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CHEMICAL COMPOSITION, SENSORY EVALUATION AND MICROBIAL CONTENT OF IRAQI SOFT WHITE CHEESE: INFLUENCE BY WHOLE BLACK SEEDS

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Abstract

Iraqi soft white cheese samples were made from cow's milk. Bacterial reninosis was used in the manufacture. The black seeds was added in percentages (1, 0.75, 0.5 and 0 % for curd cheese) T_1, T_2, T_3 and T_4. The fourth treatment without black seeds adding (control). The samples were stored at 4°C and were analyzed for total solid, fat, protein, NaCl, and ash at (0, 6, and 9 days). Also, tests were ducted for *E. coli, Staphylococcus aureus* and the Bacterial total count. More over the sensory evaluation was used. The aim of this study is to determine the impact black seeds adding in cheese. The results showed that the number of bacteria, *E. coli*, *Staphylococcus aureus* and total bacterial count decreases for T_1, T_2 and T_3 as we age, whereas T_4 increases the number of bacteria which has been studied. This is apparent at age 9 days. The statistical analysis of the cheese components showed at Pd" 0.05 all the treatments with significant difference between different ages or the similar age of the treatments. The sensory evaluation showed significant differences for sensory qualities in age for the same treatment or the similar age of the treatments, except for color there was no significant difference in similar ages for all treatments, as well as different ages for the same treatment except treatment T_2.

Key words : Iraqi soft white cheese, black seeds, chemical composition, Microbial content, sensory evaluation.

Introduction

Iraq ranks at 9th position among the producing milk countries of the Arabic world (FAO, 2003). Large amounts of milk are available in the spring and summer season in villages and rural producers because of the high temperatures and the lack of easy marketing, which causes the speed of damage and therefore most of it is used in the manufacture of Iraqi soft white cheese and the rest goes to the manufacture of other products such as yogurt, sterilized milk, ice cream, butter and other products (AL-Dahan, 1983). The art or science of cheese making comprises five key factors.milk composition,) rate and extent of acid development, moisture content, curd manipulation and ripening conditions (Lucey *et al.,* 2003). Other factors that may influence the quality of different varieties of cheese are the composition of milk, types of milk, starter cultures and manufacturing technology (Varnam and Sutherland, 1994). In Iraq, the industry of Iraqi soft white cheese is easy to manufacture and it does not need complex manufacturing processes and does not need a period of ripening and remains unchanged without development. This cheese is classified as soft cheeses with a moisture content of 45-70%. It also contains low fat and has a thin, light acidity and elasticity Abdo, 1997). As a result of the evolution in the concepts of health consumers and the cause of the addition of chemical catalysts of damage may be known or unknown so far, researchers have been interested in the addition of materials for the development of food industries, including dairy products for the purpose of increasing the duration of conservation or change in flavor or taste (Jafar, 2012); (Al-Jassas and Abdullah 2008) Many researchers have used preservatives, such as vegetable, for this type of cheese for the purpose of determining their effectiveness (Al-Khazraji, 2005) used some bacteria *Lactobacillus rhamnosus* GG to prolong the duration of preserving some of the therapeutic soft cheeses. (AL-

