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THE EXTENT OF FRAUD IN COW BUTTER BY ADDING MARGARINE

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ABSTRACT

Butter adulteration constitutes an important problem in Egypt, this may occur by substitution of poor quality and artificially saturated vegetable oils (margarine) which is low price instead of high priced one (butter). Forty random butter samples of different trades were collected from different markets in El- Gharbia Governorate, pure butter and pure margarine as control. All samples were prepared and analyzed for detection of adulteration of pure butter with margarine. Cholesterol contents and physicochemical properties (analytical constants) including the Refractive Index (RI), Melting Point (MP), Saponification Number (SN), Iodine Number (IN), acid value, and Peroxide value were measured. The obtained results showed that, the value of RI, MP, and IN increased, while that of SN, acid value and peroxide value were decreased by addition of margarine to butter. Fat constants in the butter samples became closer to margarine by increasing the levels of margarine. Results also revealed that 16 (40%) of butter samples under study were adulterated with margarine. According to these results, the RI, MP, SN, IN, acid value and peroxide value can be reliably used to differentiate margarine added butter from pure butter. Margarine adulteration rate were 7(20%), 5(30%), 2 (40%) and 2 (50%) with a percent of 43.8%, 31.2%, 12.5% and 12.5% in adulterated butter samples, respectively. On the other aspect, adulteration could be determined accurately and quickly by measuring cholesterol content which decreased by increasing addition of margarine due to presence of vegetable oils. Mean values of total cholesterol were 164.6±1.2, 157.5±1.1, 150.2±1.0, 140.7±0.9 while high density lipoprotein (HDL) were 41.4±0.7, 39.1±1.0, 35.4±1.02, 33.9±1.3 in 20%, 30%, 40% and 50% in adulterated butter samples, respectively. The public health significance of butter adulteration as well as suggestive measures to improve the final product of cow butter was discussed.

Keywords:

Butter; Margarine; Adulteration; Chemical analysis.

INTRODUCTION

More than 6 billion people worldwide consume milk and milk products, according to Food and Agriculture Organization of the United Nations **(FAO, 2014).** Economically motivated adulteration (EMA) is defined as the intentional fraudulent modification of a finished product or ingredient of food products for the purpose of economic gain **(GMA, 2010).**

The consumers are increasingly aware on food safety and quality which are directly related to health and social improvement in the food industry **(Barile *et al.*, 2006; Regattieri *et al.*, 2007 and Nurrulhidayah *et al.*, 2013)**.

Fats from animal and vegetable sources provide a concentrated source of energy in the diet; they also provide the building blocks for cell membranes and a variety of hormones and hormone like substances. Fats as part of a meal slow down absorption of the meal so that people do not feel hungry. In addition, they act as carriers for important fat-soluble vitamins A, D, E and K. Dietary fats are needed for the conversion of carotene to vitamin A, for mineral absorption and for a host of other processes. Butter is America's best source of these important nutrients. In fact, vitamin A is more easily absorbed and utilized from butter than from other sources. **(Enig Mary, 1995 and Rombaut and Dewettinck, 2006).**

Raw butter is a fabulous fat that often contains some omega-3 fatty acids, a critical nutrient needed today by everyone. Butter contains about 12-15% short- and medium-chain fatty acids. This type of saturated fat does not need to be emulsified by bile salts but is absorbed directly from the small intestine to the liver, where it is converted into quick energy. These fatty acids also have antimicrobial, antioxidant, antitumor and immune-system-supporting properties, especially 12-carbon lauric acid, a medium-chain fatty acid not found in other animal fats. Highly protective lauric acid should be called a conditionally essential fatty acid because it is made only by the mammary gland and not in the liver like other saturated fats **(Kelly, 1998; Prasad and Larry shanks, 2000 and Gylling and Miettinen, 2010).**

Butter has high nutritional value, a pleasant taste and aroma. Aside from all the advantages of butter, its price is higher than other oils and fats. For this reason in order to gain illegal profits sometimes it can be mixed with margarine **(Ulberth and Buchgraber, 2000 and Karoui *et al.*, 2005).** The addition of extraneous fats to the original milk fat can be detected through several analytical methods such as chemical analysis, gas chromatographic analysis of fatty acids **(Sharma and Singhal, 1996)**, triacylglycerols **(Destaillats *et al.*, 2006)** or sterols

