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The Effect of Addition Wheat Germ on Quality of Low Fat Cheese

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ABSTRACT

It was investigated how adding wheat germ to low-fat cheese at a proportion of 1.2% would affect the cheese's rheological, sensory, yield, chemical, and microbiological characteristics. The results showed that adding 2% wheat germ and 6% fat increased the total solids content of the cheese made in comparison to the control. The behaviour of the protein, salt, and ash contents was consistent. The highest in several rheological characteristics were seen in treated cheeses. When compared to control cheese, whether it was fresh or after 14 days, low fat producing cheese with 1% wheat germ, 3% fat in milk, and coagulant with 1.5% starter had superior sensory evaluation ratings. Additionally, cheese made with 0.3% fat in milk with coagulant and 1% wheat germ when compared to other treatments and control cheese, 1.5% starter had the fewest microbiological traits, whether they were present immediately or after 14 days. Additionally, the cheese's extended shelf life was 14 days as compared to control cheese.

Keywords: low-fat cheese, wheat germ, rheological, chemical, and microbiological characteristics.

INTRODUCTION

Numerous biologically active compounds, including flavonoids, hormones, glutathione, phenols, and unsaturated fatty acids (oleic, linoleic, and alpha-linolenic acids) are present in wheat germ. Additionally, wheat germ is high in protein and is regarded as a strong source of the amino acids leucine and lysine. Use of wheat germ in the environment as it exists right now It strengthens the body's defences against damaging environmental factors like radiation and chemical pollutants. Because of the way it is constructed The chemical composition of wheat germ was determined as 28.5% protein, 14.0% starch, 11.7% moisture, 10.4% fat, 7.5% cellulose, 6.8% hemicellulose, and 4.5% ash (Avcıoğlu, 2014).Wheat germ content contains high levels of lecithin, essential fatty acids, unsaturated fatty acids (oleic, linoleic, and alpha-linole-nic), proteins and minerals zinc, manganese, and chromium among minerals, (Özcan et al., 2013).The biological value of the proteins found in wheat germ (%23) is similar to animal (meat %16–22, milk %3.5, and cheese %16–30 proteins) (Arslan, 2002; İnal, 1990).Wheat germ, produced with or without oil, is offered for sale in plastic bags or jars at the places in Europe and the USA where health-care and dietary products are sold. These products can be added to soups, milk, and yoghurt and consumed with breakfast cereals by using various sweeteners. Wheat germ is used as filler and enrichment agent for various foodstuffs, especially bread (Çakmaklı, Köse, & Kemahlıoğlu, 1995; Kahveci & Özkaya, 1990). They stated that the Labneh cheese produced by adding wheat germ extract had a higher dry matter level and higher hardness than the control group and also had an effect on the taste and flavor of the product. Basiony (2013) stated that as a result of cheese production, which was made by adding such ingredients as wheat seeds, oat, saccharin fiber, and barley, an increase in cheese yield and in the amounts of protein, ash, and fatty acids was achieved as well as a decrease in clotting time. Cheese production by adding various components is common in many countries. For example, in Greece, Italy, Spain, and Portugal, cheeses made with hazelnut, fruit, vegetable, and spice crops, soy-bean products added to Japan, China, Korea, and other countries, cheeses made with isolates, and vegetable ingredients in Southeast Asia and Western European countries and in America like cheeses (Zakharova, 2014).Nahla and Makarim (2018) Studies; wheat seeds in soft cheeses also improve the sensory properties , the purpose of this study is to assess how direct acidification by starter culture and wheat germ affects the characteristics of low-fat cheese.

MATERIALS AND METHODS

Materials

Source of milk:

Fresh and skim buffalo milk which have the chemical composition mentioned in Table (1) was purchased from Dairy processing unit, Faculty of Agriculture, Mansoura University.

Table 1. shows the chemical makeup of milk.

Treatments	Chemical structure					
	T.S%	TP%	Fat %	Lactose	PH	Acidity
Raw milk	15.60	4.20	6.10	4.95	6.40	0.15
Skim milk	10.00	3.85	0.30	4.83	6.40	0.17

Starter:

yoghurt Starter *(lactobacillus delbrueckii ssp. Bulgaricus and streptococcus thermophiles*) . Hansen (Horsholm 2970, Denmark) were used as starter bacteria for milk fermentation processes during cheese making.

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Wheat germ

With key functional qualities like water absorption1 of 200%, wheat germ contains a physiologically active substance (18–24%), carbohydrates (8–10%), proteins (21.5–28%), and fat (8–11%). Were obtained from center research – eldoky- elgiza-Egypt

Salt:

Dry Sodium chloride commercial food grade, produced by El-Nasr Saline's Company in Egypt was purchased from the local market at Mansoura, Dakahlia Governorate.

Chemicals:

All Chemicals used for testing analysis were received from the El-Gomhoria company , El- Mansoura city, Egypt.

