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Improving the Quality Properties of Chicken Burger

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ABSTRACT

The present study was undertaken to produce new low coast chicken burgers with significant nutritional value and to improve the physiochemical properties of the familiar chicken burger using partially replacement of breast chicken meat in formula 1 (F1), using 10% wheat germ and formula 2 (F2) with 30% pumpkin pulp, which were the most palatable ratios being win according to the panelists evaluations. The formulas were investigated for their physicochemical properties, consumer acceptability, approximate chemical composition, minerals content and the profile of amino and fatty acids. The results astonished that, the incorporation of wheat germ and pumpkin pulp made the products more palatable and increased both of crude fiber and carbohydrate content; further more wheat germ increased the crude fat in F1 and pumpkin pulp increased the moisture, ash, crude fiber and total carbohydrate contents significantly in F2. Sensory evaluation declared that there were no significant differences among the control sample and the two prepared formulas in all parameters, moreover adding wheat germ and pumpkin pulp improved the overall acceptability. It was astonishing that F2 was superior to control sample regarding to the organoleptic properties. Data obtained significant increase ($P < 0.05$) in both cooking loss and shrinkage in F2, otherwise cooking yield decreased significantly. The highest cooking yield (lowest cooking loss, shrinkage and expressible water) was recorded for F1. Adding wheat germ and pumpkin pulp resulted in slightly decreasing in the total essential amino acid content (1.76%, 2.09% respectively) compared to control sample. Wheat germ led to an increase in poly unsaturated fatty acids content (from 71.46 in control, to 74.25% in F1), whereas incorporating of pumpkin pulp into F2 decreased the % of saturated fatty acids while increased the total poly unsaturated fatty acids from 71.46 % in control to 73.74 % in F2. Moreover, using wheat germ and pumpkin pulp in our prepared chicken burgers reduced the final coasts by approximately 7.1 and 27% % respectively.

Keywords: Chicken meat, Pumpkin pulp, Wheat germ, Chicken burgers.

INTRODUCTION

Consumer choice in the developing world is likely constrained by socioeconomic and cultural traits. However, it's more relevant that the choice be nutritious, enjoyable and readily accessible.

Poultry meat and eggs continue to be the easiest, fastest and economical way to convert the protein from plant origin to high quality animal protein (Aylward, 2000). Chicken meat is the most popular meat protein source, for lack of cultural or religious prohibitat for poultry consumption (Van der Sluis, 2001 and Barbut, 2002). Chicken breast is one of the most popular cuts of chicken, due to its high protein, low fat content, which characterized by less saturated than beef fat besides providing zero grams of carbohydrate, making it the optimum choice for people hoping to lose weight or suffering from some diseases such as cardiovascular diseases. Chicken protein is a rich source of all the essential amino acids. In the 1980s, the Nutrition Collaborative Research Support Program identified six micronutrients that were particularly low in the primarily vegetarian diets of schoolchildren in rural Egypt, Kenya, and Mexico: vitamin A, vitamin B12, riboflavin, calcium, iron, and zinc. Negative health outcomes associated with inadequate intake of specific nutrients include anemia, poor growth, rickets, impaired cognitive performance, blindness, neuromuscular deficits (Soriano, 2010). Chicken meat is a particularly rich source of all of these nutrients, and can substantially enhance the nutritional content of common vegetarian diets when added to it. (Guerrero-Legarreta and Hui 2010).

Pumpkin is a yellow-colored fruit grown in tropical and subtropical countries where it consumed as freshly boiled and steamed or as a processed food items such as soup or curry. It contains lots of pectin, carbohydrate, vitamins and minerals. (Wang and Zhao., 1998; Wang *et al*., 2002). It was used to treat bladder problems and as a pain killer. Caili *et al*., (2006) and Mulleder *et al*., (2002) reported that pumpkin considered as a healthy food as long it contains miscellaneous biologically active components such as polysaccharides, proteins, sterols, fixed oils and peptides. Moreover (Bendich 1989) mentioned that pumpkin is a good source of carotenoids.

Wheat germ is a by-product derived from the wheat milling industry. It is the small, nutrient-containing center of a wheat kernel, comprising only about 2.5% of the weight of the kernel, but filled with a very beneficial list of attributes (Anon, 1987). Moreover it is the healthy part that contains the majority of the nutrients. Relatively a huge quantity of wheat germ is produced annually as a by-product of wheat milling industry in Egypt. In 2012, it was reported that about 120,000 tons wheat germ were produced from wheat milling (Mahmoud *et al*., 2015)**.**

In order to avoid malnutrition and to obtain the recommended percentage of protein, the consumption of meat products is prevalent in most countries of the world. but due to their high prices, there is an urgent desire to use alternatives that do not involve meat (ELbakheet *et al*., 2017).

