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THE NUTRITIONAL VALUE AND SPECIFIC PROPERTIES OF SOME TRUFFLE AND RED MEAT PRODUCTS

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Abstract

Fungi have a large role and influence on humans and its use in food is a very old practice, it is the Greeks who started using them since the fifth century BC. The research was conducted by selecting black truffles and beef to manufacture the burger product. Chemical tests were conducted and the following results were found. There were significant differences in protein values between the coefficient (A), and the coefficient (B), in the product coefficients, a statistically significant difference (P≤0.05) also appeared, in the coefficient of (E) after mixing of meat and truffles, the protein reached to (27.3). Also, a decrease in fat was observed in (B) coefficient compared to (A). There was a high significant difference in fat decrease in product coefficients, as it increased in (C) to (12.35) beef burger and decreased in (D) coefficient to (6.29), balanced in the coefficient of (E) to (10.36), this is a beneficial decrease in nutritional terms. As for moisture, it increased in (A) and (B), and by statistically significant difference (P≤0.05), and it decreased again in the three coefficients, the lowest in (C) reached (60.5). In the coefficient of (B), the ash content was higher than the coefficient of (A), it reached from (1.2) to (5.4), since the truffle is a plant obtained from the earth , the carbon percentage increased, as for the rest of the coefficients, the (E) coefficient got the lowest percentage (2.38) less than (C, D). Carbohydrates increased in coefficient (B) to (33) and decreased in coefficient (A) to (5.8). In the rest of the coefficients, they increased, in (E) coefficient reached (17). The results of the metallic elements examinations also indicated a clear statistically significant difference (P≤0.05), especially for the elements of calcium, sodium and zinc, which increased in coefficients (B, E) significantly with a high iron and phosphorus in coefficients (A, C, D). The results of the sensory evaluation showed a statistically significant difference (P≤0.05) for coefficient (C), which has the highest color ratio (7.3),general accepting (7) and the appearance (6.6). As for the (D) coefficient, the lowest indicators of sensory evaluation were obtained with significant differences (P≤0.05). Coefficient (E) came after the coefficient of (C). The appearance obtained (5.8), color (5.7), and general accept (5.5).

***Keywords*:** Truffles, meat, burger, beef burger.

Introduction

Some people believe that all fungi in nature are harmful, and this talk is true because there are types that cause diseases such as fungal spores that may grow on foods, but there are some useful and beneficial fungi that contain a high nutritional value such as truffles (Faka'a), mushrooms (Al-Alawi, 2009), and it is called fungi because it does not depend on itself but rather lives intrusively and dependent on others, where we note, for example, truffles must rely on trees, whether large or small for growth and living (Al-Rahma, 2000).

Truffle mushrooms grow under the surface of the earth after the rain comes down and its parts do not appear on it, and the desert truffle location is indicated by either the cracking of the land or its height above it, or by the hovering of insects above it (Al-Shabibi *et al.*, 1982) Its size may range from the size of a bird's egg to the size of an apple or orange, and it can be seen with the naked eye if the growth is complete, as it splits the ground and protrudes to the surface, and it may also exist in large sizes at times where it may range from half to a kilogram (Al-Rahma, 2000).

There are many types of truffles, including:-

- Al-Zubaidi, which is white in color and is characterized by large size.
- Al-Khalasi: Its color tends to be red and is smaller than Al-Zubaidi in size, but it is sometimes more expensive than Al-Zubaidi, which is often the most delicious taste.
- AI-Jabibi: This type is black in color and its size is very small (AL-Ruqaie, 2006).

Truffles are spread all over the world, as they spread in Europe, especially France and Spain, and are also present in the Levant and in the north of the Kingdom of Saudi Arabia, Kuwait and Iraq (Al-Alawi, 2009).

