



## **Production of cheese Kaçkavall from Cows milk at Milk Industries in Kosova**

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**Abstract:** Milk processing in Kaçkavall cheese takes very important place in productivity of dairy, in the same time takes very important roll in domestic economy as well as nutritive for humankind. This study is done to research the technology for production of Kaçkavall cheese, (This types of cheese is classified to hard group of cheeses) with a little milk to produce 1kg cheese (Until now we need 10 liters of milk to produce 1 kg. of this kind of cheese), after research and analyses of physical-chemical peculiar feature of milk, research of technological process to forming the coagulum, curd forming, storage, preparation for drying of curd and additives that we need for this technologic process of production line. We have followed the processes from drying of cheese until preparing it for market, physical-chemical peculiar feature (pH,  $^{0}\text{SH}$ , percentage fat, percentage of proteins in general, percentage of sec matter, and percentage of solids) daily fresh cheese, 15 to 30 days maturing. Organo- leptic peculiar feature, its storage in suitable temperatures. There were made near 100-s of analyses to searching better production method. In fact, the best aerie to produce Kaçkavall cheese is milk industry in Kosova (Fushë Kosova and Prizren). Peculiar future of organic tasting (organo-leptic) for estimation of cheese kaçkavall from Cow's standardized milk with 3.16% of fat, with Traditional technology-industrial could be produced, production with desirous organic tasting for consumer and market.

**Keywords:** Milk, coagulum, whey, curd, cheese, Kaçkavall

### **Introduction**

Milk production began 6,000 years ago even earlier. The dairy animals of today have been developed from untamed animals which, through thousands of years, lived at different altitudes and latitudes exposed to natural and, many times and extreme conditions. The suitability of milk as a raw material for production of cheese depends largely on conditions at the dairy farm. Quite a part from the general demand for strict hygienic conditions, milk from sick cows or animals undergoing treatment with antibiotics must not be used for cheese making, or any their milk product. Feeding animals on badly prepared silage can adversely affect the quality of several varieties of cheese (Anonym, 1995).

When collection of milk on alternate days was introduced, cheese producer who had to use such milk noticed that the quality of cheese frequently deteriorated. This tendency was particularly noticeable when the milk had to be stored a further day after reception, even when it was chilled to 4 °C in conjunction with transferor from road tanker to storage tank.

During cold storage, the milk protein and milk salts conge character, which tends to impair cheese-making properties. It has been shown that about 25% of the calcium precipitates as phosphate after 24 hours storage at +5 °C. This reduction, however, is temporary; when the milk is pasteurized, the calcium rediscovers and the coagulating properties of the milk are almost completely restored.  $\beta$ -Casein also leaves the complex casein micelle system during cold storage, which further contributes to reducing the cheese making properties. However, this reduction too is almost completely restored by pasteurization.

Another and equally important phenomenon is that the micro flora introduced into the milk by recontamination - especially *Pseudomonas* spp - will adapt to the low temperature at

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which the enzymes, proteins and lipases, will decompose protein and fat respectively. The result of such action is a "bitter" flavour emanating from decomposition of the  $\beta$ -casein that has left the casein micelle during low - temperature storage (Coralba, 1982; Anonym, 1995).

Cheese has been made in most cultures from ancient times. Cheese is a milk concentrate, the basic solids of which consist mainly of protein, actually casein and fat. The residual liquid is called whey. As a rule of thumb, the casein and fat in the milk are concentrated approx. 10 times in production of hard and semi-hard types of cheese. No strict definition of the concept of cheese is possible, as so many variants exist (Anonym, 1995). The hugest cheese ever made was a Cheddar cheese weighing 15 190 kg. It was produced in January 1964 by the Wisconsin Foundation to be exhibited at the World Expo in New York; it took 43 hours to produce. In 1974, some Russians found a cheese in the permafrost of the Siberian tundra. It was at least 2000 years old and was said to be an unrivalled delicacy (Anonym, 1995).