Aim of investigation:

The aim of this investigation is to incorporate both of wheat germ or pumpkin pulp in partial replacement of meat to improve the quality characteristics as well as minimizing production costs of chicken burger.

MATERIALS AND METHODS

Materials:

Chicken breast meat: Were obtained from EL-Shrouk Company for meat and poultry at Assiut city during November 2017.

Pumpkin fruits: (Cucurbita moschata) were obtained from the Faculty of Agriculture farm, Assiut University during November 2017.

Wheat germ: was obtained from the (Millers of North Cairo)

Low-fat soy flour: Was purchased from the Food Technology Institute, Agriculture Research Center, Giza, Egypt during November 2017.

Fresh onion, sodium chloride, black pepper, allspices and sun flower oil were obtained from the local market Assiut city, Egypt, during November 2017.

Chemicals:

All chemicals used in this study were obtained from EL-Gomhouria for Trading Chemicals and Drugs Co., Assiut city, Egypt.

Methods:

Preparation of ingredients:

- Chicken breast meat was carefully washed, and then minced using a meat mincer.
- Wheat Germ was ground to form wheat germ flour.
- Pumpkin fruits were washed, pulped with a knife to remove the peel and seeds, then the pulp was cut into small cubes which steamed for 25 min, then homogenized in a blender.

Preparation of chicken burger

Chicken burgers were formulated as indicated in Table (1).

Table 1. Composition of chicken burger formulas (g/1000g)

Ingredients (g)	Control (C)	Formula 1 (F1) (10%) wheat germ flour	Formula 2 (F2) (30%) pumpkin pulp
Chicken breast meat	780	702	546
wheat germ flour	-	78	-
mashed pumpkin	-	-	234
Soy bean flour	100	100	100
Fresh onion	100	100	100
Sodium chloride	10	10	10
Black pepper	5	5	5
All spices	5	5	5
Total	1000	1000	1000

The burger formulas were formed using a patty marker (stainless steel model "Form") to obtain round discs 10 cm diameter and 0.5 cm thickness. After preparation, the chicken burger samples (each sample was 100 g) were packed in polyethylene bags in foam dish and were stored immediately in a refrigerator (4 ±1C°) until analysis .Other sample were grilled in a small quantity of sun flower oil for 3 min on one side and 2 min for the other side and used for sensory evaluation as described by (Mohamed *et al*., 2012).

Sensory evaluations:

Chicken burger samples were grilled then evaluated organoleptically. Grilled chicken burger samples were evaluated by 10 staff members in the Food Science and Technology Department, Faculty of Agriculture, Assuit University and Assiut Agricultural Research Center who are familiar with these products. A 10- point hedonic scale (1 being dislike very much to 10 being like very much) were used to evaluate the sensory attributes of color, taste, flavor, texture and overall acceptability of the prepared chicken burger sample according to (Gelman and Benjamin, 1989).

Water holding capacity (W.H.C):

Water holding capacity (WHC) was determined using expression of the juice by centrifugation method as described by (Hamm, 1960), the expressible fluid (E.F) was determined by difference between the sample weight before and after centrifugation.

Cooking loss:

Cooking loss was determined according to A.M.S.A (1995). It was measured after grilling beef burger samples. Cooking loss was calculated as follows:

$$\%\ \text{Cooking loss} = \frac{\text{Raw sample weight} - \text{cooked sample weight}}{\text{Raw sample weight}} \times 100$$

Cooking yield:

Cooking yield was calculated as given by (El-Nemr, 1979).

$$\%\ \text{Cooking yield} = 100 - \%\ \text{Cooking loss}$$

Shrinkage:

The shrinkage percentage was calculated as described by A.M.S.A (1995) as follows:

$$\%\ \text{Shrinkage} = \frac{(\text{raw thickness} - \text{cooked thickness}) + (\text{raw diameter} - \text{cooked diameter})}{(\text{raw thickness} + \text{raw diameter})} \times 100$$

Chemical composition:

Moisture, crude protein, crude fat and ash contents were determined according to Official Methods (A.O.A.C. 2000). Carbohydrate contents: were calculated by difference (Turhan *et al*., 2005) as follows:

$$\%\ \textit{carbohydrate} = 100 - (\%\ \text{moisture} + \%\ \text{protein} + \%\ \text{ash} + \%\ \text{fat})$$

Caloric value:

Caloric value was estimated as follows as described by (Mohamed, 2005):

$$\text{Caloric value (k. Cal/100 gm)} = (\%\ \text{carbohydrate} \times 4) + (\%\ \text{protein} \times 4) + (\%\ \text{fat} \times 9)$$

Determination of Crude Fiber:

Crude Fiber content was Determined according to the method of AOAC (1990)

Determination of minerals content:

The determination was carried out in Central Laboratory, Faculty of Agriculture, Assiut University, as described in AOAC (1995).

