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STUDY OF THE QUALITATIVE CHARACTERISTICS OF MEAT BURGER WITH VARIETY FATTY TISSUES ADDED

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Abstract
The study included the manufacture of beef burgers by adding a variety of fatty tissues, including the the sheep fat tail tissues, the hump of the calf and the hump of the camel, in addition to the belly fat of sheep, calves and camels, at a rate of 10% for each treatment. Burgers pieces were formed with a weight of 50 g, thickness of 7 mm and diameter of 11 cm. The burger pieces stored in plastic containers under frozen storage conditions at -18°C for 45 days. Qualitative changes during that period were studied. The pH value of the meat burgers ranged (6.3-7.2), and a gradual decrease in the pH was observed during the storage stages, reaching (5.2) in the meat burgers contain to the a calf hump and (5.8) in the burgers added the a camel hump. The percentage of free fatty acids ranged (0.08- 0.56) % in meat burger added to sheep fat and camel hump fat. The changes in diameter, weight and thickness of the studied samples were studied and changes in color, flavor, juiciness, aroma and tenderness were studied. The results of sensory evaluation of meat burger with added fat from the hump and belly of the calf showed significant differences at 0.05<p0 to reach 9, while the degree of color evaluation for the meat burger prepared with sheep fat tissues reached (8.6_9) and the burger prepared from calf meat with camel fat tissues (8.3) from 9 degrees. The flavor did not show any significant differences between the treatments, with the exception of the burger added to the sheep fat tail tissues. As for the characteristic of juiciness, no significant differences were found, with the exception of the birch with which the fat of the camel's belly was added. Also, the smell characteristic of the burger with added calf fat tissue showed significant differences (0.05<p0), which amounted to (8.7_9) compared to the other samples (8.3) to which sheep and camel fat were added. The characteristic of tenderness indicated that calf meat burger samples were significantly superior to calf fat tissues. 0. 05<p0(8.3-9) compared to other samples.

Keywords: burger calf meat . sheep fat tissues, camel fat , calf fat

Introduction

Burger is one of the most common processed meat products in the world, and is usually used as a ready-to-eat food or a precooked cooked foods. In Iraq, it is considered one of the cheap, popular dishes that are daily circulated in restaurants and small shops, and the bulk of its manufacture is still limited to private sector factories, and it is made from ground beef after adding quantities of animal fats, table

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salt and spices in unlimited quantities and according to the taste of the consumer compared to some Countries, as it consists of minced beef with animal fat of no more than 30% as determined by American and Canadian laws. Since meat prices continue to rise, it has become necessary to use beef from some parts of the carcass of low quality, which has become an excellent market for meat processing Especially the fast food industry. Burger is a food product prepared from red meat and poultry meat without bones and cartilage and minced with one or more of the optional materials mentioned in item (4/17). The product is in the form of units of identical shape, size and thickness, and is kept refrigerated or frozen, (Standardization Organization for the Cooperation Council for the Arab States of the Gulf 948 GSO 05 CDS,2017).

Materials and Methods

The study was conducted in the laboratories of the Faculty of Agriculture, University of Tikrit, during the period between 2021-2022, during which samples of calf meat, sheep fat tail tissues, sheep belly fat, calf hump fat, and calf belly fat were collected from the local markets of the city of Tikrit of Salah al-Din Governorate, camel hump fat and camel belly fat from Muthanna Governorate, Samawah city. They were well packaged with placed in clean plastic containers and frozen to -18C for 72 hours until it is transferred to the university. The burgers were manufactured according to the following method. Cutting the meat and fat into small pieces with a knife to prepare it for the mincing process .The meat was minced with the addition of 10% of the fatty tissue for each treatment by an electric mincer of the Chinese type GOSONIC, and then mixed well and Add salt, black pepper and garlic: So that 5 grams of salt, 5 grams of black pepper, and 5 grams of mashed garlic were added for each kilogram of meat and fat, then chopped again to ensure homogeneity. Forming pieces of the mixture at a rate of 50 grams for the manufacture of the burger pieces. Manufacturing the burger pieces by a special mold after adjusting the thickness and diameter of the manufactured burger pieces and then wrapping them with butter paper and keeping them by freezing at a temperature of -18 C until the subsequent tests are performed

