BP and BS, respectively) ($P < 0.05$). Carcass yield of BS females showed the highest value at 5 and 6 months of age (59.03 and 57.58 % LW, respectively). Breast yield of the two breeds was influenced by the slaughter age and showed the lowest value at 6 months of age (59.57 % CW in BP and 57.58% CW in BS). Breast moisture, protein, ether extract (EE) and ash contents were not affected by breeds, except for ash at 6 months of age (1.18% vs 1.15 % in BP and BS, respectively) and EE at 8 months of age (0.43 % vs 0.28% in BP and BS, respectively). Sex influenced mainly moisture (on average 74.26% for males and 73.35% for females) and EE (0.27% for males and 0.82% for females on average). Slaughter age influenced mainly moisture and EE of breast meat with the highest values at 5, 6 and 7 months of age, respectively. Considering carcass parameters, slaughtering age at 7 and 8 months showed the best results in males and females of BP and males of BS. Five and six months were the best slaughter age in females of BS for carcass yield.

Keywords: breed; sex, Bionda Piemontese; Bianca di Saluzzo; carcass yield; ether extract.

[P2-18]: Health/housing/miscellaneous (ID: 120139)

[Italy]

Effect of regrouping on welfare of two Italian autochthonous breeds

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Italian autochthonous avian breeds. 110 chicks of Bionda Piemontese (N=55) and Bianca di Saluzzo (N=55) were reared homogeneously for 12 months divided in 5 subgroups for each breed, 10 females and 1 male for each. In this phase, birds were reared in pen (2.2 x 3.5m) with outdoor access (2.2 x 4.5m). At the age of 12 months, birds were regrouped on breed basis in two pens with same previous animal density by removing the internal fences between indoor and outdoor pens. Tonic immobility duration (TI) and heterophil to lymphocyte ratio (H/L) were evaluated at 1 week (T0) before and 3 (T3), 15 (T15) and 30 (T30) days post regrouping. Split-plot repeated measure ANOVA was used to examine differences using one within-subject variable (time of sampling) and one between-subject variable (breed and sex) and considering the interaction between these main effects. Effect of regrouping was significant only for time, whereas neither breed nor sex and their interaction showed significant differences. In particular, TI showed lower value at T0 (101.61±60.76 sec, P<0.05) and greater values at T3, T15 and T30 (175.97±21.72 sec, 157.29±45.56 sec and 152.35±48.32 sec, respectively); this trend confirmed that social stress after regrouping occurred. Respect to H/L ratio, at first (T0) and final (T30) evaluations similar values were found (0.81±0.30 and 0.86±0.31, respectively), while the highest value was showed at T15 (1.09±0.35, P<0.05); regard to T3 this value was found equal to T0 and T15 (0.94±0.51). As for TI also, H/L confirmed that regrouping produced social stress, being evidenced by the increasing ratio at T15; after the establishment of new social hierarchies (T30), this stress was solved producing the reduction of H/L ratio. In conclusion, after regrouping social stress occurred, independently by breed and sex, but during time the effect of social stress on TI and H/L was different; in fact, after 30 days birds reacted positively in terms of increased lymphocytes production, whereas under behavioral point of view birds still showed fear.

Keywords: autochthonous poultry breeds; regrouping; welfare parameters.