(Contarini *et al.*, 2002). Often, adulteration can be detected from the presence of minor components that occur in the adulterant and not in the food itself. In such cases, trace chemical analysis is necessary to assess the purity. For example, β-sitosterol is the predominant sterol of the most vegetable oils, while the cholesterol is the principal sterol of the milk fat **(Lopez-Ortiz *et al.*, 2006).** Fat constants values of normal milk fat and margarine are very different. MP is the level at which a solid fat becomes completely liquid and clear. Each individual pure fatty acid has a specific complete MP. Generally, MP increases with the increasing chain length. IN is a measure of the number of double bonds or the degree of unsaturation. RI increases with the chain length and with the increasing unsaturation. SN is an indicator of molecular weight or size as a function of the chain lengths of the constituent fatty acids **(Kurt *et al.*, 2007 and Metin, 2008).** Margarine usually contains poor-quality, refined, and artificially saturated vegetable oil. It also contains harmful trans-fatty acids, and often residues of nickel, a highly toxic metal. It is also devoid of most of the important nutrients found in natural fats as that present in butter. All margarines are made from assorted vegetable oils that have been heated to extremely high temperatures. This causes the oils to become rancid. After that a nickel catalyst is added, along with hydrogen atoms to be solidified. Finally, deodorants and coloring are added to remove the margarine's smell **(Caswell *et al.*, 2008; Abd El-Aziz *et al.*, 2013; Kleber *et al.*, 2015 and Remig, 2015).** FDA in US of America gave food manufacturers 3 years to remove partially hydrogenated oils (PHOs), the primary dietary source of artificial trans-fat in processed foods, from their products **(FDA, 2015).** Cholesterol is a typical animal sterol, e.g. its content in milk fat is 95-98%, and stigmasterol and sitosterol are referred to as phytosterols. Both cholesterol and phytosterols occur in free and esterified forms**.** Determination of sterols in dairy products is carried out to measure the total cholesterol content to obtain nutritional information and to detect the presence of vegetable fats **(Careri *et al*., 2001 and Contarini *et al*., 2002).**

Moreover, it is hard to maintain the purity of butter. Therefore this research was planned to use fast, cheap and easy methods for understanding the adulteration of butter with margarine for economic gain. Which affected on food safety and quality and directly related to health and social improvement in the food industry.

MATERIAL AND METHODS

Samples:

1-Pure cow butter (Control samples): Three samples of fresh butter were obtained from processingmilkunit,Faculty of Agriculture, CairoUniversity,Giza, Egypt.

2- Margarine(Control samples):Three samples of margarine were obtained from supermarkets from Tanta city in Egypt.

3- Commercially available 40 butter samples were purchased randomly from different markets in Tanta city, Egypt in December 2017.

Preparation of samples for chemical analysis:

Butter oil (Anhydrous milk fat) was extracted from butter samples by the method of **Amer *et al* (1985).** Fresh butter was melted at 60°C, removing the top oil layer, filtering through glass wool and drying the resulting oil over anhydrous sodium sulphate. The oil then refiltered (under vacuum, Whatman paper 41) to obtain clear oil (99.5% milk fat), flushed with nitrogen and stored at - 20°C until used.

Physicochemical properties:

Refractive index, melting point, iodine, saponification, acid, and peroxide values were analyzed according to standard methods of **AOAC (2000).**

1-Determination of the Refractive Index.

The ratio of velocity of light in vaccum to the velocity of light in the oil or fat; It expresses the ratio between the sine of angle of incidence to the sine of angle of refraction when a ray of light of known wave length (usually 589.3 nm, the mean of D lines of Sodium) passes from air into the oil or fat. Determined by Refractometer - Abbe or Butyro Refractometer

2-Determination of Melting Point of Fat.

The temperature at which the oil or fat softens or becomes sufficiently fluid to slip or run as determined by the open-tube capillary-slip method.