1- Determination of free fatty acids

Free fatty acids were calculated according to the method described in A.O.A.C. (2004) Using the following equation

Free fatty acid (%) = amount of NaOH used in scaling (ml) x 2.082 sample weight

The calculated amount of free fatty acids is represented by oleic acid (where 1 ml of 0.1 N of base = 0.0282 grams of oleic acid), and in all cases the number is Acid value equal to twice the fatty acid.

2- Determination of pH

I followed the method mentioned before (Nafiseh and Hossein., 2015) with a weight of 3 gm of Burger and mixed it well with 10 ml of distilled water in a ceramic mortar and measured the pH using pH meter

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3- Change in diameter of the burger pieces during cooking:

The diameter of the tablets for each treatment was measured by three readings for each tablet before and after cooking using the Vernia device. The percentage change in diameter due to cooking was calculated based on the following equation:

:

$$\text{change in diameter } \% = \frac{\text{diameter before cooking (mm) - diameter after cooking}}{\text{Diameter before cooking (mm)}} * 100$$

4- The change in thickness of the burger pieces during cooking

The percentage of change in the thickness of the Burger pieces as a result of cooking was measured based on the method (1974, Judge), where the thickness was measured before and after cooking using a phonon device, and the percentage of change in thickness due to cooking was felt based on the following meanings.

%change in thickness = Thickness before cooking (mm) - thickness after cooking (mm) / thickness before cooking (mm) * 100

5- Total weight loss during cooking

The total weight loss during cooking was measured on three tablets from each treatment, based on the following equation.

Loss Percentage = Weight before cooking (gm) - Weight after cooking (gm) x 100
Weight before cooking (gm)

6- Panel taste

The characteristics and tables suggested by Lawrie, 2006 were used. The quality characteristics were studied by conducting organoleptic taste tests by selecting two assessors for the manufactured product from teachers and graduate students at Tikrit University / College of Agriculture / Department of Food Sciences), and up to 10 assessors to conduct the panel taste sensory assessment process. For all transactions, the degrees of texture, tenderness, juiciness, aroma, color and general acceptance were estimated according to the degrees indicated in the attached sensory evaluation form, which shows the degrees of sensory evaluation sensory analysis.

Un acceptable 5 marks	Acceptable 6 marks	**Good 7 marks**	**Verygood8 marks**	**Excellent 9 marks**

Give the appropriate estimate for the following characteristics according to the above Lawrie, 2006) Sensory evaluation form

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7- Statical Analysis

The experiment was designed using a fully randomized design (CRD) test by Al-Rawi and Khalaf Allah (2000) and the results were statistically analyzed using the analysis of variance (ANOVA) design Probability P0< 0.05 and 0.01.

Notes	Adjective						the sample sequence
	General acceptance	Tenderness	Aroma	Juiciness	Flavor	the color	
							A
							B
							C
							D
							E
							F

Results and discussion

1- percentage of free fatty acids

Table (1) shows the effect of freezing on the percentage of free fatty acids for veal burger prepared with different fatty tissues

Period				Fat site	Fat type	Meat type
45 Day	30 Day	15 Day	0 Day			
5.68Aa	5.66Aa	5.66Aa	5. 64Aa	Sheep fat tail tissues	Sheep	Calf meat
2.20Ca	2.15Ca	2.10Ca	2. 09Ca	Sheep belly		
5.68Aa	5.67Aa	5.67Aa	5.64Aa	Hump	Calf	
3.80Ba	3.78Ba	3.78Ba	3.73Ba	Calf belly		
0.91Da	0.90Da	0.90Da	0.87Da	Hump	Camel	
1.09Da	1.08Da	1.08Da	1.03Da	Camel belly		

