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Tenderization of spent hen meat using kiwi and pineapple extracts

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Abstract

The main objective of the current study was to improve the physico-chemical and sensory quality of raw spent hen meat using natural extracts of kiwi, pineapple and their combination. A marinade containing common salt, polyphosphate and white paper was prepared used as control. Moreover, marinades contained kiwi (5 and 10 %), pineapple (5 and 10 %) and combination of kiwi (5 %) and pineapple (5 %) in the control marinade were prepared. Spent hen breast fillets were prepared from spent hen carcasses chilled for 24 hrs.at 4 °C after slaughter and dressing. Prepared fillets were treated with the control marinade and marinades containing kiwi and pineapple with a group dipped in water and kept for 24 hrs.at 4 °C. After 24 hrs.marination, all treated fillet were investigated for proximate chemical composition, shear force, color parameters, deterioration criteria sensory attributes. The results revealed significant (P<0.05) reduction of the shear force of samples treated with fruit extracts with consequent improvement of the tender, juiciness and overall acceptability scores. A reduction in the thiobarbituric acid reactive substances was observed after marination in fruit extracts; however, the pH and total volatile base nitrogen were not affected. It can be concluded from this study that the fruit extracts can be used for improving the tenderness, physico-chemical and sensory characteristics of spent hen meat with consequent encouragement of meat processors to use spent hen meat as a good source for raw materials in poultry industry.

Key words: Spent hen meat, kiwi, pineapple, sensory attributes, physico-chemical characteristics.

Introduction

Spent hens are chickens that are used for egg production for about 75- 100 weeks. Recetly, there are large number of them due to excessive expansion in egg production. There are about 2.6 billion spent hens in the world that are used in the pet food industry and not much for human consumption (Navid et al., 2011). Meat from spent hen is a good protein source (Rhee et al., 1999; Lee et al., 2003), highly enriched with omega-3 fatty acids and lower in cholesterol content in particular breast muscle (Ajuyahet al., 1992) which have been shown to have health promoting benefits. However, they are very tough and dry due to their higher collagen content (Nurmahmudi and Sams, 1997; Lee et al., 2003). Therefore, they are unsuitable for use in whole meat food, not well accepted by the consumers and have reduced market values in many countries (Nowsadet al., 2000a, b; Lee et al., 2003; Li, 2006). Moreover, the unacceptable toughness and brittle bones made spent hen meat has a problem for the poultry industry.

Meat tenderness is one of the most important determinants of meat quality. Meat tenderness depends on the amount of intramuscular connective tissue, the length of the sarcomere and also the proteolytic potential of the muscle (Kemp and Parr, 2012). On the other hand, meat toughness is one of themost undesirable meat qualities for consumers (Kemp et al., 2010). Actomyosin and background toughness are 2 main types of classified meat toughness. The former is attributable to changes in myofibrillar proteins, whereas the latter is due to connective tissues or stromal proteins (Chen et al., 2006).

The process of meat tenderization is recognized to be enzymatic in nature (Lantto, et al., 2010). Treatment by exogenous proteases is one of the most progressive methods used for meat tenderization. Proteases such as papain, bromelain and ficin, all derived from plants, have been widely used as meat tenderizers (Ha et al., 2012; Ketnawa&Rawdkuen, 2011; Koak et al., 2011; Naveena et al., 2004; Sullivan & Calkins, 2010). Plant proteases are superior to bacterially derived enzymes mainly because of safety problems, such as pathogenicity, or other disadvantageous effects with the latter (Chen et al., 2006). Pineapples contain a group of protein-digesting enzymes (called cysteine proteinases) which can be used as

tenderizing substances in meat. Moreover, they can be used as a nutritional additive because they can be used as anti-inflammatory, anti-thrombotic, an inhibitor of tumor cell reproduction, and an immunogenic agent (Batkin et al., 1988; Hale et al., 2002; Wen et al., 2006; Ketnawa et al. (2009). Kiwi fruit contain a plant thiol protease that has been reported by many investigators to have a meat tenderizing effect (Lewis and Luh, 1988; Sugiyama et al., 2005; Christensen et al., 2007).

