

SENSORY EVALUATION OF BREAST MEAT FROM BIANCA DI SALUZZO CHICKEN SUPPLEMENTED WITH LIVE AND DRIED BLACK SOLDIER FLY LARVAE

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I. INTRODUCTION

Insects are currently recognised as one of the most promising alternative and sustainable protein source in poultry nutrition. Along with the necessity to find an alternative and sustainable feed source in animal nutrition, the same is occurring in the meat sector, showing a renovating interest towards rearing slow-growing chicken genotypes. Although scarce information existing on slow-growing chickens' slaughter performances and meat quality, they are known for their natural adaptability in alternative farming systems (i.e., organic farming) and natural resource utilisation, that can affect the sensorial profile of their meats, largely appreciated by consumers. Various sensory studies have been performed on meat derived from insects fed poultry, and the results showed the absence of negative effects on meat sensory attributes [1]. However, any studies have investigated the effects of live and dried Black Soldier Fly (BSF) larvae supplementation on meat sensory properties of a slow-growing chicken genotype, reared in organic systems, at different slaughtering ages.

II. MATERIALS AND METHODS

A total of 192 Bianca di Saluzzo (BS) male chicks were reared from 39 days until slaughtering age. Animals (8 birds/pen, 6 replicates/treatment) were randomly assigned to four experimental treatments: Control soy-based diet (C), Sustainable soy-free diet (S), Sustainable soy-free diet + Live BSF Larvae (SLL) and Sustainable soy-free diet + Dried BSF Larvae (SDL). Based on the expected average daily feed intake, SLL and SDL experimental groups received 15% and 5% supplementation of live and dried BSF larvae, respectively. For this trial animals were slaughtered at two different ages, 150 and 180 days, with 48 birds (2 birds/pen, 12 birds/treatment) slaughtered each. After 24h of refrigeration at 4°C, all the breast fillets were excised, vacuum packed and stored at -20°C before being transported to the laboratory. For sensory evaluation, breast fillets were then thawed and cooked in a water bath at a range temperature of 75 - 85 °C for 40 min. Sensory descriptive analysis were performed in duplicate by 10 trained panellists, with a specific software for sensory data acquisition, (FIZZ Biosystèmes), using a nine-points intensity scale. Sensorial profiles were analysed through the ANOVA and post hoc test (Tukey's HSD) (p<0.05).

III. RESULTS AND DISCUSSION

Both slaughtering ages, 150 and 180 days, showed significant differences in terms of meat "consistency", with the higher intensity in SLL group (Tab.1). The second slaughtering age was also significantly different in "chewiness" and "plant flavor" attributes, with the higher intensity observed in S group. Furthermore, the "plant flavor" was perceived in SDL group too.

Table 1 Sensory profiles of breast meat sampled at first and second slaughtering ages (150 and 180 days respectively)