Laboratory tests have proven that it contains 09% proteins, 13% starchy materials, 01% fat, 75% water, and it contains minerals as in the human body such as phosphorous, sodium, calcium and potassium, and it is rich in vitamin B. The truffles also contain a quantity of nitrogen, Carbon, oxygen, and hydrogen, and this is what makes their composition look similar to the texture of meat and its taste when cooked is similar to the taste of the kidneys (Andrew and Carey, 2002, Riccioni *et al.*, 2004). In a study conducted with the aim of identifying nutrients in truffles, the results showed that they contain proteins, carbohydrates, fats, water and some minerals such as lead, chromium, cadmium, manganese, zinc, nickel and copper, and there were no pathological concentrators for heavy metals.

Truffles are classed with protein-rich materials; they contain a high level of high-quality protein due to their richness in essential amino acids. Truffle mushrooms are superior to meat in terms of protein content, on the one hand, and in terms of the nature of protein, on the other hand, because it is not associated with fats and cholesterol. This chemical composition makes classification of truffles difficult, because they differ from the plant in terms of fiber and vitamins, and also do not contain chlorophyll, and differ with the animal in terms of fat and cholesterol. Like all other fungi, it is a rare substance, which has a distinct role, because it does not carry a risk and integrates in it components such as proteins, mineral salts, vitamins and wood fibers, and a few good fats, and other components that the scientific research is still searching for as some flavonoids or hormonal compounds (Yan *et al.*, 2017; Bouatia *et al.*, 2018).

In addition to the basic mineral salts, truffles contain vitamins of the vitamin B group, including vitamin B 1 or thiamine, vitamin B 2 or riboflavin; there is no vitamin B 2 in the plant, it is limited to milk derivatives; truffles also contain niacin or vitamin B 3, and on folic acid (Murcia *et al.*, 2002; Kivrak, 2018). And on other nutritional components, including dietary fiber, because it is fermented, and because it is high in truffles. We know that vitamin B 3, or niacin, metabolizes fats and sugars, and works to reduce malignant cholesterol (LDL), and the lack of this vitamin in the body causes ulcers in the mouth, skin ulcers and digestive disorders. , In addition to the pleasant smell and delicious taste, which makes many buy it no matter how expensive it is (Murcia *et al.*, 2003; Akyüz, 2013; Hamza and Jdir, 2016).

Truffles are popularly used to treat brittle nails, the speed of their breaking or pounding, dryness of the lips, and vision disturbance, in which the Messenger (peace and blessings of God be upon him) said: "Truffles is a bounty from Allah "almighty" and their water is a cure for the eye" and truffles are used as good food as their nutritional value is more than 20% of their weight as they contain a large amount of protein protects against chronic diseases. An essential source to protect the eyes from swelling and contributes to facilitating human blood circulation, an essential component of bone growth and strengthening (osteoporosis) (Elsayed *et al.*, 2014).

For this reason, the current study aimed to know the nutritional value of truffles compared to beef after inserting truffles into a processed food product, which is burger, carrying out chemical tests and sensory properties, and knowing the nutritional components of the home-made product.

Materials and Methods

Truffles and beef were purchased from the local markets, and the black type was chosen as samples were taken up to 100 g for each of the two and finely chopped with the Japanese-made chopping Machine "National"

How to prepare burger from the two products (truffles and beef)

100 g were selected for the two research samples, from which the product was prepared. The pure meat was mixed with 2 g of salt; it was mixed well and then was put in a mold. 100 g of minced truffles and 1 g of salt were added (due to the prominent taste of the truffle, the salt was reduced in the product) it was mixed well and were put in a mold, and then 50 g of minced beef and 50 g of minced truffle were taken the product was mixed well and 1 g of salt was added to produce the burger. After that, the three products were fried on low heat with a very small amount of oil, and then they were presented to the evaluators and chemical analyzes were carried out to find the nutritional value and the difference between the meat and truffles.

Table one shows the coefficients codes used in the current search.

