Minia J. of Agric. Res. & Develop., Minia Univ., Vol. 45 (4): 1009 - 1018, 2025

Minia Journal of Agricultural Research and Development

Journal homepage & Available online at:

https://mjard.journals.ekb.eg

The Effect of Almond Oil Addition on The Physicochemical, Sensory and Antioxidant Properties of Ras Cheese.

Heba, M. EL-Sagher*, Salma, M. Galal, Karima A. H. Saleh and A.S. Zahran.

Diary Science Department, Faculty of Agriculture, Minia University, Minia, Egypt.

Received: 2 Nov. 2025 Accepted: 10 Nov. 2025

ABSTRACT

This article reviews the potential impact of incorporating almond oil into Ras cheese on its pH, acidity, moisture, fat content and antioxidant capacity. Ras cheese treatments were manufactured from cow milk, as control (c), cow milk with 3% almond oil (T_{A1}) and cow milk with 5% almond oil (T_{A2}) (almond oil was added into cheese curd). The chemical, sensory and antioxidant analysis of the cheese during 6 months of ripening period at 13°c±2were evaluated. There was a significant decrease in moisture and pH, while fat, acidity and antioxidant capacity significantly increased. Ras cheese with 5% almond oil showed the highest radical scavenging activity than that with 3% almond oil as well as control. Results of total phenolic and flavonoids compounds indicated that Ras cheese with 5% almond oil had the higher content in fresh cheese (32.6± 0.1, 26.3± 0.1) and increased during ripening period for 6 months (35.6 ± 0.1 and 33.1± 0.1 mg/100g cheese). In all cheese treatments, the amount of total volatile fatty acids (TVFAs) rose during the ripening process. The acceptability of Ras cheese for sensory evaluation increased in tandem with the ripening period in all treatments. However, after three months of ripening, cheese containing 5% almond oil received the greatest ratings for flavor, body, and texture. After four months, however, Ras cheese with 3% almond oil-based received the highest score.

Keywords: Ras cheese, Almond oil, Antioxidants, Cheese ripening.

INTRODUCTION:

Ras cheese is one of the most often consumed hard cheeses in Egypt.

It is generally manufactured without the use of special starters from raw cow milk or a combination of cow and buffalo milk. It is consumed after 3 to 6 months when it has a sharp aroma close to the Greek variant (Kefalotyri cheese) **(Shahin *et al.*, 2023)**.

The aroma and taste of Ras cheese are crucial components. Most of the time, consumers base their cheese selection on its flavor. Starter and non-starter lactic acid bacteria produce the cheese flavor by lipolysis and proteolysis (**Awad et al., 2007**).

* Corresponding author: Heba, M. EL-Sagher
E-mail address: hebashawkey@mu.edu.eg

Almond oil, obtained from prunus amygdales, contains a high proportion of unsaturated fatty acids and oil-soluble compounds such as phytosterols and tocopherols (Vit. E) (**Grundy *et al*., 2016**).

Almond oil consists predominantly of oleic acid (about 70%) and linoleic acid, along with minor amounts of saturated fatty acids. It is an excellent source of vitamin (E) and contains bioactive phytochemicals with antioxidant properties. The aim of this study was to evaluate the effect of almond oil addition on the physicochemical and antioxidant activity of Ras cheese.

MATERIALS AND METHODS

Materials

Chemicals:

All chemicals used in this study were of analytical grade supplied by BDH sigma and prolabo chemical companies. Distilled water was used for the preparation of all solutions, Pyrex glassware were used throughout.

Milk samples:

Whole fresh Cow's milk was obtained from the herd of the Animal Production Department, Faculty of Agriculture, Minia University.

Oil extract:

Bitter almond oil was obtained from Faculty of Agriculture, Assiut University.

Salt

Commercial sodium chloride was obtained from El-Naser Company for salt Alexandria, Egypt.

Starter:

Ras cheese starter consisted of *Loctobacillus delbrueckii* subsp *bulgaricus* (EMCC 11102) and *Streptococcus salivarius* subsp *Thermophilus* (EMCC 11044) and *Lactobacillus casei* (EMCC 11093) were obtained from Cairo Microbiological Resource's Center (MIRCEN) Faculty of Agriculture, Ain Shams University.

Methods

Cheese manufacture:

Ras cheese was prepared using the mothed of **Hammam et al**., **(2020**). cow's milk inoculated with *Streptococcus salivarius* subsp *thermophilus*, *Lactobacillus delbrueckii* subsp *bulgaricus*, and *Lactobacillus casei* (1:1:1%) as lactic acid starters at 32°C, thoroughly mixed, and allowed to sit for 30 minutes to generate the acid before renneting. After 40 minutes of coagulation, the curd was cut into small cubes, and the temperature was raised to 45°C for 15 minutes.