Amino acids composition:

Amino acids were determined according to the method described by Pellett and Young (1980). The analysis was performed in Regional Center for Food and Feed, Agriculture Research Center- Giza, Egypt using Beckman Amino Acid Analyzer Model119CL.

Determination of tryptophan:

Tryptophan was determined using spectrophotometric method as described by Sastry and Tummuru (1985)

Fatty acids composition: as mentioned by (Rossell *et al*., 1983).

Final coast:

The final costs of the prepared chicken burger samples were calculated according the local market costs of the used ingredients by Egyptian pound

Statistical analysis:

The data obtained from three replicates were analyzed by ANOVA using the SPSS statistical package program, and differences among the means were compared using the Duncan's Multiple Range test (SPSS, 2011). A significance level of 0.05 was chosen

RESULTS AND DISCUSSION

- **Proximate composition of raw material used in chicken burgers preparation:**

The percentage of moisture, crude protein, crude fat, ash, carbohydrate and the calculated caloric value based on dry weight are presented in Table (2). Data revealed that pumpkin pulp scored the highest moisture and carbohydrate percentage with a great difference compared to the other ingredients; thus F2 - which included 30% pumpkin pulp, will be markedly affected, regarding physical properties, crude fiber fiber content and chemical composition. Moreover pumpkin pulp had the highest ash content. Pumpkin analysis was in a good agreement with those reported by Pongjanta *et al*., 2006; El-Demery M.E., 2011 and Bhat and Bhat, 2013. Chicken breast meat was superior in crude proteins but had the lowest carbohydrate content. (Zacchı *et al*. 2006) recorded that the wheat germ constitutes only about 2% of the whole wheat grain and contains about 8–14% oil. Also (Wang and Johnson 2001) reported that wheat germ oil has been used as a fertility agent, an antioxidant, and an additive in natural food and health and cosmetic products.

In our investigation, wheat germ presented the highest crude fat content (11.13%) this is in a good agreement with Gurinovich and Patrakova (2013).

According to the findings, wheat germ had a high concentrations of both crude protein and carbohydrates (30.34 , 53.4 % respectively) thus, as mentioned by Gurinovich and Patrakova (2013) wheat germ can be classified as a protein- carbohydrate feedstock with a high content of technologically significant components and lipids.

Table 2. Proximate composition of raw material used in chicken burgers preparation (on dry weight basis)

Parameters Ingredients	Moisture (%)	Crude protein (%)	Crude fat (%)	Total ash (%)	Carbohydrates (%)	Caloric value (kcal/100g)
Chicken breast meat	73.07^{b}	82.43^{a}	8.31^{b}	5.49^{c}	3.75^{d}	419.51^{b}
wheat germ flour	12^{c}	30.34^{c}	11.13^{a}	5.11^{d}	53.4^{b}	435.13^{a}
mashed pumpkin	90.08^{a}	12.2^{d}	1.5^{d}	6.45^{b}	79.84^{a}	381.65^{d}
Low fat soy bean flour	4.28^{d}	48.98^{b}	7.27^{c}	6.69^{a}	37.04^{c}	409.51^{c}

Different letters in the same columns Means significantly difference ($p<0.05$)

- **Chemical composition and caloric value of the prepared chicken burgers (on dry weight basis):**

Chemical composition and caloric value of the prepared chicken burgers (on dry weight basis) are shown in (Table 3).

Table 3. Chemical composition and caloric value of the prepared chicken burgers (on dry weight basis)

Sample Parameter	Control	F (1)	F (2)
Moisture (%)	68.50^{b}	63.75^{c}	72.47^{a}
Crude protein (%)	67.33^{a}	61.62^{b}	59.21^{c}
Crude fat (%)	8.50^{b}	9.02^{a}	7.49^{c}
Total ash (%)	8.54^{b}	8.50^{c}	8.82^{a}
Crude fiber (%)	9.64^{c}	9.92^{b}	10.18^{a}
N.F.E (%)	5.97^{c}	10.94^{b}	14.30^{a}
Total carbohydrates (%)	15.61^{c}	20.86^{b}	24. 48^{a}
Caloric value (kcal/100g)	408.30^{b}	411.10^{a}	402.17^{c}