3-Determination of Saponification Value.

The oil sample is saponified by refluxing with a known excess of alcoholic potassium hydroxide solution. The alkali required for saponification is determined by titration of the excess potassium hydroxide with standard hydrochloric acid.

$$\text{Saponification Value} = \frac{56.1\,(B-S)N}{W}$$

B = Volume in ml of standard hydrochloric acid required for the blank.

S = Volume in ml of standard hydrochloric acid required for the sample.

N = Normality of the standard hydrochloric acid.

W = Weight in gm of the oil/fat taken for the test.

4- Determination of Acid Value.

The acid value is defined as the number of milligrams of potassium hydroxide required to neutralize the free fatty acids present in one gram of fat. Acid value = $\frac{56.1(VN)}{W}$

V = Volume in ml of standard potassium hydroxide or sodium hydroxide used

N = Normality of the potassium hydroxide solution or Sodium hydroxide solution;

W = Weight in g of the sample

The acidity is frequently expressed as free fatty acid for which calculation shall be;

Free fatty acids as oleic acid = $\frac{28.2\ (VN)}{W}$ per cent by weight

Acid value = Percent of fatty acid (as oleic) x 1.99

5-Determination of Iodine Value.

The iodine value of an oil/fat is the number of grams of iodine absorbed by 100g of the oil/fat, was determined by using Wijs solution.

The oil/fat sample taken in carbon-tetrachloride was treated with a known excess of iodine monochloride solution in glacial acetic (Wijs solution). The excess of iodine monochloride was treated with potassium iodide and the liberated iodine estimated by titration with sodium thiosulfate solution.

Iodine value = $12.69 \frac{(B - S)}{W} N$

B = volume in ml of standard sodium thiosulphate solution required for the blank.

S = volume in ml of standard sodium thiosulphate solution required for the sample.

N = normality of the standard sodium thiosulphate solution.

W = weight in g of the sample.

6- Determination of Peroxide value.

6-1. Determination of the titre of the sodium thiosulfate solution **(Asakawa and Matsushita, 1978).**

6-2. Determination of peroxide value:

Accurately, 3g of the sample were mixed with10 ml chloroform into a 250 ml Erlenmeyer flask. Furthermore, 15 ml acetic acid and 1.0 ml KI solutions were added and mixed. The mixture was left for 5 minutes in a dark place. Thus, 30 ml distilled water and 1 ml starch inductor was added. The mixture was titrated with sodium thiosulfate until blue colour disappeared. The titration procedure was repeated at least 3 times and the individual results shouldn't vary more than 0.3 ml.

PV = $(V_1 – V_0)$ x T x 1000 / m (mille equivalent available oxygen/kg).

V_1 = volume of thiosulfate solution required to titrate the sample (ml).

V_0 = volume of thiosulfate solution required to titrate the blank.

T = titre of the sodium thiosulfate solution (normality).

m = weight of sample (g).

***Equations of margarine adulteration rate** (MAR) according to**Kahyaoglu and Cakmakci (2016).**

7-Determination of cholesterol.

Cholesterol determination was carried out using a commercial test kits **(Sigma diagnostic kits, Sigma Chemical Co., St Louis, Messouri, 63103, USA).** Lipid extract (20 µl) was taken for the estimation of total lipids by the method of **Parmar *et al.* (2016)**. Quantitative estimation of triglycerides and cholesterol in each sample was done by employing method for each specific kit. The Cholesterol Quantitation Kit can also be used to determine the concentration of free cholesterol, cholesteryl esters, or both (total) present in a sample. In this kit, total cholesterol concentration is determined by a coupled enzyme assay, which results in a colorimetric (570 nm)/ fluorometric (λex = 535/λem = 587 nm) product, proportional to the cholesterol present.

RESULTS AND DISCUSSION

Table (1): Incidence of adulteration in examined butter samples.

No of examined samples	Adulterated samples		Non-adulterated samples	
40	No	%	No	%
	16	40%	24	60%

Table (2): Lipolytic indices of pure and adulterated butter and margarine.