| Attributes | 150 Days | | | | | | 180 Days | | | | | | |
|--------------------|-------------------|-------------------|--------------------|--------------------|---------|-------|--------------------|-------------------|--------------------|--------------------|-------------------|---------|-------|
| | SLL | SDL | C | S | p | RSE | Attributes | SLL | SDL | C | S | p | RSE |
| Overall odor | 5.80 | 6.25 | 6.00 | 6.25 | 0.205 | 0.779 | Overall odor | 5.30 | 5.20 | 5.35 | 5.70 | 0.223 | 0.794 |
| Typical odor | 5.50 | 5.85 | 5.60 | 5.85 | 0.288 | 0.703 | Typical odor | 5.10 | 5.30 | 5.35 | 5.70 | 0.058 | 0.679 |
| Plant odor | 2.60 | 2.50 | 2.55 | 2.60 | 0.928 | 0.550 | Plant odor | 2.15 | 2.45 | 2.30 | 2.40 | 0.440 | 0.619 |
| Off odor | 1.35 | 1.50 | 1.30 | 1.30 | 0.541 | 0.498 | Off odor | 1.45 | 1.40 | 1.40 | 1.35 | 0.878 | 0.384 |
| Consistency** | 5.20 ^a | 4.30 ^b | 5.00 ^{ab} | 4.40 ^{ab} | 0.009** | 0.936 | Consistency* | 4.90 ^a | 4.30 ^{ab} | 4.50 ^{ab} | 3.80 ^b | 0.015* | 1.071 |
| Fibrousness | 4.35 | 4.05 | 4.10 | 3.85 | 0.498 | 1.028 | Fibrousness | 4.35 | 3.75 | 3.95 | 3.55 | 0.071 | 0.977 |
| Flouriness | 3.00 | 2.75 | 2.75 | 2.70 | 0.511 | 0.687 | Flouriness | 2.85 | 3.00 | 2.70 | 2.80 | 0.563 | 0.674 |
| Greasiness | 2.50 | 2.75 | 2.50 | 2.85 | 0.160 | 0.597 | Greasiness | 2.70 | 3.00 | 2.65 | 2.70 | 0.388 | 0.708 |
| Adhesiveness | 3.85 | 3.35 | 3.70 | 3.70 | 0.099 | 0.644 | Adhesiveness | 3.35 | 3.60 | 3.45 | 3.45 | 0.751 | 0.725 |
| Juiciness | 3.30 | 3.25 | 3.30 | 3.45 | 0.808 | 0.681 | Juiciness | 3.10 | 3.30 | 3.40 | 3.20 | 0.709 | 0.849 |
| Chewiness | 4.65 | 4.85 | 4.65 | 4.90 | 0.886 | 1.269 | Chewiness* | 4.00 ^b | 4.80 ^{ab} | 4.80 ^{ab} | 5.50 ^a | 0.012* | 1.115 |
| Astringency | 3.45 | 3.60 | 3.65 | 3.45 | 0.703 | 0.672 | Astringency | 3.15 | 3.10 | 3.45 | 3.45 | 0.302 | 0.758 |
| Pungency | 2.10 | 2.05 | 1.90 | 2.05 | 0.531 | 0.450 | Pungency | 1.60 | 1.65 | 1.60 | 1.75 | 0.581 | 0.390 |
| Sweet | 3.00 | 3.15 | 3.05 | 3.00 | 0.844 | 0.604 | Sweet | 2.80 | 2.45 | 2.35 | 2.55 | 0.056 | 0.531 |
| Salty | 3.45 | 3.45 | 3.40 | 3.50 | 0.957 | 0.565 | Salty | 3.55 | 3.50 | 3.90 | 3.65 | 0.185 | 0.618 |
| Sour | 1.65 | 1.60 | 1.65 | 1.75 | 0.739 | 0.434 | Sour | 1.85 | 2.05 | 1.85 | 2.00 | 0.422 | 0.473 |
| Bitter | 1.60 | 1.50 | 1.60 | 1.65 | 0.700 | 0.408 | Bitter | 1.80 | 1.90 | 1.60 | 1.80 | 0.093 | 0.378 |
| Umami | 3.70 | 3.75 | 3.65 | 3.60 | 0.847 | 0.557 | Umami | 4.00 | 4.00 | 4.10 | 4.05 | 0.952 | 0.635 |
| Overall flavor | 5.55 | 5.85 | 5.75 | 5.90 | 0.277 | 0.604 | Overall flavor | 5.25 | 5.30 | 5.40 | 5.55 | 0.711 | 0.872 |
| Typical flavor | 5.30 | 5.55 | 5.30 | 5.40 | 0.532 | 0.614 | Typical flavor | 5.20 | 5.00 | 5.25 | 5.45 | 0.311 | 0.750 |
| Plant flavor | 2.60 | 2.50 | 2.60 | 2.60 | 0.911 | 0.530 | Plant flavor** | 2.10 ^b | 2.60 ^a | 2.40 ^{ab} | 2.50 ^a | 0.002** | 0.452 |
| Metallic flavor | 2.20 | 2.35 | 2.35 | 2.35 | 0.899 | 0.761 | Metallic flavor | 2.45 | 2.55 | 2.55 | 2.35 | 0.810 | 0.755 |
| Wild/animal flavor | 2.35 | 2.40 | 2.30 | 2.50 | 0.794 | 0.651 | Wild/animal flavor | 2.15 | 2.25 | 2.05 | 2.00 | 0.652 | 0.671 |
| Off flavor | 1.60 | 1.35 | 1.30 | 1.45 | 0.173 | 0.452 | Off flavor | 1.25 | 1.40 | 1.25 | 1.35 | 0.281 | 0.294 |
| Freshness | 4.95 | 5.15 | 5.00 | 4.85 | 0.651 | 0.755 | Freshness | 4.85 | 5.20 | 4.85 | 5.20 | 0.409 | 0.915 |

Note: Different letters in the same row correspond to significantly different means according to the Tukey's Hsd post-hoc test (*p<0.05; **p<0.01); C, control; S, sustainable; SLL, sustainable + live larvae; SDL, sustainable + dried larvae; p, p-value; RSE, residual standard error.

IV. CONCLUSION

In conclusion, a dietary supplementation with 15% live or 5% dried BSF larvae did affect a few sensory attributes of BS breast meat, mainly related to texture and specifically in meat samples of SLL group. Additional studies will be performed on breast meat tenderness, even with instrumental devices, to better comprehend a possible correlation between meat tenderness, animals age and larvae supplementation. Although significant differences were found regarding the "plant flavor" perceived in meat of SDL group, further research should assess if this attribute could also be perceived by consumers or masked by meat cooking different methods.

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