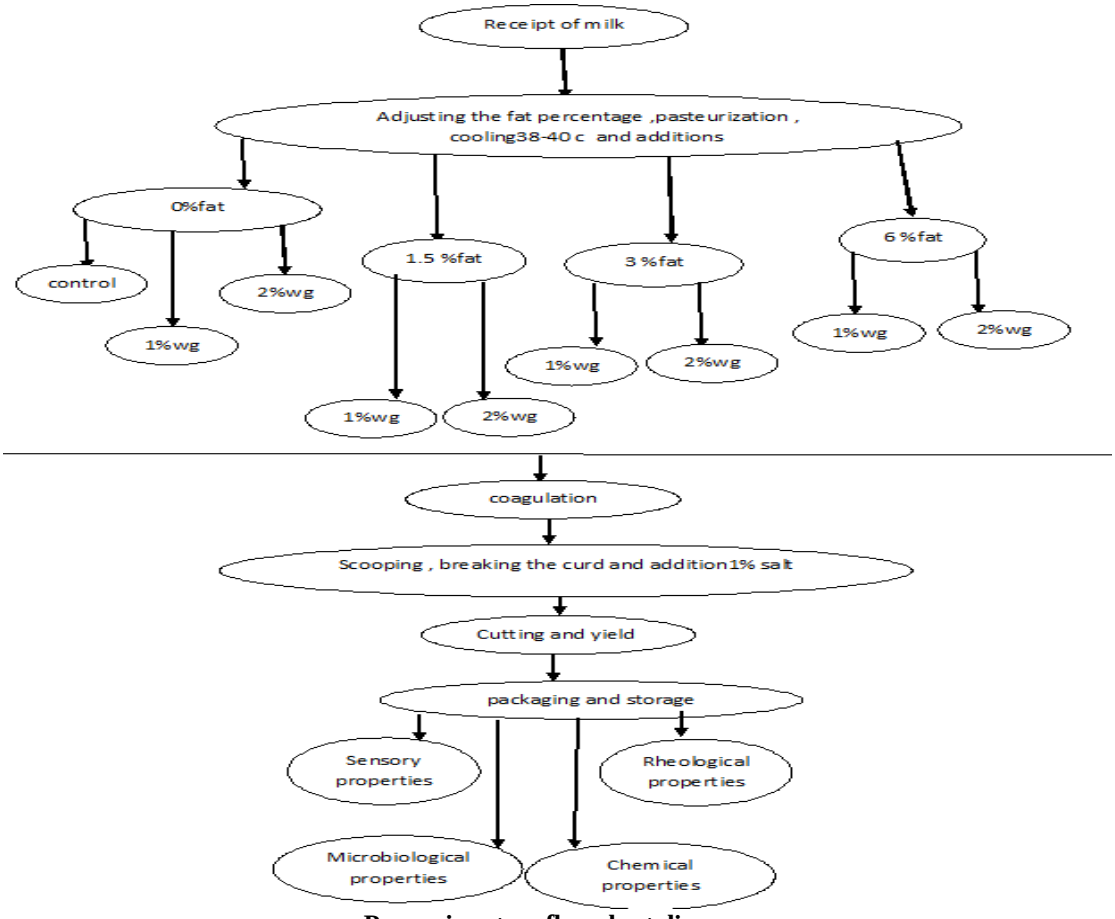
Methods:

cheese making:

Cheese milk was divided into four portions according to the fat percentage as the following (0.3, 1.5, 3.0 and 6.0%).

The first portion (0.3% fat) was divided into 3 parts all parts inoculated with 1.5 % traditional yoghurt starter and processed to free fat soft cheese by the traditional method without wheat germ addition for the first part and considered as a control cheese, the other two parts were processed by the same steps followed in control cheese except wheat germ addition (1 and 2%). the other three portions (1.5, 3.0, 6.0 % fat) was divided into two parts and processed by the same control making steps with wheat germ addition (1 and 2).

All treatments and control cheese were collected and stored at refrigerated condition (5 ± 1 °c) and analyzed for chemical, rheological, microbial and organoleptic properties at intervals periods (zero, 7 and 14 days) in three replicates. The following flow sheet diagram indicates the processing steps:-



Processing steps flow sheet diagram

Sampling:

Samples of cheese treatments were collected in three replicates from zero, 7 and 14 days for chemical, rheological, microbiological and organoleptic analysis.

Methods of analysis:

Chemical analysis:

From the interior and exterior of the blocks, 100g of experimental cheese samples were obtained and homogenization for chemical analysis.

Total solids content (TS):

Total solids of cheese samples were calculated based on (AOAC, 2005) method.

Titratable acidity (TA):

Titratable acidity of cheese treatments as Lactic acid percentage in cheese was calculated based on (Ling, 1963).

Total protein (T.P):

The total protein contents of investigated cheese was calculated by using the method outlined by Ling (1963) after estimating the total nitrogen and multiplying the estimated total nitrogen by 6.38.

