Assiut Vet. Med. J. Vol. 60 No. 140 January 2014

PHYSICOCHEMICAL DIFFERENCES BETWEEN COOKING AND PASTEURIZED BUTTER SOLD IN ALEXANDRIA CITY

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ABSTRACT

Received at: 30/12/2014

Accepted: 12/2/2014

Fifty random samples of cooking and pasteurized cow butter (25 samples each) were collected from different markets in Alexandria, city. Samples were examined for organoleptic and physicochemical characters. Sensory evaluation revealed that 10 (40%) ; 9 (36%) and 6 (24%) of cooking butter samples were graded as good, fair and poor, respectively, while 3 (12%) samples of pasteurized butter were excellent ; 16 (64%) good ; 4 (16%) fair and 2 (8%) of poor quality. Cooking butter samples showed average fat %, acid degree value (ADV), iodine value, solid not fat (SNF) and moisture content as 76.27 ± 5.17; 2.51 ± 1.8 ; 36.29 ± 16.7 ; 2.88 ± 1.65 and 17.55 ± 2.34, respectively. While corresponding results for pasteurized butter were 81.66 ± 5.96 ; 0.96 ± 0.54 ; 43.07 ± 11.9 ; 2.25 ±1.12 and 15.07± 2.09, respectively. Nine (36%) samples of cooking butter and 4 (16%) samples of pasteurized butter had a fat content lower than the legal limit set by the Egyptian Standards not less than 78% (EOSQC 154-5/2005). According to the results of Acid degree value (ADV) 2 (8%) of cooking butter samples graded as normal {<0.4} ; 5 (20%) borderline {0.7-1.1}; 2 (8%) slightly lipolyzed {1.2-1.5} and 16 (64%) were extremely lipolyzed {≥ 1.5}. Regarding pasteurized butter samples 11 (44%) were normal ; 8 (32%) borderline ; only one (4%) were slightly lipolyzed and 5 (20%) were extremely lipolyzed, while the legal limit set by the Egyptian Standards not exceed than 0.4% (EOSQC 154-5/2005). Measurement of iodine value (IV) declared that 20 (80%) and 21 (84%) of cooking and pasteurized butter samples, respectively were within the normal iodine value range (26-43). While 3 (12%) and 4 (16%) of cooking and pasteurized butter samples, respectively had higher values than the maximum limit and they may be adulterated by vegetable oils. Two (8%) of cooking butter samples showed results lower than the minimum limit of iodine value. According to the results of Solid Not Fat (SNF), 12 (48%) and 16 (64%) of cooking and pasteurized butter samples, respectively were within the normal. While, 11 (44%) and 5 (20%) of cooking and pasteurized butter samples, respectively had high (SNF) content more than 3%. Measurement of moisture content declared that 22 (88%) and 23 (92%) of cooking and pasteurized butter samples, respectively were in the normal limit, while 3 (12%) and 2 (8%) of cooking and pasteurized butter samples, respectively had moisture content higher than 18%. All the examined butter samples were proved to be free from adulteration by starch.

Key words: *Cooking, Pasteurized butter, acid degree value, iodine value, fat percent.*

INTRODUCTION

Butter is a dairy product made by churning fresh or fermented cream or milk. It is generally used as a spread and a condiment, as well as in cooking, such as baking, sauce making and pan frying. Butter consists of butter fat, milk proteins and water (Ragheb *et al.,* 2003 and Siddique *et al.,* 2011).

Butter is a smooth fatty product made from milk, cream or both, with or without addition of common salt. It contains not less than 78% milk fat, not more than 18% water and in salted one, 1.5-2% NaCl. In addition, it may also contain lactic and flavor producing starter microorganisms (Lampert, 1975; Varnam and Sutherland, 1994). It has a very desirable flavor, it is perceived by consumers as high quality natural product and plays a prominent role in the cooking of many countries (Kaylegian, 1999; Fahmy and Abdel- Fattah, 2008).

Dairy products are often pasteurized during production to kill pathogenic bacteria and other microbes. Butter made from pasteurized fresh cream is called pasteurized butter. Production of pasteurized butter first became common in the 19th century, with the development of refrigeration and the mechanical cream separator (Parfitt, 1934 ; Deeth and Fitz-Gerald, 1976 ; Juffs and Deeth, 2007 ; Scutte, 2013).