The curd was kept at this temperature for fifty minutes. After that, the whey was drained when the curd acidity reached 0.14%. the salt was added to the curd/ whey mixture at a rate of 2% of the original milk weight and stirred for 15 minutes and then cooled. The curd cheese was divided into three portions, the first part as control (C), the second and third parts were treated with 3 and 5% almond oil (on the base of cured weight) and nominated as (T_{A1}) and (T_{A2}) respectively. The cheese curd was pressed.

The initial two hours the curd was subjected to the pressing using a weight of 160 pounds. Following this initial light press, the weight was significantly increased to 1000 pounds for overnight pressing. Once the desired moisture level and shape were achieved, the cheese was waxed. The ripening occurred at a stable temperature of 13±2°C and a relative humidity of about 85%.

Physicochemical analysis

Sampling: In accordance with ***Guinee et al.*** **(2000**), 200 g of cheese samples were taken, and the outside portion (2 mm beneath the crust) was removed. The cheese samples were then grated to produce 1 mm particles.

Cheese samples were analyzed in triplicate when fresh, and after 15 days ,1 ,2, 3, 4months, 5 and 6 months of ripening.

2.1-pH values:

Ten grammes of cheese were homogenized with ten milliliters of distilled water to create emulsion cheese samples, and a digital pH meter (model SA 720, USA) was used to determine the samples' pH.

2.2-Titratable acidity (TA):

The titratable acidity was determined according to **(AOAC, 2012)**.

2.3-Moisture content

Moisture was determined according to the method described by Ling **(1963).**

2.4-Fat Content

Fat content was determined using the Gerber‟s method as mentioned in AOAC **(2012)**.

3- Lipolysis in cheese

The method outlined by **Kosikowski (1982)** was used to measure the changes in total volatile free fatty acids (TVFFA) after lipolysis in cheese during ripening.

4- Determination of Antioxidant properties

(4.1)- Radical Scavenging method (DPPH):

DPPH radical scavenging method for water soluble extract. The 1,1-diphenyl-2-picrylhydrazed radical (DPPH) assay was carried out by was used following **Bhandari *et al*., (2010**).

4.2 -Total phenolic contents

Total phenolic contents were measured using the Folin–Ciocalteu technique and reported as gallic acid equivalents (GAEs) (**Sim et al., 2010**).

4.3-Total Flavonoid Determination:(TFC)

The concentration of total flavonoid compounds in the extracts was determined by the aluminium chloride colorimetric assay **Kim *et al*, (2003)**.

5-Sensory evaluations:

According to **Pappas et al. (1996**), the sensory properties of the experimental Ras cheese samples were assessed during ripening period.

6-Statistical analyses

Data collected had been subjected to two-way Analysis of Variance (ANOVA) to determine the overall effect of treatments and storage, on physicochemical and quality attributes of samples. The differences had been separated using the Least Significant Difference (LSD)**(Motulsky,1999)**.

Results and Discussion

Titratable acidity (TA) and pH values:

All cheese treatments showed a significant steady rise in titratable acidity ($P<0.05$), particularly during the first three months of the ripening period. This can be related to fermentation of residual lactose and degradation of Table (1) intermediates components of protein and fat **(Ibrahim *et al*., 2011; El-Hawary *et al*., 2015)**.

The titratable acidity was posit to the pH values either fresh of during the ripening process. Throughout the ripening process, the pH values of the cheese samples steadily dropped dramatically. This may be attributed to the high lipolysis and proteolysis during ripening process.

The changes in the (TA%) and pH values during in ripening of Ras cheese samples indicated a more proteolysis and lipolysis occurred in the treated cheese with almond oil compared to the control one. These results are in agreement with **Awad *et al*., 2007; Ebid, 2016 and Abd-Elmontaleb, 2017)**.

The results indicated that, there are a significant increase ($P\leq0.05$) in fat content of all Ras cheese samples during ripening period. The highest level of fat was observed in the treated samples (T_{A2}) (30.4 ±0. 1%), while the

lowest level was found in the control samples (27 ±0.2%) when fresh, and during ripening periods.

Table (1) Changes in the chemical composition of functional-Ras cheese samples during the ripening period as affected by Almond oil at 13°c±2.