Fat content:

Using a special butyrometer for cheese, the traditional Gerber's procedure was applied (B.S.I. 1955).

Microbial analysis:

According to the procedures outlined by the American public health association (1992), samples of cheese treatments were examined for total viable bacterial count (T.C), photolytic, and lipolytic bacteria.

Coliform Bacterial Count (CFBC) :

It accordance to (Difco 1977) was calculated using MacConkey Agar Medium (Oxid, Basingstoke, Hampshire, England).

Fungi and Yeasts Count (FYC) :

Potato Dextrose Agar (PDA) Medium was used for the experiment, in accordance with Luck and Gavron (1990). The plates were incubated for 5 days at 24 1 C.

Rheological tests (TPA) :

Texture profile analysis: The evaluation of Texture Profile Analysis (TPA) was carried out in Agriculture Res.center, food Technology Res., Insti, Ministry of Agriculture and land Reclamation, Egypt, - by using two samples for each treatment with Universal Testing Machine , provided with the software. Back extrusion cell with 35 mm diameter compression disc was used. Two cycles were applied at a constant crosshead velocity of 1 mm sec-1 to 35% of sample depth then returned. From the resulting force-time curve the values for texture attributes, i.e., hardiness, chewiness, cohesiveness, gumminess and springiness were calculated TPA graphic.

Curd tension:

Was estimated by using the technique described in (Chandrasekhara et al., 1957),

Curd syneresis:

According to (Mehanna and Mehanna, 1989) the values and percentages of curd syneresis was estimated.

Organoleptic properties of low fat cheese:

Low fat organoleptic evaluation of cheese samples resulted in scores for flavour (50 points), body and texture (35 points), and appearance and colour (15 points). Five panellists averaged the results, according to Nelson and Trout (1981).

Cheese yield:-

As weight of cheese by the weight of milk used to make cheese and multiplying by 100. by (Metzger *et al.*, 2000).

Result and discussion

It is well known that cheese is poor in fibers which is important for health so , this part of study aim to add wheat germ to cheese milk to raise ,total solid ,protein , and improving its rheological properties and its yield of the product ElŜbieta *et al*.,(2004)

Effect of Starter and Addition of wheat germ on the Chemical Composition of cheese on during storage periods:

Acidity and pH

Illustrated data in table (2) indicates the effect of fat content and wheat germ in some physiochemical properties of soft white cheese these data reveal that the cheese acidity percentage varied according to the cheese milk make ingredients and addition whereas the control cheese (0.3%fat) without wheatgerm addition gained the highest all content among other treatments either it was fresh or after storage period (1.580 ,1.630 , 1.72)on the other hand the cheese which made from high fat content milk (6%) either with 1or 2 %wheat germ had the lowest acid content among other treatments and control cheese either with were fresh and throughout storage (0.82.0.84.0.86) .

Total Solids

the same data in table (2) shows the total solids (TS%) of control and treated soft white cheese these data reveal that the total solids content increased in cheese treatment in relation with the rising in the fat content of cheese milk also the wheat germ addition ratio as fat lowing the content cheese (0.3%fat) have the lowest total solids content among other treatment either at the begrudging or throughout storage period (24.85, 25.65, 26.75) on the other hand (D3) treatment gained the higher total solids content among other treatment and content cheese (40.02,41.10 ,42.15)and this might be due to the variations in the fat content wheat germ ratio and the evaporation for some moisture content during storage. These result agree Abeer MAbdo Elhamid (2016) The low fat cheese compared to the control, had a significantly (P 0.01) higher yield, lower total solids content,

Total Protein

Data presented in table (2). shows the total protein (TP) content these data reveal that the protein content decreased according to the increasing of fat content so control cheese have(18.42)(0.3%fat) but (D1) have (16.70)(6.0%fat)on the other hands the total protein percentage were increased according to the increasing of wheat germ ratio as the following (A1)(0.3%fat and 1%wheatgerm) have 18.85% whereas (A2) (0.3%fat and 2%wheatgerm) have 19.25% At zero time all protein values were increased according to the progress at storage period for all treatments and control cheese . These result agree Nahla and Makarim (2018) the result ant demonstrated that the time of coagulation, the yield percentage, and the cheese hardness were all influenced by the wheat germ. Compared to the control treatment, adding wheat germ to cheese increased its ash and protein content

Total Fat

According to the variation of milk cheese fat content of treated cheese was increased as relation according to that as the following control cheese (0.3%fat) gained the lowest fat content 1.02% but D1(6%FAT) have 18.28%.fat values were increased for all cheese treatments and control with the progress at storage period for example fat contents were (1.02and1.2) for control cheese at zero time and the end of storage period (14days).

