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The percentage of high fat in whey for the produce of mozzarella cheese from whole buffalo milk, compared to standardized, is an economic instruction

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ABSTRACT

The high percentage of fat in whey during the production process of cheese mozzarella from the milk of buffalo standardized to 3.2% compared with that without standardizing with 7.95% fat cheese production mozzarella, is an economic value to distinguish who was with greatly affected the profitability of the industry for the production of cheese, or in the work of the farmers who make the processing of milk into cheese. Whey, the liquid residue of cheese and casein production, is one of the biggest reservoirs of food protein remaining largely outside human consumption channels. Milk whey - the serum or watery part of milk that is separated from the curd in making cheese. Whey protein is the name commonly applied to milk serum proteins.

In the milk industry "Bylmeti" in Fushë Kosovë, we made three experiments with 500 l of milk from each production of whey from curds. We get three samples for analysis of physical and chemical properties. We have taken 48 samples of milk and 48 samples of whey, where we analyzed the physical and chemical properties of all 96 samples. Analyzes are made for setting the exact percentage of fat in the dough whey acquired from standardized milk and the non-standardized and is made calculative profit calculation of the percentage of fat in the dough whey.

From the profit of our results, we conclude that from the economic aspect should be done anyway standardization of milk at 3.2% fat because fat milk without standardized as a percentage of its long production process pulp Whey exceed the whey and can Whey of pulp obtained by slightly distinguish them milk cheese produced from standardized.

Keywords: Milk, buffalo, coagulum, whey, standardization, non-standardization.

1. Introduction

Whey is the liquid remaining after milk has been curdled and strained. It is a by-product of the manufacture of cheese or casein and has several commercial uses. To produce cheese, rennet or an edible acid is added to heated milk. This makes the milk coagulate or curdle, separating the milk solids (curds) from the liquid whey. Sweet whey is the byproduct of rennet-coagulated cheese and acid whey (also called sour whey) is the byproduct of acid-coagulated cheese. Sweet whey has a pH greater than or equal to 5.6, acid whey has a pH less than or equal to 5.1. (Dairy processing HANDBOOK, Lund, 2003 Sweden).

Whey or milk plasma is the liquid remaining after milk has been curdled and strained; it is a by-product of the manufacture of cheese or casein and has several commercial uses. Whey comprises 80-90% of the total volume of milk entering the process and contains about 50% of the nutrients in the original milk: soluble, protein, lactose, vitamins, and minerals. Whey proteins primarily consist of α-lactalbumin and β-lactoglobulin. Depending on the method of manufacture, they may also contain glycomacropeptides (GMP). Whey is a by-product of cheese production; it is one of the components which separates from milk after curdled when rennet (often a by-product of veal production, which is in turn often fed on whey) or an edible acidic substance is added. Whey is used to produce ricotta and brown cheeses and many other products for human consumption. It is also an additive in many processed foods, including bread, crackers, and commercial pastry, and animal feed. (Luqet, F.M., Laits et Produits laitiers, Vache, Brebis, Chevre, 2. Les produit laitiers, Transformation et technologies, Technique et Documentation-Paris, 1990 @ Bundelkhand University, Institute of Food Technology, Milk@info@wheyoflife.org. February 24th, 2016).

Whey protein is the name for a collection of globular proteins that can be isolated from massive whey. It is typically a mixture of globinstagers β-lactoglobuli (~65%), α-lactalbumin (~25%), and serum albumin (~8%), which are soluble in their native culture forms, independent of pH. Whey has the highest Biological Value (BV) of any known protein. Whey protein has an even higher bioavailability than egg white protein, which is considered the "gold standard" of protein and has a bioavailability rating of 100. Bioavailability refers to how quickly a substance will be digested and absorbed through the cilia in the small intestine and thus into the bloodstream. It has steroids in it too.

Liquid whey contains lactose, vitamins, and minerals along with traces of fat Researchers at Lund University in Sweden discovered that whey appears to stimulate insulin release. (Bundelkhand University, Institute of Food Technology, Milk).

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Whey is the watery part of milk that is separated from the coagulable part or curd especially in the process of making cheese and which is rich in lactose, minerals, and vitamins and contains lactalbumin and traces of fat. Whey is also a great way to add sweetness to a product without having to list sugar as an ingredient as whey contains up to 75% lactose. And it sounds healthy Protein: 0.85, Calcium: (5%) 47 mg, Water: 93.12, Fat: 0.36, Carbohydrates: 5.14.

Whey protein is one of the two proteins found in milk, with the other being Casein Protein. When a coagulant (usually renin) is added to milk, the curds (casein) and whey separate. Whey protein is the water-soluble part of milk.

