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Processing of Jerky meat in Iraq using soya sauce, sweet chili sauce and special spices

Mahfoodh Khaleel Abdullah Maysaloon Wail Ibrahim

Ahmed Ramadan Muhaimeed

Department of Animal production / College of Agriculture / University of Tikrit / Republic of Iraq

Email: Dr_mka@yahoo.com maysaloonwail@yahoo.com ahmedalaraby79@yahoo.com

Abstract

This research was done in it in the laboratories of department of animal production/agriculture college/Tikrit university from 2/12/2016 to 2/2/2017 the beef meat loin samples collected from the butchers shop. Then the muscle (longissimussdorsi) separated for use in the manufacture of jerky. The meat dried in the oven after treated with some additives divided into four treatments: control treatment1(without additions) , treatment2 (Soya Sauce added) , treatment3 (special spices added) , treatment4(sweet chili sauce added). The moisture and protein percentage of jerky pieces were measured then panel test was conducted by specialized professors in the department .

The results showed a significant differences in moisture contents between four treatments where the percentage was low in the third treatment than the others (23.45±0.45)% also the control treatment which was (25.16 ±0.22) %. protein percentage, the results indicated that there was a significant decreased in the protein percentage for treatment 2 and 4 which were (64.94±0.28)% and (65.02±0.74)% respectively .

while this percentage was increased significantly in1 and 3 treatments (67.02±0.33)% and (68.52±0.11)% respectively.

For the PH value, the results indicated that there was a significant decreased in the pH value for treatments 2,3 and 4 (5.66±0.04)(5.59±0.00)(5.71±0.01) compared to the control treatment which was (5.93±0.03).

For the panel test, the results indicated that there was no significant differences in rancidity except accounting differences only where treatment 4 was superior than the other treatments . as for the color, treatment 2,3 and 4 showed significant differences for the desired color of the Jerky by the consumer as it reached (4.11±0.63) (4.74±0.17) and (4.90±0.62) respectively compared to the treatment 1 (3.12 ± 0.22). For the tenderness, there was no significant differences between the four treatments where the tenderness was decreased for all treatments.

Finally, for the general acceptance, treatment 1 and 3 were superior as it reached (4.94±0.71)(5.00±0.65) respectively compared to treatment 2 and 4 as it reached (3.11±0/61)(4.28±0.58).

Keywords: Jerky meat, Meat processing, extended meat shelf-life.

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Introduction

Meat is necessary of human nutrition because of its high protein content and some vitamins (vitamin B) .also it has important mineral elements such as iron, Phosphate and Calcium. It is highly nutritious because it is one of the most concentrated and easily digested foods, as well as a good source of essential amino acids for human life. Meat also activates the metabolism because it contains large amounts of proteins, that helps the human body to produce heat and energy for all vita processes of the body(7).

Because of the increase of population in world, there was a need to find a complete industry to provide high-quality meat products with high nutritional value. The meat industry has started since ancient times and no doubt after the man learned fishing, and the first known methods are drying under the sun(3). The scientific basis behind the method of preserving meat by drying, is by removing the moisture and thus it will prevent the growth of microorganisms and mold which preserves meat(1). Processed meat is fresh properties which have been modified using one or more methods, adding flavorings, discoloration and thermal treatment (3).

In this study, we refer to a method of processing meat which has not been previously worked in Iraq called(Jerky Meat). We hope to be operated by the competent authorities for the processing meat and involve it within the workshop producing meat in Iraq, as it is beneficial to both , researchers and traders.

Material and Methods:

This study was conducted in the laboratories of animal production department / in agriculture college in Tikrit University. Beef meat (longissimussdorsi) muscle was bought from Tikrit markets. Because it doesn't prefer the pieces containing fat which is

caused the speed of meat tasting as it affects the taste and flavor ,so, it must be 93% of it is lean , after that we removed any connective tissue or cartilage and then cut it to slices(thickness slide is ¼ inch) by using meat –slicing machine in the meat laboratory in animal production department.to make the slicing process easier, It is preferable to freeze the meat before so it become easy to deal with . then, the meat slices became symmetric.

Then, we divided the meat slicesin to four treatments (salt was added to the four treatments equally)

Treatment 1: the control without additions

Treatment 2: soya sauce added

Treatment 3: special spices added

Treatment 4: sweet chili sauce added

The meat was minced with these additives for 3 hours and then put it in the oven in order to be dried according to the first method mentioned above then removed from the oven and the following tests were carried out:

Chemical analysis:

1- Chemical analysis of meat:

1-1 moisture content:

Moisture content was determined according to A.O.A.C (2) .