Butter made from fresh or cultured unpasteurized cream called cooking butter. While butter made from pasteurized cream may keep for several months, cooking butter has a shelf life of roughly 10 days at 4° C (ICMSF, 2005 ; Al-Hawary *et al.,* 2012 ; Yasin and Shalaby, 2013).

Regarding nutritional value, butter is not only an important source of milk fat (16% of total fat intake) and supply the body with 24% of saturated fatty acids (SFA) and 13% mono unsaturated fatty acids and dietary energy but also source of fat soluble vitamins especially A and D (Hui, 1993; Varnam and Sutherland, 1994 ; Staessen *et al.,* 1998 ; Wahba, 2003 ; Willson, 2013). In addition to vitamins A and E, butter is a very rich source of selenium, which are vital antioxidants.

Actually butter contains many nutrients that protect against heart disease and cancer. In addition, it is rich in short and medium chain fatty acids and conjugated linoleic acid which gives excellent protection against cancer. Cholesterol found in butter fat plays an important role in the development of brain and nervous system in children, (Alfin-Slater and Aftergood, 1980).

Cooking butter is one of the most popular dairy products in Egypt, always made from sour cream which obtained by gravity, hence it well gain an acid taste. It is produced in villages by rural women that are usually using their traditional knowledge during manufacturing. It is eaten as butter, used as oil for food preparation or for cooking and also used as hairdressing and as a skin cosmetic by both sexes (Ahmed *et al.,* 1987 ; Abdou, 2002 ; Fatouha *et al.,* 2005 and Meshref, 2010).

According to the Egyptian Standards (EOSQC 154-5/2005), cooking butter should have a minimum milk fat content of 78%, maximum water content 18% (salted butter) and 20% (if unsalted), while SNF, salt and acidity content must not exceed 3%, 2% and 10%, respectively. Iodine value ranges from 26.4 - 43.1. In addition to, the product must be free from rancidity, foreign fat, residues, preservatives and thickeners (E. O. S. Q.C., 2005).

The iodine value (IV) gives a measure of the average degree of unsaturation of lipids, the higher the IV the greater the number of double bonds, consequently it can be used as an estimate of oxidative stability of lipids. Butter has low IV so it is less liable to oxidation. While acid degree value (ADV) is a good measure for the breakdown of the triacyl- glycerols into free fatty acids which have an adverse effect on the quality of fats (Sobeih, 2005 ; Abdelfattah and Saleh, 2007 ; Siddique *et al.,* 2011).

This study was planned to throw light on the sensory (organoleptic) and physicochemical characteristics of locally manufactured cooked and pasteurized butter available in Alexandria city markets.

MATERIALS and METHODS

Collection of samples: Fifty random samples of cooking and pasteurized cow butter (25 samples each) at the point of consumption were randomly collected from retail and markets in Alexandria city. Samples were transferred to the laboratory directly with a minimum of delay for sensory and physicochemical examinations.

Sensory (Organoleptical) evaluation:
It was carried out according to the American Dairy Science association "ADSA" (1990). Scoring guide using 25 point system with 10 points for flavor ; 5 for body and texture ; 5 for color and appearance ; 3 for salt and 2 for the package was used. Sensory evaluation was done by 5 staff members of Food Hygiene Department. Total score of ≥ 90% was graded excellent or grade A ; 80-89% good or B ; 60-79% fair or C ; ≤ 59% poor or grade D. (Guide for sensory evaluation of foods, 1971 and Larmond, 1977).

Physicochemical evaluation:
- Compositional analysis:
Determination of fat content by Roese Gottlieb method using ether extraction according to (Richardson, 1985).

- Acid degree value (ADV):
used to measure free fatty acids (FFA) in the fat extract according to Richardson, (1985). The extent of hydrolytic rancidity in butter samples was discussed according to the suggested evaluation of ADV.

- Determination of Iodine value:
The method recommended by (Varnam and Sutherland, 1994).

- Determination of total solids not fat:
The method recommended by (AOAC, 1996).

- Determination of moisture content:
The method recommended by (AOAC, 2005).

- Detection of adulteration by starch:

Butter may be adulterated with thickeners as starch so butter samples were examined for starch according to the method adapted by (Williams, 1972).

- Statistical analysis:
The obtained data was analyzed statistically according to (Perrie and Waston, 1999). The results are presented as the mean of three replicates. The analytical test used included unpaired Student t-test to compare means for two groups at $p < 0.05$.

RESULTS

Table 1: Sensory evaluation of the examined butter samples.

