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Tenderize Chicken Breast Meat by Using Different Methods of Curing

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Abstract: The aim of this study is tenderizing breast spent hens meat by using cheap local materials such as (bitter orange juice, vinegar, salt and sugar for (1, 2 and 3) h, distill water is used (T_1) in curing to make it as standard. Bitter orange juice (acidity of 1.5) (T_2), vinegar (acidity of 7) (T_3), table salt (2%) (T_4) and sugar (2%) (T_5) were used. The processed meat was investigate the influence of the type of treatment and the periods of storing and submersion on the sensory properties and chemical qualities through estimating the percentage of moisture, volume of the released extract. A sensory properties evaluation of the qualities of flavor, juiciness, tenderness and overall acceptance was carried out. The following findings were obtained: The percentage of moisture increased significantly ($p < 0.05$) of the treatment groups compared with T_1 . It was found that the highest significant differences ($p < 0.05$) was T_4 . A decrease appeared in the volume of the released extract. The highest significant ($p < 0.05$) was T_1 and the lowest one was T_4 . Results of sensory evaluation indicated the improvement of the sensory qualities of the samples treated with the different solutions especially of tenderness and juiciness. These results were reflected on the quality of general acceptance by the consumer of the samples. Results of sensory evaluation revealed that T_2 and T_4 was the best sample. Significant differences ($p < 0.05$) as far as the periods of curing were noticed. Thus we can recommend using 2% salt and bitter orange juice (1.5 acidity) in curing breast spent hens meat.

Key ward: Chicken meat, curing methods, bitter orange juice, vinegar, salt

INTRODUCTION

Curing is an important method for improving tenderness of spent hens meat (Richard, 1998). Acid solution was used in curing to tenderize and improve flavor and texture and thus called marinade, acids, salts, sugar, spices were used in curing. The acids used in the process of tenderizing meat effect the collagen of the connective tissue (Seuss and Martin, 1993). Acids blow up myofibrils (Offer and Trinick, 1983). Genaro *et al.* (1989) found that acids such as acetic, citric and lactic acid act on collagen, and led to dissolved the collagen and decreased the shear value.

Vinegar is a weak carboxy acid, it contain 6-10 % acetic acid (AL-Jalili *et al.*, 2004). bitter orange juice contain 87.8% water and 10.2% carbohydrate and 68 mg/100 g vitamin C and its pH 2-2.4 (AL-Sakini, 1997). Joslyn (1978) observed that bitter orange juice contain 6.33% citric acid and 0.32% malic acid. The researcher notice that citric acid improved tenderness and its other qualitative characteristics.

Salt solution used too in curing, chloride ion increase the electrostatic state between molecular as of protein (Offer and Trinick, 1983). The use of calcium chloride in solution (0.3 M) and sodium chloride (0.6 M) injection a breast meat led to decrease the shear value. AL-Hajo (2009) used different methods to tenderize spent hens meat and she recommended to use 2% salt and bitter orange juice in curing .

Long time ago in many parts of the civilized world man learned how to preserve meat for future consumption,

the most widely used method was by salting and then drying the meat (Al-Ani, 1986). Curing used as a method of preservation, Since then several meat curing methods has been developed to a suitable way to increase getting a homogenize curing components and minimize the presence of any unfavorable ingredient in the curing process such as the unfavorable color or any degradation of the meat cuts (Leverentz, 2001; kutas, 2002).

The aging of meat in the plant led to increase the costs because of holding the meat in storage which causes loss of moisture and then decreased the quality of meat (Goll *et al.*, 1962). Further research is needed to study these curing methods to improved the quality of breast spent hens meats.

MATERIALS AND METHODS

This study was conducted at the college of Agriculture/ University of Baghdad. The broilers (48-52 months) were brought from a local market then slaughtered and cut the breast for our research.