The fact for this product is that has found nice place in milk industries in Kosova (Fushë Kosova, Prizren). Peculiar future of organic tasting (oregano-leptic) for estimation of cheese Kaçkavall from cow's standardized milk with 3.16% of fat, with traditional technology-industrial could be produced, production with desirous organic tasting (organo-leptic) for consumer and market.

### Methods and Materials

It is used fresh milk to produce cheese of Kaçkaval- unpasteurized cows with these parameters. For physical-chemical peculiar feature of milk and Kaçkaval samples were used these methods:

- Soxhelt-Henkels method were used to define sour taste,
- For definition of pH value were used a pH-metre (Miskra, Kran, Typ MA 5730),
- For definition of milk density were used a Laktodezimetre,
- For definition of fat percentage % were use the method of Gerber,
- For definition of dry matters until drying up of constant mass,
- Dry quantity of mass without fat has been done in calculated way,
- Percentage of fat at dry mass has been done in calculated way,
- Water quantity has been done in calculated way,
- For definition of Nitrogen (N) were used the Kjeldahs method,
- For definition of saline (NaCl) were done according to the IDF standards,

Beside, equipments and devices which are provided with regulations to define the physical-chemical peculiar feature of milk and cheese were used as well the below mentioned:

- Technological line for production of Kaçkaval cheese, consist from: twofold bath with capacity of 5,000 L (Nederlands bath equipped with equipment for benefiting of coagulant-dough mass-curd),
- Coagulant baking line-"Maxhar" Budapest, Hungarian,
- Frames,
- Shelfs (Pejiq, 1972; Coralba, 1982).

Production of cheese goes through different phases that are common to all of cheese sorts. There are also other ways of treatment, which are specific to certain varieties. Cheese milk is pre-treated, possibly premixed after addition of a bacterial culture appropriate to the type of cheese, and mixed with rennet. The enzyme activity of the rennet causes the milk to coagulum. This mass is cut with special cutting tools into small cubes (1x1 cm) of the desired size -above all to enable share- out the whey. During the rest of the curd making process the bacteria grow and form lactic acid, and the curd grains are subjected to mechanical treatment with stirring tools, while at the same time the curd is heat up according to prearranged programmed. The combined effect of these three actions -growth of bacteria, mechanical treatment and heat treatment- results in sunrises, *i.e.* separation of whey from the curd. The finished curd is placed in cheese moulds of metal, wood or plastics, which determines the shape of the finished cheese. The cheese is pressed, either by its own weight or more commonly by applying pressure to the

moulds. Treatment during curd making and pressing determines the characteristics of the cheese.

To produce Kaçkaval type of hard cheese, standardized and un-pasteurized (fresh) milk was used. To produce this kind of cheese in industrial way it was used 5,000 L of milk. It was made three (3) producing experiments of this cheese kind and taken three (3) samples of Kaçkaval for experiment (every seventh baked cheese roundel was taken as a sample). For jellification-milk coagulation were used yeast Astro (from Nova Pazova), where 2 kg. of yeast in temperature of 30 °C will jellificate-coagulate 100 L of milk in 40<sup>th</sup> minutes. From every cheese product were taken in parallel two samplings (viz 2 x 3= 6 samples) which were analyzed: Physical-chemical peculiarity, in time term of one (1) daylong, fifteen days (15) and thirty (30) days.

After 40<sup>th</sup> minutes milk coagulates. Coagulant will be cut up in 1x1 cm. As coagulation Kaçkaval was produced by cow's milk and experimented in Dutch vat with capacity from 500 L, with 3.16% of fat. Milk is boiled in temperature of 33 °C, well intermixing afterwards adding ferment-yeast (100 gr. of yeast will be dissolved in three litres of water goes down to the bottom of the vat, then the whey goes away through rubber pipe.

Coagulated part will be intermixed for 15 minutes and heated in temperature of 42 °C with warm water where in this temperature will be mixed for 40 minutes. Afterwards whey will be separated and fresh coagulum curd remains in the vat. Curd-coagulum will be cut up in bulks from 15-30 cm where is baked in surroundings temperature (usually at 24 °C) about 16 hours.