*Grade (Score)	Cooking butter n=25		Pasteurized butter n=25	
	No. of samples	(%)	No. of samples	(%)
A "excellent" (≥ 90%)	0	0	3	(12%)
B "good" (80-89%)	10	(40%)	16	(64%)
C "fair " (60- 79%)	9	(36%)	4	(16%)
D "poor" (≤ 59%)	6	(24%)	2	(8%)

*According to Guide for sensory evaluation foods (1971) and ADSA (1990).

Table 2: Statistical analytical results of physicochemical character of the examined butter samples.

Analytical value	Cooking butter n=25	Pasteurized butter n=25
	Mean ± SD	Mean ± SD
Fat %	76.27 ± 5.17	81.66 ± 5.96
ADV	2.51 ± 1.80	0.96 ± 0.54
Iodine Value	36.29 ± 16.70	43.07 ± 11.9
SNF	2.88 ± 1.65	2.25 ± 1.12
Moisture content	17.55 ± 2.34	15.07 ± 2.09

ADV = Acid Degree Value
SNF = Solid Not Fat

Table 3: Frequency distribution of fat content in the examined butter samples.

Fat %	Cooking butter n=25		Pasteurized butter n=25	
	No. of .samples	(%)	No. of samples	(%)
< 78%	9	(36%)	4	(16%)
78-80%	11	(44%)	5	(20%)
> 80%	5	(20%)	16	(64%)

Limits not less than 78% fat in E.O.S.Q.C. for natural butter (No. 154-5/2005)

Table 4: Frequency distribution of acid degree value in the examined butter samples.

ADV	Degree of lipolysis	Cooking butter N=25		Pasteurized butter n=25	
		No. of samples	(%)	No. of samples	(%)
< 0.4	Normal	2	(8%)	11	(44%)
0.7-1.1	Border line	5	(20%)	8	(32%)
1.2-1.5	Slight lipolysis	2	(8%)	1	(4%)
≥ 1.5	Unsatisfactory	16	(64%)	5	(20%)

Limits not exceed 0.4% ADV in E.O.S.Q.C. for natural butter (No. 154-5/2005)

Table 5: Frequency distribution of Iodine value in the examined butter samples.

Iodine value	Cooking butter n=25		Pasteurized butter n=25	
	No. of samples	(%)	No. of samples	(%)
<26	2	(8%)	0	0
26-43	20	(80%)	21	(84%)
>43	3	(12%)	4	(16%)

Limits of Iodine Value range 26.4-43.1 in E.O.S.Q.C. for natural butter (No. 154-5/2005)

Table 6: Frequency distribution of solid not fat (SNF) content in the examined butter samples.

SNF %	Cooking butter n=25		pasteurized butter n=25	
	No. of samples	(%)	No. of samples	(%)
<2	2	(8%)	4	(16%)
2-3	12	(48%)	16	(64%)
>3	11	(44%)	5	(20%)

Limits not exceed 3% SNF in E.O.S.Q.C. for natural butter (No. 154-5/2005)

Table 7: Frequency distribution of Moisture content in the examined butter samples.

Moisture %	Cooking butter n=25		pasteurized butter n=25	
	No. of samples	(%)	No. of samples	(%)
<15	4	(16%)	7	(28%)
15-18	18	(72%)	16	(64%)
>18	3	(12%)	2	(8%)

Limits not exceed 18% moisture in E.O.S.Q.C. for natural butter (No. 154-5/2005)
** All the examined cooking and imported butter samples were free from starch.

DISCUSSION

According to the Egyptian Standards (E.O.S.Q.C. 154-5/2005), cooking cow butter should have a minimum milk fat content of 78%, maximum water content 18% (salted butter) and 20% (if unsalted), while SNF, salt and acidity content must not exceed 3, 2 and 10% respectively. Iodine value ranges from 26.4-43.1 and ADV must not exceed than 0.4%. In addition to, the product must be free from rancidity, foreign fat, residues, preservatives and thickeners (E. O. S. Q.C., 2005).

Results recorded in Table 1 show that 10 (40%) ; 9 (36%) and 6 (24%) of the examined cooking butter samples were graded as good, fair and poor, respectively according to their sensory evaluation score while pasteurized butter recorded 3 (12%) as excellent ; 16 (64%) as good ; 4 (16%) as fair and only 2 (8%) were of poor quality.