Treatments	Ripening period (month)	Compositional parameters				
		Moisture	Fat	Protein	TA	pH value
Cheese (1) Control cheese	Fresh	43.55^{a}±0.01	27^{m}±0. 2	26.92^{s}±0.01	1.1^{l}±0.1	5.27^{a}±0.01
	15days	40.83^{c}±0.001	27.5^{m}±0.2	27.58^{p}±0.01	1.2^{k}±0.1	5.20^{d}±0.01
	1	37.83^{f}±0.001	28.8^{l}±0.2	28.71^{l}±0.01	1.55^{ghi}±0.01	5.02^{i}±0.01
	2	36.21^{j}±0.01	29.5^{jk}±0.2	29.24^{k}±0.01	1.75^{de}±0.01	4.91^{l}±0.01
	3	35.49^{l}±0.001	30.4^{hi}±0.2	29.86^{h}±0.01	1.84^{cd}±0.01	4.78^{q}±0.01
	4	34.29^{o}±0.001	31^{gh}±0.2	30.29^{f}±0.01	1.94^{c}±0.01	4.66^{r}±0.02
	5	33.32^{s}±0.001	31.7^{fg}±0.2	30.87^{d}±0.01	2.1^{b}±0.1	4.53^{t}±0.02
	6	33.06^{u}±0.001	32.2^{ef}±0.2	31.35^{b}±0.01	2.26^{a}±0.1	4.47^{u}±0.01
Cheese (2) +With 3% Almond oil (T_{A1})	Fresh	41.35^{b}±0.001	29.5^{jk}±0.1	26.46^{v}±0.01	1.2^{k}±0.1	5.25^{b}±0.01
	15days	38.93^{e}±0.001	30.4^{hi}±0.1	26.8^{t}±0.01	1.34^{j}±0.01	5.16^{e}±0.01
	1	37.12^{h}±0.001	31.03^{gh}±0.1	27.11^{r}±0.01	$1.57f^{g}$±0.005	4.96^{j}±0.01
	2	36.18^{k}±0.001	31.7^{fg}±0.1	28.16^{n}±0.01	1.84cd±0.01	4.85^{o}±0.01
	3	35.46^{m}±0.001	32.2^{ef}±0.1	29.47^{j}±0.01	1.93^{c}±0.005	4.66^{r}±0.01
	4	34.13^{q}±0.001	32.8^{de}±0.1	30.16^{g}±0.01	1.8^{d}±0.01	4.87^{n}±0.01
	5	33.12^{t}±0.001	33.2^{cd}±0.1	30.64^{e}±0.01	1.58^{fg}±0.01	5.02^{i}±0.01
	6	32.77^{v}±0.001	33.8^{bc}±0.1	31.51^{a}±0.01	1.5^{ghi}±0.01	5.09^{g}±0.01
Cheese (3) +With 5% Almond oil (T_{A2})	Fresh	39.88^{d}±0.001	30.4^{hi}±0.1	26.66^{u}±0.01	1.23^{k}±0.05	5.23^{c}±0.01
	15days	37.41^{g}±0.001	31.03^{gh}±0.1	27.24^{q}±0.01	1.45^{i}±0.01	5.12^{f}±0.01
	1	36.86^{i}±0.001	31.7^{fg}±0.1	27.74^{o}±0.01	1.67^{ef}±0.01	4.94^{k}±0.01
	2	35.45^{n}±0.001	32.2^{ef}±0.1	28.29^{m}±0.01	1.92^{c}±0.01	4.83^{p}±0.01
	3	34.76^{p}±0.001	32.8^{de}±0.1	29.52^{i}±0.01	2.1^{b}±0.1	4.64^{s}±0.01
	4	33.31^{r}±0.001	33.4^{cd}±0.1	30.17^{g} ±0.01	1.7^{e}±0.01	4.89^{m}±0.01
	5	32.77^{v}±0.001	34.2^{ab}±0.1	30.87^{d}±0.01	1.56^{gh}±0.01	5.06^{h}±0.01
	6	31.99^{w}±0.001	34.7^{a}±0.1	31.24^{c}±0.01	1.46^{hi}±0.01	5.12^{f}±0.01

The increment of fat as one of the dry mater constituents in cheese which increased with the loss of water during the ripening period. These results are with what obtained by **Abou- Dawood *et al*., (2005); Kebary *et al*., (2011)**. These results also are in agreement with **Awad *et al*., (2013)** and the same trend was observed by **Mehanna *et al*., (2009)**.

Table (1) showed also that during ripening the moisture content of Ras cheese from all treatments gradually decreased (P≤0.05). The moisture content was significantly different (P≤0.05) among all treated cheese, where the lowest moisture content recorded with (T_{A2}) samples.

This may be attributed to the water evaporation during ripening or the binding of water with protein as bound water as the ripening advanced, similar results were reported by **El-Essawi *et al*., (2013); Abd-Elmonem *et al*., (2022)**.

Total volatile fatty acids:

The obtained data showed that Ras cheese with 5% almond oil contained more TVFA Fig (1) (P≤0.05) as compared to control cheese during period of ripening.

Ras cheese with 5% almond oil had considerably (P≤0.05) higher total volatile fatty acid levels than both TA_1 and the control one either fresh or during the ripening process.

This may be primarily explained by the higher levels of fatty acids in almond oil and the rise of lipolysis that occurs during the ripening of cheese.