Small letters that are similar horizontally mean that there are no significant differences between them capital letters that are similar vertically mean that there are no significant differences between them

Table (1) shows the changes in the percentage of free fatty acids in the burger prepared from veal and fatty tissue mixture. The results C showed that the burger to which was added fat And camel belly fat values ranged between (0.91-1.09)% compared to the burger meat added to sheep fat tail tissues (5.64-5.68)% and calf hump (5.64-5.68), while the percentage of fatty acids was In burgers to which sheep belly fat was added (2.1-2.2)%, and calf belly fat (3.80-3.72) %, this may be due to the high stability of visceral fat to autolysis enzymes or microorganisms, which reduces It releases fatty acids, as well as the stability of fatty tissues of camels because they contain high percentages of saturated fatty acids that

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are more stable than fatty acids in saturated ones that are subjected to decomposition or oxidation because they contain Mono and polyunsaturated fatty acid

These results converge with the findings of Al-Issawi and Nagy, 2016, when adding tomato residue extract to the beaker, where the percentage of fatty acids were (0.18-0.2) mg manoldehyde for fresh samples and (0.19-0.215) mg manoldehyde / 100 g after storage for a period of three weeks.

2-Determination PH value

Table (2) represents the pH value of the burger product made from calf meat with different fatty tissues

Period				Fat site	Fat type	Meat type
45 Day	30 Day	15 Day	0 Day			
5.5 BCc	6.5 Ab	5.6 Bc	7.2 Aa	Sheep fat tail tissues	Sheep	Calf meat
6.4 Ab	6.9 Aa	6.5 Ab	7.2 Aa	Sheep belly		
5.2 Cc	6.8 Ab	5.6 Bc	7.5 Aa	Hump	Caif	
5.4 Cc	6.9 Ab	5.8 Bc	7.4 Aa	Calf belly		
5.8 Bb	6.8 Aa	5.9 Bb	6.3 Bb	Hump	Camel	
5.9 Bb	6.7 Aa	5.9 Bb	6.3 Bab	Camel belly		

Small letters that are similar horizontally mean that there are no significant differences between them capital letters that are similar vertically mean that there are no significant differences between them

Table (2) shows the pH value of the burger prepared from calf meat with different fatty tissues, as it is noted that the pH value ranged between 5.2 - 7.45 in the burger prepared from calf meat with fat hump of calf. The results also show the tendency of the pH in the burgers before storage towards the basal at Po < 0.05, while during the storage periods it began to decrease significantly (P < 0.05) to reach its lowest level of 5.2 in veal burgers and calf fat, and the decrease in pH may be due to the release of Free fatty acids by endogenous lipase enzymes or produced by microorganisms, where a high percentage of free fatty acids is observed during the storage period. These results converge with the findings of **Hanula et al. 2022**, noting that the pH value of the acai oil replacement treatments ranged from 5.36 at the beginning of storage to reach 5.61 after a week of storing fresh and cooked burger.

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3- Change in diameter of the burger pieces during cooking:

Table (3) shows the percentage of loss in diameter for calf meat burgers with different fatty tissues

Period				Diameter before cooking	Fat site	Fat type	Meat type
45 Day	30 Day	15 Day	0 Day				
32.1 Ca	30.8 Ca	31.5 Ca	31.2 Ca	11b	Sheep fat tail tissues	Sheep	Calf meat
27.5 Da	27.5 Da	26.9 Da	27.2 Da	11b	Sheep belly		
38.4 Aa	37.8 Aa	37.5 Aa	39.0 Aa	11b	Hump	Caif	
35.1 Ba	32.4 BCa	34.8 Ba	34.8 Ba	11b	Calf belly		
24.8 Ea	25.4 Da	24.8 Da	25.7 Ea	11b	Hump	Camel	
35.4 Ba	33.9 Ba	34.2 Ba	35.4 Ba	11b	Camel belly		

Small letters that are similar horizontally mean that there are no significant differences between them capital letters that are similar vertically mean that there are no significant differences between them

Table (3) shows the percentage of loss in the diameter of the burger prepared from calf meat with different fatty tissues added to it, as the results indicated that the highest percentage of loss in diameter was in the burger that was added calf hump fat, as it reached 39%, while the lowest percentage was in burger added it is the fat of the camel's hump, as it reached (24.8)%.