Cheese is baked in briny water (with 15%) in 75 °C, after coagulant goes through the grind machine and forming of this mass under the pressure-pressing and filling up the shapes. Cheese remains in surroundings temperature in the shape (usually at 25 °C) about 24 hours (in the meantime the shapes with the cheese should be whirled). After removing the cheese from the shapes they stay to be dried up for one day in the same surroundings temperature (in the same room), after that they are delivered to waiting room for dry salting that takes two weeks (where each day the cheese is whirl about). The cheese is baked for thirty days in temperature up to 20<sup>oC</sup>, as well as on moisture up to 85%. The cheese is maintained in the store (the cheese is whirl about, salted and cleaned) (Petriciq, 1984).

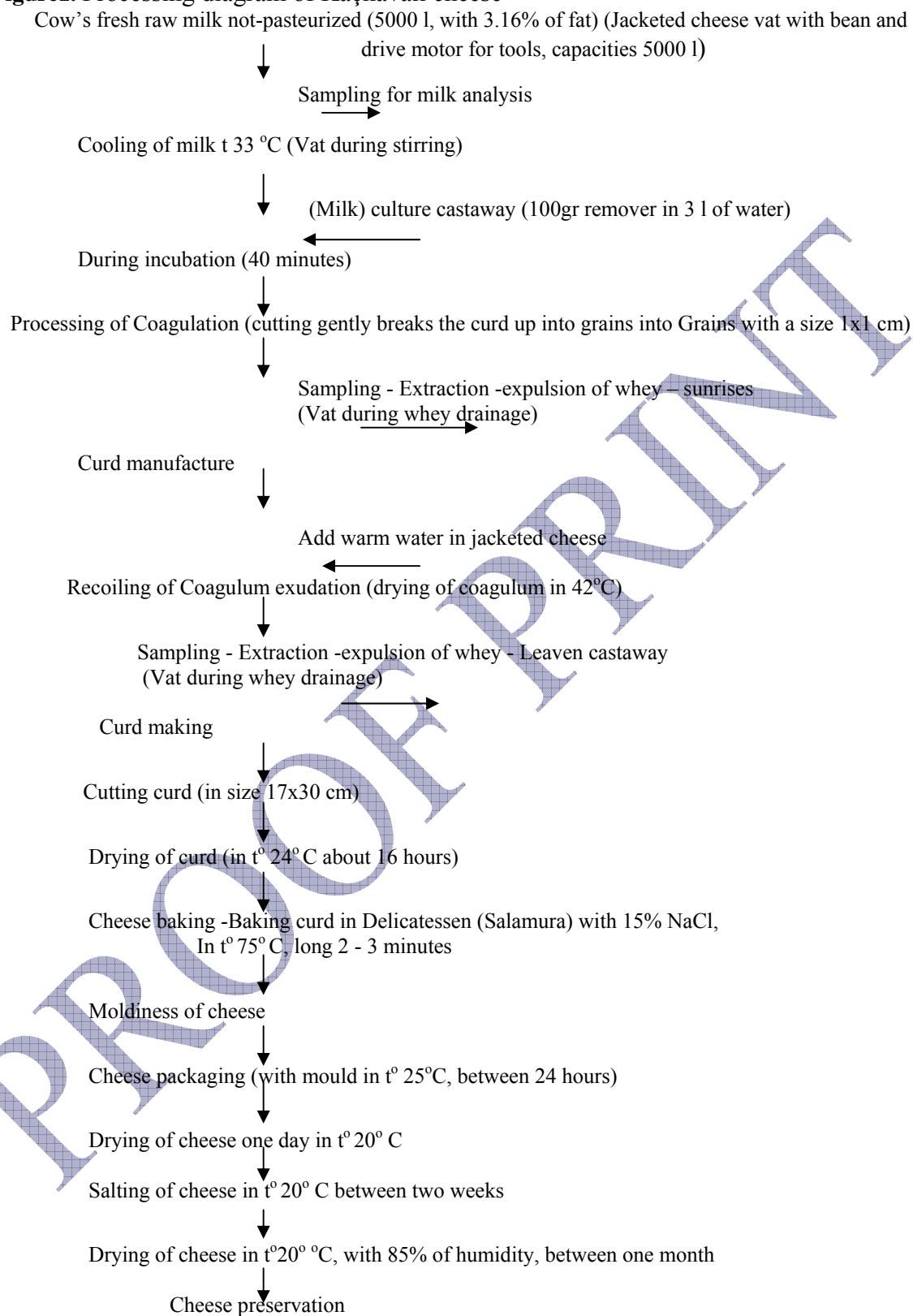
**Table 1.** The physical-chemical analysis results of cow's milk