Ash

Data for ash % which ills traded in table (2) reveals that ash % was increased as relation with fat increasing so the control cheese (0.3%fat) gained the ash content (3.05) in contrast with D2 which contained (4.12) at zero time. Also the ash% was increased according to the progress of the storage period for example it was (4.12) and increased to (4.27) at zero time and 14days respectively in D2(6fat2%wheatgerm). These results are agreeing Gehan and Samah (2018) Imitation cheese made without dairy is produced using vegetable oil and protein. The main dietary fibre sources for humans include oats, wheat germ, and cereals

Data for TP/TS, F/TS and ASH%/TS% have the same behavior which decreased according to the increased of TS the progress at storage period and the fat content. for example, it was (74.12,4.1and 12.27) for TP, F and Ash /TS respectively in control cheese at zero time after that decreased for (16.4)

Table 2. Effect of Type of Starter and Addition of wheat germ on The Chemical Composition of Fresh.7,14, day's low fat Cheese:

Treatments	Fat%	Storage Period	A%	T.S%	TP%	TP/TS	F%	F/TS	ash%	Ash/TS
		zero	0.158	24.85	18.42	74.12	1.02	4.10	3.05	12.27
Control	0.3	7	0.163	25.65	18.89	73.64	1.12	4.36	3.12	12.16
		14	0.172	26.57	19.23	72.37	1.20	4.51	3.20	12.04
		zero	2.00	25.86	18.85	72.89	1.20	4.64	3.17	12.25
A1	0.3%	7	2.02	26.75	19.35	72.33	1.30	4.85	3.26	1218
		14	2.05	27.57	19.92	72.25	1.42	5.15	3.33	12.07
		zero	2.00	26.23	19.25	73.38	1.24	4.72	3.١9	12.16
A2	0.3%	7	2.02	27.37	19.95	72.89	1.36	4.96	3.30	12.05
		14	2.05	28.45	20.38	71.63	1.47	5.16	3.37	11.84
		zero	1.49	28.05	18.10	64.52	5.10	18.18	3.22	11.47
B1	1.5%	7	1.51	29.10	18.46	63.43	5.35	18.38	3.30	11.34
		14	1.53	30.25	18.86	62.34	5.69	18.80	3.40	11.23
		zero	1.49	29.15	18.55	63.63	5.60	19.21	3.38	11.59
B2	1.5%	7	1.51	30.20	18.78	62.18	5.87	19.43	3.48	11.52
		14	1.53	31.10	18.95	60.93	6.15	19.77	3.57	11.47
		zero	0.90	33.21	17.14	51.61	11.10	33.42	3.65	10.99
C1	3.0%	7	0.92	34.17	17.37	50.83	11.57	33.86	3.70	10.82
		14	0.94	35.23	17.74	50.35	11.97	33.97	3.80	10.78
		zero	0.90	34.75	17.75	51.07	11.48	33.03	3.78	10.87
C2	3.0%	7	0.92	35.82	17.95	50.11	11.88	33.16	3.85	10.74
		14	0.94	36.89	18.48	50.09	12.38	33.55	3.92	10.62
		zero	0.82	38.95	16.10	41.33	18.28	46.93	3.87	9.93
D1	6.0%	7	0.84	39.90	16.46	41.25	18.88	47.31	3.94	9.87
		14	0.86	40.95	16.75	40.90	19.55	47.74	4.00	9.76
		zero	0.82	40.02	16.70	41.72	19.10	47.72	4.12	10.29
D2	6.0%	7	0.84	41.10	16.85	40.99	19.75	48.05	4.20	10.21
		14	0.86	42.15	17.12	40.61	20.45	48.51	4.27	10.13

Rheological properties

Tabulated data table (3) Show that curd tension was decreased as a relation with the increasing of fat content .so the control cheese gained .the highest value (103gm) among all treatments on the other hand D2(6%fat and 2%wheatgerm)have the lowest value (48) in comparing with control cheese and other treatments .the data at the same table revealed that the increasing of wheat germ percent caused a decrease in the curd tension value and that might be due to the weakness of the casein net and the Hight percent of fat content data in table(3) reveal the differences on the curd syneresis quantity at annoying time periods. These data discerns that control cheese have the lowest curd syneresis quantity (26.66)as precent with the cheese sample at the end of test time among all cheese treatments .also these data shows that the addition of wheat germ increased the curd syneresis quantity specially with the decrease of fat content so A1 .A2 gained the highest curd syneresis quantity (49.5and48.5) among all treatments and control cheese .

