

## Meat Quality Attributes of broilers supplemented with Herbal Toxin binder Product

Waskar, V.S.<sup>1</sup>, Devangare, A.A.<sup>1</sup>, Gosavi, P.P.<sup>1</sup>, Ravikanth, K.<sup>2</sup>, Maini, S.<sup>2</sup> and Rekhe, D.S.

1 College of Veterinary and Animal Sciences Udgir, Dist. Latur, Maharashtra,  
(Maharashtra Animal and Fishery Sciences University)

2: R&D team, Ayurvet Limited, Baddi, India.

### Abstract

Raw and cooked meat quality is of immense consideration to consumers in present scenario. A study was conducted in 50 unsexed day old broiler chicks with an aim to assess effect of herbal toxin binder product on meat quality attributes. Chicks were randomly divided into two groups. Group I was untreated control (G1), while G2 was given treatment with herbal toxin binder (Toxiroak) @ 1.5 Kg / tonne of feed (supplied by Ayurvet Ltd. Baddi, India). Carcass quality traits, raw and cooked meat quality attributes, organoleptic characteristics of cooked meat and proximate analysis of raw and cooked meat were studied at the end of 6 week experimental trial by slaughtering the birds of both the groups. Supplementation of herbal toxin binder product in basal diet is efficacious in improving overall meat quality attributes such as carcass yield, dressing %, giblet yield, fillet and tender yield, sensory raw meat characteristics, organoleptic cooked meat parameters, overall palatability and acceptability of meat. The product doesn't have any residual or adverse effect on raw, eating and cooking quality of meat & hence is safe for usage.

**Keywords:** meat quality, broiler, herbal toxin binder, organoleptic, carcass

### Introduction

More emphasis than ever before is now placed on global food security. Meat is important in human nutrition, being an excellent source of high quality protein, vitamins and minerals (except calcium). Raw and cooked meat quality is of immense consideration to consumers in present scenario. To the consumer, appearance is the major criterion for purchase, selection and initial evaluation of meat quality. Eating quality (texture, flavor, and juiciness) are other main product traits assessed by (Jahan et al., 2005). The ISO definition of quality is "the totality of features and characteristics of a product that bear on its ability to satisfy stated or implied needs" (ISO, 1986). Quality aspects of meat include food safety, sensory quality, animal welfare and sustainability of production.

With regard to sensory quality, appearance criteria are important in choosing meat, but in re-purchase, factors like taste may dominate over appearance (Dransfield et al., 2005). Poultry meat is susceptible to development of off-flavour (Gray and Pearson, 1987), changes in texture and nutritive value (Pearson et al., 1983). There has been resurgence of interests for "all natural" medicinal plants like herbal feed additives, plant extracts with growth, flavour, colour enhancing, antioxidant and antibacterial activities (Adodo, 2002; Omojasola and Awe, 2004). Herbal

formulations have proved useful in increase in weight gain and less meat: bone ratio beyond doubt. However, there is dearth of data on efficacy of herbal products especially on carcass characteristics and cooking attributes. Taking this into consideration, the present study was undertaken to evaluate carcass traits, effect of microwave cooking and sensory evaluation of cooked meat of broilers supplemented with herbal toxin binder products.

### Materials and Methods

A study was conducted in Department of Veterinary Public Health, College of Veterinary & Animal Sciences Udgir, Dist. Latur, Maharashtra on 50 unsexed day old broiler chicks. Chicks were randomly assigned equally in two groups of dietary treatments, untreated control (G1) and treatment group G2 supplemented with herbal toxin binder (Toxiroak) @ 1.5 Kg / tonne of feed (supplied by Ayurvet Ltd. Baddi, India) for 6 weeks. Two types of basal diets (starter and finisher) were formulated to cover the nutrient requirements of broiler chicks as per standard recommendations of NRC, (1994). Ad libitum water was offered throughout the experimental period as well as artificial lighting was provided 12 hours daily. Both the groups were housed in a brooder cum grower house randomly with standard and identical managemental, nutritional and environmental conditions. All the chicks were

vaccinated as per routine farm practices.

Post-Slaughter observations: At the end of 6 week long study i.e. during last week of experimental trial, all the birds of both the groups were slaughtered and dressed using humane methods and hygienic aspects. Dressed weight, fillet & tender yield, total giblet weight i.e. combined weight of heart, liver and gizzard were recorded.

