

Key Results of the Italian Living Lab on Chicken Farming

Main Findings and Practical Implications

Context

In recent years, consumer interest in animal products from rearing systems that respect animal welfare and ensure high quality products has been growing. Specifically in poultry sector there is an open debate about the effect of outdoor rearing systems on the main meat quality traits and the use of suitable genotypes for these less intensive systems. Several researches have been carry out about these topics suggesting that slow growing chickens genotypes showed a best adaptability to outdoor rearing systems due to their high kinetic and exploratory ability. In this context, and in line with the main objectives of the INTAQT project, which aims to assess the relationship between husbandry systems and the intrinsic quality of animal-derived products by involving the main stakeholders across the production chain, a trial was conducted in Italy.

Aim

The aim of this trial was to evaluate the effects of dietary and outdoor enrichment on meat quality traits in free-range, slow-growing chickens. The enriched diet was supplemented with 5% extruded flaxseed, 225 mg/kg vitamin E, and 0.2 mg/kg organic selenium. Outdoor enrichment consisted of the presence of trees in the outdoor pens (Figure 1).

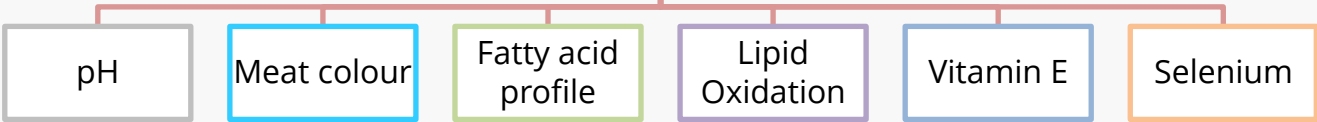
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Fig. 1: Illustration of the farms with non enriched and enriched outdoor area

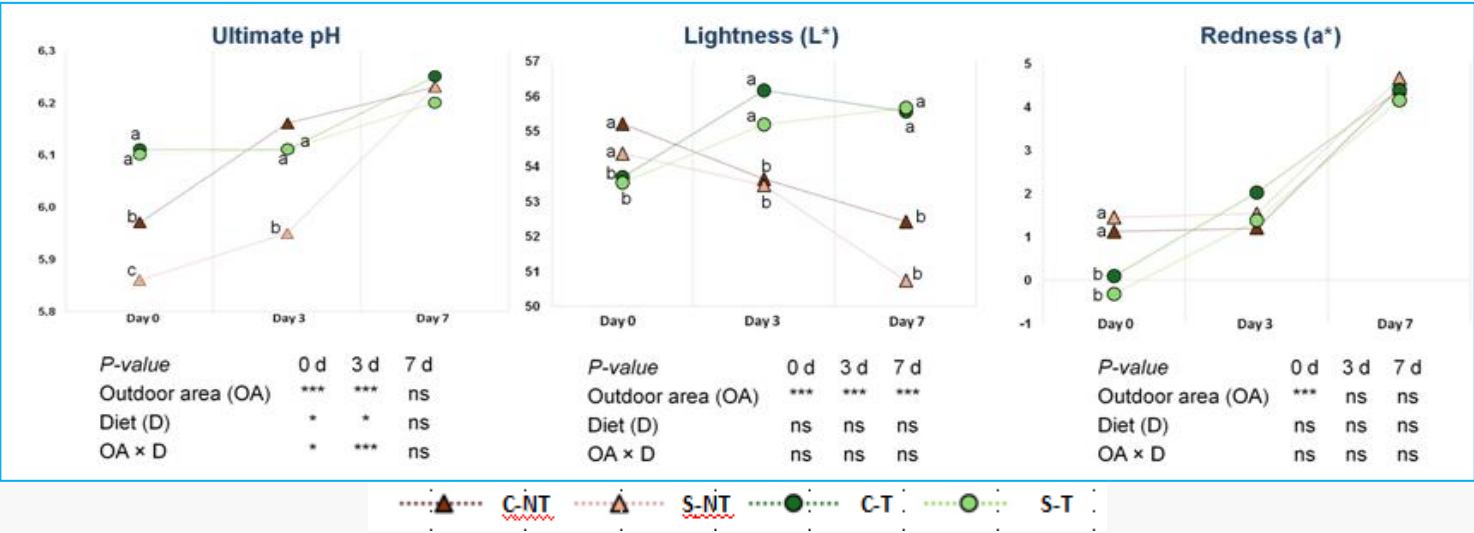
The study was carried out through the collaboration between the University of Bologna and the University of Perugia, as scientific partners, and the Amadori Group, as the industrial partner of the project. A key strength of this trial was its implementation under commercial farming conditions, allowing the inclusion of a large number of chickens across multiple farms. The study involved four commercial farms, each with two poultry houses, with approximately 20,000 chickens per house.