Coefficients	Additions
A	A piece of pure meat
B	A piece of pure truffles
C	Beef burger meat 100 g
D	Burger truffles 100 g
E	(Burger mixture (50g meat and 50g truffles

Chemical tests

The chemical composition of burger products from meat and burger from truffles was estimated using the standard methods mentioned in (15) (A.O.A.C). As mentioned below:

1. Estimating the protein

Protein was estimated by the Kaldal method, whereby total nitrogen was estimated and multiplied by a factor of 6.25 to extract the protein percentage.

2. Estimating ash

The ash was estimated by burning the sample in the Muffle Furnace incinerator at a level of 525 m until the color changed to grayish-white to extract the amount of ash in the eye (E.O.A.C, 2015).

3 Estimating humidity

2-3 g were taken for each sample of the research and placed in a known-weight basin with an electric oven of 105 °M until the weight was established. After cooling, the basin was taken, weighed and moisture extracted.

4. Estimating fat

Fat was extracted by Soxhlet device and by using petroleum ether.

5. Estimating the total carbohydrates

It was estimated according to what mentioned in (A.O.A.C, 2005).

6. Estimating the mineral elements

Iron, calcium, phosphorus, sodium, copper, and zinc were estimated using the Atomic Absorption Scectrophometer, manufactured by Perkin Elmer Model VSA500, according to the method mentioned in (Dubois *et al.*, 1956).

Sensory evaluation

The sensory evaluation of the burger sample of meat and truffles was carried out by 10 evaluated specialists from the University of Baghdad, Department of Home Economics, according to the evaluation form mentioned in (Watts *et al.*, 1989; Haswell, 1991) and approved by the Department of Food and Nutrition of the University of Kansas, USA, using the interactive balance, which starts from 1-7 Where 7 = Excellent 6 = Very Good 5 = Good 4 = Average 3 = Acceptable 2 = Bad 1 = Very Bad. These characteristics included (smell color, flavor, texture, appearance, and general acceptance.

Statistical analysis

The results were analyzed statistically according to the (SAS-Statistical Analysis System) (SAS, 2012) which is used in data analysis to study the effect of different coefficients for all characteristics studied according to a random design for each of the (CRO) and the differences between the averages were compared with the least significant difference test (LSD).

Results and Discussion

Table 1 : Effect of coefficients on the results of chemical analysis

Transaction	Protein	Oil	Humidity	Ash	CHO
A	58 ± 2.58	3.54 ± 0.09	71.8 ± 3.61	1.2 ± 0.03	5.8 ± 0.14
B	24 ± 1.53	2.83 ± 0.07	75 ± 2.82	5.4 ± 0.17	33 ± 2.09
C	43.8 ± 2.66	12.35 ± 0.46	60.5 ± 2.36	3.36 ± 0.07	8.5 ± 0.54
D	14.2 ± 0.72	6.29 ± 23	64.63 ± 2.09	6.3 ± 0.25	13.4 ± 0.35
E	27.3 ± 1.86	10.36 ± 0.52	67.16 ± 2.74	2.38 ± 0.12	17 ± 1.03
Values LSD	7.552 *	3.427 *	7.821 *	1.264 *	5.027 *

*(P≤0.05).

Table No. (1), the chemical content of the five coefficients is explained. In coefficient (A), the amount of protein increased in compare with coefficient (B) and with a significant statistical difference (P≤0.05) with higher fats and a statistically significant difference (P≤0.05). As for moisture, ash And carbohydrates they were risen in coefficient (B) and this is match with (Aboud and Rohm, 2008).

Reducing fat in truffles is an important matter. In addition, that these fats are originally of a harmless type that is beneficial to the body, which increasing the importance of truffles (Al-Hussainy and Al-Fadhly, 2019; Khalifa *et al.*, 2019). When comparing the three coefficients (C, D, E), we notice a high statistically significant difference (P≤0.05). The protein increased in the coefficient (C) and it becomes less in (D). In coefficient (E), a significant difference was obtained. The ash content in the coefficient (E) was less than the two coefficients C.D with a high statistically significant difference. As for fats, it reached a balance in the percentage of which in an amount that is not harmful, as well as with balanced amounts of moisture and carbohydrates. From the table, we note the coefficient (E) has shown a remarkable balance in the proportions of the contents and compensated for the deficiency and increase in the coefficients (C .D). Truffles contain important nutrients in ideal quantities, which increased the importance and nutritional value of truffles, and this was emphasized by each of (Patel, 2012; Vahdani, 2017).