Different letters in the same row Means significantly difference ($p<0.05$)
(F1) = (10%) wheat germ flour Replacement of meat
(F2)= (30%) pumpkin pulp Replacement of meat
N.F.E=Nitrogen free extract (%Total Carbohydrates-%crude fiber)

Data determined that there were significant differences between the two formulas compared to control in all studied parameters. According to the findings, replacement of meat with pumpkin pulp affected the moisture content of F2 which was reflected in the values of crude protein and crude fat which scored the least percentage among all studied formulas due to higher moisture present in pumpkin, meanwhile; the percentage of crude fiber, ash and carbohydrate were increased compared to control and F1. Similar results were reported by Zargar *et al*, (2014). Many researchers recommended that consumers should increase the level of dietary fiber in their daily diet (Eastwood, 1992; Johnson and Southgate, 1994; Bhat and Bhat, 2011a, 2011b). It is known that fibers have many health benefits besides improving the physiochemical properties of many products specially meat products such as texture. Fiber rich food can help to maintain a healthy weight and lower the risk of diabetes, heart diseases and colorectal cancer. Pumpkin pulp has the highest crude fiber level amongst the other formulas. F1 obtained the highest crude fat level and so caloric value due to the higher fat present in wheat germ (11.13%). Control sample scored the highest protein content. The moisture content was significantly ($p<0.05$) reduced as a result of replacement of chicken meat by (10%) wheat germ and that might be due to its low moisture content.

- **Sensory evaluation**:

According to the means given by the panelists of grilled samples, sensory scores for studied parameters such as taste, flavor, color, texture and overall acceptability revealed that, there were no significant differences observed ($p>0.05$) amongst the treatments for all the studied parameters indicating that the partial replacement of chicken meat (10%) wheat germ or (30%) steamed pumpkin pulp did not change product acceptance by consumers (Table 4). We astonished that F2 had the highest scores in all parameters even it was superior to control.

Table 4. Sensory evaluation of the prepared chicken burger

Sample Parameter	Control (C)	Formula (1)	Formula (2)
Taste	9.41^{ab}	9.17^{ab}	9.58^{a}
Flavor	9.28^{ab}	9.08^{ab}	9.33^{a}
Color	9.58^{ab}	9.50^{ab}	9.83^{a}
Texture	9.41^{ab}	9.20^{ab}	9.50^{a}
Overall acceptability	9.83^{ab}	9.92^{ab}	10.00^{a}

Different letters in the same row Means significantly difference ($p<0.05$)
(F1) = (10%) wheat germ flour Replacement of meat
(F2) = (30%) pumpkin pulp Replacement of meat

Physiochemical properties of the prepared chicken burgers:

The mean values of various physicochemical parameters namely cooking loss, cooking yield, shrinkage and water holding capacity for the two studied formulas are presented in Table (5).

Table 5. Physiochemical properties of the prepared chicken burgers at zero time

Samples Parameters	Control (C)	F (1)	F (2)
Cooking loss (%)	14.95 [b]	7.32 [c]	19.93 [a]
Cooking yield (%)	85.05 [b]	92.68 [a]	80.07 [c]
Shrinkage (%)	13.22 [b]	8.33 [c]	13.64 [a]
WHC (%Bound water)	65.64 [b]	62.89 [c]	69.44 [a]
Moisture (%)	68.50 [b]	63.75 [c]	72.47 [a]
E.F.*%	2.86	0.86	3.03

Different letters in the same row Means significantly difference (p<0.05)
(F1) = (10%) wheat germ flour Replacement of meat
(F2) = (30%) pumpkin pulp Replacement of meat.
E.F.*% = Expressible fluid (% moisture – W.H.C)

The obtained data indicated that there was a significant increase ($P < 0.05$) in both cooking loss and shrinkage in F2, otherwise cooking yield significantly decreased. This can be explained due to the high moisture content in pumpkin pulp besides lower emulsion stability as indicated by Zargar *et al* (2014). With regard to water holding capacity in F2, although it scored the highest level (72.47%) compared with control and F1,its expressible water was the greatest confirming the decreasing in cooking yield and the increasing of cooking loss and shrinkage. The highest cooking yield (lowest cooking loss, shrinkage and expressible water) was recorded for F1 (10% replacement by wheat germ). This could be explained since the wheat germ fibers were capable of binding a larger amount of water, caused lower shrinkage level and greater water retention. Similar results were published by Ammar *et al*, (2014) who noticed that cooking loss was decreased and cooking yield increased as the level of date seed powder, wheat germ and pumpkin flour was increased. Also the increase of W.H.C. could be explained due to increase protein tended to decrease the cooking loss. Anjaneyulu *et al*. (1991) reported that this increase was in consistences with the fact that an increase in water holding capacity (WHC) due to protein addition reduced the insignificant drop in cooking losses. Moreover Pearson and Gillett (1999) cleared that plant protein absorb large amount of water and when water added became sticky causing the ground meat to adhere to each other.