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Dirush and Al-Shamri, 2000)also used bacteria *Bifidobacterium bifidum* in the manufacture of Iraqi soft white cheese. In this research, the black seed plant was selected as an additive to the Iraqi soft white cheese as one of the methods of cheese development. This plant was selected for its human health importance. Moreover, this plant (*Nigella sativa*) is spreading in Iraq. It is a medicinal plant and is classified as one of the most important spices (BLACK SEED, 2017). These plants are spread throughout the Mediterranean, West Asia and North Africa and contains stable oils 30-35% of weight and volatile oils by 1.5% in addition to containing effective chemicals such as Nigel line, Nigel lone, Thymoquinone and many nutrients, vitamins and dietary fiber(AL-Saiad and Hussein, 2010). Moreover, contains potassium, calcium, copper, iron, phosphorus, zinc as well as lionic acid, oleic, beta- carotene, folic acid and vitamins B1, B2 and B3 (Abdulelah and Zainal-Abidin, 2007 a); (Abdulelah and Zainal-Abidin, 2007 b) and (Health Benefits of Black Seed, 2017) they has been found that the effectiveness of the black seed against malaria. (Morsi, 2000)while found to be effective against some Gram- negative bacteria and some Gram- positive bacteria and had a large role on liver diseases, as (Turkdogan *et al.,* 2003) was found to have liver protection of the substance of carbon tetrachloride toxic, either (Iddamaldeniy *et al.,* 2003) Found to have a prevention Against cancer of both liver and kidney. (Salim and Fukushima, 2003) found that black seed oil has the ability to prevent colon cancer while (Farah and Begum, 2003) found in black seed extract was effective in inhibition of breast cancer cells. (Kanter *et al.,* 2003) They have been found that the black seed helps in the treatment of diabetes, they found that they keep the level of sugar in the blood while (Meral *et al.,* 2001) found that the effectiveness of the black seed reduces the incidence of atherosclerosis and thus reduce the incidence of heart clots also (Al-Majed *et al.,* 2001) found that the substance of Thymoquinone and a basic compound found in the black seed it has an effect in the treatment of bronchial asthma. Black seed oil decrease the fat oxidation rate as antioxidant activity increases, antioxidants are known to help protect the body from the effect of free radicals, which contribute to damage to many tissues in a number of diseases such as atherosclerosis, cancer, fear, etc. (Kanter *et al.,* 2003). This research project was planned to study the manufacturing parameters for Iraqi soft whit cheese effect of addition black seed on quality of cheese.

Material and Methods

Raw Milk

Raw cow milk was obtained from Dairy Farms, Near the Technical Institute/Musayyib, AL-Musayib, Halla, Iraq. And used in the preparation of cheese in dairy laboratory, Technical Institute/Musayyib.

Chemical Analysis of Milk

Raw milk was analyzed for moisture, pH, acidity, protein, lactose, graphic density, S.N.F and freezing point (1 AOAC, 2000). Fat content was analyzed by Gerber test (Najim *et al.,* 2012). Prior to use in cheese. Milk samples were prepared for the tests, according to (Najim *et al.,* 2012). At 37°C curd was set with Chymosin *(Rhizomucor pusillus*) was produced from Meito Sengyo Co., LTD aban., strength 1/25000 w/w. Approximately. 40-50 minutes after chymosin addition, the curd was cut with 2 cm wire knives and then allowed to heal in the whey for 5 minutes with periodic gentle agitation to prevent curd matting. After that, two thirds of the whey were drained and the curd was divided into four proportion, the first proportion without the addition of a black seed (standard) was added 1% black seed, the second section was added 0.75% black seed, the third section was added 0.5% black seed and the fourth section, The added black seed to according curd weight and then add 3% w/w salt each section. Then the salted curd was molded and vacuums packed for two hours after that turn the molds and the vacuums was repeated again for two hours, and placed in polyethylene bags at 4 ° C and stored until tests were carried out.

Compositional Analysis of Cheese

Grated cheese was analyzed for total solid (iso 5534 1985), estimated the fat as Kerber said (kosikowiski 1982), salt, PH (Kosikowiski 1982) and protein ash (AOAC, 1990) at 0, 6 and 9 days. Cheese samples were taken for tests as indicated (ISO 707, 1985), but the sensory evaluation samples followed the method mentioned (Kosikowski, 1982).

Sensory Evaluation of Cheese

The sensory evaluation was conducted according to the form mentioned (Al-Dirush, 1982), which was modified by (Al-Dirush, 1982) according to the type of cheese to be evaluated in a sense, which includes flavor, texture, chosen, color, bitter and total, given to each recipe 10 degrees.

Bacteriological Examinations

Bacteriological tests were carried out by planting the culture media as male (Oxoid, 1973) and estimated the total count of bacteria, the group of bacteria *coliforms* and *Staphylococcus aureus* by pour plate method mentioned (American Public Health Association, 1978).

