

Genome-wide scan for selection signatures in Italian local chicken breeds

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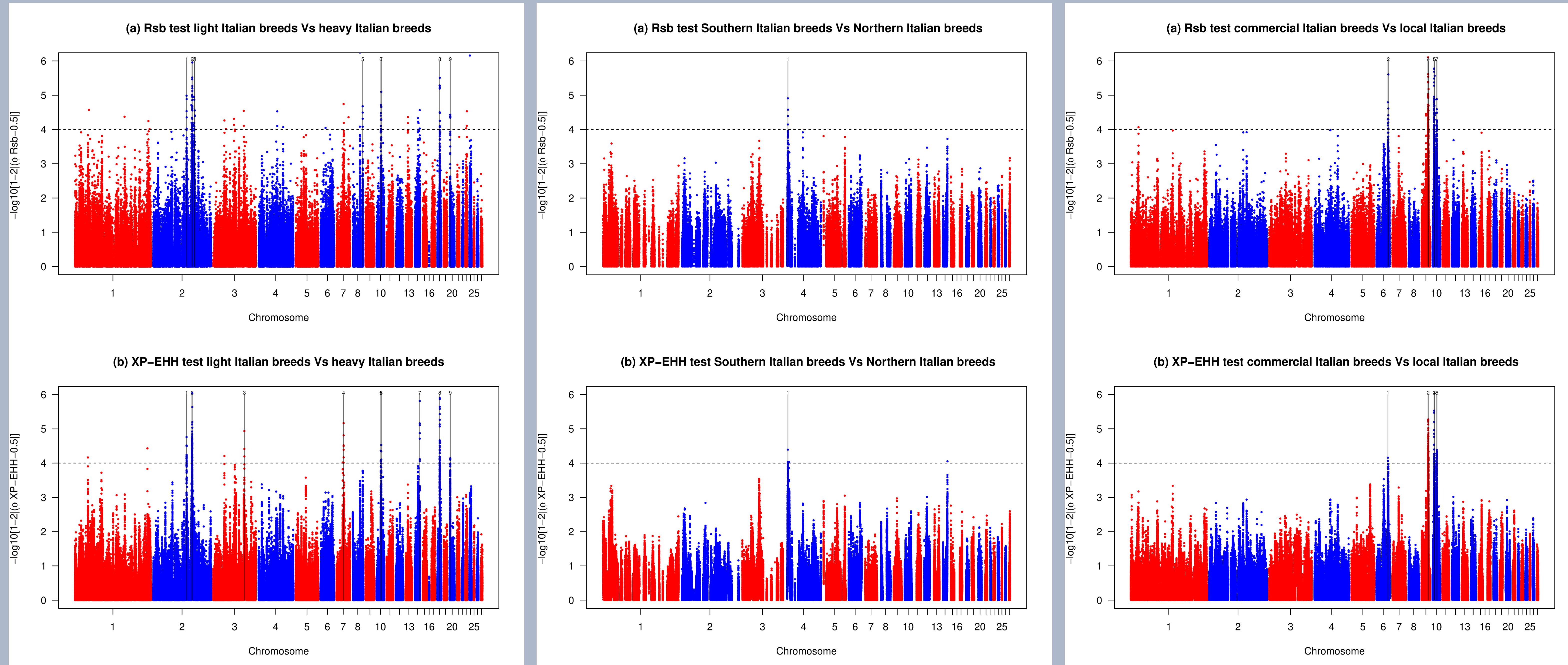
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INTRODUCTION

Genetic makeup of chicken populations is the result of a long-term process of selection and adaptation to specific environments. Identifying genomic regions that are or have been under selection pressure (selection signatures) is essential for sustainable chicken production because it could help to elucidate molecular mechanisms governing robustness and environmental responses in local populations.



CONCLUSION

Results highlight that selection and environmental adaptation have played an important role in shaping the genome of local chicken populations. Our study can be considered as a starting point to identify gene mutations playing a central role in coping with climate change.

MATERIAL & METHODS

In this study, we used single nucleotide polymorphism (SNP) data from 600K Affymetrix Chicken array to detect signatures of selection in 23 Italian local chicken breeds and 4 commercial hybrid lines. The breeds were categorized into 6 groups for comparative analysis based on classification (local vs commercial), live weight (heavy vs light) and geographic origin (Northern vs Southern Italy). Putative selection signatures were investigated by combining three Extended Haplotype Homozygosity (EHH) tests either within (iHS) or among groups (Rsb and XP-EHH).

RESULTS AND DISCUSSION

After genotype quality control, 582 animals and 313,508 SNPs were available for statistical analysis. We detected 11 candidate regions within the groups (*iHS*) and 12 divergent regions between groups, identified combining the results obtained with *Rsb* and *XP-EHH*. Within these genomic regions, we identified genes involved in chicken adipogenesis, growth-related processes and feed efficiency which are basically under strong selection in commercial chicken as they are of great economic importance. Other identified regions contained candidate genes with biological functions in response to environmental stress, immune responses and disease resistance, which underline local adaptation. Indeed, local breeds are reared as backyard chickens and thus they have developed resistance to environmental challenges.



This work was supported by the projects: “protection of biodiversity of Italian poultry breeds” – TuBAvI – 2017/2020 and TuBAvI-2 – 2021/2024. PSRN – Support for the conservation use and sustainable development of genetic resources in agriculture. Sub-measure 10.2.