4- The change in thickness of the burger pieces during cooking

Table (4) shows the percentage of thickness loss in calf meat burgers prepared with different fatty tissues

Period				thickness before cooking	Fat site	Fat type	Meat type
45 Day	30 Day	15 Day	0 Day				
5.1 Db	4.7 Dc	4.2 Ed	4.2 Dd	7.7 a	Sheep fat tail tissues	Sheep	Calf meat
12.5 Ca	12.0 Bb	11.6 Cc	11.6 Cc	7.7 d	Sheep belly		
12.9 Cab	13.3 Ba	12.0 Cc	12.0 Cc	7.7 d	Hump	Caif	
7.3 Da	7.3 Ca	7.3 Da	3.8 Db	7.7 a	Calf belly		
20.3 Abc	18.1 Ac	21.1 Ab	31.5 Aa	7.7 d	Hump	Camel	
17.7 Ba	16.8 Aa	17.2 Ba	18.9 Ba	7.7 b	Camel belly		

Small letters that are similar horizontally mean that there are no significant differences between them capital letters that are similar vertically mean that there are no significant differences between them

Table (4) shows the loss in meat burger thickness, where it is noted that the burger to which camel hump fat was added, there was a significant p0> 0.05 thickness loss, as it reached (20.1.18.1,21.1.31.5)% for fresh and frozen stored for periods (zero, 15, 30, 45 days, respectively, while the percentage of losses

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in the burger thickness added to the sheep fat tail tissues was less, reaching (5.1.4.7.4.2, 4.2) for the periods (0, 15, 30, 45) days, respectively. This may be due to the different nature of adipose tissue and its content of phospholipids that act as emulsifying agents that help retain water associated with protein**, Mirgan 1977** asserted that camel fat is low in phospholipids, in addition to the quality of protein tissues .

5- Total weight loss during cooking

Table (5) shows the percentage of weight loss in calf meat burgers prepared with different fatty tissues

Period				weight before cooking	Fat site	Fat type	Meat type
45 Day	30 Day	15 Day	0 Day				
40.80CDa	40.40Ba	40.57Ba	40.33BCa	50 b	Sheep fat tail tissues	Sheep	Calf meat
44.17ABa	43.8Aa	43.53Aa	43.67ABa	50 b	Sheep belly		
42.33BCa	40.53Ba	40.73Ba	41.87Ba	50 b	Hump	Caif	
45.87Aa	45.73Aa	45.37Aa	45.60 Aa	50 b	Calf belly		
39.2Da	38.87Ba	39.17Ba	38.80Ca	50 b	Hump	Camel	
41.00CDa	40.93Ba	34.00Cb	42.67Ba	50 c	Camel belly		

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Table (4) shows the percentage of weight loss in burgers prepared from veal with different fatty tissues, as the results show that the percentage of loss in burgers prepared from calf meat and the added to the cells of sheep and belly fat amounted to (43.67,40.33%), respectively.

while the burger added to the hump of the calf and fat belly of the calf, the percentage of weight loss was (45.6,41.87 %). As for the burger prepared from calf meat and hump fat and camel belly, the percentage of weight loss was (42.67,38.80%). That is, the burger to which belly fat was added in sheep, calf and camel showed a higher percentage of weight loss compared to tissues. As the sources indicate that belly fat contains a percentage of saturated fatty acids that may reach 34.1% compared to the sheep cells that contains 37.1% saturated fatty acids with high melting points, especially during cooking the burger which reduces weight .Momen et al., 2016