Bitter orange juice (acidity of 1.5) as citric acid, vinegar as acetic acid, table salt (sodium chloride) 2% and sugar 2% were used. The breast then washed with tab water and immersed in the solution, small sample is taken to investigate the influence of the type of treatment and the periods of curing.

The samples of the standard treatment were immersed in distill water and conducted the same process on it. the percentage of moisture was determined according

A.O.A.C. (1980), Extract release volume was estimated according to Pearson (1976). The degree of sensory evaluation of flavor, tenderness, juiciness and overall acceptance of cooked meat by boiling determined according to Levie (1970). A 9-point hedonic scale (9-like extremely, 1-dislike extremely) was used to evaluate the following attributes. Ten staff members of the college of agriculture and graduate students most of whom had participated in previous consumer panels work as panelists, were given the details about this panel and we do a primary panel before the essential test which we adapted in this study. We depending the standard point to control on varieties which may effect the degree of panel: Time of the test in 11 O'clock (A.M.), degree of cooking temperature, time between cooking and test, drinking water in 25°C between the test and other, finally the size of the pieces which we tested (Lee *et al.*, 1997).

Statistical analysis: The data were analyzed using Complete Randomized Design and Multiple Regression. the calculation was preformed by the SAS package programmers (SAS, 2001). LSD test was used to determine significant differences.

RESULTS AND DISCUSSION

The effect of curing breast meat with different methods and submersion for the periods 1, 2 and 3 h on the percentage of moisture are summarized in (Table 1) the data revealed a significant differences ($p < 0.05$) of the percentage of moisture for all treatments, which increased as the periods of curing increased, because of the changes of the protein structure induced by cathapsins which causes the binding of the water. The bacteria also produced a complex compound named Aminosugar which causes the increased of water binding (Jay, 1972). Busboom (2002) and AL-Hajo (2008) reported that percentage of moisture of curing meat has been increased.

Curing in salt T₄ (Table 1) increased significantly ($p < 0.05$) the percentage of moisture while it decreased the another treatment (T₂, T₃ and T₅), no significant differences among them were observed, the increased could be because of the diffusion which led the salt to penetrate into the tissues of the meat and mixed with the molecular water because of the increased of negative charges of meat protein and the increased of spaces among them which cause some binding of molecular water which consider a polarized molecules (Lawrie, 1974).

In conclusion, the percentage of moisture increased ($p < 0.05$) when submersion compared with fresh treatment.

Table 2 showed the effect of curing breast meat with different methods and for the periods (1, 2 and 3) h on the volume of the released extract, the treatment with different solution achieved an increased in the ability of

Table 1: Effect of curing meat with different method and submersion for a period (1, 2 and 3) h on the percentage of moisture

Method of curing	Curing Period (hours)		
	1	2	3
T ₁	67.05 ^{cd}	68.86 ^{cc}	69.05 ^{cb}
T ₂	71.42 ^{bd}	72.64 ^{bc}	73.28 ^{Bb}
T ₃	71.63 ^{Bb}	72.41 ^{Bb}	74.89 ^{Bb}
T ₄	74.39 ^{ab}	75.27 ^{Ab}	76.38 ^{Ab}
T ₅	72.85 ^{bc}	73.57 ^{Bb}	73.91 ^{Bab}

Means followed by the same small letter (Raw) and means followed by the same big letter (columns) are not significant.

• The percentage of moisture before treatment was 65.17

Table 2: The effect of curing meat with different methods and submersion for the periods (1, 2 and 3) h on the volume of the released extract

Method of curing	Curing Period (hours)		
	1	2	3
T ₁	22.98 ^{Aa}	23.21 ^{Ab}	22.75 ^{Ab}
T ₂	15.88 ^{ca}	15.46 ^{cb}	15.11 ^{cc}
T ₃	16.61 ^{Ba}	16.10 ^{Bab}	15.71 ^{Bb}
T ₄	12.92 ^{ea}	12.50 ^{Ea}	12.24 ^{Da}
T ₅	15.00 ^{Da}	14.86 ^{Da}	14.75 ^{Ca}