Sample	pH	<sup>o</sup> SH	Density kg/m <sup>3</sup>	Fat %	Mat. Sec %	Mat. sec without fat %	Water %
1	6.58	7.2	1.0286	3.3	9.25	5.95	90.75
2	6.43	7.0	1.0252	3.1	9.26	8.16	88.74
3	6.26	7.2	1.0240	3.1	9.84	6.74	90.16
$\bar{X}$	6.42	7.2	1.0259	3.16	10.11	6.95	89.89

**Table 2.** The results of physical-chemical peculiarity of Kaçkaval cheese produced by cow's milk during one day (1) baking

Sample	pH	<sup>o</sup> SH	Fat %	Mat. sec %	Mat. sec without % fat	Solids (NaCl) %	N general %	Prot. Gene %	Water %
1	4.78	54.0	20.05	51.20	31.15	1.46	4.10	25.62	48.80
2	4.80	60.0	19.05	47.03	27.98	1.40	3.95	24.68	52.97
3	4.90	55.0	18.00	49.19	31.19	1.05	3.90	24.56	50.81
$\bar{X}$	4.82	56.3	19.03	49.14	30.10	1.30	4.00	25.00	50.86

In below diagram is shown the technological process for production of Kaçkaval cheese in industrial way.

**Figure1.** Processing diagram of Kaçkavall cheese**Table 3.** The results of physical – chemical peculiarity of Kaçkaval cheese produced by cow's milk during thirty days (15) baking

Sample	pH	<sup>0</sup> SH	Fat %	Mat. sec %	Mat. sec without fat %	Solids (NaCl) %	N general %	Prot. Gene %	Water %
1	4.80	52.00	20.05	51.27	31.22	1.90	3.91	24.43	48.73
2	4.90	58.00	20.05	47.03	26.98	2.60	4.61	28.81	52.97
3	4.75	53.00	18.00	49.19	31.19	1.60	4.85	30.31	50.81
$\bar{x}$	4.81	54.33	19.36	49.16	29.80	2.03	4.45	27.81	50.84

**Table 4.** The results of physical-chemical peculiarity of Kaçkavall cheese produced by cows milk during fifteen (15) days baking

Sample	pH	<sup>0</sup> SH	Fat %	Mat. sec %	Mat. sec without fat %	Solids (NaCl) %	N general %	Prot. Gene %	Water %
1	4.95	54.0	20.1	51.29	31.24	2.04	5.31	33.18	48.71
2	5.01	48.0	20.1	47.04	26.99	2.74	5.00	31.25	52.96
3	4.90	50.0	18.0	49.18	31.18	1.75	4.80	30.00	50.80
$\bar{x}$	4.95	50.7	19.4	49.17	29.81	2.17	5.03	31.43	50.81

**Table 5.** The results of physical-chemical peculiarity of Kaçkavall cheese produced by cows milk thirty days (30) baking

Sample number	pH	<sup>0</sup> SH	Fat %	Mat. Sec %	Mat. sec without fat %	Solids (NaCl) %	N gene %	Prot gene. %	Water %
1	4.95	54	20.1	51.29	31.24	2.04	5.31	33.18	48.71
2	5.01	48	20.1	47.04	26.99	2.74	5	31.25	52.96
3	4.9	50	18	49.18	31.18	1.75	4.8	30	50.8
$\bar{x}$	4.95	50.66	19.4	49.17	29.81	2.17	5.03	31.43	50.81

Valuation of organo-leptik experimental cheese samples were don according to Regulation for evaluation of milk and milks products, Novi Sad 1980. The evaluation has been done by (5) members and samples were valued with points (Anonym, 1980).