There findings were similar with what obtained by **El-Kholy, 2015; El-Sayed *et al*., 2020 and Solhi *et al*., 2020).**

Antioxidants:

Table (2) provides the data for the total phenolic content and flavonoid content. As the concentration radical scavenging of almond oil increased, the TPC and TFCs exhibited a significant (P≤0.05) increase.

While during ripening the (TPCs) and (TFCs) increased till (60 days) of ripening then the content gradually decreased till the end of ripening in all treated cheese samples and the control.

This phenomenon may be because phenol is used as a free radical to prevent fat from oxidizing by producing its own radical during the oxidation process (**Poncet-Legrand et al., 2006**). These findings are in line with those of **Rahman et al. (2017)**, who found that adding chia oil to Cheddar cheese considerably raised its phenolic content.

DPPH radical scavenging activity:

The DPPH radical scavenging activity of Ras cheese are shown in **Table** (2) and **Fig** (2). Ras cheese supplemented with 5% almond oil had the highest radical scavenging activity than treated samples with 3% almond oil and control cheese samples.

The antioxidant activity of Ras cheese with 5% almond oil were 42.5±0.1, 47.4±0.1, 54.1±0.1, 58.2±0.1, 56.3±0.1, 53.2±0.1, 51.4±0.1 and 49.7±0.1 (mg/100g) but treated Ras cheese with 3% almond oil were 41.2±0.1, 46.6±0.1, 52.8±0.1, 56.9±0.1, 54.1±0.1, 52.1±0.1, 50.3±0.1, and 49.2±0.1 and for control cheese were 39.5±0.1, 45.6±0.1, 49.5±0.1, 52.7±0.1, 50.4±0.1, 49±0.1, 46.3±0.1 and 44±0.1. These results are in agreement with those obtained by **Osman *et al*., 2011; Gafour *et al*., 2020.**

Who found that increasing the ratio of sesame hulls added resulted in a higher values of DPPH radical scavenging activity of cheese.

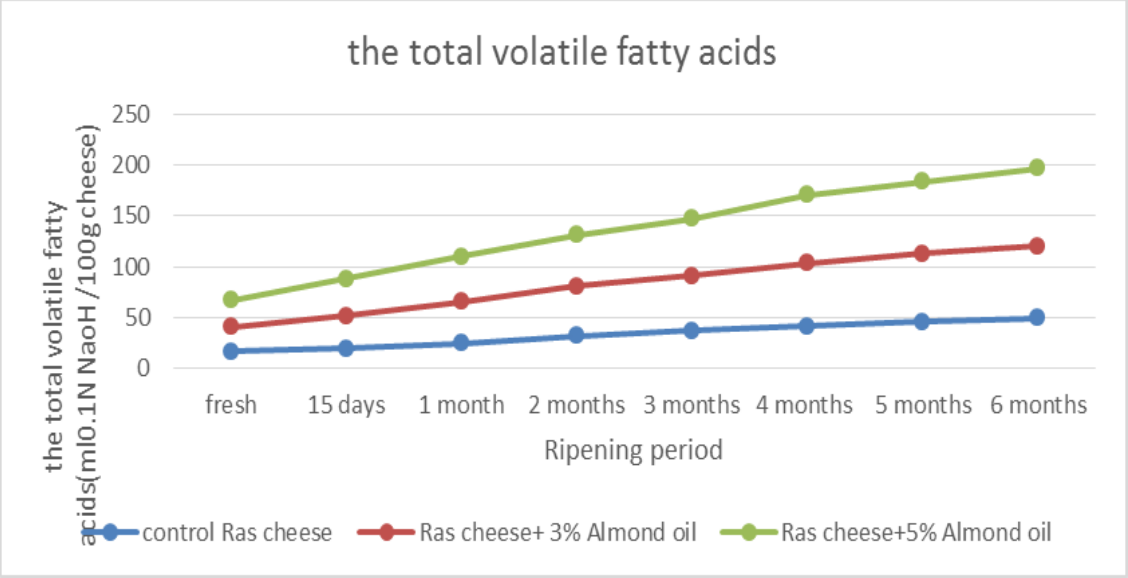

Fig (1) Effect of almond oil on total volatile fatty acids (ml 0.1N NaOH /100g cheese) content values of functional-Ras cheese samples during the ripening period as affected by almond oil at 13°c±2.

Table (2): Concentration of radical scavenging activity (DPPH) (%), total phenolic content (TPC) (mg/100g) and total flavonoids content (TFC) (mg/100g) of functional-Ras cheese samples during the ripening period as affected by almond oil at 13°c±2.