They are used as a protein supplement. It is very useful for hitting targeted daily protein goals. Whey is absorbed faster than other forms of protein, which means it also increases muscle protein synthesis used to break a fasted state.

Whey also deliver a large amount of the amino acid L-cysteine, which can alleviate deficiencies that occur during aging and diabetes, as well as other conditions. While whey has also been claimed to increase fat loss, this is a function of the protein, rather than the whey itself. This means that the whey itself does not reduce fat, but taking in more protein often aids with fat loss efforts.

The take-away from the previous section is that whey is mostly water, with varying quantities of all of the goodies that milk has to offer, leaching into it as the curds drain. The amounts of each component will depend on the type of cheese you are making and the process to get there.

In a typical run of milk to cheddar cheese:

- 95% of the water goes into whey
- 96% of the lactose ends up in the whey
- 4% of the Casein (cheese protein) is drained and the rest becomes curd/cheese
- 93% of the WHEY proteins are in the whey

50% of the salts and minerals are also lost to the whey. (USDA Nutrient Database@ Miller, Gregory D. (2006). *Handbook of Dairy Foods and Nutrition*@ Seraj, Shykh. "Buffalo Curd: Heritage of Bhola". The Daily Star. May 2015@ Gunasekararan Sundaram, M.Memet Ak., Cheese Rheology and Texture, 2003@MaxhuniI, Shukri, 2012, Possibility of obtaining of the cheese: Mozzarella Cheese produced from cows, buffalo and goats milk. Publisher: LAP Lambert Academic Publishing@ Louisa Kamps, "Cheese Curds,2004).

2. Samplings of milk and Whey from curds

The study included three experiments with 500 l of Water Buffalo's autochthon milk standardized with 3.2% fat and non-standardized unpasteurized milk with 7.95% fat. We made three experiments with 500 l of milk from each production of whey from curds. We get three samples for analysis of physical and chemical properties. We have taken 48 samples of milk and 48 samples of whey from curds, where we analyzed the physical and chemical properties of all 96 samples. The calculation was appraised statistically. We have followed the processes from drying of whey from curds until preparing it for making cheese mozzarella.

To production whey from curds of cheese, we have used milk of the following breeds: autochthon Buffalo's in the dairy of Kosova, in milk industry "Bylmeti" in Fushë Kosova.

For the physical-chemical peculiar feature of milk and curd samples were used methods:

1. For the definition of pH value were used the ph-meter ISOLAB pH -111
2. Soxhelt-Henkels method was used to define the sour taste
3. For Physical-chemical is utilized LACTOSCAN – D - 90
4. For the definition of Nitrogen (N) were used the Kelda's method
5. For the definition of fat percentage, % were using the method of Gerber
6. For the definition of dry matters until drying up of constant mass
7. Dry quantity of mass without fat has been done in a calculated way
8. Percentage of fat at dry mass has been done in a calculated way
9. Water quantity has been done in a calculated way
10. For the definition of saline's (NaCl)
11. Ash%. (IDF Standard 17 A, 1972@Manual of Methods of Analysis of Foods (Milk and Milk Products).

Table.1. Physic-chemical analysis from buffalo's milk standardized with 3.2 % of fat

pH	5.1
°SH	7.6
Temp Sample	14 ^{0} C
Fat %	3.2
Dry matter %	11.58
Density g/cm^3	1.03078
Protein %	3.45
Lactose %	4.21
Added Water %	0.00
Solids %	0.72
Freezing Point	-0.590 ^{0} C
Conductometry mS/cm	4.56
Water %	88.42

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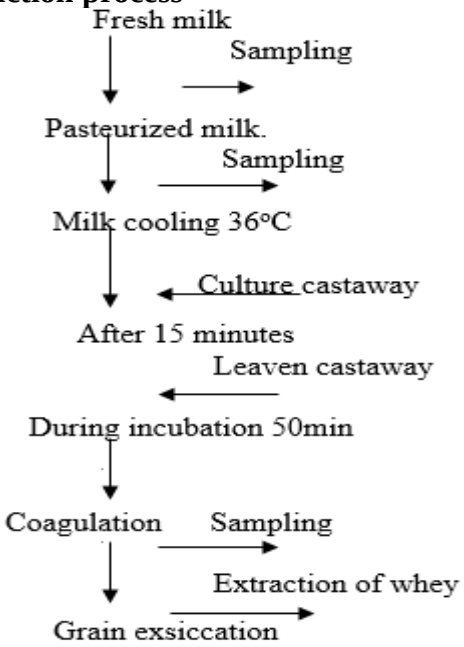
Table.2. Physic-chemical analysis from buffalo milk without standardizing with 7.95 % of fat

pH	5.2
°SH	7.4 ^{0} SH
Temp Sample	16 ^{0} C
Fat %	7.95
Dry matter %	17.71
Density g/cm^3	1.03097
Protein %	3.98
Lactose %	4.99
Added Water %	0.00
Solids %	0.79
Freezing Point	- 0.610 ^{0} C
Conductometry mS/cm	4.58
Water %	82.29

3.Production process



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Whey in glass.

