Consumption of poultry meat and poultry meat products is growing all over the world\(^1\). The physical appearance and colour of retail cuts were the two most important attributes that consumers prefer to select and purchase meat\(^2\). Colour of the meat greatly affects its saleability and bright red colour is connected to freshness. Colour represents perceived freshness and it is of vital importance to the meat industry and meat science research\(^3\). Colour stability varies according to the muscle type which can be associated with the different balance of antioxidative and pro-oxidative compounds that control the oxidation rate of myoglobin\(^4\). Meat colour depends on myoglobin concentration, their chemical states and the light scattering properties of meat\(^5-6\). The meat colour is also influenced by some factors such as the species, breed, genotype, gender, age, variation in muscle reducing systems and metabolic type, nutrition and pre-slaughter\(^7\). The meat derived from the adult birds appears darker and is apparently tougher upon consumption after cooking. The breast meat of poultry is more tender than thigh meat\(^8\). But the consumer preference is more towards thigh meat than breast meat and it could be due to the colour appearance of the muscle. So this paper deals with the effect of age and muscle portions on the colour of Turkey, quail and desi chicken.

**MATERIAL AND METHODS**

**EXPERIMENTAL DESIGN:** A total number of twelve male birds of two different age groups viz., young and adult were selected and each groups had six birds. The young and adult age groups of Nandanam Turkey-II (Beltsville Small White birds evolved as Nandanam Turkey-II by the individual selection of 20 generations) with the age of 12 weeks and 40 weeks old, respectively and Nandanam Quail-Ill (The continuous selective breeding of Nandanam Quail-I and Nandanam Quail-II on eighteen generations) with the age of 5 weeks and 27 weeks old, respectively were obtained from Institute of Poultry Production and Management (IPPM), Madhavaram, TANUVAS. The young and adult age groups of desi chickens were obtained at the age of 8 weeks and above 40 weeks old respectively. All the birds were brought to the department of Meat Science and Technology, Madras Veterinary College, Chennai. The birds were slaughtered and breast and thigh meat were obtained.

**INSTRUMENTAL COLOUR ANALYSIS:** The colour of breast and thigh meat samples of two age groups was tested using Hunter lab Mini scan XE plus Spectrocolorimeter (Model No. 45/O-L, Reston Virgenia, USA) with geometry of diffuse/80 (sphere – 8 mm view) and an illuminant of D\(_{65}\)/10\(^o\) standard observer\(^9\). Colorimetry measures color with quantitative physical methods and can define them within well established numerical values. Here, they were expressed using the standard Hunter L\(*\) a\(*\) b\(*\) system. L\(*\), a\(*\), b\(*\) values (non-dimensional units) refer to the three axes of the system: a lightness axis (white-black, L\(*\)); and two axes representing both hue and chroma, one red green (a\(*\)) and the other blue-yellow (b\(*\)). This system provides an unambiguous description of the colour of the meat. The mean lightness (L\(*\)) value of breast and thigh meat of adult turkey, quail and desi chicken was lower than young. The breast and thigh meat of adult turkey, quail and desi chicken had significantly higher redness (a\(*\)) and lower yellowness (b\(*\)) value than young. The thigh meat had significantly lower lightness (L\(*\)), yellowness (b\(*\)) and higher redness (a\(*\)) (P<0.01) value than breast in both young and adult age groups of turkey, quail and desi chicken.
of colour and has the advantage that colour differences between samples can be determined using simple computer programs. The instrument was calibrated with black and white tile \((L^* = 94, a^* = 1.10 \text{ and } b^* = 0.6)\) every time before the colour measurement was taken. The colour was expressed as \(L^*\) (brightness), \(a^*\) (redness) and \(b^*\) (yellowness). Average value for each colour parameter was determined by taking observation from six different areas of the same sample.

**STATISTICAL ANALYSIS:** The data obtained in the present study was analysed by unpaired t- test using IBM® SPSS® 20.0 for MS-Windows®.