Treatments	Ripening period(month)	DPPH (%)	Total phenolic (mg/100g)	Total flavonoids (mg/100g)
Cheese (1) Control cheese	Fresh	39.5^{v}±0.1	29.4^{t} ±0.1	22.4^{v}±0.1
	15days	45.6^{r}±0.1	31.9^{r} ±0.1	27.4^{r}±0.1
	1	49.5^{l}±0.1	36.9^{m} ±0.1	31.1^{p}±0.1
	2	52.7^{g}±0.1	39.4^{g}±0.1	35.6^{ij} ±0.1
	3	50.4^{j}±0.1	37.9^{j} ±0.1	33.6^{l} ±0.1
	4	49^{n} ±0.1	36.4^{n}±0.1	31.4^{o} ±0.1
	5	46.3^{q} ±0.1	34.9^{p}±0.1	29.6^{q}±0.1
	6	44^{s}±0.1	31.9^{r}±0.1	26.6^{s}±0.1
Cheese (2) +With 3% almond oil (T_{A1})	Fresh	41.2^{u}±0.1	31.3^{s}±0.1	24.4^{u}±0.1
	15days	46.6^{q}±0.1	35.5^{o}±0.1	32.2^{n}±0.1
	1	52.8^{f}±0.1	39.4^{g}±0.1	38.1^{f} ±0.1
	2	56.9^{b}±0.1	42.9^{c}±0.1	41.2^{c} ±0.1
	3	54.1^{d}±0.1	41.5^{f}±0.1	39.1^{e} ±0.1
	4	52.1h±0.1	39.1^{h}±0.1	37.3^{h} ±0.1
	5	50.3^{j}±0.1	37.3^{l}±0.1	35.7^{i} ±0.1
	6	49.2^{m}±0.1	35.6^{o}±0.1	33.1^{m}±0.1
Cheese (3) +With 5% almond oil (T_{A2})	Fresh	42.5^{t}±0.1	32.6^{q}±0.1	26.3^{t} ±0.1
	15days	47.4^{o}±0.1	37.6^{k}±0.1	34.6^{k} ±0.1
	1	54.1^{d}±0.1	41.2^{e}±0.1	39.6^{d} ±0.1
	2	58.2^{a}±0.1	45.6^{a}±0.1	43.1^{a} ±0.1
	3	56.3^{c}±0.1	43.7^{b}±0.1	41.6^{b} ±0.1
	4	53.2^{e}±0.1	41.6^{d}±0.1	39.7^{d} ±0.1
	5	51.4^{i}±0.1	40.2^{f}±0.1	37.7^{g}±0.1
	6	49.7^{k}±0.1	38.7^{i}±0.1	35.5^{j}±0.1

Organoleptic properties:

Data in Table (3) indicated that the score of flavor, body and texture, appearance and overall acceptability of Ras cheese as affected by adding almond oil to Ras cheese with 5% almond oil (T_{A2}) gained the highest ($P \leq 0.05$) score after 3 months followed by (T_{A1}) after 4 months then the control after 5 months.

After 3 months for cheese treatment (T_{A2}) or after 4 months for (T_{A1}) of ripening the cheese as characterized as off flavor (un-like flavor) and as firm-slight brittle for body-texture. No significant ($P > 0.05$) differences were observed in appearance of Ras cheese among all treatments

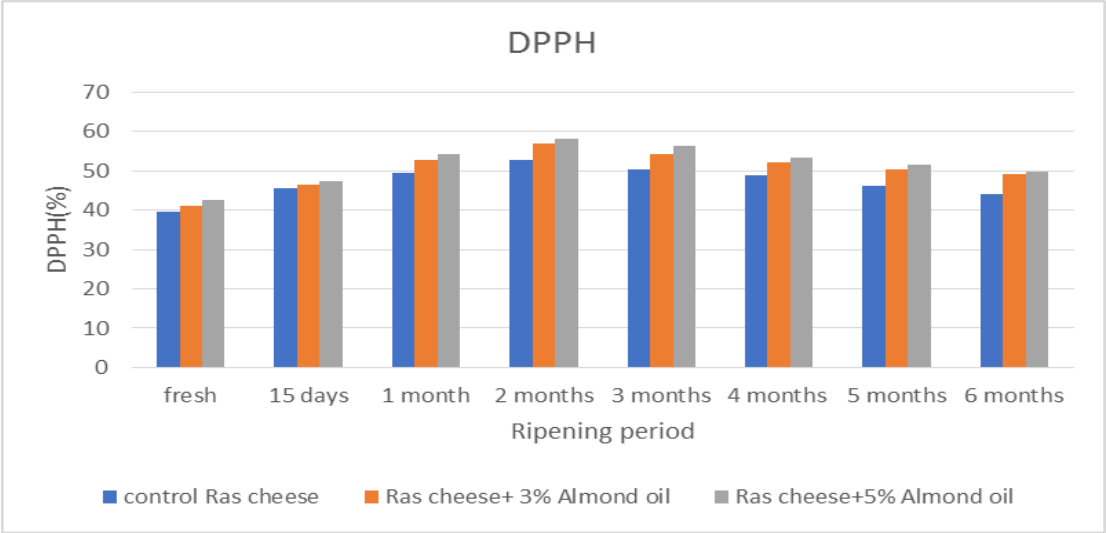

Fig (2). Concentration DPPH scavenging activity (%) of functional-Ras cheese samples during the ripening period as affected by almond oil at 13°c±2.