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5- Effect of adding fat tissue on the qualitative and sensory characteristics of the burger

1- Effect of adding fat tissue on the color quality in meat burgers

Table (5) shows the sensory evaluation (color) of processed veal burger with fatty tissue differen

color				Fat site	Fat type	Meat type
The average	M3	M2	M1			
8.6 AB	8	9	9	Sheep fat tail tissues	Sheep	Calf meat
9.0 A	9	9	9	Sheep belly		
9.0 A	9	9	9	Hump	Caif	
8.6 AB	9	9	8	Calf belly		
8.3 B	9	8	8	Hump	Camel	
8.3 B	9	8	8	Camel belly		

Capital letters that are similar vertically mean that there are no significant differences between them

The results of table (5) show the changes in the color character of burger prepared from calf meat with different fatty tissues, as the burger of calf meat added to it calf fat tissues (hump and belly of the calf). Significantly at 0.05 < p0 to reach (9), while the degree of color evaluation in meat burger with sheep fat tissue reached (8.6-9) and prepared from burger calf meat with camel fat tissues (8.3) out of (9) degrees, and this indicates that fatty tissues The additive maintains a high sensory color rating These results were good compared to what **Al-Issawi and Naji 2016** found when adding a dye. Lycopene as an anti-oxidant factor for beef burger, as the color character obtained ranged degrees Between (7-7.50) out of (9) scores .

2- Effect of adding fat tissue on the flavor quality in meat burgers

Table (6) shows the sensory evaluation (flavor) of processed veal burger with fatty tissue differen

flavor				Fat site	Fat type	Meat type
The average	M3	M2	M1			
8.3 B	9	8	8	Sheep fat tail tissues	Sheep	Calf meat
9 A	9	9	9	Sheep belly		
9 A	9	9	9	Hump	Caif	
9 A	9	9	9	Calf belly		
9 A	9	9	9	Hump	Camel	
9 A	9	9	9	Camel belly		

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Capital letters that are similar vertically mean that there are no significant differences between them

The results of Table (6) sensory evaluation of the flavor characteristic also show that there are no significant differences between the treatments except for the burger to which the sheep cells is added, as it is due to the sheep fat tail tissues containing acids Fatty, aldehyde and ketone compounds affected the evaluation of this trait.

7=Effect of adding fat tissue on the juiciness of meat burgers

Table (7) shows the sensory evaluation (juiciness) of processed veal burger with fatty tissue different

Juiciness				Fat site	Fat type	Meat type
The average	M3	M2	M1			
7.7 A	7	9	7	Sheep fat tail tissues	Sheep	Calf meat
8.0 A	8	8	8	Sheep belly		
8.0 A	8	8	8	Hump	Caif	
8.0 A	8	9	7	Calf belly		
7.7 A	9	7	7	Hump	Camel	
7.0 B	7	7	7	Camel belly		

Capital letters that are similar vertically mean that there are no significant differences between them

The results of Table (4-27) also show that the juiciness of the samples did not show significant differences with the exception of Burger with camel belly fat tissue added

Effect of adding fat tissue on the aroma of meat burgers

Table (8) shows the sensory evaluation (aroma) of processed veal burger with fatty tissue different

Aroma				Fat site	Fat type	Meat type
The average	M3	M2	M1			
8.3 B	9	8	8	Sheep fat tail tissues	Sheep	Calf meat
8.3 B	9	8	8	Sheep belly		
8.7 A	9	9	8	Hump	Caif	
9.0 A	9	9	9	Calf belly		
8.3 B	9	8	8	Hump	Camel	
8.3 B	8	9	8	Camel belly		

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The results of Table (4-28) show that the aroma characteristic of the burger to which calf fat tissue is added showed significant differences (0.05<p0), reaching (8.7-9) compared to the other samples (8.3) to which it was added Sheep and camel fat.