Cooking butter samples are sold unpackaged so their appearance were unacceptable and some were unclean, but they were acceptable in terms of their taste, aroma and texture. Abdou (2002) recorded nearly similar results, he recorded 8.5 average score for flavor out of 10 points; 2.5 for body and texture out of 5 points ; 3.6 out of 5 for color and appearance ; 2.8 of 3 for salt while zero out of 2 point for package.

Regarding pasteurized butter organoleptic quality was satisfactory except some samples had very dry body and unnatural high color. Abdalla and Darwish (1998); Ahmed *et al.* (2013) reported that physicochemical characters of the examined pasteurized butter oil brands were highly acceptable in terms of their appearance, aroma, texture and taste.

In the present study, the cooking butter samples which obtained the lowest score for color had a high moisture content and that might be attributed to dispersion of large air cells in the butter samples. These finding were supported by (Ahmed, 2007 and FAO, 2010) that color of the butter is affected by high moisture content, presence of salt, large size of air cells and their dispersion in the butter fat granules.

The results of the present work was confirmed by (Douglas, 2006) who concluded that butter which had good fat percentage, moisture percentage, solids, solids not fat, color, texture and taste would give good appearance.

Larmond (1977); Rodriguez *et al.* (2003); ILS (2007) contributed that aroma is attributed to the presence of volatile acids. These findings were further supported by (Wright *et al.,* 2001) who reported that butter flavor loss is due to inter-esterification at high temperature.

The findings of the present study showed that butter sample which achieved good texture scores get good taste scores. These results are supported by the conclusion of (Bornaz *et al.* (1995) who indicated that taste is attributed to the texture of the butter and how it taste in the mouth.

The finding of the butter texture scores might be due to the low iodine value in the range of 25-27, as low iodine value attributed to less oxidation and good texture. These findings are also supported by facts given by Bornaz *et al.* (1995) who concluded that butter texture was dependent upon the low iodine value (25-27). Moreover, the butter with good fat content gives good texture scores. This result is also supported by Winton and Winton (2006) that fatty acids content of butter affect the texture of butter samples and 80% variation in texture is attributed to fatty acids, which gives desirable texture (Larmond, 1977; Neupaney *et al.,* 2003; Samet-Bali *et al.,* 2010).

Cooking and pasteurized butter samples recorded average fat contents of 76.27 $\pm$ 5.17 and 81.66 $\pm$ 5.96, respectively Table 2. According to the E.S 36% and 16% of cooking and pasteurized butter samples, respectively didn't satisfy the standard fat content Table 3.

Nearly similar results were reported by Simpfendrfer and Cardoso (1989) as 65% of samples were within the legal limit of minimum 80% fat. While Nazem (1991) found 16% of cooking butter samples had lower fat content than the Egyptian Standards, 2005.

On the other hand, 5 (20%) and 16 (64%) of the examined cooking and pasteurized butter samples, respectively had >80% fat content Table 3, Nambiar and Subrahmanyam (1975) found that 20 samples out of 70(28.6%) had milk fat of >80%. Lower results were reported by Hayaloglu and konar (2001) and Abdou (2002), as all their examined butter samples were below the minimum fat percent. While, higher results were recorded by Hankin and Hanna (1983) and EL- Demerdash (1990).

The low fat content in the examined cooking butter samples in the present study may be due to failure in working (under working) which results in high moisture and low fat content or due to adulteration by adding thickeners other than starch.

Nadeem *et al.* (2012) reported that the highest butter fat content (89%) was achieved by using cream of 35% fat and churning the samples at 10°C temperature. The present study shows increasing trend in the butter yield with decreased temperature; this might be due to the reason that low temperature of churning leads to rapid fat coagulation and large butter granules which have more fat content. These findings are supported by Sun *et al.* (2008) who reported that low temperature churning gives rapid coagulation of butter fat.

The ADV in cooking butter samples recorded average value of 2.51 $\pm$ 1.8, while it was 0.96 $\pm$ 0.54 for pasteurized butter samples Table 2. Regarding the degree of lipolysis, 16 (64%) and 5 (20%) of the examined cooking and pasteurized butter samples, respectively were unsatisfactory (Table 4), which indicates that these samples are undergo hydrolytic rancidity either due to the initial high lipase enzyme in milk or cream used for butter manufacture or more likely due to contamination with lipolytic microorganisms. The results revealed that, only 2 (8%) of the examined cooking butter samples were normal (<0.4 ADV), 5 (20%) were borderline (1.2-1.5 ADV), while 16 (64%) were extremely lipolyized ($\geq$ 1.5 ADV), Table 4.