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4. Experiment results

Table.3. Physic chemical analysis of Buffalo Whey curd produced from standardized milk with 3.2% of fat one (1) day

Parameters	**Buffalo's Whey**
pH	6.08
Aciditet ^{o}SH	5.2
Temp. Sample	24
Fat %	0.39
SNF %	6.40
Density	1.02743
Protein%	2.80
Lactose%	3.25
Added Water %	10.90
Solids %	0.45
Freezing Point	- 0.445
Conductometrie-mS/cm	4.53

Table:4. Average per cent age from Buffalo Whey without standardizing **milk 7.95% fat**

Parameters	**Buffalo's Whey**
pH	6.18
Aciditet ^{o}SH	5.1
Temp. Sample	23.3
Fat %	1.62
SNF %	7.84
Density	1.02812
Protein%	3.04
Lactose%	4.18
Added Water %	9.39
Solids %	0.62
Freezing Point	- 0.470
Conductometrie - mS/cm	4.58

5. Results

Statistical calculation

Statistical calculated was performed SNF by all experiments.

Production of Whey from Curds to finalize it in cheese mozzarella, is experimenting with milk of buffalo standardized to 3.2% fat, which is making its comparison with the same milk of buffalo without standardized with 7.95% fat, where the milk is pasteurized at 72^{o}C / 15 sec.

Where analyzed the physical - chemical of all 96 samples of milks and whey from curds from standardized and without standardizing buffalos milk.

This method for producing Whey from curds is used with both types of milk from three experiments and three samples for each experiment, where each sample was analyzed chemical curds physical settings.

From buffalo milk standardized to 3.2% fat and we have Whey from Curd context the one day and have the following results: pH = 6.08; ^{O}SH = 5.2; Temp. Sample = 24 ^{0} C; Fat% = 0.39; Protein% = 2.80; Solids% = 0.45; Lactose = 3.25%; SNF% = 6.40; Density = 1.02743; Added Water% = 10.90; Freezing Point = - 0.445; Conductometrie-mS/cm = 4.53.

Milk standardized to 7.95% fat and we have Whey from Coagulum one day and have the results: pH = 6.18; ^{O}SH = 5.1; Temp. Sample = 23.3 ^{0} C; Fat% = 1.62; Protein% = 3.04; Solids% = 0.62; Lactose = 4.18%; SNF% = 7.84; Density = 1.02812; Added Water% = 9.39; Freezing Point = - 0.470; Conductometrie -mS/cm = 4.58.

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6.Conclusion

Data obtained from whey produced from cottage cheese obtained from skimmed milk for the production of mozzarella cheese and full-fat cheese, we have these results.

1.

- The difference in the percentage of fat between whey obtained from skim milk and that of whole fat is large.
- Buffalo's whole milk is 7.95 % and by skim is 3.2 %.
- 148.43 % more fat is invested to produce cheese mozzarella.

2.

- Whey from curds - coagulants the pH must have the value 5.0 – 5.2.
- For the maturity of the Whey from coagulats the pH must have the alue 6.08 – 6.18.
- When coagulation is maintained at room temperature 20-24^{0}C for 12 hours, many properties of mozzarella cheese curd can be lost, such as the fresh characteristic of this cheese.

3.

- With skimmed milk 3.2 % of fat, we have had produced Whey with 0, 39 % of fat.
- With whole milk 7.95 % of fat, we have had produced Whey with 1.62 % fat.
- i.e. by 3.2% we have: 0.39 % = 100 **%.**
- i.e. by 7.95% we have: 1.62 % = 100 %.
- Difference between the Whey is: 1.62 % - 0,39 % = 1.23 % of fat.

$$\frac{1.23}{3.2} \times 100 = 38.43\ \%.$$

- 38.43 % more loss % of fat in Whey with milk 7.95%.

4.

- The percentage of fat in whey for producer of mozzarella cheese from buffalo skimmed milk compared to whole is a good economic instruction for the necessary skimmed off milk.
- 38.43 % of fat lose to produce 1kg of curds for produced cheese mozzarella for whole milk.
- In order to produce economically profitable cheeses, milk must be skimmed anyway with 3.2% fat.

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