**RESULTS AND DISCUSSION**

The Mean ± (S.E.) of lightness \((L^*)\), redness \((a^*)\) and yellowness \((b^*)\) of breast and thigh muscle of young and adult age groups of Nandanam Turkey II, Nandanam Quail III and desi chicken meat was presented in Table-1 along with test of significance. The young turkey, quail and desi chicken birds had higher mean lightness \((L^*)\) value than adult birds in both breast and thigh \((P<0.01)\) meats. The breast meat of turkey, quail and desi chicken had higher mean lightness \((L^*)\) value than thigh meat in both young as well as adult \((P<0.01)\) age groups.

Lightness in meat and meat products depends on several factors like free water, water holding capacity and fat content\(^{10-13}\). The breast and thigh meats of adult turkey, quail and desi chicken had significantly higher redness \((a^*)\) value than young. There was a highly significant difference \((P<0.01)\) noticed between two age groups of thigh meat of turkey and quail, whereas, significant difference \((P<0.05)\) noticed in desi chicken. The significant difference in the \(L^*\) and \(a^*\) values was reported in ostriches \((P<0.001)\) and in quail \((P<0.05)\)\(^{14-15}\). This phenomenon indicates that turkey, quail and chicken meat, just like beef and other meats, becomes darker and redder with increasing age, which is mainly due to an increased in concentration of myoglobin pigment\(^{16-17}\). Muscle pigment concentration was influenced by many factors including species, breed, sex, age, type of muscle and muscular activity\(^{18}\). The thigh meat of turkey, quail and desi chicken had significantly \((P<0.01)\) higher redness \((a^*)\) value than breast meat in both young and adult age groups which indicates the more red muscle fibre in the thigh meat than breast meat. The higher redness \((a^*)\) value in the thigh meat than breast meat could be due to more myoglobin content in thigh meat. This desirable colour effect on the thigh meat could be one of

| Table 1. The Mean ± S.E. of instrumental colour analysis of breast and thigh muscle of young and adult age groups of turkey, quail and desi chicken meat. |
|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|
| Instrumental colour analysis             | Age                                      | Nandanam Turkey II                       | Nandanam Quail III                       | Desi chicken                           |
|                                        | Breast                                   | Thigh                                   | Breast                                   | Thigh                                   |
| Lightness \((L^*)\)                     | Young                                    | 59.17 ± 1.90                            | 49.22 ± 1.17                            | 60.01 ± 2.03                            |
|                                        | Adult                                    | 55.01 ± 1.90                            | 43.40 ± 0.86                            | 63.28 ± 2.02                            |
|                                        | \(t\)-value                              | 1.50\(^*\)                               | 3.79\(^**\)                             | 2.99\(^*\)                               |
| Redness \((a^*)\)                       | Young                                    | 5.07 ± 0.24                             | 5.85 ± 0.15                             | 6.05 ± 0.14                             |
|                                        | Adult                                    | 6.79 ± 0.70                             | 11.70 ± 0.07                            | 11.00 ± 0.24                            |
|                                        | \(t\)-value                              | 2.32\(^*\)                               | 12.99\(^**\)                            | 2.96\(^*\)                               |
| Yellowness \((b^*)\)                    | Young                                    | 12.54 ± 0.88                            | 10.24 ± 0.03                            | 17.44 ± 1.45                            |
|                                        | Adult                                    | 9.94 ± 0.73                             | 8.40 ± 0.73                             | 12.92 ± 0.84                            |
|                                        | \(t\)-value                              | 2.62\(^*\)                               | 2.08\(^**\)                             | 1.40\(^**\)                             |

No. of samples - 6, means bearing different superscripts differ significantly. \(^*\) = significant \((P<0.05)\), \(^**\) = highly significant \((P<0.01)\), NS = Non - significant \((P>0.05)\).
the reasons why consumers are more preferring thigh meat than breast. The breast and thigh meats of young turkey, quail and desi chicken had higher yellowness (b*) value than adult. The breast meat had higher yellowness (b*) value than thigh meat in both young as well as adult age groups of turkey, quail and desi chicken. Contrary to this, the higher yellowness (b*) value was observed in adult turkey than young. Based on the results obtained in this study on instrumental colour analysis it was concluded that the age had the significant effect on the meat of Nandanam Turkey II, Nandanam Quail III and desi chicken and the thigh meat had more desirable colour quality than breast meat.

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