To the best of our knowledge, there is a limited data on the use of extracts of kiwi and pineapple in the tenderization of meat. Therefore, the main objective of the current study was to improve the physico-chemical and sensory quality of raw spent hen meat using natural extracts of kiwi, pineapple and their combination during refrigerated storage.

Materials and Methods

Experimental design

A three replicate based experiment (three independent replicates) was carried out to investigate the effect of kiwi and pineapple extracts (5 and 10 %) and combination of kiwi extract (5 %) with pineapple extract (5 %) on the physic-chemical and sensory characteristics of spent hen breast fillets. Moreover, the treated spent hen breast fillets were stored at 4 °C and examined each other day for sensory quality, pH, and thiobarbituric acid as well as total volatile base nitrogen until objective deterioration of the meat.

Preparation of ingredients

Six dressed carcasses of spent hen (5 kg each) were purchased from local spent hen plant in Cairo, Egypt for each replicate. The carcasses were transferred to the lab and stored overnight at 4 °C. Sodium tripolyphosphate and white pepper were obtained from LobaChemie, Mumbai, India. Moreover, the sodium chloride was obtained from a local market at Cairo, Egypt.

EnzymespreparationPreparation of marinade solution

A base marinade solution was prepared using a simple traditional formulation as follows: salt 1.8 %, polyphosphates, 0.3 %, white pepper 0.002 %. Five marinade solutions were prepared by addition of kiwi (5 and 10 % from total weight) and pineapple (5 and 10 % from total weight) as well as combination of kiwi (5%) and pineapple (5 %) to the base marinade.

Marination process

After storage of spent hen carcasses at 4°C for 24 h, the breast fillet were separated and divided 7 groups. Five groups were marinated in marinade solutions containing fruit extracts as follow: the 1st group was marinated by immersion in the marinade solution containing 5 % kiwi extract, the 2nd group was marinated by immersion in the marinade solution containing 10 % kiwi extract, the 3rd group was marinated by immersion in the marinade solution containing 5 % pineapple extract, 4th group was marinated by immersion in the marinade solution containing 10 % pineapple extract and the 5th group was marinated by immersion in the marinade solution containing combination of 5 % kiwi extract and 5 % pineapple extract. Two groups were used as controls, the 1st one was immersed in water and the 2nd one was immersed in the base marinade solution (without kiwi or pineapple). All groups were stored at 4°C for 24 hrs.

Analysis of marinated spent hen breast fillet

After 24 h marination of spent hen breast fillet at 4°C, the fillet was analyzed for the following parameters.

Shear Force

Shear force was measured for cooked spent hen fillets. Three breast blocks of 2 cm were prepared and cooked in a convection oven (Heraeus, D-63450 Hanau, Germany) adjusted at 180°C to an internal temperature 70 °C. Six core samples of 1.27 cm diameter were removed parallel to the longitudinal orientation of the muscle fiber from each block using hand-held coring device. Each core was sheared once with an InstronUniversial Testing machine (Model 2519 105; Instron Corp., Canton, MA, USA) (Shackelford et al., 2004).

Cooking loss

Cooking loss was calculated as outlined by Neel et al., (1987). The spent hen fillet samples were blottedwith blotting paper and weighed accurately just beforecooking. After cooking, the samples

were cooled and wipedwith blotting paper and weighed immediately. The cookingloss as a percentage was the difference in weights of thesample before and after cooking.

Color evaluation

The color of the surface of raw marinated spent hen breast fillets was measured using Croma meter (Konica Minolta, model CR 410, Japan) calibrated with a white plate and light trap supplied by the manufacturer. The L* (lightness), a* (redness), and b* (yellowness) values were obtained using CIE standard illuminant D_{65} light source. Color was expressed using the Commission International de l'Eclairage (CIE) L*, a*, and b* color system. (Shin et al., 2008).

Deterioration criteria

For measurement of pH value, five grams from each of the prepared muscle sample were homogenized with 20 ml distilled water for 10-15 seconds and the pH was measured according to the method of Kandeepan et al., (2009). For determination of thiobarbituric acid reactive substances (TBARS), five grams from each muscle sample were homogenized with 15 ml deionized distilled and the TBARS values were determines by the method of Du and Ahn (2002). Moreover, the total volatile Basic Nitrogenwas determined according to the method of Kearsley et al., (1983).

