EFFECT OF TURMERIC EXTRACT ON PHYSIOCHEMICAL AND SENSORY EVALUATION OF SPENT LAYER MEAT

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ABSTRACT

The objective of this study was to evaluate the effect of turmeric extract on physiochemical and sensory evaluation of spent layer meat. Twenty spent layers' was used for this study. The birds were slaughtered following standard procedure and the deboned spent hen meat was cut into primal cut. The fresh turmeric was obtained, washed and blended with distilled water. The breast meat was mainly used which was marinated in 0%, 5%, 10%and 15% of 1L inclusion levels respectively in a completely randomized design, kept in the refrigerator at the temperature of 5^0C overnight. On the basis of this experiment, pH, temperature, oxidative rancidity and sensory parameters were evaluated. Data were analyzed using descriptive statistic and ANOVA at α0.05. The mean pH value was higher in meat from 15% turmeric extract while the control meat had the lowest pH value. Control without the extract had the temperature value of 24.05 ^{o}C, with the lowest in 10% and 15% inclusion level of the extract of 23.50 ^{o}C, Spent layer meat oxidative rancidity was higher in control with 0% inclusion level with lowest in meat from 15% turmeric extract. 10% turmeric extract had the highest colour while meat from 15% turmeric extract had the highest flavor, juiciness, texture, tenderness and overall acceptability. In conclusion, spent layers meat can be marinated in turmeric extract up to 10 – 15% /L due to its improvement on pH, temperature, oxidative rancidity and sensory parameters.

Key words: Turmeric extract, pH, oxidative rancidity, sensory evaluation and spent layer meat

INTRODUCTION

Turmeric belongs to *Zingiberaceae* family from which the rhizome part is used for food and medicinal purpose. This plant produces an orchid like flower with greenish yellow petals streaked with purple colour. Curcumin shows very significant antioxidant properties as a food additive. The turmeric protease is a thiol proteinase with an optimum activity at 60°C. Rapid denaturation of the enzyme occurs at 70°C. Its proteolytic activity on collagen appears to be many times greater than that on actomyosin and the combined proteolysis of these two muscle proteins resulted in significantly more tender meat (Oshibanjo *et al.,* 2019). In the presence of curcumin, the oxidation of linoleic acid is very slow, and the antioxidant effect is about 80% (Jayaprakasha *et al.,* 2006) when used as a dietary supplement. Curcumin prevents oxidation and lipid modification of low density lipoproteins, and as a consequence, the inhibition of prostacyclin (PGI2), which contributes to the formation of thrombosis and arteriosclerosis, and thus contributes to the prevention of the same (Mahfouz *et al.*, 2009).

Therefore, the objective of this study was to evaluate the effect of turmeric extract on physiochemical and sensory evaluation of spent layer meat.

MATERIALS AND METHODS

Experimental site

This experiment was carried out at Animal Products and Processing Laboratory, Department of Animal Production, Faculty of Agriculture, University of Jos, Jos Plateau state.

Methodology

Twenty spent layers' was used for this study. The birds were slaughtered following standard procedure, dressed hygienically and manually deboned. The fresh turmeric was obtained, washed and blended with distilled water in the following inclusion levels 0%, 5%, 10%and 15% of 1L. The breast meat was mainly used which was marinated in 0%, 5%, 10%and 15% of 1L inclusion levels respectively in a completely randomized design, kept in the refrigerator at the temperature of 5^0C overnight. On the basis of this experiment, the following meat quality and sensory parameters were evaluated.

pH

pH value was done according to method described by AOAC (2000).

Temperature

The was determined using a probe meter as described by AOAC (2000)

Oxidative rancidity

Thiobarbituric acid value (TBA) was estimated by modified methods of Buege and Aust (1978).

Sensory evaluation

A total of 20 trained individuals among the staff and students aged between 20 and 40 years were used to assess two replicate of the prepared sausage. The samples were evaluated using a 9-point hedonic scale for flavor, colour, juiciness, tenderness, and overall acceptability The scale had a maximum score of 9 while the lowest score of 1 was assigned to the poorest condition (Mahendraker *et al.,* 1988).

Experimental Design and layout

Completely randomized design.

Data analysis

The data obtained was statistically analyzed with the SPSS program for Windows (SPSS version 25 SPSS Inc., Chicago, IL, USA). Duncan's multiple-range test was used to compare the difference between the means.

RESULTS

All the physiochemical evaluation parameters were represented in Table 1. There were significant differences in all the parameters measured. The mean pH value was higher in meat from 15% turmeric extract (6.70) while the control meat had the lowest pH value (6.55). Control without the extract had the temperature value of 24.05 ^{o}C, with the lowest in 10% and 15% inclusion level of the extract of 23.50 ^{o}C, Spent layer meat oxidative rancidity was higher in control with 0% inclusion level (3.63 mg/g) with lowest in meat from 15% turmeric extract (2.33 mg/g).

Data on the sensory evaluation of meat containing various levels of turmeric extract as natural tenderizer are presented in Figure 1. 10% turmeric extract had the highest colour while meat from 15% turmeric extract had the highest flavor, juiciness, texture, tenderness and overall acceptability.