Table (3). Sensory evaluation of functional-Ras cheese samples during the ripening period as affected by almond oil at 13°c±2.

Treatments	Ripening period(month)	Flavor (50)	Body texture (40)	Appearance (10)	Total scores (100)
Cheese (1) Control cheese	1	$41.5^{n}\pm0.1$	$36.3^{g}\pm0.1$	$8.4^{e}\pm0.1$	$86.2^{i}\pm0.1$
	2	$43^{l}\pm0.1$	$37.23^{f}\pm0.1$	$9.13^{bc}\pm0.1$	$89.36^{f}\pm0.1$
	3	$45^{g}\pm0.1$	$35.5^{hi}\pm0.1$	$8.86^{c}\pm0.1$	$92.33^{d}\pm0.1$
	4	$47^{d}\pm0.1$	$38.5^{c}\pm0.1$	$9.83^{a}\pm0.1$	$92.36^{d}\pm0.1$
	5	$48^{b}\pm0.1$	$37.7^{e}\pm0.1$	$9.42^{b}\pm0.1$	$95.12^{b}\pm0.1$
	6	$46^{e}\pm0.1$	$35.7^{h}\pm0.1$	$9.76^{a}\pm0.1$	$91.46^{e}\pm0.1$
Cheese (2) +With 3% almond oil (T_{A1})	1	$43^{l}\pm0.1$	$37.1^{f}\pm0.1$	$8.75^{cd}\pm0.1$	$88.85^{g}\pm0.1$
	2	$44.06^{j}\pm0.1$	$38.46^{c}\pm0.1$	$9.16^{b}\pm0.1$	$91.68^{e}\pm0.1$
	3	$45.63^{f}\pm0.1$	$38.9^{b}\pm0.1$	$9.43^{b}\pm0.1$	$93.96^{c}\pm0.1$
	4	$47.4^{c}\pm0.1$	$38^{d}\pm0.1$	$9.76^{a}\pm0.1$	$95.16^{b}\pm0.1$
	5	$42^{m}\pm0.1$	$36.16^{g}\pm0.1$	$9.41^{b}\pm0.1$	$87.57^{h}\pm0.1$
	6	$39.5^{p}\pm0.1$	$34.13^{j}\pm0.1$	$9.43^{b}\pm0.1$	$83.06^{j}\pm0.1$
Cheese (3) +With 5% almond oil (T_{A2})	1	$43.26^{k}\pm0.1$	$37.7^{e}\pm0.1$	$8.85^{cd}\pm0.1$	$89.81^{f}\pm0.1$
	2	$44.46^{h}\pm0.1$	$38.86^{b}\pm0.1$	$9.26^{b}\pm0.1$	$92.58^{d}\pm0.1$
	3	$49.26^{a}\pm0.1$	$39.9^{a}\pm0.1$	$9.73^{ab}\pm0.1$	$98.89^{a}\pm0.1$
	4	$44.78^{g}\pm0.1$	$35.26^{i}\pm0.1$	$9.73^{a}\pm0.1$	$89.77^{f}\pm0.1$
	5	$40.1^{o}\pm0.1$	$32.7^{k}\pm0.1$	$8.42^{e}\pm0.1$	$81.12^{k}\pm0.1$
	6	$37.5^{q}\pm0.1$	$30.1^{l}\pm0.1$	$8.4^{e}\pm0.1$	$76^{l}\pm0.1$

CONCLUSION:

The study demonstrated that addition of almond oil significantly ($P \leq 0.05$) enhanced the content of (TPCs) and (TFCs) compounds compared with the control sample.

The improvement was associated with a marked increase in antioxidant activity, as evidenced by higher DPPH radical scavenging efficiency. Furthermore, almond oil supplementation led to a considerable reduction in the ripening period, allowing the cheese to reach desirable sensory and texture characteristics in a shorter time compared to the control.

These findings highlight the potential of almond oil as a natural functional ingredient to be used to improve both the nutritional quality and maturation efficiency of Ras cheese.

REFERENCES

Abd-Elmonem, M. A., Tammam, A. A., El-Desoki, W. I., Zohri, A. N. A., & Moneeb, A. H. (2022). Improving the properties of the Egyptian hard cheese (ras type) with adding some probiotic Lactobacillus spp. as adjunct cultures. *Assiut Journal of Agricultural Sciences*, *53*(1), 12-30.