1-2 protein content:

the (Kieldahl) method was used to estimate the protein percentage in Jerky based on the method that (9) mentioned it. Which includes three steps (digestion, distillation and burette) then obtain the protein ratios according the equation:

2- pH determination **:**

The PH was measured by using a digital pH meter (Switzerland) about 3 g of Jerky sample was cut into small pieces and 27 ml of distilled water was added. The mixed was made using homogenizer (Malaysia) and pH was recorded.

3- Panel test:

In panel test, we used the method that mentioned by Cross *et. al*. (5) .By 8 professors from animal production department, where the samples were offered to them to conduct a sensory evaluation to the flavor, tenderness,color and general except according to the sensory level (5 degrees) as in the panel test form:

Statistical analysis:

Analysis was done by analysis of variance (ANOVA) using the statistical analysis system (12)

And Duncan's multiple range tests were used to determine the statistical significance.

Results and discussions:

Chemical analysis of Jerky**:**

Noticed from table (1) low significant differences in treatment3 (23.45 ± 0.45) compared with control it was (22.16±0.22) the reason may be due to the type of spices were used in treatment 3. In other side we noticed a high significant differences in moisture contents in 2 and 4 treatments were (27.12±0.98) (26.93 ±0.38) respectively compared with control , the reason may be due to the sauce used in that treatments that contain high percentage of moisture. In general, commercial intermediate – moisture foods have moisture content of 20% to 40% (8).and when manufacturing intermediate – moisture food, it is important to control the moisture content because is closely related to water activity (11). This relationship between moisture and water activity is very important for controlling the quality and sensory properties of the Jerky(4).

As for protein percentage in Jerky we noticed significant differences in treatment 1and 3 were high

percentage (67.02±0.33) (68.52±0.11) respectively. While it were low percentage of protein in 2 and 4 treatments (64.94±0.28) (65.02±0.74) respectively. This may be due to the high moisture content in 2 and 4 treatments. In general, the protein was high percentage in all treatments.

Table (1) the percentage of moisture and protein in BeefJerky meat

Treatment	Moisture %	Protein %
Treatment 1(control)	25.16±0.22 b	67.02±0.33 a
Treatment 2(soya sauce)	27.12±0.98 a	64.94±0.28 b
Treatment 3(special spices)	23.45±0.45 b	68.52±0.11 a
Treatment 4(sweet chili sauce)	26.93±0.38a	65.02±0.74 b

Meanings of different letters of column differ significantly($p<0.05$) between them.

pH **:**

The PH values of all treatments was significantly lower (5.66± 0.04)(5.59±0.00)(5.71±0.01) respectively compared with the control sample was (5.93±0.03) . (8) Reported that the average PH for meat products was between (4.72 to 6.73) average. Also (11) reported that low PH can inhibit or delay the spoilage of various dried meat products by mold and microorganism growth .also the PH value of Jerky can be affected by additive types.

Panel test :

In panel test we noticed no significant differences between treatments in rancidity and this is because of the low percentage of fat in the samples ((fat increase the rancidity speed of meat)) as well as because of the correct way to preserve the Jerky.

About color, control was low significant differences (3.12±0.22) than the other treatments were (4.11±0.63)(4.74±0.17)(4.90±0.62) respectively . it should be noted that the color differences is due to the type of additives used in each treatment separately if the drying time is constant between the treatments.

The tenderness did not show significant differences between all treatments it were low (1.11±0.43)(1.94±0.08)(1.77±0.52) (1.80±0.24) respectively . this is not surprising if the reason due to the low level of moisture and this is the basis of the process of preparing Jerky is drying.

Finally, general acceptance showed significant differences in 1 and 3 treatments were high (4.94±0.71)(5.00±0.65) respectively compared with 2 and 4 treatments were (3.11±0.61)(4.28±0.58) respectively . Although, all treatments were within the limits of general acceptance by the consumer.

Table (2) the percentage of pH in BeefJerky meat

Treatment	pH
Treatment 1(control)	5.93 ± 0.03a
Treatment 2(soya sauce)	5.66 ± 0.04b
Treatment 3(special spices)	5.59 ± 0.00b
Treatment 4(sweet chili sauce)	5.71 ± 0.01b

Meanings of different letters of column differ significantly($p<0.05$) between them.