Key No	RI	MP	SN	IN	Acid value	Peroxid value
Pure butter	**1.4498**	**33.1**	**232.1**	**29.8**	**0.37**	**0.79**
Adulterated butter						
1	**1.4581**	**36.1**	**215.7**	**42.7**	**0.25**	**0.55**
2	**1.4569**	**36.3**	**218.2**	**42.1**	**0.26**	**0.54**
3	**1.4564**	**35.8**	**219.5**	**40.2**	**0.29**	**0.59**
4	**1.4539**	**34.5**	**224.3**	**40.1**	**0.28**	**0.61**
5	**1.4554**	**35.9**	**220.9**	**41.9**	**0.26**	**0.54**
6	**1.4688**	**36.7**	**209.6**	**48.3**	**0.25**	**0.52**
7	**1.4553**	**36.5**	**216.4**	**42.3**	**0.26**	**0.55**
8	**1.4563**	**34.8**	**220.5**	**38.3**	**0.29**	**0.60**
9	**1.4566**	**35.4**	**223.4**	**37.4**	**0.25**	**0.58**
10	**1.4581**	**36.3**	**213.6**	**44.8**	**0.26**	**0.54**
11	**1.4526**	**35.0**	**222.2**	**38.5**	**0.29**	**0.60**
12	**1.4527**	**35.6**	**220.3**	**39.1**	**0.28**	**0.58**
13	**1.4556**	**36.1**	**216.3**	**42.5**	**0.26**	**0.56**
14	**1.4591**	**36.8**	**208.3**	**49.2**	**0.24**	**0.53**
15	**1.4537**	**34.9**	**219.9**	**37.8**	**0.29**	**0.57**
16	**1.4556**	**35.6**	**218.1**	**41.4**	**0.26**	**0.56**
margarine	**1.4703**	**38.9**	**189.5**	**54.3**	**0.21**	**0.48**

Physicochemical analysis results of pure butter, pure margarine (control samples) and butter samples were purchased randomly from different markets were showed that16 samples (40%) of butter under examination were adulterated by adding margarine (Table1).These results indicated that adulteration of butter is occasionally and considered a commercial fraud in Egypt because it will contribute to increasing sales and subsequently brings more profit to the traders. The adulteration of butter is motivated by the economic advantages, being one of the most expensive milk products. These results were agreed with **Karoui and Baerdemaeker (2007) and Nurrulhidayah *et al.* (2013).** The market price of butter and ghee is almost 3

times more than the price of edible vegetable oils/fats. The supply of butter is also far short of its demand these gaps between price and availability leads to several malpractices.

Table (3): Incidences of margarine adulteration rates (MAR).

M A R	No	%
20%	**7**	**43.8%**
30%	**5**	**31.2%**
40%	**2**	**12.5%**
50%	**2**	**12.5%**
Total	**16**	**100%**

The results in (Tables 2, 3) revealed that margarine adulteration rate in examined cow butter samples was 20%, 30%, 40% and 50% were represented 7 (43.8%), 5 (31.2%), 2 (12.5%) and 2 (12.5%) of adulterated butter samples, respectively. According to the equation of margarine adulteration rat stated by **Kahyaoglu and Cakmakci (2016):**

M. A. R. (%) = -21350.73 + (14663.50 × refractive index).

M. A. R. (%) = -416.02 + (13.04 × melting point).

M. A. R. (%) = 660.73 – (2.90 × saponification number).

M. A. R. (%) = -124.57 + (3.85 × iodine number).

Table (4): Comparison between mean values of chemical parameters of pure and adulterated butter and margarine.

MAR	RI	MP	SN	IN	Acid value	Peroxide value
Pure butter	**1.4498±0.0007**	**33.1±0.1**	**232.1±0.9**	**29.8±0.4**	**0.37±0.005**	**0.79±0.005**
Adulterated 20%	**1.4546±0.001**	**35.1±0.65**	**221.9±2.4**	**38.2±0.9**	**0.28±0.006**	**0.59±0.01**
Adulterated 30%	**1.4558±0.0008**	**36.2±0.2**	**217±2.3**	**42.1±0.3**	**0.26±0.006**	**0.55±0.01**
Adulterated 40%	**1.4581±0.0006**	**36.2±0.1**	**214.5±1.2**	**44.1±0.6**	**0.255±0.005**	**0.545±0.006**
Adulterated 50%	**1.4613±0.0005**	**36.85±0.05**	**208.95±0.75**	**48.75±0.5**	**0.245±0.005**	**0.525±0.005**
Margarine	**1.4703±0.001**	**38.9±0.3**	**189.5±1.3**	**54.3±0.3**	**0.21±0.006**	**0.48±0.007**

Mean values ± standard deviation.