Abd-Elmontaleb, H. S. M. (2017). Biotechnological and chemical studies on hard cheese. Ph.D., Fac. Agric., Fayoum Univ.

Abou Dawood, A.I.; Soada, H. Taha. and Mohamed, M. A. (2005). Chemical and microbiological quality of raw milk, soft and hard cheeses collected from districts at Giza governorate. Egyptian J. Dairy Sci., 33(2): 201-214.

AOAC, 2012. Association of Official Analytical Chemists. *Official Methods of Analysis*. 19th Ed, Washington, DC, USA.

Awad, S., Ahmed, N., & El Soda, M. (2007). Evaluation of isolated starter lactic acid bacteria in Ras cheese ripening and flavour development. *Food Chemistry*, *104*(3), 1192-1199.

Awad, S.; Ahmed, N. E. and El Soda, M. (2013). Application of salt whey from Egyptian Ras cheese in processed cheese making. Food and Nutrition Sciences, 4(9): 79.

Bhandari, R., Sharma, G., & Jamarkatel-pandit, N. (2015). Antioxidant activity of selected medicinal plants of the Himalayan Region. *International Journal of Pharmaceutical Sciences and Research*, *6*(1), 473.

Ebid, W. M. A. (2016). Biotechnological studies on probiotic Ras cheese produced using ultrafiltration. Ph.D., Fac. Agric., Fayoum Univ.

El-Essawi, A. A.; Ashour, M. Z.; Abd El Baky, M. A. and Zoghby, A. S. A. (2013). Use of some lactic acid bacterial strains in enhancing Ras cheese ripening. Zagazig Journal of Agricultural Research 40: 747-754.

El-Hawary, M. A., Talbe, A., Samar, I. T., & Eid, M. H. (2015). Acceleration of Ras Cheese Enzymes as Induced by Different Fruit Extract. *Assiut Journal of Agricultural Sciences*, *46*(2).

El-Kholy, A. M. (2015). Ras cheese making with vegetable coagulant-a comparison with calf rennet. *World Journal of Dairy & Food Sciences* 10 (1): 82-89, 2015 ISSN 1817-308X.

El‐Sayed, S. M., Ibrahim, O. A., & Kholif, A. M. (2020). Characterization of novel Ras cheese supplemented with Jalapeno red pepper. *Journal of food processing and preservation*, *44*(7), e14535.

Gafour, W. A., Tawfek, M. A., & Baker, E. A. (2020). Improving of LowFat Ras Cheese Properties with Adding Sesame Hulls. *American Journal of Food Science and Technology*, *8*(3), 118-127.

Grundy, M. M. L., Lapsley, K., & Ellis, P. R. (2016). A review of the impact of processing on nutrient bioaccessibility and digestion of almonds. *International Journal of Food Science and Technology*, *51*(9), 1937-1946.

Guinee, T. P., Auty, M. A., & Fenelon, M. A. (2000). The effect of fat content on the rheology, microstructure and heat-induced functional characteristics of Cheddar cheese. *International Dairy Journal*, *10*(4), 277-288.

Hammam, A. R., Elfaruk, M. S., Ahmed, M. E., & Sunkesula, V. (2020). Characteristics and technological aspects of the Egyptian cheeses. *International Journal of Current Microbiology and Applied Sciences*, *9*(6), 3338-3354

Ibrahim, E. M.; El-Baz, A. M. and Mehanna, N. M. (2011). Quality of Ras cheese made from pasteurized milk supplemented with probiotic bacteria. Egyptian J. Dairy Sci., 39(1): 139-152.

Kebary, K. M. K., Iman, ;, Yousef, T. A., Hoida, ;, El-Shazly, A. M., & Rajab, W. A. A. (2011). QUALITY OF RAS CHEESE MADE BY PROBIOTIC STRAIN OF Lactobacillus rhamnosus. In *J. Food and Dairy Sci., Mansoura Univ* (Vol. 2, Issu).

Kim, D. O., Jeong, S. W., & Lee, C. Y. (2003). Antioxidant capacity of phenolic phytochemicals from various cultivars of plums. Food chemistry, 81(3), 321-326.

Kosikowski, F.V. (1982). Cheese and fermented milk foods. 2nd Printing with revistions (1978). 573.F.V. Kosikowski and Associates, P.O.139 Brooktondale, Ithaca. N. Y.USA.

Ling, E. R. (1963). Dairy Chemistry, Vol. II, Practical. Chapman and Hall, London.

Mehanna, N. M.; Moussa, M. A. M. and El-Khair, A. A. A. (2009). Improvement of quality of Ras cheese made from pasteurized milk using slurry from ewe's milk cheese. Egyptian J. Dairy Sci., 37(1): 101-111.