Table 3. Effect of the addition of wheat germ to cheese milk on some milk rheological

Treatment	Percent fat	Coagulate Time	Curd tension 100gm	Curd synersis (gm /30 gm. of curd) 30M	60M	90M	120M
Control	0.3	393m	103 gm.	6.12	7.10	7.48	8.00
A1	0.3%	372m	94 gm	13.05	13.89	14.50	14.87
A2	0.3%	367m	86 gm	12.75	13.65	14.10	14.55
B1	1.5%	413m	80 gm	12.05	13.08	13.85	14.10
B2	1.5%	405m	73 gm	11.50	12.38	13.05	13.56
C1	3%	448m	67 gm	10.35	11.45	12.20	12.87
C2	3%	442m	60 gm	9.85	10.75	11.45	11.87
D1	6%	485m	55 gm	9.05	10.45	11.25	11.65
D2	6%	479m	48 gm	8.65	9.35	10.05	10.25

(A1)=1.5%starter+1%wheatgerm+0.3%fat **(A2)= 1.5%starter+2%wheatgerm+0.3%fat**
(B1)= 1.5%starter+1%wheatgerm+1.5%fat **(B2)= 1.5%starter+2%wheatgerm+1.5%fat**
(C1)= 1.5%starter+1%wheatgerm+3%fat **(C2)= 1.5%starter+2%wheatgerm+3%fat**
(D1)= 1.5%starter+1%wheatgerm+6%fat **(D2)= 1.5%starter+2%wheatgerm+6%fat**

The data in table (3) show that the effect of wheat germ in increasing the whey pulsion rate decrease with increasing cheese fat content so D1 and D2 have the lowest curd syneresis quantities as a percent of cheese sample at the end of test period (38.8and33.5)respectively .in addition these data reveal that the increasing of wheat germ ratio decrease the curd syneresis rate for example in(D1 1%wheatgerm and D2 2%wheatgerm) it were (38.8 and 33.5)respectively at the end of test period (120m)these results might be due to the effect of wheat germ in the curd strength and the length of the curding time data in table (3) reveal the influence of wheat germ in the total curding time and these data indicate that the addition of wheat germ increased the total curding time so the control cheese

gained the lowest total curding time among all cheese treatment on the other hand D1.2 treatments have the highest total curding time among all cheese treatments and control (485and 479) respectively .these result might be due to the effect of wheat germ on the strangely of casement which reflects on the lengthiness of total curdling

Cheese fracture:

There were strong relation between the fat content and fracture values but this relation not stand up where as when the fat content increase up to 1.5%this relation was inverted so A1and A2(0.3% fat and 1,2wheatgerm)have the highest fracture values among all cheese treatments at zero time determination .also the high fat content treatment (6%milk fat)have the lowest fracture value specially with 1%wheatgerm (0.2) at the beginning of determination time these results might be related to the effect of milk fat on the smoothness of cheese matrix and the effect of wheat germ addition ratio on adding some strength for the cheese matrix and these results came in agreement with …..data in the same table indicate that the fracture values were decreased through out that the progress of storage period in all treatments and control cheese, for example that value decreased from (2.1to1.01) after14days of storage period for control cheese

Cheese hardness:

Data in table (4)show the effect of fat content and wheat germ ratio on the hardness values, these data reveal that the presence of milk fat decreases the hardness values, so A1,D2 cheese treatment gained the highest value among other treatments and control cheese (5.55 and 6.87) respectively ,also the increasing of wheat germ ratio was increased the hardness value in all treatments such as A2(0.3%fat,2%wheat germ5.55) have higher hardness value than A1(0.3%fat,1%wheatgerm 6.78)these results might be due to the effect of wheat germ in the increasing of total solids content in addition the progress at storage period have a decreasing effect ,so, in control cheese the hardness value (4.55 and 2.22) at the behavior and the end of storage period respectively. this behavior was found in all treatment and that might be due to the increasing of fat/ts also for the happing of some analysis on the cheese texture and these results care in agreement in the. Koca and Metin (2004) reported comparable outcomes.

Cheese adhesiveness:

Adhesiveness is the effort necessary to remove cheese from a surface (such as the tongue or teeth)., plate).

Table (4) shows that cheese made by adding (wheat germ 2%)and with (6%)fat obtained the heights value either fresh or after 14 days (0.433, 0.227) sequentially Adhesiveness values compared with other treatments It is noticeable that the higher the percentage of fat in cheese, the heights the percentage of Adhesiveness fat. The decrease in moisture and rise in total solids may be to blame for this. Relative proportions of water, protein, and fat were found to be the main influences on cheese. Adhesiveness

Cheese cohesiveness:

Table (4) shows that by adding (wheat germ 2%)and with (3% fat)the Cohesiveness values in fresh cheese and after 14 days obtained the heights value either fresh or after 14 days (6.23, 1.47) sequentially.. It is noticeable that the higher cheese's fat content as a %, the heights the percentage of Adhesiveness until the percentage of 6% fat, decreased the Cohesiveness. It is noticeable that the higher the percentage of fat in cheese, the height the percentage of Cohesiveness fat. The decrease in moisture and rise in total solids may be to blame for this. Relative proportions of water, protein, and fat were found to be the main influences on cheese. These outcomes resemble (Ahmed *et al*.,2004).

Cheese springiness:

The pace at which a material returns to its original state after being deformed is known as springiness or elasticity..