Table (3) the Panel Test in Beef Jerky meat

Treatment	Flavor	Color	Tenderness	General Accept
Treatment 1(control)	4.21±0.52 a	3.12±0.22 b	1.11±0.43 a	4.94±0.71 a
Treatment 2(soya sauce)	4.99±0.12 a	4.11±0.63 a	1.94±0.08 a	3.11±0.61 b
Treatment 3(special spices)	4.30±0.72 a	4.74±0.17 a	1.77±0.52 a	5.00±0.65 a
Treatment 4(sweet chili sauce)	5.00±0.82 a	4.90±0.62 a	1.80±0.24 a	4.28±0.58 b

Meanings of different letters of column differ significantly($p<0.05$) between them.

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تصنيع لحم (الجيركي) في العراق باستخدام اضافات مختلفة

محفوظ خليل عبد الله ميسلون وائل ابراهيم احمد رمضان محيميد

قسم الإنتاج الحيواني / كلية الزراعة / جامعة تكريت / جمهورية العراق

Email: Dr_mka@yahoo.com maysaloonwail@yahoo.com

ahmedalaraby79@yahoo.com

المستخلص

اجري هذا البحث في مختبرات قسم الإنتاج الحيواني /كلية الزراعة / جامعة تكريت للفترة من 2016/12/2 ولغاية 2017/2/2 تم خلالها شراء قطعيات لحم أبقار (منطقة القطن) وتم فصل عضلة ال LongissimussDorsi لاستخدامها في صناعة الجيركي ، حيث قسمت الى شرائح ثم تم تجفيفها في فرن التجفيف بعد معاملتها بأضافات معينة قسمت على اساسها الى اربع معاملات المعاملة الاولى: معاملة السيطرة بدون إضافات ، المعاملة الثانية اشتملت على اضافة صلصة الصويا ، المعاملة الثالثة اضيف اليها خلطة خاصة من البهارات ، اما المعاملة الرابعة فقد شملت اضافة صلصة الفلفل الحلو. اجري قياس مستوى الرطوبة والبروتين لقطع الجيركي الناتجة وبعدها تم اجراء الاختبار الحسي من قبل اساتذة مختصين في القسم .

اظهرت النتائج وجود فروقات معنوية في مستوى الرطوبة بين المعاملات الاربع حيث انخفضت نسبة الرطوبة في المعاملة الثالثة عن باقي المعاملات (23.45 ± 0.45) وكذلك معاملة السيطرة حيث بلغت (25.16 ± 0.22) ، كذلك نسبة البروتين فنلاحظ انخفاض معنوي في نسبة البروتين في المعاملتين الثانية والرابعة حيث بلغت (64.94 ±0.28) و (65.02 ± 0.74) على التوالي بينما ارتفعت هذه النسبة في المعاملتين الاولى والثالثة حيث سجلت (67.02 ± 0.33) و (68.52 ±0.11) على التوالي .ايضا تم قياس الـpH اظهر انخفاض معنوي في مستوى الـpH في المعاملات الثانية والثالثة والرابعة (5.66+0.04) (5.59+0.00) (5.71+0.01) مقارنة بالمعاملة الاولى (السيطرة) التي اظهرت نسبة PH (5.93 + 0.03)

اما بالنسبة للاختبار الحسي فنلاحظ في صفة الزناخة لم تظهر اي فروقات معنوية بين المعاملات الاربعة بأستثناء فروقات حسابية فقط حيث تفوقت المعاملة الرابعة عن باقي المعاملات حسابيا ، اما بالنسبة للون فقد اظهرت المعاملات الثانية والثالثة والرابعة فروقات معنوية بالنسبة للون المرغوب للجيركي من قبل المستهلك حيث بلغت (4.11 ±0.63) و(4.74 ± 0.17) و (4.90 ± 0.62) مقارنة بالمعاملة الاولى (3.12 ± 0.22) ، صفة الطراوة لم تظهر اي فروقات معنوية بين المعاملات الاربعة فقد انخفظت نسبة الطراوة في جميع المعاملات ، واخيرا بالنسبة للتقبل العام فقد

تفوقت المعاملتين الاولى والثالثة معنويا في صفة التقبل العام حيث بلغت (4.94 ± 0.71) و (5.00 ± 0.65) على التوالي مقارنة بالمعاملتين الثانية والرابعة اذ بلغت (3.11 ± 0.61) و (4.28 ± 0.58) .

الكلمات المفتاحية:لحم الجيركي ، تصنيع اللحوم ، اطالة العمر الخزني للحوم .

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