Coliform Count

MacConkey agar was prepared and 1 ml of inoculum of each dilution was placed in duplicate Petri dishes. The sterile molten (45°C) MacConkey agar was poured in 15 ml quantities into each Petri dish and mixed thoroughly. The Petri dishes, after solidification of the medium were incubated at 37°C for 24 hours. Pink colored colonies were counted.

Staphylococcus aureus count

We used the same method to calculate *Staphylococcus aureus* bacteria with changing food medium we used menthol salt agar, incubation temperature 32°C and incubated time 72 hrs.

Bacterial Total Count

We used the same method to calculate bacteria total count with changing food medium we used Nutrient agar, incubation temperature 37°C and incubated time 48 hrs.

Statistical Analysis

Results obtained from different parameters were subjected to statistical analysis using Analysis of

Variance Technique (ANOVA) factorial completely randomized designs (CRD) as described by (Al-Mohammadi and Al-Yunis, 2000). To evaluate the influence of different parameter on quality and acceptability of Iraqi soft white cheese using and A level value has been calculated at (P=0.05) to find the difference between means.

Result and Discussion

Milk composition

Chemical composition of raw milk is shown in Table 1. The fat content was 3.00%. The S.N.F (solid nonfat) was 8.97%. The protein was 3.32%. The lactose was 5.02%. The ash was 0.87% and the total solid was 12.04%. The pH and acidity all milk samples were found in the range 6.55-6.58 and 0.12-0.13%, respectively. The graphic density was 1.025. The freezing point was 0.57. This table is shows that all composition of milk samples are normal.

Number of Bacteria

Fig. 1, 2 and 3 show the numbers of *Staphylococcus aureus,* the total numbers of bacteria, as well as *E. coli* at the ages of 0, 6 and 9 days for all the treatments. Its appear that the preparation of bacteria increases by 6 days and then decrease of treatments T_1, T_2 and T_3 after 9 days except for the treatment of control T_4 as it increases continuously and this is due to the effect of the black seed. I think the reason for the increase in the number of bacteria at the age of 6 days may be return of reason to the active ingredient in the black seed did not work well in the early ages. The images show that the T1 containing 1% black seed has more effect than other treatments on decreasing bacterial numbers. These numbers correspond to the Iraqi standard for the preparation of bacteria in Iraqi soft white cheese (Central Organization for Standardization and Quality Control, 2006). This shows that the black seed has a great effect on the types of bacteria studied. In addition, to the total numbers of bacteria are decreased and this means that the use of black seed in Iraqi soft white cheese is very useful in terms of health.Moreover, the numbers of these bacteria are approach to what they found (Al-Manhal, 2013) in the ages of 0 and 6 days, but these numbers are much lower in the treatment of T_1, T_2, and T_3 on day 9 than he found.

Statistical Analysis of Sensory Characteristics

The table 2 shows that differences between the ages of cheese for the T_1 treatment:

Flavor : The treatment of cheese at the age of 9 days has surpassed the treatments of cheese aged 0 and 6 days, as for treated the age of 0 and 6 days do not have difference.

Texture : All the treatments for the age of 6 and 9 days have a significant effect compared to the age of 0 days, so that each of them is better than the treatment of 0 days.

Cohesion : The age of cheese 9 days may exceed the cheese age 0 and 6 days so that the preference for this age as for cheese at 0 and 6 days there is no difference between them.

Color : There are no differences between the ages of cheese. All cheeses are similar in this capacity at different ages.

Bitter : The 9 day age cheese is better than the rest ages and the cheese is 0 and 6 days old there is no difference between them.

TOTAL : The total sensory characteristics of this age shows that age cheese at 9 days is better than cheese at 0 and 6 days.

The table 2 shows that differences between the ages of cheese for the T_2 treatment.

Flavor : The treatment of cheese at the age of 9 days has surpassed the treatments of cheese aged 0 and 6 days, as for treated the age of 0 and 6 days do not have difference.

Texture : the cheese at 6 day is bitter than at cheese is 0 and 9 days.

Cohesion : There are no differences between the ages of cheese.

Color : Cheese aged 6 and 9 days is better than cheese at age 0, because there is significant difference between age 9 and 0, as well as between age 6 and age 0.

Bitter : There are no differences between the ages of cheese.