**Table 6.** Organo-leptik results for evaluation of cheese produced by cow's milk after 30-ty days.

Ingredients	Average number of points
Externals	3
Colour	2
Consistency	2
Cutting	3
Smell	2
Taste	7
Total number of points	19

## Results and Discussion

Three experiments were done with 5000l of cow's fresh standardized non-pasteurized milk (with 3.16% fat). The samples of milk and cheese produced in industrial way by traditional technology were taken to be analyzed from cow's milk; the chemical-physical peculiar analysis has been done for fresh milk and fresh cheese lasting from one (1) day, fifteen (15) day and thirty (30)days. In addition, the analyses were taken for Saline percentage % (NaCl), total



percentage of Nitrogen, and total percentage of proteins in cheese. The samples of every seven<sup>th</sup> roundel have taken to analyze. More than 100 analyses were done to research the best method to produce this kind of cheese.

- a) Chemical-physical peculiarity results of cow's milk produced and stored cheese Kaçkavall per one day mil: pH=6.42, °SH=7.2, density=1.0259 kg/m<sup>3</sup>, fat=3.16%, matter sec=10.11%, matter sec without fat=6.95, water=89.89%.
- b) Chemical-physical peculiarity results of cow's milk produced and stored cheese Kaçkavall per one (1) day are pH=4.82, °SH=56.33, fat=19.03%, matter sec=49.14, matter sec without fat=30.10%, saline (NaCl)=1.30%, total nitrogen=4%, total proteins=25%, water=50.86%.
- c) Chemical-physical peculiarity results of cow's milk produced and stored cheese Kaçkavall for fifteen (15) days are pH=4.81, °SH=54.33, fat=19.36%, matter sec=49.16, matter sec without fat=29.80%, saline (NaCl)=2.03%, total nitrogen=4.45%, total protein=27.81%, water=50.84%.
- d) Chemical-physical peculiarity results of cow's milk produced and stored cheese Kaçkavall for thirty (30) days are pH=4.95, °SH=50.66, fat=19.40%, matter sec=49.17, matter sec without fat=29.81%, saline (NaCl)=2.17%, total nitrogen=5.03%, total protein=31.43%, water=50.81%.

All parameters are of world standards, but mode and technology of this cheese makes possible less expense than needed litters to one (1) litter milk. During the production of cheese, very important role takes the sort and the quality of milk. As percentage of fat in milk changes so the percentage of fat in cheese changes as so in matter sec, proteins, saline and water are changes too.

It is ascertained that during baking-drying of cheese in the store, from the first day until the thirtieth day the physical-chemical parameters are raising, such as raising percentage of matter sec, total nitrogen (N), saline (NaCl) and in very small percentage the percentage quantity of fat.

Organo-leptik valuation of Kaçkaval after thirty (30) days it was ascertained it has achieved the peculiarity of smell, taste, Consistency because in general it has achieved very good estimation With traditional technology and with good quality of milk we can have a good product of this kind of cheese with very good organo-leptik peculiarity: nice smell, good taste and strong cheese.

In normal standards is needed 10 litres of milk to produce 1 kg cheese of this kind. By means of this method, for one (1) kg. Kaçkaval cheese were used 8,5 litres of un-standardized and un-pasteurized fresh milk it means that from 5000 litres of milk we have 588 kg. kaçkaval cheese.

Production of this kind of cheese has nutritious value for the population and good economic value for milk industry considering profit of one (1) kg cheese with 8,5 litters milk. This kind of cheese can hold out in surroundings temperature up to 25°C. Furthermore, the gained results of such good production with good quality of cheese are showing that it has good economic importance for milk processing industry having in consideration of the market interest for this kind of cheese with such peculiarity.

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