Measurement of collagen content and solubility

Hydroxyproline contents of cooked meat samples were estimated as described by Neuman and Logan (1950). Collagen solubility of marinated breast meat was calculated according to the method described by Naewbanij et al. (1983).

Sensory evaluation:

The guidelines of AMSA (1995) were followed during sensory evaluation. For sensory evaluation, 9 experienced panelists (from both sexes in the age range of 30 to 45 years) were chosen from the staff members of the Department of Food Hygiene and Control at Faculty of Veterinary Medicine, Cairo University, Egypt. Each panelist evaluated three replicates of all formulas in a randomized order and asked to assigns a numerical value between 1 and 9 for following attributes: appearance, flavor, juiciness and tenderness where 9 denote extremely acceptable and 1 denotes extremely unacceptable. At the end of evaluation of the given sample, each panelist was asked to give a score for overall acceptability from 1 (dislike very much) to 9 (like very much).

Statistical analysis

Statistical data analysis for the three independent replicates was carried out using SPSS statistics 17.0 for windows. The difference between means of values among different treatments were determined using one way analysis of variance (ANOVA) and multiple comparisons of means were done using Post Hoc (least square difference test, LSD) procedure.

Results and discussion

Shear force

The toughness of spent hen meat is a challenging issue for meat processors, therefore, improving the tenderness of this type of meat is of great significance to fast growing poultry industry. The shear force values of spent hen breast meat marinated with a marinate containing common salt, polyphosphate and white pepper (control marinade) were not significantly ($P > 0.05$) lower than those of meat treated with water only. Addition of kiwi at concentration of 5% and 10%, pineapple at concentration of 5% and 10% and combination of kiwi 5% and pineapple 5% resulted in significant ($P > 0.05$) reduction of shear force values when compared with those marinated with salt, polyphosphate and white pepper only.The shear force of spent hen breast meat marinated with pineapple10% was significantly ($P > 0.05$) lower than other treatments (Table 1).The observed results were in agreement with previous researchers who reported a tenderizing effect of bromelain extracted from pineapple in duck (Buyakyavus, 2013) and spent hen meat (Devitre and Cunningham, 1985). Moreover, tenderizing effects of kiwi fruit extract or extracted actinidin when applied in beef (Lewis and Luh, 1988; Sugiyama etal., 2005) and kiwi, pineapple containing vegetable power in spent hen breast.(Kang etal., 2012). The tenderizing effects of extracts of kiwi and pineapple are

attributed to their contents of proteolytic enzymes (actinidin and bromelain) which cause degradation of myofibrillar with generation of small peptides or proteins with low molecular weight and consequent reduction of the firmness of meat and destruction of connective tissue proteins (Ketnawa and Rawdkuen, 2011)

Cooking loss percentage

Marination of spent hen breast meat with salt, polyphosphate and white pepper resulted in non-significant ($P>0.05$) increase of cooking loss %in comparison with samples dip in water only. Addition of kiwi and pineapple to the marinade resulted in significant ($P<0.05$) increase in cooking loss of treated spent hen breast meat. Moreover, the pineapple 10 % extract resulted in significant ($P<0.05$) increase in cooking loss values when compared with kiwi (5 and 10 %), pineapple (5) or combination of kiwi (5 %) and pineapple (5 %)(Table 1). Our observations were in agreement with Devitre and Cunningham (1985) and Ketnawa and Rawdkuen (2011) who obtained higher cooking loss after treatment of spent hen breast with bromelain as well as Buyukyavus (2013) after treatment of duck breast with bromelain.