TOTAL : This treatment showed no preference for a specific age due to the absence of significant differences in the age of cheese.

As well as the table 2 shows that differences between the ages of cheese for the T_3 treatment:

Flavor : There is no preference between cheeses for this character.

Texture : Cheese at the age of 6 days over the cheese aged 0 and 9 days, because there is significant difference between the age of 6 day and 0, 9 days and the preference for cheese at the age of 6 days.

Cohesion : There is no preference between cheeses for this character.

Color : There is no preference between cheeses for this character.

Bitter : There was a superiority of cheese at the age of 6 and 9 days because of significant differences between them and cheese at 0 days and the preference for cheese at the age of 9 days because of a high significant difference.

TOTAL : cheese surpassed the age of 9 days for the rest of the treatments, because there is significant difference between him and the rest of the age of cheese.

As well as the table 2 shows that differences between the ages of cheese for the T_4 treatment.

Flavor : In this character, cheese aged 6 and 9 days was preferable to cheese at 0 days, due to significant differences between them and cheese at 0 days.

Texture : There is no significant difference between the age of cheese and the other components of cheese, cohesion, color and bitterness.

TOTAL : Both cheese aged 6 and 9 days surpassed the cheese at 0 days and there is a convergence of 9-day-old cheese and age-old cheese 6 day.

Statistical analysis of sensory characteristics on similar age for all treatments

Flavor : 0 day age : There is no significant difference between the age of cheese for all treatments, due no significant difference.

6 days age : The T_1, T_2, and T_3 preference on T_4 and the T_1, T_2, and T_3 no significant difference with them at character.

9 days age : There is a similarity between the age of cheese at T_3 and T_4 also between T_1 and T_2, but treatment T_1 was preference to all treatments**.**

Texture: 0 day age : There is a similarity between the age of cheese at T_3 and T_4 but, T_1 and T_2 are different from T_4 and T_2 was preference to all treatments.

6 days age : There is a similarity between T_3 and T_4 as well as the convergence of all the treatments and the preference was for T_4, and perhaps the reason is due to the absence of different materials with cheese such as black seed leads to the non-good texture of cheese in other treatments.

9 days age : There is no significant difference between the age of cheese for all treatments.

Cohesion : 0 day age : There was a difference between T_3 and the rest of the treatments and the preference was T_3 because of the high arithmetic value.

6 days age : There is no significant difference between the age of cheese for all treatments.

9 days age : There was a difference between T_4 and other treatments. T_1 and T_2 were better than T_4 and the preference was 1 for higher arithmetic value,

Color : **0 day age, 6 days age, and 9 days age :** There is no significant difference between the age of cheese for all treatments**.**

Bitter : 0 day age : There is no significant difference between the age of cheese for all treatments**.**

6 days age : There was a difference between T_1 and T_3 moreover, between T_4 and T_2 and the preference was T_4 because of the high arithmetic value.

9 days age : T_1, T_2 and T_4 were similar in characteristics to this age, but differed from them 3 and preference was T_4 for higher arithmetic value.

Total : 0 day age : T_4 surpassed the rest of the treatments.

6 days age : There is no significant difference between the age of cheese for all treatments.

9 days age : The results showed that there was a difference between T_3 and the rest of the treatments as it obtained the lowest score by evaluation and obtained the best grade T_1 and thus surpassed all treatments.

As well, the table 2 Shows that T_1 at 9 days performed of the total sensory characteristics of all treatments followed by T_2 at age 9 and the lowest value for T_2 at

age 6 days.

Statistical Analysis of Chemical Composition for Processed Cheeses during the Age Period for all Treatments

Statistical analysis of the differences between the ages of cheese for the same treatment

The table 3 shows that differences between the ages of cheese for the T_1 treatment.

Total solid : there was a significant difference between the ages of cheese but the preference was 6 and 9 days old.

Fat : There was a significant difference between the age of cheese aged 0 and 6 for the age of cheese at the age of 9 days, but the preference was at the age of 9 days

Protein : The preference for cheese aged 6 and 9 days for cheese at 0 day. it was the preference for cheese at the age of 9 days, because there is a high significant difference.