Cooked yield and proximate analysis of microwave cooked breast fillets (MWBF) and microwave cooked chicken tenders (MWCT): carcasses were dressed into basic parts (breasts, thighs, drumsticks, wings, pelvis and backs observing the method prescribed by the Poultry Meat Quality Regulation (Official Gazetteer of the SFRY 1/81 and 51/88). Dressed carcasses were packed in packing material (LDPE bags) and kept for chilling in refrigerator at  $4\pm 1^{\circ}\text{C}$  for 20 hours. From the breast, the fillets (Pectoralis major) and the tenders (Pectoralis minor) were removed without disturbing the shape. These dressed carcasses were further used for the evaluation of cooked meat quality attributes, microwave cooked breast fillets and microwave cooked chicken tenders. Standard power-time combination prescribed by the manufacturer of the microwave oven was followed for the cooking and grilling of meat. Marinated fillet and tender pieces were forked and grilled using power-time combination. Weight of the marinated material was recorded.

proximate analysis of raw & microwave cooked breast fillets (MWBF) and microwave cooked chicken tenders (MWCT) - Moisture (%), protein% and fat% were evaluated for raw meat and after microwave cooking of fillets and tenders by adopting the standard methods as per AOAC (1995).

Organoleptic and sensory evaluation - For the consumer sensory testing on the broiler breast fillets, an 8 point hedonic scale (score 8 as excellent and score 1 as extremely poor) as per the method given by Keeton, (1983). Tenderness, juiciness, flavour, and overall preference on microwave cooked chicken breast fillets and tenders of two groups were determined. A minimum of 60 consumer panellists were used in this study. Parameters were evaluated by a trained panel of 6 members. The members were trained on flavour, tenderness, juiciness, and attachment of the meat to the bone. Data was summarized in tabular form for each

individual group and the data was analyzed using randomized block design as per Snedecor and Cochran (1967).

#### Results and Discussion

Evaluation of carcass and meat quality parameters revealed that the treatment group had higher dressed and eviscerated percentage (%).

Dressing % of G2 (60.21%) was also significantly better than the untreated control group (56.28%) (table 1). Total giblet yield was found to be significantly higher in treated birds (102.33 g) than control (85.33gm), (table 2). This is suggestive of beneficial effect of herbal toxin binder products in improving the delicacy (giblet) yield in addition to dressing % and carcass yield. Data of breast muscle & fillets reveal significantly ( $P= 0.05$ ) higher yield in the treatment group G2 (221.25 of fillet and 55.15g of tender) than control G1 (188.0g of fillets and 48.5g of tender). It can also be inferred that the herbal feed supplement Toxiroak contains certain herbs having active constituent that plays important role in improving quantitative carcass traits of broilers.

Proximate analysis of raw and cooked meat (table 3, 4): Moisture%, Protein % and fat% of raw and cooked meat of treated groups G2 is well comparable and non-significantly different from control group (G1).

Similarly, protein and fat % of tenders and fillets of treated groups is also in confirmation and non-significantly different from untreated control group. This indicates that supplementation of herbal product is efficacious in optimizing protein and fat content of raw and microwave cooked meat and in maintaining quality of meat.

Sensory evaluation of microwave cooked meat of both the groups revealed that appearance of fillets and tender in treated group was observed to be better than untreated control (table 5). Appearance of fillets in G2 was scored higher (6.66) than the control group G1 (6.3). Similarly, appearance of tenders in treated groups was in confirmation with the untreated control group. This suggests that administration of herbal toxin binder products have also positive impact in improving organoleptic characteristics of meat in addition to improving dressing % and do not exert any adverse effect on the quality or acceptability of meat (with reference to appearance).

Table-1. Mean Carcass traits of slaughtered birds of two groups (G1 & G2)

| Group         | Carcass traits     |            |                   |                   |
|---------------|--------------------|------------|-------------------|-------------------|
|               | Carcass yield (gm) | Dressing % | Fillet yield (gm) | Tender yield (gm) |
| G1 (Control)  | 1067.75            | 53.22      | 188               | 48.55             |
| G2 (Toxiroak) | 1195.75            | 60.21      | 214.92            | 55.58             |

Table-2. Mean giblet Weight of slaughtered birds of two groups (G1 &amp; G2)

| Group        | Weight (gm) |       |         |               |
|--------------|-------------|-------|---------|---------------|
|              | Liver       | Heart | Gizzard | Giblet Weight |
| G1(Control)  | 35.33       | 41.50 | 8.50    | 85.33         |
| G2(Toxiroak) | 48.00       | 43.33 | 11.00   | 102.33        |