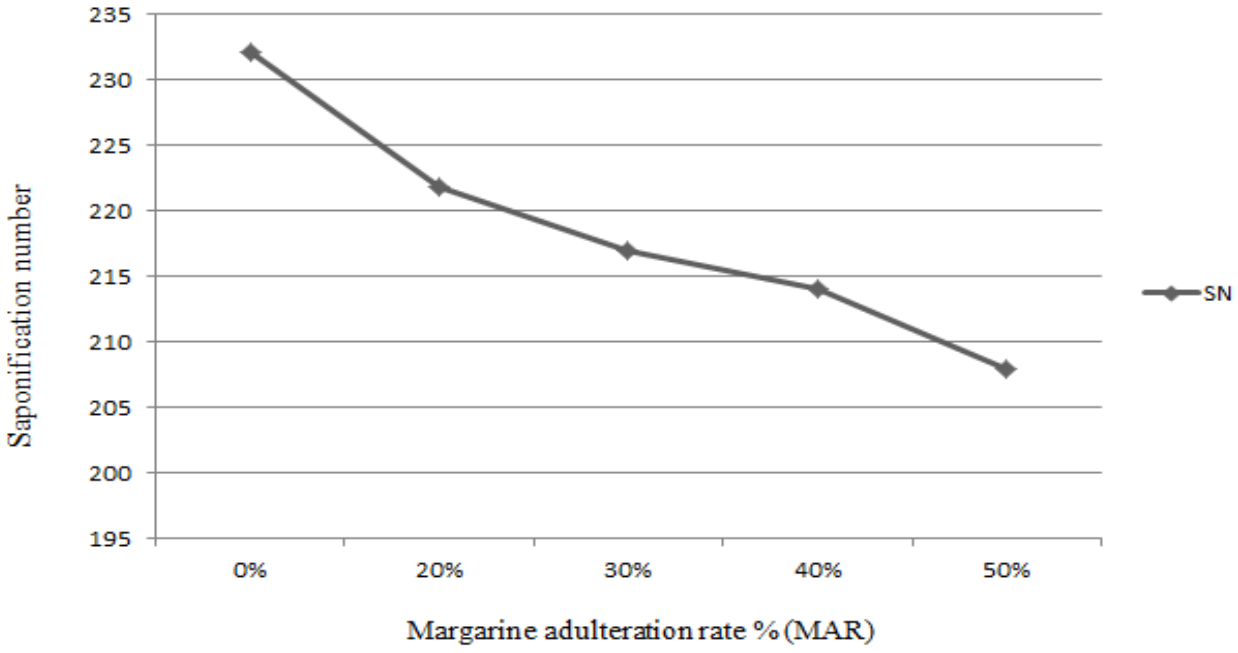

Fig. (1): The effects of margarine adulteration rats on the saponification number.