Table 2 : Effect of coefficients on results of content of mineral elements.

Transaction	Cu ppm	Na %	Fe ppm	P%	Ca ppm	Zn/ppm
A	10 ± 0.42	0.20 ± 0.06	204 ± 11.48	0.66 ± 0.043	0.02 ± 0.003	70 ± 3.56
B	4 ± 0.09	0.63 ± 0.12	143 ± 8.23	0.43 ± 0.032	0.15 ± 0.012	153 ± 8.62
C	5 ± 0.15	0.81 ± 0.19	93 ± 4.51	0.45 ± 0.073	0.33 ± 0.008	51 ± 2.77
D	22 ± 1.08	3.00 ± 0.08	120 ± 7.02	0.33 ± 0.008	0.23 ± 0.0013	32 ± 1.35
E	25 ± 2.16	2.11 ± 0.15	120 ± 5.49	0.38 ± 0.015	0.27 ± 0.008	76 ± 3.76
Values LSD	4.821 *	0.772 *	24.382 *	0.175 *	0.114 *	17.662 *

*(P≤0.05).

Table No. (2) shows us the content of coefficients of minerals, so if we compare the coefficient of (A) which is pure meat and the coefficient of (B) which is pure truffle, we notice the high content of (B) of each of the calcium that reached in 100 grams to (0.15) with a high statistically significant difference (P≤0.05) while in meat (A) it reached (0.02) in the same quantity and the increase in the percentage of sodium metal in truffles (B) to (0.63) with a statistically significant difference (P≤0.05) over meat (A) that reached (0.2) and a noticeable increase and a highly statistically difference for the element zinc in the truffle that reached (153) and (70) in the meat. There is an increase in iron and phosphorus in meat than in truffles; If we compare the product, there is a noticeable increase in the product of mixed meat with truffles, coefficient (E), it has gotten a high increase in iron and phosphorus, sodium, copper and zinc, with a statistically significant difference (P≤0.05). With this increase, we get a beneficial increase that compensated for the deficiency in some elements, which is one of the good indicators to increase the nutritional value of the product due to the fact that the quantities are also high in minerals, and this is identical to the study (Sawaya, 1985).

Table 3 : Effect of coefficients on sensory evaluation results.

Transaction	Appearance	Color	Taste	Tissue	juiciness	Odor	General acceptance
C	6.6 ± 0.32	6.4 ± 0.25	7.3 ± 0.36	6.3 ± 0.30	6.0 ± 0.26	6.3 ± 0.28	7.0 ± 0.33
D	4.6 ± 0.09	5.0 ± 0.13	4.8 ± 0.15	4.0 ± 0.12	4.9 ± 0.14	4.7 ± 0.14	4.0 ± 0.10
E	5.8 ± 0.16	5.7 ± 0.14	5.0 ± 0.14	5.1 ± 0.17	5.5 ± 0.21	5.6 ± 0.25	5.5 ± 0.24
Values LSD	1.047 *	1.193 *	1.224 *	1.084 *	1.114 *	1.372 *	2.034 *

*(P≤0.05).

From the table, we note that the coefficient (C) obtained the highest levels of acceptance by the specialist evaluators and with significant differences (P≤0.05) with a general acceptance of (7) with a significant difference (P≤0.05) and with high ratios of appearance, color, taste, texture, juiciness, and odor. As for the coefficient (D), it obtained a med general acceptance by the evaluators of all characteristics, due to one reason being the incoherence of the tissues that

got (4), and the acceptance of appearance was less than the rest of the coefficients. However, the coefficient was never rejected by the evaluators. From the results, we note the acceptance of the product consisting of a mixture of meat and truffles more than if the truffles were alone.

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