Color and odour of cooked or raw poultry meat is important because consumers associate it with the product's freshness, and they decide whether or not to buy the product based on their opinion of its attractiveness. It is the only species known to have muscles that are dramatic extremes in color (white and dark meat). Breast meat is expected to have a pale pink color when it is raw, while thigh and leg meat are expected to be dark red when raw. There are times when poultry meat does not have the expected color, and this has created some special problems for the poultry industry. The desirable meat colour most accepted to consumers is pinkish to red, light meat colours are scored high on hedonic scale than dark meat colours (Keeton, 1983). Meat colour scores measured on 8-point scale revealed that meat colour 45 minutes post slaughter were desirable in the treated and control groups well comparable to each other.

However, colour of fillets of treated group G2 (6.33) was scored higher than control (6.1) and similarly, colour of tender muscle of both the groups was non-significantly different. More is lighter the meat colour, higher is the score for colour on hedonic scale and more is the preference by the consumers for the meat. Several researchers have also demonstrated that a significant negative correlation exists between breast meat lightness color values and breast meat pH (Allen et al., 1997). Similarly off-odours are the major criteria of raw and cooked meat rejection. The odour and juiciness of microwave cooked fillets of treated groups were in confirmation to each other and in normal range, suggesting that administration of herbal toxin binder product do not lead to any deterioration in colour and odour of cooked meat and the product is completely safe for usage and do not exert any undesirable effect on organoleptic characteristics, colour, odour and juiciness of meat.

Flavour and tenderness of meat are another most important organoleptic characteristic that also

regulates acceptability of meat. In present experiment, supplementation of herbal products has been shown to improve the flavour and tenderness of microwave cooked meat; however two groups were non-significantly different from each other. It can be inferred that supplementation of these products might have led to improvement in collagen and myofibrillar solubility, in turn improving the tenderness of edible muscles in addition to its toxin binding activity. (Brown et al., 2008) also reported that flavour liking and overall liking of meat from birds produced in the standard system was most preferred as observed based on hedonic assessments of meat quality attributes, by a small panel of assessors. Data of sensory evaluation showed that the treated group has comparatively better overall palatability and acceptability.

#### Conclusion

It can be concluded that supplementation of herbal toxin binder product is efficacious in improving overall meat quality attributes such as carcass yield, dressing %, giblet yield, fillet and tender yield, sensory raw meat characteristics, proximate values, organoleptic cooked meat parameters, overall palatability and acceptability of meat. The product doesn't have any residual or adverse effect on raw, eating and cooking quality of meat and hence is safe for usage.

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Table-3. Mean Proximate Analysis data of raw meat of group 1 &amp; 2

| Group         | Carcass traits |           |       |
|---------------|----------------|-----------|-------|
|               | Moisture %     | Protein % | Fat % |
| G1(Control)   | 70.97          | 56.43     | 11.75 |
| G2 (Toxiroak) | 71.69          | 55.66     | 10.49 |

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Table-4. Mean Proximate Analysis data of microwave cooked meat of group 1 &2

| Traits/groups | Fillet |       | Tender |       |
|---------------|--------|-------|--------|-------|
|               | G1     | G2    | G1     | G2    |
| Moisture %    | 70.11  | 63.21 | 70.29  | 67.15 |
| Protein %     | 55.25  | 57.47 | 59.88  | 58.39 |
| Fat %         | 7.46   | 6.28  | 9.47   | 6.56  |

Table-5. Mean Sensory evaluation of microwave cooked meat (fillets & tenders) of group 1 &2

| Traits/groups        | Fillet |      | Tender |      |
|----------------------|--------|------|--------|------|
|                      | G1     | G2   | G1     | G2   |
| Appearance           | 6.3    | 6.66 | 6.83   | 6.83 |
| Colour               | 6.1    | 6.66 | 6.5    | 6.8  |
| Odour                | 5.8    | 5.66 | 5.66   | 5.66 |
| Juiciness            | 6.1    | 5.3  | 6.33   | 5.66 |
| Texture              | 6.3    | 6.3  | 6.56   | 6.56 |
| Tenderness           | 6.16   | 5.6  | 6.5    | 5.83 |
| Flavour              | 6.0    | 5.8  | 6.5    | 6.5  |
| Overall Palatability | 6.3    | 6.6  | 6.83   | 6.5  |

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