High acidity level were also recorded by Nambiar and Subrahmanyam (1975). Also, Nazem (1991) recorded that 60 and 64 % of the examined cooking and pasteurized butter samples exceeded the acidity limits specified by the Egyptian Standards, 2005. While Hatipoglu (1972) recorded only 3(7.7%) rancid butter samples examined in Turkey. Augusta and Santana (1998) and Abdou (2002) found the acidity of all butter samples were in the expected range.

A declining trend in free fatty acids with decrease in temperature might be attributed to the finding of Hunziker (1948) who reported that free fatty acids value increased during churning and reduced with decrease in temperature. High fat content gives rise to more free fatty acids content, so the increase in the fat percentage of churned cream leads to increase in the free fatty acids in the end product. These findings agreed with the findings of Sawaya *et al.* (1984) ; Al-Khalifa and Al-khatani (1993) ; Walstra *et al.* (1999) who concluded that the high fat cream churning gives rise to more free fatty acids content. The present results is also confirmed by Uphus (1996) who found that free fatty acids in sweet cream butter samples ranged between 0.3 to 0.6%.

In some instances, butter manufacturer replace milk fat by cheaper fats as vegetable fat, this adulteration could be detected by determination of iodine value (IV). Milk fat butter has low IV while vegetable oils have high IV due to greater number of unsaturated fatty acids.

The mean of iodine value were 36.29 $\pm$ 16.7 and 43.07 $\pm$ 11.9 for cooking and pasteurized butter samples, respectively as recorded in Table 2. The IV exceeded the normal limit (26-43) in 3 (12%) and 4 (16%) of the examined cooking and pasteurized butter samples, respectively Table 5. Twenty (80%) cooking butter samples were within the normal limit, while two (8%) samples recorded IV lower than the minimum limit. Regarding pasteurized butter samples, 21 (84%) samples were within the normal limit Table 5.

Similar results were recorded by Augusto and Santana (1998), who recorded that 15.2% of samples exceeded the legal limit for IV. While Hatipoglu (1972) recorded nearly normal IV range (24.3- 44) with an average of 33.6. Also Downey (1975) recorded IV range of 29-35 for both slightly salted ripened cream butter and salted sweet cream butter samples manufactured in Ireland.

The mean solid not fat (SNF) were 2.88 $\pm$ 1.65 and 2.25 $\pm$ 1.12 for cooking and pasteurized butter samples, respectively as recorded in Table 2. The SNF exceeded the normal limit 3% in 11 (44%) and 5 (20%) of the examined cooking and pasteurized butter samples, respectively (Table 6). 12 (48%) cooking butter samples were within the normal limit, while 2 (8%) samples recorded SNF lower than 2%. Regarding pasteurized butter 16 (64%) samples were within the normal limit Table 6. Lower results were recorded by Keogh (2006) who reported that SNF in butter samples would be up to 2%.

The results of the present study for solids not fat could be attributed to the butter texture containing large and good structure fat globules had fewer amounts of other solids. The findings of the study were supported by Walstra *et al.* (1999) who stated that the solids not fat are the amount of solids present in butter fat globule except fat.

The mean moisture content were 17.55 $\pm$ 2.34 and 15.07 $\pm$ 2.09 for cooking and pasteurized butter samples, respectively as recorded in Table 2. The moisture content exceeded the normal limit 18% in 3 (12%) and 2 (8%) of the cooking and pasteurized butter samples, respectively Table 7. 18 (72%) cooking butter samples were within the normal limit, while 4 (16%) samples recorded a moisture content lower than 15%. While pasteurized butter samples 16 (64%) samples were within the normal limit, 7 (28%) samples recorded a moisture content lower than 15%.

In the present study while observing moisture content with respect to butter fat levels, the highest moisture content might be due to the increase in free fatty acids. These findings are supported by Sağdic *et al.* (2004) and Funahashia and Horiuchi (2008) reported that the increase in free fatty acids is due to the churning which influence the moisture content. Churning at low temperature resulted in low moisture content due to the formation of large butter globules with good drainage of butter milk. The more pronounced change in moisture % might be due to the significant change in fat level of butter samples Walstra *et al.* (1999).

In the current study all the fifty cooking and pasteurized butter samples were proved to be free from adulteration by starch. However, Garcia-Olmedo and Gastanaduy (1971) and Singh *et al.* (1975) found that 51.2% and 16% of the examined butter samples in madrid and India, respectively were adulterated by starch.