Table 1: Chemical evaluation of spent layers' meat tender with turmeric extract

Parameters	Control	5% Turmeric	10% Turmeric	15% Turmeric	SEM
pH	6.55[b]	6.65[ab]	6.65[ab]	6.70[a]	0.02
Temperature ^{o}C	24.05[a]	23.55[b]	23.60[b]	23.50[b]	0.07
Oxidative rancidity(mg/g)	3.63[a]	2.93[b]	2.46[b]	2.33[b]	0.14

[abc] Means on the same row with different superscripts are significantly different ($p<0.05$)
SEM= Standard Error mean

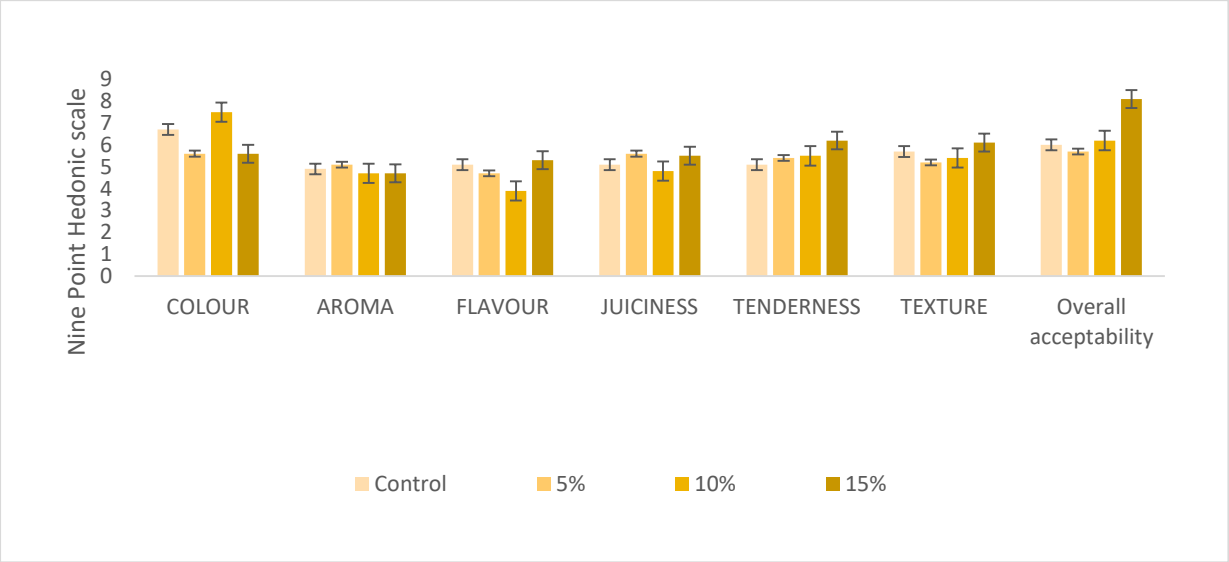

Figure 1: Sensory Evaluation of spent layers' meat tender with turmeric extract

DISCUSSION

The pH of muscle/meat is a measure of acidity and alkalinity. The pH of meat can range from 5.2 to 7.0. pH is determined by the extent of the pH decline at 24 hours after slaughter i.e glycolysis. The variation in pH influences factors such as colour and the ability of the meat to retain water. In this study the mean pH value was higher in meat from 15% turmeric extract while the control meat had the lowest pH value. The values obtained in this study were in agreement with data reported by other authors (de Carvalho et al., 2019; Lorenzo et al., 2018), who evaluated the influence of natural extracts in the shelf life of meat products. Moreover, these findings could be related to the proteolytic processes that occur during the shelf life. According to Carvalho et al. (2019), pH values can be affected by the degradation of proteins and liberation of peptides, amino acids, ammonia and amines during storage. As it could be observed, as the inclusion levels increased, the pH value increases which could be due to the phytochemical compound presence in turmeric.

Control without the extract had the temperature value of 24.05 ^{o}C, with the lowest in 10% and 15% inclusion level of the extract of 23.50 ^{o}C, This result obtained could be due to the pH value. Temperature is greatly influenced by pH. The *pH value* of a solution is directly dependent on the *temperature*. A *pH value* without a *temperature* value is incoherent. Soluble metals form hydroxide in water which increase pH at low-temperature, solubility decrease and concentration of hydroxide decrease which decrease pH, while in high-temperature solubility increase and a large amount of hydroxide form which increase pH.

Lipid oxidation is one of the main factors limiting the shelf life of meat products (Domínguez, Pateiro, *et al.,* 2019). Spent layer meat oxidative rancidity was higher in control with 0% inclusion level with least value in meat from 15% turmeric extract. The result obtain in this study was in line

with the one reported by Naveena B. M. and Mendiratta S.K. (2010) who worked on tenderisation of spent hen meat using ginger extract. The results obtain shows that turmeric extract is an antioxidant.

The sensory evaluation of spent layers' meat fed turmeric extract shown in Figure 1 reveals that meat from 15% turmeric extract had the highest flavor, juiciness, texture, tenderness and overall acceptability. The result obtained in this study was not in agreement with those reported by Naveena B. M. and Mendiratta S.K. (2010) who worked on tenderisation of spent hen meat using ginger extract and Black Shear *et al. (*1966). The result obtained could be due to the biochemical compound presence in turmeric and higher pH value obtained.

CONCLUSION

In conclusion, spent layers meat can be marinated in turmeric extract up to 10 – 15% /L due to its improvement on pH, temperature, oxidative rancidity and sensory parameters.

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