Motulsky, H.J. (1999) Analyzing data with Graphpad Prism. San.Diego.Graphpad software INC.

Osman, D. M., Shahin, Y. H., Abd El-Galil, H. A., & Mohran, M. A. (2011). Chemical and microbiological characteristics of Ras cheese collected from Assiut markets. Assiut J. Agri. Sci, 42, 47-54.

Pappas, C. P., Kondyli, E., Voutsinas, L. P., & Mallatou, H. (1996). Effects of starter level, draining time and aging on the physicochemical, organoleptic and rheological properties of feta cheese. *International Journal of Dairy Technology*, *49*(3), 73-78.

Poncet-Legrand, C., Edelmann, A., Putaux, J.-L., Cartalade, D., Sarni-Manchado, P., & Vernhet, A. (2006). Poly (L-proline) interactions withflavan-3-ols units: Influence of the molecular structure and the polyphenol/protein ratio. Food Hydrocolloids, 20, 687–697.

Rahman, M. J., de Camargo, A. C., & Shahidi, F. (2017). Phenolic and polyphenolic profiles of chia seeds and their in vitro biological activities. Journal of Functional Foods, 35, 622-634.

Shahin, A. A., Nasser, A. M., & Ragab, W. A. (2023). Effect of addition of some enzymes on the acceleration of ras cheese manufactured with addition of goat's milk. *Egyptian Journal of Food Science*, *51*(1), 101-111.

Sim, K. S., Nurestri, A. S., & Norhanom, A. W. (2010). Phenolic content and antioxidant activity of Pereskia grandifolia Haw.(Cactaceae) extracts. *Pharmacognosy magazine*, *6*(23), 248.

Simov, G.U (1980). Technological of milk products, A text Book, Plovidiv .P. 162.

Solhi, P., Azadmard-Damirchi, S., Hesari, J., & Hamishehkar, H. (2020). Production of the processed cheese containing tomato powder and evaluation of its rheological, chemical and sensory characteristics. Journal of food science and technology, 57(6), 2198-2205.

الملخص العربي:

تأثير إضافة زيت اللوز على الخصائص الفيزيائية والكيميائية والحسية ومضادات الأكسدة لجبن الراس.

هبه محمد الصغير، سلمى محمد جلال، كريمة عبد الحميد حسنين، أحمد شوقي زهران.

قسم الألبان - كلية الزراعة- جامعه المنيا

الهدف من هذه الدراسة هو دراسة تأثير إضافة زيت اللوز الى الجبن الرأس وأجريت التحليلات الكيميائية والحسية مثل قياس الرقم الهيدروجيني والحموضة والرطوبة ونسبة الدهن ومضادات الاكسدة. وكانت المعاملات عباره عن كنترول جبن الرأس من اللبن البقري والمعاملة الثانية جبن الرأس مضاف اليه 3% من زيت اللوز (TA_1) والمعاملة الثالثة جبن الرأس مضاف اليه 5% من زيت اللوز(TA_2) على أساس وزن الخثرة. وتم اجراء التحليلات الكيميائية والحسية ومضادات الاكسدة للجبن حتى تمام النضج في فترة استمرت حتى 6 أشهر.

لوحظ من التحليلات ان قيم الpH والرطوبة تنخفض خلال فترة التسوية بينما يحدث زيادة واضحة في كلا من الحموضة والدهن ومضادات الاكسدة. أظهرت المعاملة المضاف اليها 5% زيت اللوز اعلى قيم في مضادات الاكسدة مقارنة بالمعاملة المضاف اليها 3% زيت لوز وأيضا بالكنترول.

أظهرت النتائج ايضا زيادة في المركبات الفينولية والفلافونيدات اعلى في المعاملة المضاف اليها 5% من زيت اللوز فكانت في العينات الطازجة (0.1 ±26.3, 0.1 ±32.6) وزادت اثناء التخزين حتى 6 أشهر ± 35.6 (0.1 and 33.1± 0.1 mg/100g cheese).

واظهرت النتائج زيادة ملحوظة في نسبة الاحماض الدهنية الطيارة في جميع المعاملات حتى نهاية فترة التخزين وبالتالي، ازدادت قابلية جبن راس للتقييم الحسي خلال فترة النضج في جميع المعاملات. بينما حققت المعاملة المضاف إليه 5% زيت لوز أعلى درجات من حيث النكهة والقوام والملمس بعد 3 أشهر من النضج في المقابل، والمعاملة المُضاف إليه 3% زيت لوز أعلى درجات من حيث النكهة والقوام بعد 4 أشهر. بينما الكنترول اخذ اعلى الدرجات من حيث النكهة والقوام والملمس بعد 6 أشهر.