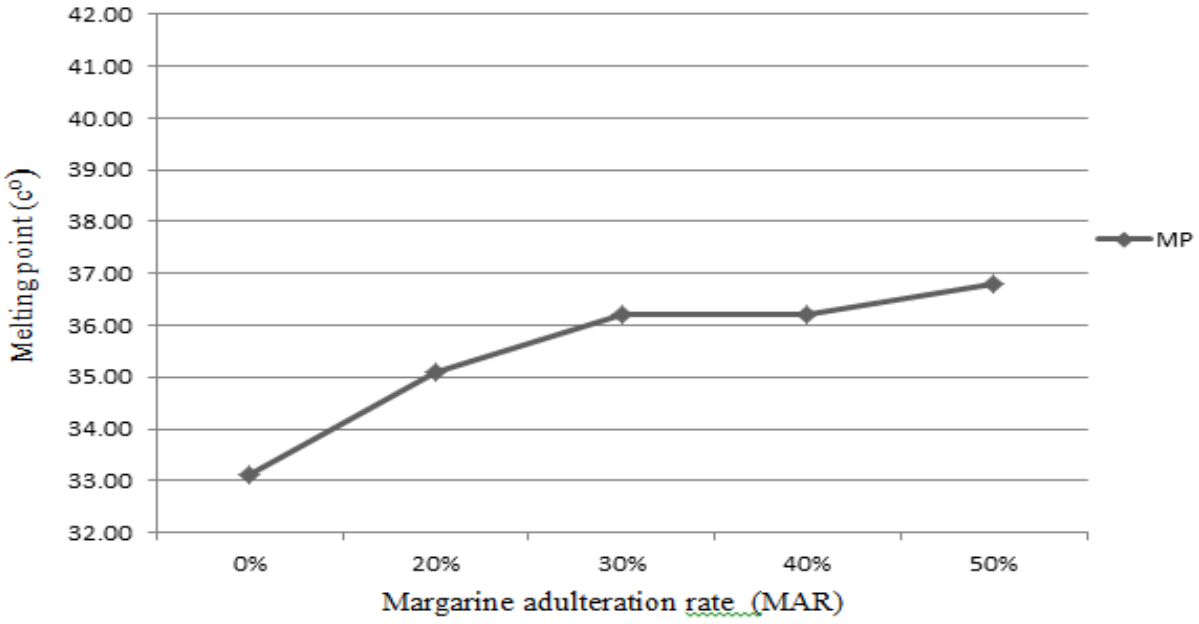

Fig. (2): The effects of margarine adulteration rats on the melting point.

Chemical constants of cow butter, margarine and their blends are given in (Table 4). The results showed that butter was higher in saponification number (SN) 232.1±0.9 Fig. (1), acid value 0.37±0.005 and peroxide value 0.79±0.005, while those of margarine were 189.5±1.3, 0.21±0.006 and 0.48±0.007, respectively. Moreover, the results showed that butter was lower in refractive index (RI) 1.4498±0.0007, melting point (MP) 33.1±0.1 and iodine number (IN) 29.8±0.4. On the other hand, mean values of margarine were 1.4703±0.001, 38.9±0.3 and 54.3±0.3, respectively. These results came in accordance with the normal ranges reported by **Zaidul *et al.* (2007); Samet-Bali *et al.* (2009) and Dhurvey *et al.* (2012).**

IN of milk fat is between 26 -35 and the value is quite low compared to other oils.

IN of the milk fat increases with the addition of vegetable fats and SN of the milk fat decrease with the addition of margarine or other fats **(Kurt *et al.*, 2007 and Metin, 2008).**

The addition of margarine to butter causes a gradual decrease in SN, acid value and peroxide value, this decrease was proportional to the amounts added. Moreover, the adulteration of butter by margarine at the rate 20%, 30%, 40% and 50% affect the normal range of SN 221.9±2.4, 217±2.3, 214.5±1.2 and 208.95±0.75 respectively Fig. (1) while acid values was 0.28±0.006, 0.26±0.006, 0.255±0.005, and 0.245±0.005 respectively and peroxide values were represented by 0.59±0.01,0.55±0.01,0,545±0.006 and 0.525±0.005 respectively.

These results agreed with **Park *et al.* (2007) and Samet-Bali *et al.* (2009).** Inversely RI, MP Fig. (2) and IN were increased gradually. The increasing was proportional to the added levels of margarine. According to iodine value of butter reported by some researchers **Kumar *et al.* (2010); Dhurvey *et al.* (2012) and Abd El-Aziz *et al.* (2013),** the addition of vegetable oils and margarine to butter in the ratio 30% and 40 % or more resulted in elevation of the IN to be out of the normal range of butter (27-35). The results in (Table 4) showed that IN in butter samples adulterated by 20%, 30%, 40% and 50% margarine was 38.2±0.9, 42.1±0.3, 44.1±0.6 and 48.75±0.5, respectively. Moreover, RI and MP in 50% adulteration rate recorded 1.4613±0.0005 and 36.85±0.05, respectively, while in margarine they were 1.4703±0.001 and 38.9±0.3, respectively. Therefore, the fat constant results mentioned above should be based on determining adulteration and its level. The recorded results therefore declared that fat constants in the samples moved closer to margarine by increasing the levels of margarine. According to the results, fat constants can be reliably used to differentiate the margarine added butter from pure butter **(Kahyaoglu and Cakmakci, 2016).**