Means followed by the same small letter (Raw) and means followed by the same big letter (columns) are not significant

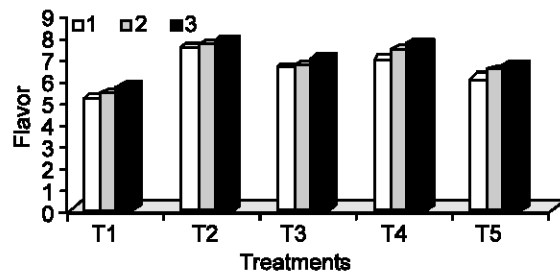


Fig. 1: Effect of curing meat with different methods and submersion for a period (1, 2 and 3) h on flavor

meat to retain water. This is reflected decreased in the volume of the released extract. It was notice that T₄ had the lowest value and then T₅, T₂ and finely T₃. The reason of low value of the released extract of the treated group was either to the increase in pH or its decrease of the isoelectric value of the actomyocine which causes the increase of its ability to retain water and thus decreases the extract (Gault, 1958).

The effect of curing meat with different methods and submersion for the period (1, 2 and 3) h on flavor of boiled meat presented in Fig. 1, which indicated that T₁ decreased in sensory score while another treatment increased, T₂ and T₄ have upper degree than T₃ and T₅. Significant different ($p < 0.05$) were notice among the periods of submersion.

Tenderness (Fig. 2) improved of the curing treatment compared with T₁, but T₂ and T₄ have upper degree

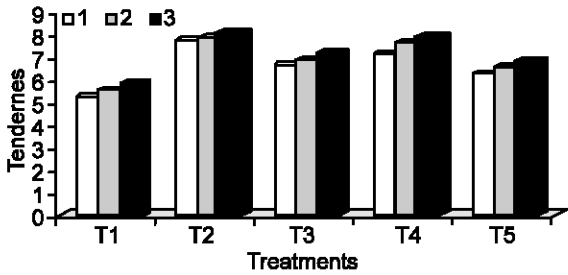


Fig. 2: Effect of curing meat with different methods and submersion for a period (1, 2 and 3) h on tenderness

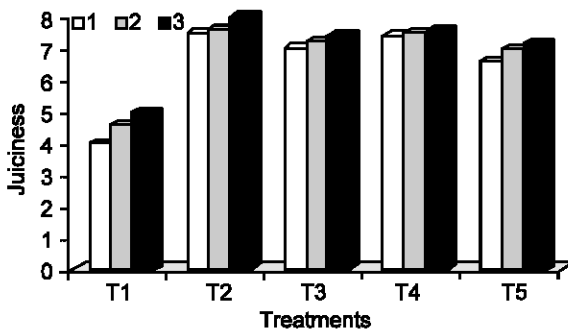


Fig. 3: Effect of curing meat with different methods and submersion for a period (1, 2 and 3) h on juiciness

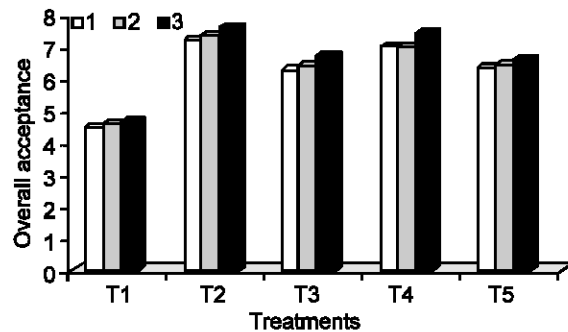


Fig. 4: Effect of curing meat with different methods and submersion for a period (1, 2 and 3) h on overall acceptance

compared with T₃ and T₅. There were significant differences ($p < 0.05$) of the period of curing.

Figure 3 showed the effect of curing meat with different methods and submersion for the periods (1, 2, 3 and 4) h on juiciness treatment had a significant differences ($p < 0.05$) in juiciness compared with T₁, but T₂ and T₄ have upper degree compared with T₃ and T₅. There were no significant differences for the periods of curing.