Analyses performed



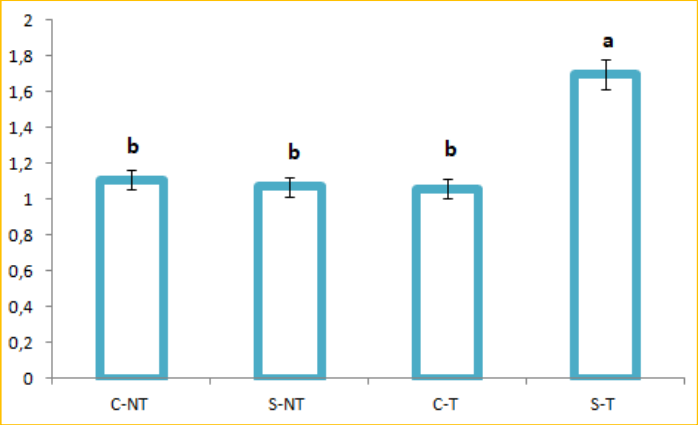
Description of the results

Fig 2. Effect of outdoor enrichment and diet supplementation on the ultimate pH and colour variables of thigh meat during refrigerated storage at 4 ±1°C



C-NT= Control diet, no trees; S-NT= supplemental diet no trees; C-T= control diet, trees; S-T= supplemental diet, trees
 *** = P<0.001, ** = P<0.01, * = P<0.05, ns = not significant; a,b = P<0.05

Figure 3. Effect of outdoor enrichment and diet supplementation on the lipid oxidation (TBARS) of thigh meat

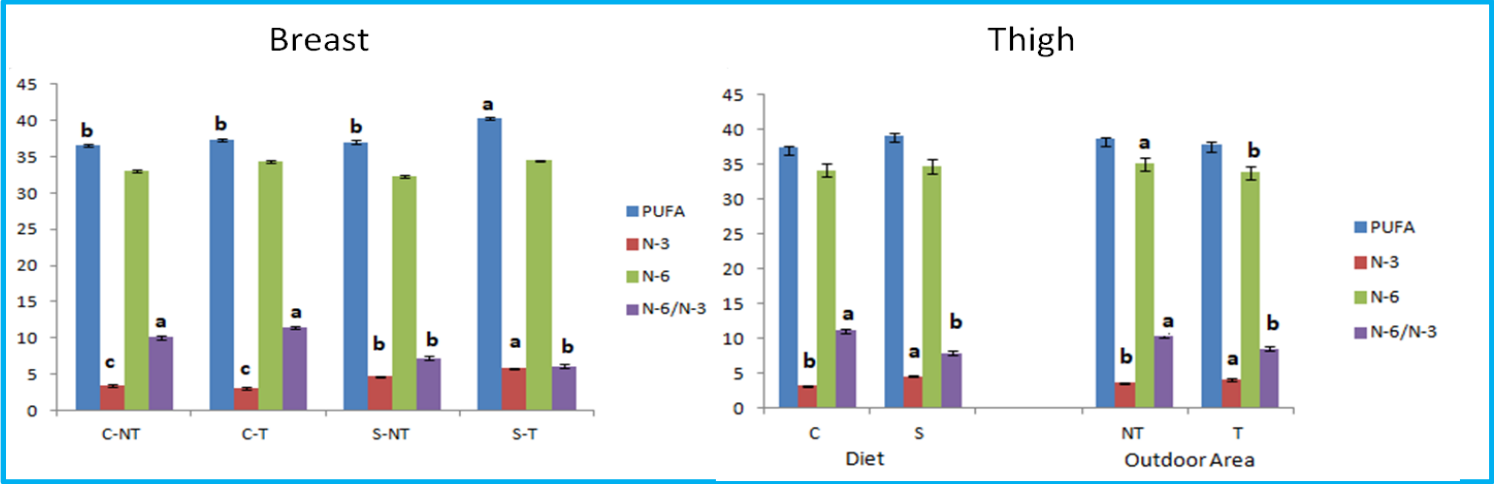


C-NT= Control diet, no trees; S-NT= supplemental diet no trees; C-T= control diet, trees; S-T= supplemental diet, trees
 a,b P<0.05