- **Minerals content of chicken burger at zero time (mg/100g dry weight basis)**

Data in Table (6) observed that the incorporation of wheat germ in F1 and pumpkin pulp in F2 increased the values of Zn and P in F1, meanwhile increased the K and Na content in F2.

Table 6. Minerals content of chicken burger (mg/100g dry weight basis) at zero time:

Minerals	Control	F1	F2
Ca	295.97	197.63	294.56
Fe	71.81	26.54	38.97
Zn	6.4211	6.87	4.48
Na	1340.45	1145.79	1605.90
K	1172.79	1107.95	1529.71
P	417.54	516.41	345.25

(F1) = (10%) wheat germ flour Replacement of meat
(F2)= (30%) pumpkin pulp Replacement of meat

- **Amino acids profile of the two studied chicken burger formulas:**

Results in Table (7) showed the amino acids composition in the two studied chicken burger formulas. The results indicated that partially replacement of chicken meat by using 10% wheat germ or 30% pumpkin pulp minimally decreased the total essential amino acids content (1.76%, 2.09% ;respectively) compared to control sample. Meanwhile, slightly increased the total non-essential amino acids content (1.15%, 1.32% for F1 and F2; respectively). With regard to the total amino acids, data declared that the two studied formulas were equal with control in their amino acids content.

Table 7. Amino acids composition of the prepared chicken burger (g/ 100g protein)

Amino acid	Control	F1	F2
Threonine	4.47	4.37	4.25
Valine	5.31	5.27	5.10
Methionine	2.75	2.68	2.59
Isoleucine	4.71	4.62	4.54
Leucine	7.87	7.87	7.49
Phenylalanine	4.41	4.40	4.44
Lysine	8.10	7.74	8.61
Tryptophan	1.49	1.47	1.28
Total essential amino acids	39.11	38.42	38.29
Histidine	3.74	3.73	3.49
Arginine	7.05	7.38	7.16
Aspartic Acid	9.78	9.76	9.97
Serine	3.85	3.67	4.08
Glutamic Acid	16.89	16.37	17.28
Proline	4.21	4.25	4.27
Alanine	5.70	6.25	5.54
Cysteine	2.15	2.12	2.13
Tyrosine	3.08	3.48	3.32
Glycine	4.38	4.52	4.42
Total non-essential amino acids	60.83	61.53	61.63
Total amino acids	99.94	99.95	99.92

(F1) = (10%) wheat germ flour Replacement of meat
(F2)= (30%) pumpkin pulp Replacement of meat

- **Fatty acids composition of the two studied chicken burger formulas:**

Chicken meat plays a positive contribution to the low income people diet. It is an important provider of the essential poly unsaturated fatty acids, especially omega 3 fatty acids. It is healthier than other meats, and low in saturated fatty acids. Table (8) presents the values of Saturated and poly unsaturated fatty acids of chicken burgers (% of total fatty acids). Data demonstrated that control formula had the highest saturated fatty acids and the lowest unsaturated fatty acids content compared to F1 and F2. Data in Table (8) declared that adding wheat germ (10% partially replacement of chicken meat) led to an increase in poly unsaturated fatty acids content (from 71.46 in control , to 74.25% in F1) which comply with Wang and Johnson (2001) who mentioned that wheat germ oil is highly valued due to its high content of unsaturated fatty acids of which it contains about 80%, mostly linoleic (18:2) and linolenic (18:3), (it is a critical item in human metabolism and cannot be synthesised by the organism). They are precursors of a group of hormones called prostaglandins, which play an important role in muscle contractions and in the proper healing of inflammatory processes (Coultae 1989). Incorporating of pumpkin pulp into F2 (30% replacement of chicken meat) , resulted in decreasing the % of saturated fatty acids compared with control sample and increased the total poly unsaturated fatty acids from 71.46 % in control to 73.74 % in F2.

Table 8. Fatty acid composition of the prepared of chicken burgers (as % of total fatty acids).