Table (6) shows that by cheese made by adding (wheat germ 2%)and with(0.3 % fat) Springiness values in fresh cheese were the cheese made Obtained the highest value (5.32) fresh and after 14 days value (7.12) while cheese made with (6%) fat obtained the lowest value either fresh or after 14 days (1.99, 5.10) sequentially. It is noticeable that the higher the percentage of fat in cheese, the heights the percentage of Springiness until the percentage of 3% fat, then the percentage of Springiness lowest with the increase in the percentage of 6% fat. This may be a result of the rise in total solids and the decrease in moisture. Relative proportions of water, protein, and fat were found to be the main influences on cheese. Springiness

Cheese gumminess:

Table (4) shows that by cheese made by adding (wheat germ 2%)and with(0.3 % fat) gumminess values in fresh were the cheese made Obtained the highest value (4.93) fresh and after 14 days value (3.24) while cheese made with (6%) fat obtained the lowest value either fresh or after 14 days (2.37, 1.98) sequentially. It is noticeable that the higher the percentage of fat in cheese, the heights the percentage of gumminess until the percentage of 0.3% fat, then the percentage of gumminess lowest with the increase in the percentage of 6% fat. This may The cheese's value and the effort needed to chew it are dependent on the cheese's cohesion and hardness. gumminess

Cheese chewiness:

The amount of effort needed to chew a solid food product until it is ready to be swallowed is referred to as chewiness. It is a secondary parameter derived from gumminess and springiness.

Table (4) shows that by cheese made by adding (wheat grain 2%) with (0.3 % fat) Chewiness values in fresh cheese Obtained the highest value (18.15) fresh and after 14 days value (10.25) while cheese made with (6%) fat obtained the lowest value either fresh or after 14 days (7.93, 5.20) sequentially. It is noticeable that the higher the percentage of fat in cheese, the heights the percentage of Chewiness then the percentage of Chewiness lowest with the increase in the percentage of 6% fat. This may be a result of the rise in total solids and the decrease in moisture. Relative proportions of water, protein, and fat were found to be the main influences on cheese Chewiness.

Moduluspiont1

Table (4) shows that by adding (wheat germ1%) moduluspiont1 values in fresh cheese were the cheese made with(0.3 % fat) Obtained the lowest value (0.23) fresh and after 14 days value (0.22) while cheese made with (6%) fat obtained the heights value either fresh or after 14 days (0.357 , 0.342) sequentially. It is noticeable that an increase in the moduluspiont1 proportion of fat.

Table (4) shows that by cheese made by adding (wheat grain 2%) with(0.3 % fat) Obtained the lowest

moduluspiont1 v value (0.24) fresh and after 14 days value (0.23) while cheese made with (6%) fat obtained the heights value either fresh or after 14 days (0.492, 0.680) sequentially. It is noticeable that the higher the percentage of fat in cheese, the heights the percentage of moduluspiont1 until

Moduluspiont2

Table (4) shows that by cheese made by adding (wheat grain 2%) with (6%) fat obtained the heights moduluspiont1 values either fresh or after 14 days (1.303, 1.980) sequentially. in fresh cheese were the cheese made with (1.5 % fat) Obtained the lowest value (0.1.03) fresh and after 14 days' value (0.98) while cheese made It is noticeable that the higher the percentage of fat in cheese, At the percentage of fat 1%, there was a decrease, moduluspiont2. then with the increase in the fat proportion, the moduluspiont2 increased once more.

Initial Modulus

Table (4) shows that by cheese made by adding (wheat grain 2%) with (1.5%) obtained the heights initial modulus value either fresh or after 14 days (2.23, 1.11) sequentially. compared with other treatments. It is noticeable that the higher how much fat is in cheese, Initial modulus decreased when the proportion of fat reached 1%. then, when the proportion of fat increased, the initial modulus increased once more.

Table 4. Reghlogical properties of soft cheese made from milk with different fat content with added 1or2% wheat germ.

Treatment	Storage	Fractur	Hard Ness	Adhev Sivnes	Cohi sivnes	Sprin Giness	Gumm iness	chewins	Modulus Piont1	Modulus Piont2	Initial Modulus
controal	Fresh	2.1	4.55	0.11	0.40	4.01	2.65	14.669	0.19	0.745	0.14
	14	1.01	2.22	0.105	0.35	5.56	1.37	6.218	0.17	0.695	0.040
A1	Fresh	2.9	5.55	0.147	0.6	5.11	3.95	16.069	0.23	0.965	0.159
	14	1.58	3.22	0.105	0.65	6.78	2.67	8.018	0.22	0.925	0.058
A2	Fresh	3.92	6.78	0.293	0.80	5.32	4.93	18.150	0.24	1.22	0.750
	14	2.98	3.11	0.218	1.03	7.12	3.24	10.25	0.23	1.12	0.450
B1	Fresh	2	5	0.237	0.503	4.103	2.833	10.85	0.25	0.99	1.98
	14	0.55	1.85	0.22	0.58	5.62	1.0	3.18	0.24	0.97	0.42
B2	Fresh	3.21	5.93	0.334	0.638	4.36	3.84	12.13	0.28	1.03	2.23
	14	1.72	2.17	0.222	0.718	6.63	2.08	4.16	0.25	0.98	1.11
C1	Fresh	0.5	3.066	0.241	5.23	4.877	3.177	7.8	0.247	0.983	0.196
	14	0.6	1.73	0.26	0.47	4.46	0.95	4.45	0.24	0.96	0.45
C2	Fresh	0.8	4.013	0.317	6.23	5.01	4.100	8.417	0.472	1.140	0.278
	14	1.23	2.150	0.523	1.47	5.770	2.012	5.970	0.480	1.014	0.974
D1	Fresh	0.2	4.2	0.344	2.83	1.6	1.78	6.46	0.357	0.913	0.557
	14	N/A	2.23	0.29	0.48	4.01	1.1	4.52	0.342	0.98	0.46
D2	Fresh	0.4	5.18	0.433	3.53	1.99	2.37	7.93	0.492	1.303	0.754
	14	N/A	3.20	0.227	1.48	5.10	1.98	5.20	0.680	1.980	0.663