Table (5): Mean values of cholesterol in pure and adulterated butter and margarine.

Type of samples	Cholesterol Mg%	HDL Mg%
Pure butter	**193.8 ± 0.64**	**76.2 ± 1.0**
Adulterated 20%	**164.6 ± 1.2**	**41.4 ± 0.76**
Adulterated 30%	**157.5 ± 1.1**	**39.1 ± 1.0**
Adulterated 40%	**150.2 ± 1.0**	**35.4 ± 1.02**
Adulterated 50%	**140.7 ± 0.9**	**33.9 ± 1.3**
Pure margarine	**105.4 ± 0.91**	**29.5 ± 0.81**

Mean values ± standard deviation.

Dairy products such as butter, has considerable consumption in Egypt, milk fat has one of the most complex composition of all natural fats. Being composed of more than 400 different fatty acids present as triacylglycerol gives milk fat highly diverse functional and nutritional properties. The complexity of milk fat provides both opportunities and challenges to modify its composition for different applications. Due to versatility of lipidic compounds, milk fat can be considered as a good source of essential fatty acids and fat-soluble vitamins.

Additionally, milk fat has physically and chemically favorable properties, and it also has good sensory quality **(Vanhoutte *et al.*, 2003 and Rombaut and Dewettinck, 2006).**

Table (5) showed the sterol fractions cholesterol as the major sterols in milk fat. Butter, margarine and its blends were examined for detecting margarine in butter. Mean values of total content of cholesterol in pure butter (control) and margarine were 193.8±0.64 and 105.4±0.91mg/100g respectively. These values agree with these reported by **Sundram *et al.* (2003) and Molkentin (2006)** who reported butter with 80% fat contains 190-200 mg cholesterol/100 g. These results mean that cholesterol is the main sterol in butter **(Contarini *et al.*, 2002).** Therefore, the addition of margarine to butter caused a gradual decrease in cholesterol compared with pure butter the changes were proportional to the addition level, with the addition of 20, 30, 40, and 50% margarine, the mean values of total cholesterol decreased by164.6±1.2, 157.5±1.1, 150.2±1.0 and 140.7±0.9, respectively. However, because butter is consumed in small quantities it should not be a major nutritional concern. The presence of trans fatty acids in foods has recently elicited scrutiny from the scientific community. Most unsaturated fatty acids in nature are found in the cis double-bond configuration, but during the hydrogenation of vegetable oils, and food processing in oil at high temperatures (e.g., in deep-oil frying), inversions of the double bonds occur resulting in

trans fatty acid isomers. Hydrogenated vegetable oils are currently a major source of trans fats in human diets. Despite trends towards reducing trans fats in margarines and hydrogenated vegetable oils in developed countries, the applicable technologies are not yet widely used in edible oils processing in Africa. Tran's fats have been shown to be nearly as hypercholesterolemic. **(Youness and Solimán, 1988;Antnino stracchi, 2006 and Derewiaka *et al.,* 2011).**

The results in (Table 5) revealed also that mean value of high-density lipoprotein cholesterol (HDL) known as the "good" cholesterol in pure butter and margarine (control samples) were 76.2±1.0 and 29.5±0.81 respectively, while mean value of HDL in adulterated butter samples by 20% margarine were 41.4±0.76. Moreover, when margarine adulteration rat were 30%, 40% and 50% the mean values of HDL were 39.1±1.0, 35.4±1.02 and 33.9±1.3, respectively. These results indicated that HDL decreased gradually by increasing the margarine rat and inversely LDL increased by increasing margarine. So it's important to choose healthier unsaturated fats. Eating too much and the wrong kinds of fats, such as saturated and trans fats, may raise unhealthy LDL cholesterol and lower healthy HDL cholesterol. This imbalance can increase your risk of high blood pressure, narrowing of the arteries (atherosclerosis), as well as great exposure to heart attack and stroke. **(Derewiaka *et al.,* 2011).**