Fatty acid	Carbon chain	Control	F1	F2
Myristic acid	C14:0	0.4	0.32	0.35
Pentadecanoic	C15:0	-	-	0.55
Palmitic acid	C16:0	20.40	18.83	19.81
Margerins	C17:0	0.12	0.11	0.11
Stearic	C18:0	6.57	5.75	5.43
Archidic	C20:0	0.18	0.21	0.14
Behenic	C22:0	0.16	0.06	0.16
Total saturated fatty acid (S.F.A)		27.84	25.28	26.54
Tetradecenoic	C14:1	0.09	0.07	0.08
Palmitoleic	C16:1	3.00	2.6	2.7
Heprodecenoic	C17:1	0.06	0.06	0.05
Oleic	C18:1	31.73	30.12	29.29
Linoleic	C18:2	33.09	36.93	36.62
Linolenic	C18:3	3.16	3.88	3.92
Econsonic	C20:1	0.33	0.59	0.81
Total unsaturated fatty acid (U.S.F.A)		71.46	74.25	73.47

(F1) = (10%) wheat germ flour Replacement of meat
(F2)= (30%) pumpkin pulp Replacement of meat

- **Total coast calculations of the prepared chicken burger formulas:**

Data in Table (9) indicated that, using wheat germ and pumpkin pulp in preparing of chicken burgers reduced the final coasts by 7.1% and 27%; respectively.

Table 9. Final cost of the prepared chicken burgers (Egyptian pound/Kg)

Price/g	Control		F1		F2	
Ingredients	Gm	EP	Gm	EP	Gm	EP
Chicken breast meat	780	53.04	702	47.736	546	37.128
wheat germ flour	-	-	78	1.305	-	-
mashed pumpkin	-	-	-	-	234	0.702
Soy bean flour	100	1.9	100	1.9	100	1.9
Fresh onion	100	0.35	100	0.35	100	0.35
Sodium chloride	10	0.04	10	0.04	10	0.04
Black pepper	5	0.3	5	0.3	5	0.3
Allspice	5	0.89	5	0.89	5	0.89
Final cost	-	56.52	-	52.52	-	41.31

(F1) = (10%) wheat germ flour Replacement of meat
(F2)= (30%) pumpkin pulp Replacement of meat
EP = Egyptian pound

CONCLUSION

- Addition of wheat germ to the chicken meat (F1) improved the proximate composition by increasing the crude fat, crude fiber and carbohydrate contents significantly. Also made the product more palatable to the panelists. More over wheat germ improved the physiochemical properties which increased the cooking yield and the water holding capacity whereas decreased the cooking loss and shrinkage. More over F1 ranked equally with control sample in total amino acids content. Also addition of wheat germ increased the poly unsaturated fatty acids content. Finally, it reduced the final coasts by 7.1%.
- Corporation of pumpkin pulp in chicken burger production (30% replacement of chicken breast meat) improved the proximate composition as well as Sensory evaluation. Moreover incorporating pumpkin pulp improved fatty acids profile, as well as reduced the final coasts by approximately 27%.

REFFERENCES

A. M. S. A. (American Meat Science Association) (1995) Research guidelines for cookery, sensory evaluation and instrumental tenderness measurements of fresh beef. American Meat Science Assoc., Chicago, U.S.A., 240pp.

A.O.A.C. (1995) Association of Official Analytical Chemistry. 16th Ed., A.O.A.C International, Washington, USA., Pages: 1141.

A.O.A.C. (2000) Association of Official Analytical Chemists, 17th Ed. Of A.OA.C. International. Published by A.O.A.C. international. Maryland, U.S.A., 1250pp.

Ammar, A. S. M; El-Hady , E. A. A and Abd El-Razik,M. M. (2014) Quality characteristics of low-fat meat balls as affected by date seed powder, wheat germ and pumpkin flour addition. Pakistan Journal of Food Sciences Volume 24, Issue 4, Page(s): 175-185.

Anjaneyulu, A . S . R . ; Sham ,N . and Kondaian, N. (1991) The effect of salt and phosphate pre blending of buffalo meat on its physicochemical properties during refrigerated storage. Fleschwirtschaft international. Vol.1 :33-37.

Anon, (1987) Wheat facts. In: Official Publications of National Association Of Wheat Growers. Vol. 10:17.

AOAC. (1990) Official methods of analysis, 14th edition, Association of Official Analytical Chemists, Washington DC. Arlington, Virginia, USA.

Aylward , L. (2000) International intrigue: Is this the golden era for U.S. exporters or just the beginning? Meat Poult. 2000(Oct):34–36.

Barbut, S., (2002) Poultry Products Processing: An Industry Guide. CRC Press LLC, Boca Raton, Florida.