- Colour and pH parameters were monitored over 7 days of refrigerated storage due to their importance in consumers' purchasing decisions.
- Chickens with access to the enriched outdoor area (T group) showed higher values for both colour and pH (Figure 2).
- The S-T group showed the highest TBARS values (Figure 3).
- Outdoor trees may increase chickens' locomotor activity, potentially promoting pro-oxidative processes.
- Vitamin E supplementation may not fully counteract these oxidative processes

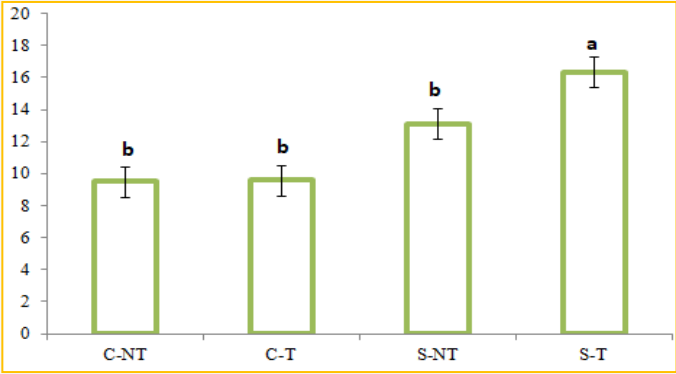
Dietary and outdoor enrichments also affected the fatty acid profile of both breast and thigh meat (Figure 4). In particular, in breast meat, the interaction between the supplemented diet and the enriched outdoor area influenced PUFA and n-3 fatty acid contents, which were higher in chickens fed with the supplemented diet and raised in enriched outdoor (S-T group) than in the other animals. Consequently, a lower n-6/n-3 ratio was observed in the S-T and S-NT birds compared with the C-T and C-NT groups. In thigh meat, both the supplemented diet and outdoor enrichment increased the n-3 fatty acid content. Indeed, the S and T groups showed higher n-3 contents and lower n-6/n-3 ratios than the C and NT ones.

Fig. 4. Effect of diet supplementation and outdoor enrichment on fatty acid profile (mg/100g) in breast and thigh meat



C-NT= Control diet, no trees; C-T= control diet, trees; S-NT= supplemental diet no trees; S-T= supplemental diet, trees C= control diet; S= supplemented diet; NT= no trees T= trees
a-c <0.05

Fig. 5. Effect of diet supplementation and outdoor enrichment on tocopherol content (µg/g) in breast meat

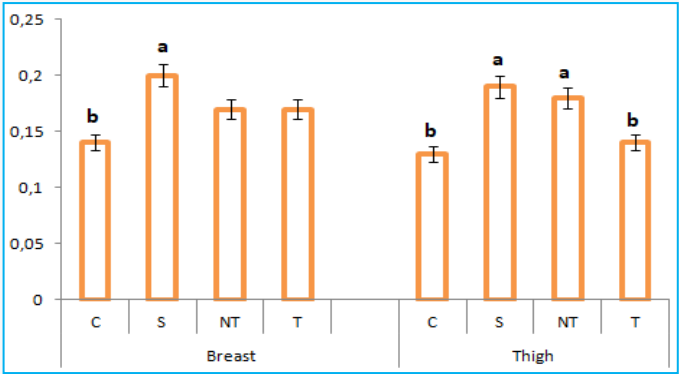


C-NT= Control diet, no trees; C-T= control diet, trees; S-NT= supplemental diet no trees; S-T= supplemental diet, trees
a,b <0.05

- Dietary supplementation had the main effect on selenium content in both breast and thigh meat.
- The S group showed the highest selenium concentrations.

- Dietary supplementation and outdoor enrichment affected tocopherol content in breast meat.
- The S-T group showed the highest tocopherol content in breast meat.

Fig. 6. Effect of diet supplementations and outdoor enrichment on selenium (mg/kg) content in breast and thigh meat



C= control diet; S= supplemented diet; NT= no trees T= trees
a,b <0.05

Practical Implications

#1. Dietary supplementation can improve the nutritional characteristics of chicken meat – Supplementation with extruded flaxseed, vitamin E and organic selenium improved specific nutritional traits, including the fatty acid profile and the concentrations of selected micronutrients

#2. Outdoor enrichment can influence meat quality, but its effects depend on the trait considered – The presence of trees in outdoor areas affected certain meat quality characteristics and interacted with dietary supplementation in determining specific nutritional parameters

#3. Oxidative stability remains an important challenge – The increased lipid oxidation observed in chickens receiving the supplemented diet and reared in tree-enriched outdoor areas highlights the need to optimise nutritional strategies to maintain meat quality during refrigerated storage

Overall, these findings support the development of integrated feeding and management strategies for free-range slow-growing chickens, balancing nutritional quality and oxidative stability