Nacl : The preference for cheese aged 6 and 9 days for cheese at 0 day. Age 6 and age 9 days there is no difference between them because there is no significant difference between them

Ash : There is no significant difference between the age of cheese for all olds.

The table 3 shows that differences between the ages of cheese for the T_2 treatment.

Total solid : There was a significant difference between the age of cheese for all treatments. But the preference was at the age of 6 and 9 days.

Fat : There is a difference between the treatment of cheese aged 6 and 9 days on the age of cheese at 0 days and the preference for the age of cheese by 6 and 9 days.

Protein : There is a difference between the treatment of cheese aged 6 and 9 days on the age of cheese at 0 days and the preference for the age of cheese by 6 and 9 days.

Nacl : There is a difference between all ages for cheeses and preference for cheese at 6 days.

Ash : There is no significant difference between the age of cheese for all olds.

As well the table 3 shows that differences between the ages of cheese for the T_3 treatment.

Total solid : There is a difference between all ages for cheeses and preference for cheese at 6 and 9 days.

Fat : T_6 and T_9 were preference to T_0. T_6 and T_9 were similar in characters.

Protein : There is no significant difference between the age of cheese for all olds.

Nacl : Cheese is 9 days was prefer than the rest of the cheese aged 0 and 6 days.

Ash : Cheese at the age of 9 and 6 days prefer than the cheese age 0 days because there is significant difference between them and there is no significant difference between the cheese aged 6 and 9 days.

As well the table 3 shows that differences between the ages of cheese for the T_4 treatment.

Total solid : There is significant difference between the age of cheese for all olds. Cheese at the age of 9 and 6 days prefer than the cheese at 0 days.

Fat : Cheese at the age of 9 prefer than the age of 6 and 0 days.

Protein : Cheese aged 6 and 9 prefer than the age of 0 days.

Nacl : Cheese aged 6 and 9 prefer than the age of 0 days.

Ash : Cheese aged 6 and 9 performed the cheese at 0 days and the cheese at 9 days prefer than the rest of the cheese.

Comparison of treatments for the same age.

Total solid : 0 day age : There is a difference between all the treatments and each of the T_1, T_2 and T_3 performed on T_4.

6 days age : There is a difference between all the treatments and T_1 performed the rest of the treatments.

9 days age : There is a difference between all the treatments and T_1 performed the rest of the treatments.

Fat : **0 day age :** There is a difference between T_4 and the rest of the treatments. The similarity between T_2 and T_3. performed T_1 on the rest of the treatments.

6 days age : There is a difference between T_4 and the rest of the treatments. There is a similarity between T_4 and T_3, performed T_1 on the rest of the treatments.

9 days age : There was a similarity between all the treatments: T_1, T_2, T_3, performed on the T_4 and T_1 were to the rest of the treatments.

Protein : 0 day age : There was a difference between T_1, T_2, T_3 and between T_4. T_1, T_2 and T_3 performed on T_4.

6 days age : There was a difference between T_1, T_2, T_3, and between T_4 and a similarity between T_2 and T_3. Performed T_1 on the rest of the treatments, followed by T_2 and T_3 respectively.

Table 1 : Physic-chemical composition of raw milk.

Freezing point	Graphic density	acidity	pH	Total solid %	Ash%	Lactose%	Protein%	S.N.F%	Fat%
0.57	1.025	0.12-0.13	6.55-6.58	12.04	0.87	5.02	3.32	8.97	3,00

Table 2 : Sensory properties of processed cheeses during the ripening period for all treatments.