Bendich, A. (1989) Carotenoids and the immune response. Journal of Nutrition 119: 112-115.

Bhat ,M.A. and Bhat, A.(2013) Study on Physico-Chemical Characteristics of Pumpkin Blended Cake, Food Processing & Technology 4(9) :1-4.

Bhat, Z.F. and Bhat, H. (2011a) Fibre based functional meat products. Asian J Food Agroindustry 4(4):261–273.

Bhat, Z.F. and Bhat, H. (2011b) Functional meat products-a review. Int J Meat Sci 1(1):1–14.

Caili, F.; Huan ,S. and Quanhong, L. (2006) A review on pharmacological activities and utilization technologies of pumpkin. Plant Foods Hum Nutr. 61, 73–80.

Coultae, T. (1989) Food: The Chemistry of its Components, 6 th edition, the Royal Society of Chemistry, London: Chap. 4.

Eastwood ,M.A. (1992) The physiological effect of dietary fiber: an update. Annu Rev Nutr .12:19–35.

El- Nemr, S. E. A. (1979) Studies on Meat Substitutes, M. Sc. Thesis, Faculty of Agric., Zagazig Univ., Zagazig, Egypt.

Elbakheet, I.S.; Elgasim , A.E. and Algadi, M.Z. (2017) Proximate Composition of Beef Sausage Processed By Wheat Germ Flour. Journal of Food Processing & Technology 8:11.

El-Deremy ,M.E.(2011) Evaluation of physico-chemical properties of toast breads fortified with pumpkin (Cucurbita moschata) flour. The 6th Arab and 3rd International. Faculty of Specific Education-Mansoura University – Egypt April, 13-14, 2011.

Gelman, A. and Benjamin, E. (1989) Characteristics of mince from Pond-bred silver carp (Hypopthamichthys molitrix) and preliminary experiments on its use in sausage. J.Sci.Food Agriculture, 47, 225- 241.

Guerrero-Legarreta, I. and Hui, Y. H.(2010) Handbook of Poultry Science and Technology: Secondary Processing. New Jersey: John Wiley & Sons, Inc

Gurinovich ,G. V. and Patrakova, I. S. (2013) Effect of wheat germ on the functional properties and oxidation stability of ground meat systems . Foods and Raw materials Vol.1 (No1) 2013

Hamm, R. (1960) Biochemistry of meat hydration. Adv. Food Res.10, 355.

Johnson, I.T.and Southgate, D.A.T. (1994) Dietary fiber and related substances. In: Edelman J, Miller S (eds) Food safety series. Chapman and Hall, London, pp 39– 65.

Mahmoud, A.A.; Mohdaly, A.A.A. and Elneairy, N.A.A. (2015) Wheat Germ: An Overview on Nutritional Value, Antioxidant Potential and Antibacterial Characteristics. *Food and Nutrition Sciences*, 6, 265-277. http://dx.doi.org/10.4236/fns.2015.62027

Mohamed, H. A. A. (2005) Low Fat Meat Products as Prepared from Ostorich and other Reduced Fat Beef. Ph. D. Thesis, Nutrition and Food Science Dept., Faculty of Home Economics, Menufiya, Univ., Egypt.

Mohamed,R. A. A.(2012) Chemical and Microbiological Studies on Some Chicken Meat Products. M. Sc. Thesis, Faculty of Agric., Assiut Univ., Assiut, Egypt.

Mulleder, U.; Murkovic, M. and Neunteufl, H. (2002) Carotenoid content in different varieties of pumpkins. J Food Comp Anal 15, 633–638.

Pearson, A.M. and Gillett, T.A. (1999) Processed meat. 3rd ed. Aspen publishers, Gaithers Burg, Maryland, U.S.A.

Pellett, P. L., and Young, V. R., (1980): Nutritional evaluation of protein foods. Food and Nutrition Bulletin, (Suppl. 4).

Pongjanta, J.; Naulbunrang, A.; Kawngdang, S.; Manon, T. and Thepjaikat, T.(2006) Utilization of pumpkin powder in bakery products. Songklanakarin Journal of Science and Technology 28 (1): 71-79.

Rossell, J. B.; King, B. and Downes, M. J. (1983) Detection of adulteration. J. Am. Oil. Chem. Soc., 60, 333.

Sastry,C.S.P.andTummuru,M.K.,(1985)Spectrophotometric determination of tryptophan in proteins. J food ,SCI. Technol,22,pp146:147.