Microbiological properties

Micrbiological characteristics of cheese made from skim milk contain 0.3%fat and 1.5, 3, and 6% fat are given that include the total number of proteolytic bacteria, lipolytic bacteria, mold and yeast throughout the holding period. The total number of bacteria varied between high value ($11x10^6$- $12x10^6$ and $14x10^6$) when fresh 6% fat contain or addition 1% wheat germ compared with made from 0.3%fat contain or addition 1%wheat germ gave less value ($5x10^6$,$7x10^6$ and $8x10^6$%). During the storage period, the overall bacterial count slightly rose. The starting culture cheese displayed the highest overall bacterial count, both when it was fresh and during the time it was stored with the 0.6% fat and 1% wheat germ. The cheese treated with 0.3% fat, starter culture, and 1% wheat germ, on the other hand, had the lowest overall level of bacteria in the fresh state of all the treatments. Table (5) demonstrates that the cheese treated with 6% fat with made starter culture and addition 2% wheat germ had the highest proteolytic bacteria value($10x10^4$,$12x10^4$and$14x10^4$) compared with 0.3%fat made starter culture and addition 1% wheat germ gave less value ($4x10^4$,$5x10^4$and $7x10^4$) either coagulants while the item is being stored. Furthermore, it was noted, Cheese treated with starter and addition 2% wheat germ 0.3%fat contain had the lowest lypolytic bacteria value($2x10^4$,$4x10^4$and$6x10^4$) compared with starter and addition 1% wheat germ 6% fat had the high value ($9x10^4$,$10x10^4$and$11x10^4$) during the times of storage, the other coagulants. Additionally, the results showed that while moulds and yeasts were absent in all treatments for fresh cheese, they were discovered in modest amounts in all treatments after seven days.6% fat starter was used to cure cheese. and addition 2% wheat germ had the highest value ($0x10^6$,$2x10^6$and$3x10^6$) mold's and yeasts count compared with starter and addition 1% wheat germ 0.3%fat ($0x10^6$) . Also noted was the absence of E. coli, both in fresh produce and during the storage period. These outcomes line up with Salem *et al* (2007). Ali , A. A et al ., (2016) Gehan H. Bisar et al ., (2015) Gehan et al ., (2015) It was discovered that the pH had clearly decreased, the acidity had increased, and this had been counteracted by lengthening the period of storage at 5-7°C. Additionally, the syneresis had significantly decreased, the log 10 cfu/g B. longum ATCC 15707 count had increased, and the viscosity had noticeably increased following maltodextrin treatment. In the end, it was determined that maltodextrin produced positive effects in stimulating the enhancing the organolepeotic properties of fermented milk and probiotic bacterial count compared to inulin, which our research suggests be used in industry.

Table 5. Enumeration of some microbial colonies grown on certain media

Treatments	Fat%	Storage period	TC x10^6 cfu/gm	Pr. b x10^4 cfu/gm	Ly.b x10^4 cfu/gm	M&Y x10^6 cfu/gm	Ecoli x10^6 cfu/gm
		FRESH	8.00	5.00	4.00	ND	ND
Control	0.3	7	9.00	7.00	6.00	ND	ND
		14	11.00	10.00	9.00	1.00	ND
		FRESH	5.00	4.00	3.00	ND	ND
A1	0.3%	7	7.00	5.00	4.00	ND	ND
		14	8.00	7.00	5.00	ND	ND
		FRESH	6.00	4.00	2.00	ND	ND
A2	0.3%	7	7.00	6.00	4.00	1.00	ND
		14	8.00	8.00	6.00	2.00	ND
		FRESH	7.00	5.00	5.00	ND	ND
B1	1.50%	7	8.00	6.00	7.00	ND	ND
		14	9.00	7.00	9.00	1.00	ND
		FRESH	6.00	8.00	5.00	ND	ND
B2	1.50%	7	7.00	9.00	6.00	ND	ND
		14	8.00	10.00	8.00	1.00	ND
		FRESH	8.00	6.00	6.00	ND	ND
C1	3.00%	7	9.00	8.00	8.00	1.00	ND
		14	10.00	9.00	10.00	2.00	ND
		FRESH	7.0	6.00	7.00	ND	ND
C2	3.00%	7	8.0	7.00	8.00	1.00	ND
		14	9.0	8.00	10.00	2.00	ND
		FRESH	11.00	9.00	8.00	ND	ND
D1	6.00%	7	12.00	10.00	9.00	1.00	ND
		14	14.00	11.00	10.00	2.00	ND
		FRESH	10.00	8.00	10.00	ND	ND
D2	6.00%	7	12.00	9.00	12.00	2.00	ND
		14	14.00	11.00	13.00	3.00	ND