Treatments	Shear force*	Cooking loss*
control-1	2.76 ± 0.34^{ad}	40.49 ± 0.92^{a}
control-2	2.54 ± 0.30^{ad}	42.18 ± 1.72^{ac}
Kiwi 5%	1.82 ± 0.06^{bc}	43.18 ± 1.85^{bc}
Kiwi 10%	1.45 ± 0.31^{dc}	44.10 ± 2.32^{bc}
Pineapple 5%	1.73 ± 0.09^{c}	43.56 ± 1.45^{b}
Pineapple 10%	1.15 ± 0.07^{d}	45.80 ± 2.74^{d}
Kiwi 5%+pineapple 5%	1.51 ± 0.034^{dc}	43.89 ± 2.16^{cd}

Table (1) Shear force values and cooking loss percentages of spent hen breast meat treated withkiwi (5% and 10%), pineapple (5% and 10%) and combination of kiwi (5%) and pineapple (5%).

*Data are presented by the mean of three independent replicates ± SD

$^{a-d}$values withdifferent superscripted significantly ($P<0.05$) different.

Control 1; breast meat dipped in water only.

Control 2; marinade containing salt, polyphosphate and white pepper.

Color values

Regarding the color values, treatment of spent hen breast with marinade containing common salt, polyphosphate and white pepper resulted in non-significant ($P>0.05$) increase of L* values, significant reduction of a* values and significant ($P>0.05$) increase of b* values. Addition of Kiwi 5% to the marinade resulted in significant ($P<0.05$) decrease in L* values, significant ($P<0.05$) increase in a* values and non-significant ($P>0.05$) decrease in b* values. Addition of kiwi 10% to the marinade resulted in significant ($P<0.05$) decrease in L* values,non-significant ($P>0.05$) decrease in a* values and significant ($P<0.05$) decrease in b* values. While, addition of pineapple 5% resulted in significant ($P<0.05$) decrease in L* values, non-significant ($P>0.05$) increase of a* values and significant ($P<0.05$) decrease in b* values. Addition of pineapple 10% to the marinade resulted in non-significant ($P>0.05$) increase in L* values, non- significant ($P>0.05$) increase of a* values and non-significant ($P>0.05$) increase in b* values. Moreover, Addition of kiwi5 andpineapple 5% resulted in non-significant ($P>0.05$) decrease in L* values, non-significant ($P>0.05$) decrease of a* values and significant ($P<0.05$) increase in b* values (Table 2). A significant

reduction in lightness (L*) with no differences in redness (a*) and yellowness (b*) values was observed after treatment of duck breast with bromelain byBuyukyavus (2013). Moreover, a reduction of a* values with no change in L* and b* values was observed by Toohey et al. (2011) after injection of beef with kiwifruit solution.

Table (2) Color values of spent hen breast meat treated with kiwi (5% and 10%), pineapple (5% and 10%) and combination of kiwi (5%) and pineapple (5%).

Treatments	L*	a*	b*
control-1	62.89 ± 1.05^{ade}	10.15 ± 0.23^{a}	8.36 ± 1.18^{a}
control-2	65.31 ± 1.08^{ad}	6.09 ± 0.17^{bd}	10.24 ± 0.13^{b}
Kiwi5%	52.70 ± 0.62^{c}	12.12 ± 0.45^{c}	7.31 ± 0.59^{a}
Kiwi10%	56.98 ± 0.45^{b}	5.82 ± 0.46^{bd}	5.37 ± 0.38^{c}
Pineapple5%	$56.23\pm0.2.61^{b}$	10.34 ± 0.48^{ad}	5.83 ± 0.25^{d}
Pineapple10%	63.45 ± 1.9^{d}	5.61 ± 0.37^{a}	10.81 ± 0.37^{b}
Kiwi 5%+pineapple5%	60.71 ± 0.56^{a}	5.71 ± 0.54^{bd}	12.20 ± 1.07^{e}

*Data are presented by the mean of three independent replicates ± SD
$^{a-d}$ values with different superscripted significantly ($P<0.05$) different.
Control 1; breast meat dipped in water only.
Control 2; marinade containing salt, polyphosphate and white pepper