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الفرق بين الخصائص الفيزيقوكيميائية للزبد الفلاحي والمبستر المباع في مدينة الإسكندرية

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أجريت هذه الدراسة لفحص خمسون عينة زبد بقري (٢٥ عينة زبد فلاحي و ٢٥ عينه زبد مبستر) تم تجميعها من الأسواق والسوبر ماركت في مدينة الإسكندرية لفحص الخصائص الفيزيقوكيميائية. أظهرت النتائج أن ٤٠٪ ، ٣٦٪ ، ٢٤٪ من عينات الزبد الفلاحي صنفت إلي درجة ثانية ، ثالثة ودرجة رابعة علي التوالي من حيث الجودة ، ويرجع ذلك لسوء تداول الزبد الفلاحي حيث أنها تباع غير مغلفة . في حين أن عينات الزبد المبستر صنفت إلي ١٢٪ درجة أولي ، ٦٤٪ درجة ثانية ، ١٦ درجة ثالثة و ٨٪ درجة رابعة. سجلت عينات الزبد الفلاحي متوسط نسبة دهن ٧٦.٢٧ ± ٥.١٧ ومتوسط رقم الحامض (ADV) ٢.٥١ ± ١.٨ ومتوسط الرقم اليودي ٣٦.٢٩ ± ١٦.٧ ومتوسط نسبة المواد الصلبة غير الدهنيةٍ(SNF) ٢.٨٨ ± ١.٥٦ ونسبة الرطوبة بمتوسط ١٧.٥٥ ± ٢.٣٤ بينما سجلت عينات الزبد المبستر القيم التالية علي التوالي ٨١.٦٦ ± ٥.٩٦ ، ٠.٩٦ ± ٠.٥٤ ، ٤٣.٠٧ ± ١١.٩ ، ٢.٢٥ ± ١.١٢ ، ١٥.٠٧ ± ٢.٠٩ . وقد تبين من النتائج أن ٣٦٪ من الزبد الفلاحي و١٦٪ من الزبد المبستر سجلت نسبة دهن أقل من الحد الأدنى للمواصفات القياسية المصرية. بقياس رقم الحامض ADV أتضح أن ٨٪ من عينات الزبد الفلاحي ذات رقم حامض أقل من ٠.٤ وصنفت خالية من التزنخ ، ٢٠٪ (٠.٧-١.١) ، ٨٪ سجلت (١.٢-١.٥) بينما ٦٤٪ من العينات متزنخة لأنها سجلت رقم حامض أعلي من ١.٥ بالنسبة لعينات الزبد المبستر وجد أن ٤٤ ٪ خالية من التزنخ ، ٣٢٪ (٠.٧-١.١) ،٤٪ (١.٢-١.٥) بينما ٢٠٪ متزنخه ، وربما يرجع ذلك إلي سوء الحفظ والتداول والتخزين. وبقياس الرقم اليودي ، وجد أن ٨٠٪ ، ٨٤٪ من عينات الزبد الفلاحي والمبستر علي التوالي توافق الرقم اليودي الطبيعي للزبد (٢٦-٤٣) ولكن ٢١، ٤٪ من العينات علي التوالي سجلت رقم يودي أعلي من ٤٣ ويرجع ذلك إلى احتمال غشها بالزيوت النباتية الأرخص ثمناً. وبقياس نسبة المواد الصلبة الغير دهنية SNF وجد أن ١٢ عينة بنسبة ٤٨٪ ، ١٦ عينة بنسبة ٦٤٪ من عينات الزبد الفلاحي والمبستر على التوالي كانت في حدود المسموح به بينما ١١ عينة ٤٤٪ ، ٥ عينة ٢٠٪ من عينات كلا من الزبد الفلاحي والمبستر كانت أعلى من الحد المسموح به ٣٪. وبقياس نسبة الرطوبة وجدت ٢٢ عينة بنسبة ٨٨٪ ، ٢٣ عينة بنسبة ٩٢٪ من عينات كلا من الزبد الفلاحي والمبستر كانت في حدود المسموح به بينما ٣ عينات بنسبة ١٢٪ ، ٢ عينة بنسبة ٨٪ من عينات الزبد الفلاحي والمبستر كانت تحتوي نسبة رطوبة أعلى من المسموح به ١٨٪. في حين أن فحص العينات أثبت خلو جميع العينات من الغش بالنشا.