Organoleptic properties

Table (6) It is deal as the percentage of wheat germ increased under different fat content yield of the resultant cheese slightly increased also the 1% wheat germ treatments gave higher acceptability for the judger than 2% percent wheat germ the higher fat content of cheese milk produced cheese with higher scoring point from the judger the higher scoring points was for cheese made from cheese milk having 3%fatand only wheat germ 1%value (90,91and 87%) while the worst cheese which gained the lowest scoring point was for cheese made from cheese milk containing 0.3%fat and 2%wheat germ the value(75,76and71%) . for all treatment, as the storage time advanced, judgers gave higher total scoring point for the cheese in general the appearance scoring point decreased, while the flavor and body texture point markedly increase and decreased in the last week. Its concluded that the best cheese milk is, having 3% fat and 1% wheat germ for young and healthy people and advanced to reduce the amount of fat in cheese and milk for old and unhealthy people.

Table 6. Organoleptic properties of soft cheese made from milk with different fat content with a dded1 or 2% wheat germ.

Treatments	Fat%	yield	Storage period	Appearance (15)	Body& texture (35)	Flavour (50)	Total(100)
			FRESH	9	26	39	74
Control	0.3	24.25	7	8	27	41	76
			14	8	25	38	71
			FRESH	9.00	29.00	40.00	78.00
A1	0.3%	24.85	7	8.00	30.00	41.00	79.00
			14	7.00	28.00	41.00	76.00
			FRESH	8.00	28.00	39.00	75.00
A2	0.3%	25.10	7	7.00	29.00	40.00	76.00
			14	6.00	27.00	38.00	71.00
			FRESH	10.00	30.00	42.00	82.00
B1	1.50%	26.65	7	10.00	32.00	43.00	85.00
			14	9.00	31.00	41.00	81.00
			FRESH	9.00	29.00	41.00	79.00
B2	1.50%	27.15	7	8.00	31.00	42.00	81.00
			14	7.00	30.00	40.00	77.00
			FRESH	11.00	33.00	46.00	90.00
C1	3.00%	28.85	7	10.00	34.00	47.00	91.00
			14	10.00	32.00	45.00	87.00
			FRESH	10.0	31.00	44.00	85.00
C2	3.00%	29.15	7	10.0	32.00	45.00	87.00
			14	9.0	30.00	43.00	82.00
			FRESH	12.00	30.00	45.00	87.00
D1	6.00%	33.15	7	11.00	32.00	46.00	89.00
			14	10.00	31.00	44.00	85.00
			FRESH	11.00	31.00	43.00	85.00
D2	6.00%	33.70	7	10.00	32.00	44.00	86.00
			14	9.00	30.00	42.00	81.00

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تأثير اضافة جنين القمح علي جوده وخصائص الجبن منخفض الده

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الملخص

في هذا البحث تم دراسة تأثير استخدام جنين القمح في صناعة الجبن الابيض قليل الدسم بنسبة (٠,٣و١,٥و٣و٦ دهن ٪) وتأثيره على علي خواص الجبن . أظهرت النتائج أن إضافة ٢٪ جنين قمح مع لبن كامل الدسم ٦% دهن أدى ذلك إلى زيادة محتوى المواد الصلبة الكلية للجبن الناتج مقارنة مع االكنترول والمعاملات الاخرى . وكذلك زيادة محتوى الجبن من البروتين والملح والرماد. ولوحظت أعلى نسبة في بعض الصفات الريولوجية في الجبن المعامل بنسبة ٦% دهن مع ٢ % جنين قمح . الجبن قليل الدسم المصنوع من ١٪ جنين القمح مع ٣٪ دهن وباضافة البادئ بنسبة ١,٥٪ حصل على اعلي درجات للتقييم الحسي سواء في الجبن الطازج او بعد ١٤ يومًا مقارنة بالكنترول . بالإضافة إلى ذلك ، فإن الجبن المصنوع من ١٪ جنين القمح و ٠,٣٪ دهن وبادئ ١,٥٪ احتوي علي أقل عدد من البكتريا والفطر والخمائر سواء في الجبن الطازج او بعد ١٤ يومًا مقارنة بالمعاملات الأخرى والكنترول .