Deterioration Criteria

The deterioration criteria of spent hen meat treated with kiwi (5 and 10 %), pineapple (5 and 10 %) and combination of kiwi (5%) with pineapple (5%) are presented in Table 3. Addition of kiwi (5 and 10%), pineapple (5% and 10%) and combination of (kiwi 5 % and pineapple 5% to the solution during marination of spent hen breast meat resulted in non-significant ($p>0.05$) reduction in PH values samples when compared with samples treated with salt, polyphosphate and white pepper (control marinade) as well as samples dipped in water. Previous investigators obtained a reduction in pH values after treatment of spent hen breast with bromelain Ketnawa and Rawdkuen, 2011) and treatment duck breast with bromelain (Buyakyavus, 2013). However, an increase in pH values was observed by Kiran et al. (2014) after tenderization of spent hen breast meat with ammonium hydroxide.Marination of spent hen breast withcommon salt, polyphosphates and white pepper resulted in non-significant ($P<0.05$) change in thiobarbituric reactive substances (TBRS) values. However, addition of kiwi (5 and 10%), pineapple (5% and 10%) and combination of kiwi 5 % and pine apple 5% resulted in significant ($P>0.05$) reduction thiobarbituricreactive substances values when compared with samples treated with salt, polyphosphate and white pepper as well as samples dipped in water. In a previous study conducted with Chueachuaychoo et al. (2011) a reduction in TBRS values was observed after treatment of spent hen breast with NaCl and polyphosphates.The total volatile base nitrogen (TVBN) values of samples marinated with salt, polyphosphate and white pepper were not significantly ($P>0.05$) different from samples treated with water. Moreover,TVBN values of samples marinated with kiwi pineapple and their combination were not significantly ($P<0.05$) different when compared with those of samples treated with salt, polyphosphate and white pepper and samples treated with water only.

Table (3) Deterioration criteria of spent hen breast meat treated with kiwi (5% and 10%), pineapple (5% and 10%) and combination of kiwi (5%) and pineapple (5%).

Treatments	PH*	TVBN*	TBA*
control-1	5.66 ± 0.02^{a}	2.47 ± 0.21^{a}	0.16 ± 0.01^{a}
control-2	5.63 ± 0.02^{a}	2.53 ± 0.43^{a}	0.16 ± 0.01^{a}

Kiwi5%	5.61±0.03[a]	2.68±0.14[a]	0.12±0.00[b]
Kiwi10%	5.62±0.02[a]	2.44±0.08[a]	0.11±0.01[b]
Pineapple5%	5.65±0.01[a]	2.35±0.08[a]	0.11±0.02[b]
Pineapple10%	5.63±0.02[a]	2.54±0.14[a]	0.11±0.01[b]
Kiwi 5%+pineapple5%	5.62±0.01[a]	2.40±.14[a]	0.10±0.01[b]

*Data are presented by the mean of three independent replicates ± SD
[a-b]values with different superscripted significantly (P <0.05) different.
Control 1; breast meat dipped in water only.
Control 2; marinade containing salt, polyphosphate and white pepper

Collagen content and solubility

The collagen contents (mg/g) and collagen solubility percentage are presented in Table 4. Marination of spent hen breast meat treated with common salt, polyphosphate and white pepper resulted in significant (P<0.05) reduction in collagen content compared with samples treated with water only. Addition of kiwi 5% to the marinade resulted in non-significant (P>0.05) reduction of collagen content when compared with samples treated with common salt, polyphosphate and white pepper and significant(P<0.05) reduction when compared with samples treated with water only. Addition of kiwi 5%,pineapple 5%, pineapple 10% and combination of kiwi 5% and pineapple 5%resulted in significant (P<0.05) reduction of collagen content of breast samples when compared with samples treated with common salt, polyphosphateand white pepper or samples treated water only. Moreover, samples marinated with amarinade containing pineapple 10% or combination of kiwi 5% and pineapple 5% revealed significant (P<0.05) reduction of collagen content in comparison to all treated samples. Regarding the collagen solubility percentages,marination of spent hen breast meat in common salt,polyphosphate and white pepper resulted in non-significant(P>0.05) reduction.However, addition of kiwi (5% and 10%),pineapple (5% and 10%) and combination of kiwi5% and pineapple 5% resulted in significant (P <0.05) increase of collagen solubility when compared with samples treated with common salt,polyphosphate and white pepper and samples treated with water only.Moreover, samples marinated with pineapple 5% and pineapple 10% revealed the highest collagen solubility when compared with other treatments.The same observation were recordedVaithiyanathan et al. (2008)after postmortem aging of spent hen breast andKiran et al (2014) after tenderization of spent hen breast with ammonium hydroxide.