Overall acceptance (Fig. 4), the results showed improved ($p < 0.05$) in the sensory evaluation, thus led to improved acceptance of curing meat compared with T₁.

T₂ and T₄ have a higher score for overall acceptance, there were a significant differences ($p < 0.05$) for the periods of submersion.

Conclusion: In conclusion, we can recommend using salt and bitter orange juice in curing on large scale basis and the best of periods of submersion was 1 h.

REFERENCES

- AL-Ani, N.N.A., 1986. Animal Resources in Raffiden Civilization. Techni: FTI J. Sci. and Technol., (5,4) 6 year.
- AL-Hajo, N.N.A., 2008. A comparative study between some the local Iraqi method for curing chicken meat and typical methods and their effect on chemical composition, sensory evaluation of fresh and storage meat. International J. Poult. Sci., 7: 1190-1193.
- AL-Hajo, N.N.A., 2009. Using different methods to tenderize spent hens meat. Int. J. Poult. Sci., 8.
- AL-Sakini, A.S., 1997. The effect of lean replacement by faba bean flour on quality and sensory characteristics of fermented sausages acidulated by sour orange juice. MSC. Collage of Agriculture. University of Baghdad. Iraq.
- AL-Jalili, Z.F., M.J. Hindi and N.N.A. AL-Ani, 2004. Using the Marinading to Improve Sensory Evaluation of Meat on Local Male Goat at Different Ages. Iraqi J. Agric. Sci., 35: 121-126.
- A.O.A.C., 1980. Official Methods of Analysis, 13th Ed. Association of official Analytical chemists, Washington, DC.
- Busboom, J.R., 2002. Curing and smoking poultry meat. CEP. Pub., E.B. 166a.
- Gault, N.F.S., 1958. The relationship between water holding capacity and cooked meat tenderness in some beef muscle influenced by acid conditions below the ultimate pH. Meat Sci., 15: 15-30.
- Genaro, C., Akganosa and G. Norman Marriott, 1989. Organic acid tenderizers of collagen in restructured beef. J. Food Sci., 54: 1173-1176.
- Goll, D.E., W.G. Hoskstra and R.W. Bray, 1962. Changes in physicochemical properties of bovine connective tissue with chronological age. J. Anim. Sci., 21: 981.
- Jay, J.M., 1972. Mechanism and detection of microbial spoilage in meat at low temperature. J. Milk Food Technol., 35: 467.
- Joslyn, N.A., 1978. Methods in food analysis. Academic press, New York and London, pp: 605.
- Kutas, R., 2002. Guring in formation. Purdue Uni., U.S.A.
- Lawrie, R.A., 1974. Meal Science. 2nd Ed., Bergamo Press, oxford, London.
- Lee, T.G., S.K. Williams, D. Slaon and R. little, 1997. Development and evaluation of a chicken breakfast sausage manufactured with mechanically debond chicken meat. Poult. Sci., 76: 415-421.

- Leverentz, J.R., 2001. Curing Meats. Morton International Inc., 800-24.
- Levie, A., 1970. The meat hand book. The AVT publishing Co. INC. west port connect ictus.
- Pearson, D., 1976. The chemical analysis of foods. Chemical publishing company. Inc. New York, 376.
- Offer, G. and J. Trinick, 1983. On the mechanism of water holding in meat. The swelling and shrinking of myofibrils. Meat Sci., 8: 245-281.
- Richard Epley, J., 1998. Meat tenderness. Produced by communication and educational technology services, University of Minnesota Extension Service. Microsoft internet explorer, pp: 1-8.
- SAS, 2001. SAS User's Guide. Statistics (Version 6.0). SAS Inst. Inc. Cory. NC, USA.
- Seuss, I. and M. Martin, 1993. The influence of marinating with food acid on the composition and sensory properties of beef. Fleischwirtsch, 73.