Total Bitter	Color	Cohesion	Textures	Flavor	Age / day	Type of treatment
a 45.84 A	a 9.81 A	a 9.36 A	a 9.13 A	a 9.20 A a 8.34 A	0	
a 45.26 A	a b 9.22 A	a 9.56 A	a b 9.23 A	b 8.72 A a 8.53 A	6	T_1 1% black seed
b 48 00 A	b 9.00 A	a 9.50 A	b 10.00 A	c 9.50 A b 10.00 A	9	
a 45.18 A	a 9.82 A	a 9.41 A	a 9.23 A	a 9.32 A a 8.40 A	0	
a 45.96 A	a 9.75 B	b 9.62 A	a 9.36 A	b 8.61 ADa 8.62 A	6	T_2 0.75% black seed
a 46.50 A	a 9.00 A	b 9.50 A	a 9.50 A	a 9.50 Ab 9.00 AB	9	
a 45.52 A	a 9.78 A	a 9.20 A	a 9.61 B	a 8.50 ABa 8.43 A	0	
a 44.20 A	b 9.20 A	a 9.50 A	a 9.00 A	b 8.50 ABa 8.00 A	6	T_3 0.5% black seed
b 45.20 B	c 8.70 B	a 9.50 A	a 9.50 A	a 9.00 Aa 8.50 CB	9	
a 46.25 B	a 10.00 A	a 9.57 A	a 9.21 A	a 9.15 B a 8.32 A	0	
b 45.38 A	a 9.88 B	a 9.50 A	a 9.50 A	a 9.50 ABb 7.00 B	6	T_4 control o% black seed
c 45.30 A	a 9.80 A	a 9.00 A	a 9.50 B	a 9.50 A c 7.50 C	9	

*Each number in the table represents an average of five replicates.
**The small letters represent the comparison between the ages of the cheese for the same treatment..
***The large letters represent the comparison between the similar age of cheese with the difference in the treatments
****Statistical analysis of the table at level ($P \leq 0.05$)

Table 3 : Chemical Composition for Processed cheeses during the age period for all treatments.

Ash	NaCl	Protein	Fat	Total Solid	Age / day	Type of treatment
a 3.65 A	a 2.20 A	a 20.60 A	a 20.80 A	a 50.80 A	0	
a 3.70 A	b 2.65 A	b 21.60 A	a 21.00 A	b 51.60 A	6	T_1 1% black seed
a 3.80 A	b 2.70 A	c 22.40 A	b 21.66 A	c 53.46 A	9	
a 3.90 A	a 2.50 B	a 19.80 A	a 19.70 B	a 46.50 B	0	
a 4.00 B	b 2.70 A	b 20.20 B	b 20.80 A	b 47.20 B	6	T_2 0.75% black seed
a 3.80 A	ab 2.08 B	c 22.01 AB	b 21.14 B	c 49.73 B	9	
a 3.20 B	a 2.30 AB	a 20.00 A	a 19.20 B	a 45.20 C	0	
b 3.72 A	a 2.40 AB	a 20.10 BC	b 20.40 B	b 46.65 C	6	T_3 0.5% black seed
b 3.68 A	b 1.92 BC	a 21.68 B	b 20.43 C	c 47.73 C	9	
a 2.20 B	a 1.80 C	a 19.00 B	a 18.10 C	a 42.30 D	0	
b 2.50 C	b 2.00 C	b 19.20 D	a 18.30 C	b 43.73 D	6	T_4 control o% black seed
c 3.02 B	b 1.75 D	b 21.00 C	b 19.21 D	c 44.38 D	9	

*Each number in the table represents an average of five replicates.
**The small letters represent the comparison between the ages of the cheese for the same treatment..
***The large letters represent the comparison between the similar age of cheese with the difference in the treatments
****Statistical analysis of the table at level ($P \leq 0.05$)

9 days age : There was a difference between T_1, T_2, T_3 and between T_4 and a similarity between T_1 and T_2 as well a similarity between T_2 and T_3. Performed T_1 on the rest of the treatments.

Nacl : 0 day age : There was a difference between T_1, T_2, T_3 and between T_4 and a similarity between T1 and T_3 as well a similarity between T_2 and T_3. Performed T_2 on the rest of the treatments Followed by T_3 and T_1 respectively.

6 days age : : There was a difference between T_1, T_2, T_3 and between T_4 and a similarity between T_1, T_2 and T_3. Preformed T_2 on the rest of the treatments.

9 days age : There was a difference between all treatments, but a similarity between T_2 and T_3. Performed

T_1 on the rest of the treatments.

Ash : 0 day age: There was a similarity between T_1 and T_2 as well between T_3 and T_4. Performed on the rest of the treatments.