Table (4) Collagen content and solubility of spent hen breast meat treated with kiwi (5% and 10%), pineapple (5% and 10%) and combination of kiwi (5%) and pineapple (5%).

Treatments	Collagen content (mg/g)	Collagen solubility
Control-1	5.89±0.10[a]	15.79±0.34[a]
Control-2	5.15±0.04[b]	15.60±0.22[a]
Kiwi 5 %	5.01±0.02[b]	18.22±0.50[c]
Kiwi 10 %	4.79±0.21[c]	19.08±0.18[d]
Pineapple 5 %	4.15±0.02[d]	20.33±0.37[e]
Pineapple 10 %	3.94±0.06[e]	22.38±0.34[f]
Kiwi 5 % & Pineapple 5 %	3.97±0.02[e]	19.87±0.19[g]

*Data are presented by the mean of three independent replicates ± SD
[a-g] values with different superscripted significantly (P <0.05) different.
Control 1; breast meat dipped in water only.
Control 2; marinade containing salt, polyphosphate and white pepper

Sensory evaluation

Sensory attributes are the major factors that determine the consumer acceptability of meat. The sensory attributes of spent hen breast meat treated with kiwi and pineapple extracts are presented in Table (5). Marination of spent hen breast meat with common salt, polyphosphate and white pepper resulted in non-significant (P >0.05) increase of sensory scores of

appearance, flavor, tenderness, juiciness and overall acceptability. Addition of kiwi (5% and 10%), pineapple (5%) and combination of kiwi 5% with pineapple 5% to the marinade resulted in non-significant ($P>0.05$) change of appearance scores when compared with samples treated with a marinate containing common salt, polyphosphate and white pepper. However, addition of pineapple10% resulted in significant ($P<0.05$) reduction of sensory scores of appearance when compared with all other treatments. The panelists observed a mushy appearance of the surface of spent hen breast meat treated with a marinade containing pineapple 10% which may be attributed to the over tenderization effect of high concentration of pineapple 10% on the surface of spent hen breast meat. On the other hand, all marinades containing kiwi and pineapple resulted in significant ($P<0.05$) increase of the scores of flavor, tenderness, juiciness and overall acceptabilitywhen compared with samples treated with a marinate containing common salt, polyphosphate and white pepper and samples treated with water only. These results were in agreement with those obtained by previous studies. A significant reduction in significant increase juiciness scores and non-significant change in overall acceptability scores of spent hen breast after treatment with bromelain were obtained by Devitre and Cunningham (1985). Moreover, Bawa et al. (1981)observed significant differences in juiciness, flavor, and overall acceptability scores after treatment of spent hen breast with bromelain.

Table (5) Sensory scores of spent hen breast meat treated with kiwi (5% and 10%), pineapple (5%) and combination of kiwi (5%) and pineapple (5%).

Treatments	Appearance*	Tenderness	Flavor	Juiciness	Overall acceptability
Control-1	5.50 ± 0.50^{a}	3.33 ± 0.57^{a}	4.66 ± 0.57^{a}	3.33 ± 0.57^{a}	3.66 ± 0.57^{a}
Control-2	5.50 ± 0.86^{a}	4.00 ± 0.00^{a}	5.33 ± 0.28^{ad}	3.66 ± 0.57^{a}	4.33 ± 0.57^{a}
Kiwi 5 %	5.66 ± 0.57^{a}	5.66 ± 0.57^{b}	5.83 ± 0.76^{bde}	5.66 ± 0.57^{b}	5.83 ± 0.76^{b}
Kiwi 10 %	5.83 ± 0.76^{a}	6.33 ± 0.57^{bc}	6.33 ± 0.76^{ce}	6.33 ± 0.28^{b}	6.00 ± 0.50^{b}
Pineapple 5 %	5.83 ± 0.76^{a}	6.66 ± 0.28^{c}	$6.16\pm0.0.28^{ce}$	6.16 ± 0.28^{b}	6.16 ± 0.28^{b}
Pineapple 10 %	4.33 ± 0.28^{b}	6.66 ± 0.28^{bc}	6.33 ± 0.28^{ce}	6.33 ± 0.28^{b}	6.16 ± 0.28^{b}
Kiwi 5 % & Pineapple 5 %	5.50 ± 0.50^{a}	6.66 ± 0.28^{bc}	6.33 ± 0.28^{ce}	6.33 ± 0.28^{b}	6.33 ± 0.28^{b}

*Data are presented by the mean of three independent replicates ± SD

$^{a-e}$values with different superscripted significantly ($P<0.05$) different.