Soriano,J. (2010) Chemical Composition and Nutritional Content of Raw Poultry Meat. Metropolitan Autonomous University. Departamento de Biotecnolog´ıa, Universidad Aut´onoma Metropolitana –Unidad. Handbook of Poultry Science and Technology, Volume 1

SPSS, (2011) SPSS for windows. Release, 20.0., Standard Version, Armonk, NY:IBM Corp.

Turhan, S.; Sagir, I. and Ustun, N. S. (2005) Utilization of hazelnut pellicle in low-fat beef burgers. Meat Sci., 71, 312-316.

Van der Sluis W. (2001) who is going to cook poultry and for whom? World Poult. 17:24–26.

Wang ,T. and Johnson L.A. (2001) Refining high-free fatty acid wheat germ oil. Journal of the American Oil Chemists'Society, 78: 71–76.

Wang, P. and Zhao, Q.Y. (1998) Nutrient ingredient, medicinal value and exploitative prospects of pumpkin. Journal of Chiang Jiang Vegetables.7, 1-4.

Wang, P.; Liu, J.; Zhao, Q. and Hao, L. (2002) Studies on nutrient composition and utilization of pumpkin fruit. Journal of Inner Mongoa Institute of Agriculture and Animal Husbandry, 3.

Zacchı ,P.; Daghero J.; Jaeger, P.R.and Eggers R. (2006) Extraction/ fractionation and deacidification of wheat germ oil using supercritical carbon dioxide. Brazilian Journal of Chemical Engineering, 23: 105– 110.

Zargar, F. A.; Kumar .S.; Bhat, Z. F. and Kumar ,P. (2014) Effect of pumpkin on the quality characteristics and storage quality of aerobically packaged chicken sausages. SpringerPlus 2014, 3:39

تحسين خصائص الجودة لبرجر الدجاج

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تم إجراء هذه الدراسة بغرض إنتاج منتج جديد من برجر الدجاج منخفض التكلفة ذو قيمة غذائية نوعية ولتحسين الخصائص الفيزيوكيميائية لبرجر الدجاج المعتاد عن طريق الاستبدال الجزئى للحوم الدواجن باستخدام 10 % جنين القمح فى فورميولا 1 , 30% لب القرع العسلى فى فورميولا 2 حيث كانتا أفضل نسبتين قبولا طبقا للتقييمات الحسية. تم اختبار الفورميولتين من ناحية الخصائص الفيزيوكيميائية , قبول المستهلكين , التركيب الكيميائى . المحتوى من العناصر المعدنية و المحتوى من الأحماض الأمينية والدهنية. أوضحت النتائج أن استخدام كلا من جنين القمح ولب القرع العسلى أدى إلى زيادة استساغة المنتجات ورفع قيمة المحتوى من كل من الألياف والكربوهيدرات بالإضافة إلى أن جنين القمح رفع قيمة الدهن الخام فى فورميولا 1 بينما رفع لب القرع العسلى محتوى الرطوبة والرماد لفورميولا 2.أوضح التقييم الحسى عدم وجود فروق معنوية بين عينة الكنترول وبين الفورميولتين المحضرتين فى جميع التقييمات وأكثر من ذلك فإن إضافة كلا من جنين القمح ولب القرع العسلى أدت إلى تحسين القابلية العامة . كان من الواضح تفوق فورميولا 2 على عينة الكنترول فى الخصائص الحسية.اظهرت النتائج زيادة معنوية فى كل من فقد الطهى والانكماش فى فورميولا 2 بينما انخفض العائد بعد الطهى معنويا. بينما سجلت فورميولا 1ارتفاعا معنويا فى عائد الطهى وانخفاضا معنويا فى قيم كلا من فقد الطهى والانكماش . أدى إضافة جنين القمح ولب القرع العسلى إلى انخفاض بسيط فى مجموع الأحماض الأمينية الأساسية (1.76%, 2.09% بالترتيب) بالمقارنة بعينة الكنترول. أدى استخدام جنين القمح إلى زيادة المحتوى من الأحماض الدهنية عديدة عدم التشبع من 71.46% فى الكنترول إلى 74.25% فى فورميولا 1. بينما أدى استخدام لب القرع العسلى فى فورميولا 2 إلى خفض النسبة المئوية من الأحماض الدهنية المشبعة بالمقارنة بعينة الكنترول و الى ارتفاع النسبة المئوية لمجموع الأحماض الدهنية عديدة عدم التشبع من 71.46 % فى الكنترول , إلى 73.74 % فى فورميولا 2 . أكثر من ذلك , فإن استخدام جنين القمح ولب القرع العسلى فى تحضير برجر الدجاج قلل من التكلفة النهائية بنسبة 7.1 و 27%على التوالى.