6 days age : Performed T_1, T_2 and T_3 on the T_4, but a similarity between T_1 and T_3. Performed T_2 on the rest of the treatments.

9 days age : there was a different between T_1, T_2 and T_3 and between T_4. Performed T_3 on the rest of the treatments.

As well, Table 3 shows that all cheese compounds were preformed at 9 days older than the rest of the cheese at the earliest ages. This may be due to changes in the biochemical conditions that occur in the cheese, which change from their nature to the best, except ash and salt because the change in them is simple and the T_2 has performed at the age of 6 days for these compounds. Moreover, The chemical composition of the cheese for the treatment of the control T_4 approach to the specifications of the Iraqi soft cheese according to Iraqi Standard No. (1/693 modified) (Central Organization for Standardization and Control Quality, 1988).

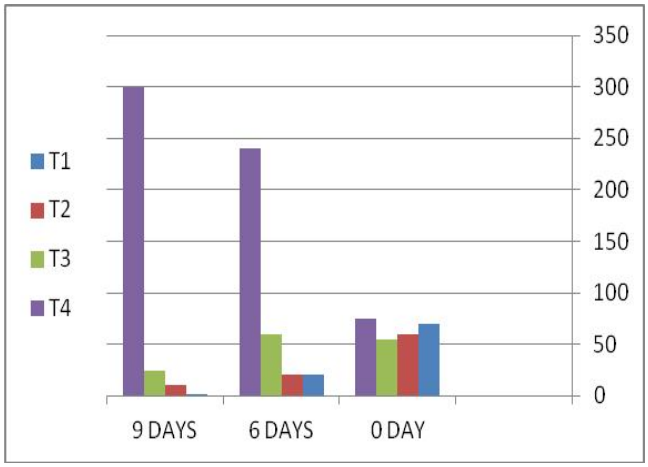

Fig. 1 : Show the number of *Staphylococcus aureus* during the age of cheese.

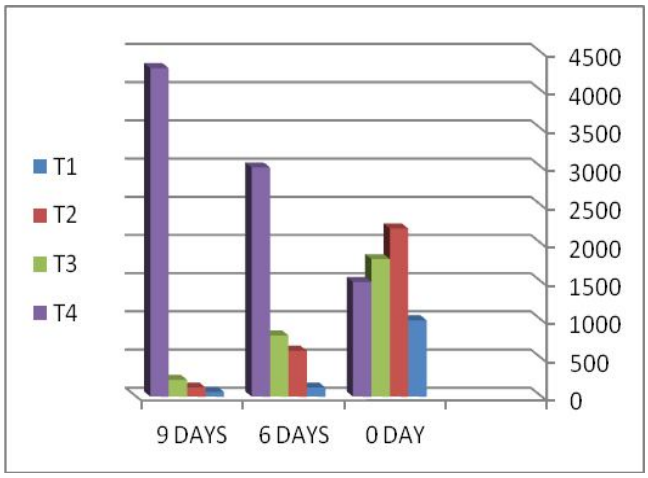

Fig. 2 : Show the number of Total bacteria during the age of cheese.

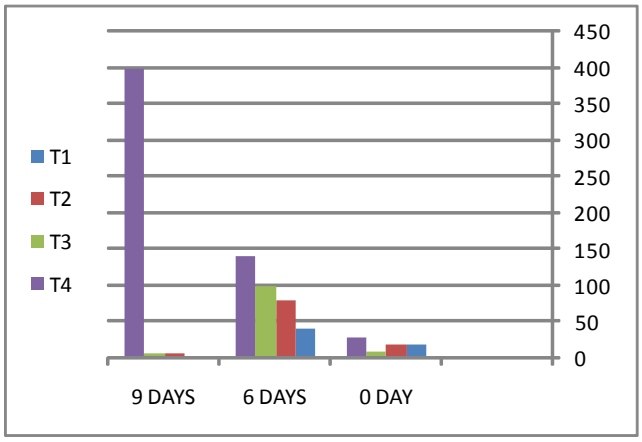

Fig. 3 : Show the number of *E. Coli* during the age of cheese.

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