CONCLUSION

Fraud of cow butter by adding margarine was malpractice among some unscrupulous traders in Egypt.40% of examined butter samples which commercially sold were adulterated with margarine. Fat constants values could be reliably and accurate and could assist the quality control authority, traders and the producers to discriminate the adulterated butter by plant-derived lipids. Besides, measuring total cholesterol content and HDL to obtain nutritional information and to detect the presence of vegetable fat. In view of the problems associated with hydrogenated food products, the following recommendations are forwarded concerned bodies especially Quality and Standard Authority and Ministry of Health should start the control of such adulteration and establishing of a legal framework. Public awareness should be created with regard to consumption of hydrogenated products. A lot of knowledge about different fats and oils is needed by the consumer to be able to distinguish the product with the healthiest fat. It can be concluded that fat is not a problem, but more information on fat quality on the label is needed.

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مدى غش الزبد البقرى بإضافة السمن النباتى

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الملخص العربى

ترجع أهمية الزبد الطبيعى لكونة أحد أهم مكونات اللبن البقرى أو الجاموسى وهو الماده الدهنية الطبيعية الأعلى سعرا فى مكونات اللبن لكونها الوحيدة التى تصنع فى الغدد اللبنية للحيوان وتحتوى على الأحماض الدهنية المهمة essential fatty acids) كما أنه يحتوى على نسبة عاليه من الكوليستيرول النافع المهم للعمليات الحيوية وامداد الجسم بالفيتامينات مثل A, D,E, k كما انه يمتص سريعا من الامعاء الدقيقه دون الحاجه الي العصارة الصفراوية,ويندرج احلال مادة دهنية أخرى سواء كانت نباتية المصدر أو شحمية حيوانية المصدر مكان الزبد الطبيعى بأى نسبة ما (وهو ما يكون دائما بغرض الربح) هو من أنواع الغش التى يجب حماية المستهلك منها , فالدهون الصناعيه هى زيوت نباتية مهدرجة تحتوى على أحماض دهنية ضارة وبقايا النيكل ومواد كيميائية اخرى ضارة بالاضافة الى نقص بعض العناصر الغذائية المهمة.

وقد تم اجراء هذا البحث على عدد 40 عينة من الزبد مجمعة من اسواق محافظة الغربية للكشف عن مدى غش انواع مختلفة من الزبد الطبيعى الموجود فى الأسواق بالزبد النباتى المهدرج بغرض الربح وذلك باجراء عدد من الاختبارات الكيميائة وهى : معامل الانكسار و درجة الانصهار و رقم التصبن و الرقم اليودى و درجة الحموضة و قيمة البيروكسيد .

أيضا تم الكشف عن محتوى الكوليستيرول لتحديد مدى تواجد الزيوت النباتية وقد اسفرت النتائج عن 40% من العينات مخلوطة بالسمن النباتي بنسب مختلفة متمثله ب 20% فى 43,8% من عينات الزبد المغشوشة و30% فى 31,2 وايضا 40% فى 12,5% و50% فى12,5 من اجمالى عينات الزبد المفحوصة معمليا.

بينما انخفضت نسب الكوليستيرول للعينات تحت الفحص والتى مثلت العينات المخلوطه انخفاضا ملحوظا وتمثلت بمتوسطات 1.2 ± 164.6 و 1.1 ± 157.5 و1.0 ± 150.2 واخيرا0.9 ± 140.7 لنسب الخلط 20% و30% و40% و50% على التوالى.

وقد نوقشت اللأهمية الصحية لكل من الزبد الطبيعى والمهدرج مع التوصية بتشديد الرقابة من الجهات المختصة واجراء الاختبارات الدورية الاستكشافية على المنتجات الدهنيه لمنع الغش وحماية المستهلك صحيا وماديا.