Effect of adding fat tissue on the tenderness of meat burgers

Table (9) shows the sensory evaluation (tenderness) of processed veal burger with fatty tissue different

Tenderness				Fat site	Fat type	Meat type
The average	M3	M2	M1			
7.3 D	8	7	7	Sheep fat tail tissues	Sheep	Calf meat
7.7CD	8	8	7	Sheep belly		
8.7 A	9	9	8	Hump	Caif	
8.3AD	9	9	7	Calf belly		
7.7 CD	8	8	7	Hump	Camel	
8.0 BC	8	9	7	Camel belly		

Capital letters that are similar vertically mean that there are no significant differences between them

As for Table (9), it represents the sensory evaluation of the characteristic of tenderness, which indicates the superiority of samples calf meat burger with calf fat tissue significantly p0 <0.05 (8.3-8.7) compared to the treatments(7.7-9.0).

Effect of adding fat tissue on the General acceptance of meat burgers

Table (10) shows the sensory evaluation (General acceptance) of processed veal burger with fatty tissue different

General acceptance				Fat site	Fat type	Meat type
The average	M3	M2	M1			
9.0 A	9	9	9	Sheep fat tail tissues	Sheep	Calf meat
8.7 A	9	9	8	Sheep belly		
8.7 A	9	9	8	Hump	Caif	
8.7 A	8	9	9	Calf belly		
8.7 A	9	9	8	Hump	Camel	
8.3 B	9	8	8	Camel belly		

Capital letters that are similar vertically mean that there are no significant differences between them

The results of Table (10) show that the trait of general acceptance obtained high levels that ranged between (9-8.3) in most of the samples.

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Conclusions

Burger samples added to camel belly fat and camel hump showed low levels of free fatty acids, and weight loss Burger and diameter for meat burger. The sensory evaluation scores were good (7) and excellent (9) for most of the traits.

References

1. A.O.A.C.(2004).official methods of analysis,15thEd,Association of Official Analytical Chemists, Washington , D.C.
2. Al-Issawi ,Muhammad Abd, Naji, Ethar Zaki (2016). Effect of tomato lycopene on the chemical and physical properties of cold-stored beef briar.Al-Anbar Journal Agricultural Sciences Volume 14 Issue1
3. Al-Rawi, Muhammad Khashi' and Khalaf Allah, Abd al-Aziz Muhammad (2000). Design and Analysis of Agricultural Experiments, House of Books for Printing and Publishing
4. Hanula,M.; Szpicer,A.; Górska-Horczyczak,E .; Khachatryan,G.; Pogorzelska- Nowicka,E,and Poltorak,A.(2022) Quality of Beef Burgers Formulated with Fat Substitute in a Form of Freeze-Dried Hydrogel Enriched with Açai Oil journal Molecules , 27, 3700.
5. Judge, M. D. (1974). Meat technology to meet the needs of the food service industry: Meat patties. In Proceedings.
6. Lawrie,R.A . (2006). Wordhead Publishius limited Lawries meat Scince ,Seventh edition. P(461).
7. Mirgani, T.; (1977), Fatty acid composition of liver triglycerides of camel. World rev. animal product.; Italy; DA. VOL. 13; NO 4; PP. 57-59.
8. Momen,M.; Kashan,N.;J, Roudbar,M.;A, Sharifi,S.;D,and Mehrgardi,A.;A,(2016) Fatty Acid Composition of Fat-Tail and Visceral Fat Depots from Chaal and Zandi Pure Bred Lambs and Their Crosses with Zel (Three Iranian Breeds). Iranian Journal of Applied Animal Science 6(1), 107-112.
9. Nafiseh, S., Hossein, G. (2015). meat beef burger using Aloe vera. Meat Science, Vol 99, PP 75
10. Standardization for the Cooperation Council for the Arab States of the Gulf 948 GSO 05 CDS,(2017). Prepared Meat - Barker Meat.