Control 1; breast meat dipped in water only.

Control 2; marinade containing salt, polyphosphate and white pepper

Conclusion

It can be concluded from this study that tenderness, physico-chemical properties and sensory attributes of spent hen breast meat can be improved by marination with extracts of kiwi and pineapple. Therefore, these extracts can add value in the quality of this type of meat and will encourage meat processors to include spent hen meat as a raw material during processing of poultry products. Moreover, this study will encourage consumers especially in developing countries to utilize this type of meatwith subsequent improvement in their welfarelif

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الملخص العربى

تطرية لحوم عتانى دواجن الأمهات باستخدام الكيوى والأناناس

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لقد اجريت تلك الدراسة بهدف تطرية لحوم عتانى الدواجن وتحسين الخواص الفيزيائية والكيمائية لهذه اللحوم وذلك باستخدام عصائر الكيوي والأناناس. لذلك تم إحضار عتاني الدواجن من الأسواق وذبحها ووضعها في الثلاجة لمدة أربعة وعشرون ساعة عند درجة حرارة أربعة مئوية ثم تم فصل لحوم الصدور من العظم وتقسيمها الي سبع مجموعات في إطباق وكانت المجموعة الأولي متبلة بالماء فقط وتم تتبيل المجموعة الثانية باستخدام الملح والفوسفات والفلفل الأبيض. وبالنسبة للمجموعة الثالثة فقد تم إضافة محلول الكيوي بنسبة 5 % الى محلول التتبيل, والمجموعة الرابعة تم إضافة محلول الكيوي بنسبة 10 % الى محلول التتبيل, فى المجموعة الخامسة تم إضافة محلول الأناناس بنسبة 5 % الى محلول التتبيل, بالنسبة للمجموعة السادسة فقد تم إضافة محلول الأناناس بنسبة 10 %, أما فى المجموعة السابعة فقد أضيف كل من محلول الكيوى والأناناس بنسبة 5 % من كل منهما. بعد عمليات المعالجة تم حفظ تلك المجموعات في الثلاجة عند 4 درجة مئوية. بعد حفظ جميع المجموعات فى الثلاجة لمدة 24 ساعة تم نقل اللحوم المعالجة إلى أكياس بولي ايثيلية ثم حفظها فى الثلاجة حتى ظهور علامات الفساد. تم اللحوم بعد 24 ساعة من المعالجات لكل من التركيب الكيميانى, دلالات الفساد (درجة الأس الهيدروجيني, حمض الثيوباربتيورك, والركبات النيتروجينية المتطايرة), shear force, محتوى الكولاجين ونسبة ذوبانه, وقيم اللون, الفحوصات الحسية, الفسل الكهربائي, والتركيب المجهرى. كما تم فحص العينات أثناء الحفظ فى الثلاجة يوم بعد يوم لكل من دلالات الفساد (درجة الأس الهيدروجينى, حمض الثيوباربتيورك, والركبات النيتروجينية المتطايرة) وكذلك الفحوصات الحسية (المظهر, النكهة, العصيرية, الطراوة ودرجة القبول الكلى). وقد اظهرت النتائج تحسن ملحوظ فى الخواص الفيزيائية والكيميائية والحسية لعتانى الدواجن. ,أظهرت النتائج زيادة طراوة اللحوم وزيادة جودتها أثناء الحفظ بالتبريد. لذلك من الممكن استخدام تلك اللحوم للاستهلاك اليومي وكمواد خام للتصنيع مما يؤدى الى توفير مصدر جيد من مصادر اللحوم ذات القيمة العالية.