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IMPROVING DAIRY PLANT OPERATIONS IN KOSOVO

KOSOVO CLUSTER AND BUSINESS SUPPORT PROJECT



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IMPROVING DAIRY PLANT OPERATIONS IN KOSOVO

THE REPORT ADDRESSSES FURTHER IMPROVEMENTS NEEDED TO BE MADE AT KOSOVO DAIRY PROCESSORS SO THEY MAY SUCCESSFULLY DEVELOP GRADES AND STANDARDS, TESTING CAPACITIES AND PLANT OPERATIONS TO PRODUCE PRODUCTS THAT CAN MEET THE SAME STANDARDS AS IMPORTED PRODUCTS FROM THE EU IN TERMS OF GMP, HACCP, AND ISO 9000 CERTIFICATION.

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PURPOSE OF ASSIGNMENT

The purpose of this assignment is to help Kosovo dairy processors make a new type of cheeses of excellent quality, during the high production time of the year, in order to take more milk off the market at a higher price. The specialist will work with the processors to develop grades and standards including chemical, physical, and microbiological criteria; to develop testing capacities; and to set up plant operations to produce products that can meet the same standards as imported products from the EU in terms of GMP, HACCP, and ISO 9000 certification.

BACKGROUND

The Kosovo dairy sector is poised to take a giant step forward in the increased production of high quality milk. This production must be accompanied by the manufacturing and marketing of high quality dairy products. The dairy sector is a prime example of how an industry must progress in terms of technology and management systems or be left behind in the world market. To launch the dairy industry in Kosovo to the next level of competitiveness, a focused approach that introduces technology and modern management techniques to the dairy processor is critical.

From year 2006 EU will implement new law regulation with obligated HACCP standardization in industry. KVFA will increase demands on quality standards of dairy processing products based on EU law. KCBS is continuing support to KVFA on improvement standards based on EU regulations. It is critical for dairy industry in Kosovo as soon as it is possible to start implementing HACCP standards in order to improve food safety.

Kosovo and Slovenia are both major milk-producing countries with similar climate and geographic characteristics. However, Slovenia produced more than 500 million liters of milk in 2003, and all of this goes to dairy processors. They then export their high quality dairy products throughout the region.

Kosovo is just the opposite. Most of the milk is sold directly from the farmer into the markets and Kosovo produces only about 15% of its dairy product needs. In addition, there is excess farm production of milk during the summer months. Dairy processors buy this extra milk at very low prices, and use it to produce more yogurt and cheese than the market can handle. This benefits the consumer with low priced dairy products; however, this ultimately reduces farm income.

The difference between the two national industries is a question of operational scale and level of technology. As much as 85 percent of Slovenia's raw milk production flows through industrial dairy processors. In Kosovo, the proportion of raw milk flowing through industrial processors is about 10-15 percent. Normally in Kosovo the milk is sold at ambient temperatures. Small dairy processors process much of this production. This situation in Kosovo is not unlike Slovenia 30 years ago or the US and the EU collection centers, developed financially strong and commercially viable farming units.

At this time, the improvement of production of Grade A milk quality is in process. Production of raw milk at Grade A quality level is the most fundamental step needed to improve the Kosovo dairy industry, but without corresponding improvements in the way dairy companies process the milk, the economic benefits of farm level improvement will be impaired. Stronger demand created by improved quality will be the foundation for the industry's sustainability and future growth.

EXECUTIVE SUMMARY

This final report is a compilation of interim reports, reports on the activities of meetings and visits to various organizations and the presentation made during my 14-day consultancy in Kosovo from March 3 to March 29, 2006. Although my experience in the dairy industry in Kosovo was limited to only six plant visits, it seemed to provide a good cross section of current conditions. It ranged from the worst (old plant with poor sanitary conditions) to the best (remodeled/new plant with aseptic Tetra Pak equipment/ Devoli-last taim/).

This report contains my findings on field visits to six dairy processors; observations made, conclusions reached; and recommendations specific to the plants themselves. At each plant, common topics to the development of the dairy processing industry were discussed. As a result of these discussions, several documents for use in the future were developed, as each of the plants aspires to successfully develop grades and standards, testing capacities and plant operations to produce products that can meet the same standards as imported products from the EU in terms of Good Manufacturing Practices (GMPs), Hazard Analysis and Critical Control Points (HACCP), and ISO 9000 certification. The topics of the questioning and the assessment of a plant's readiness to incorporate GMP and HACCP requirements were developed for future application.

Throughout the dairy industry the concept of an "uninterrupted refrigeration chain" should be stressed as the single most important quality parameter that can insure a longer shelf life of dairy products. There is a need to repeatedly stress the importance of proper cleaning and sanitizing practices as a critical quality assurance tool. (In HACCP terminology: a "critical control point"). Plants should be advised to order Cleaning and Sanitization (C&S) supplies to include technical literature and material safety data sheets (MSDS). This will eliminate the uncertainty on how to use cleaners and sanitizers. Reputable companies supply this information routinely.

Two major workshops/seminars were held in Prizren and Peja with detailed powerpoint presentations. Materials were disseminated to the attendees. But it is evident that much follow-up training and education of production and QA/QC personnel on a broad spectrum of issues is necessary. Short courses or training programs should strongly emphasize practical aspects with hands-on demonstrations in a plant/production environment. It is also recommended that media campaigns are promoted covering such key issues as sanitation, rapid milk cooling after milking, and employee personal hygiene. These might include posters in the dairies, newsletters in Association periodicals, and even in the local press.

It will be important to monitor each dairy plant as it moves towards introducing and applying improved quality control procedures and practices; to this end a sample plant inspection form was prepared and a completed copy, as it applied to RONA dairy plant is included in the Annexes. Introduction GMPs begins with conducting an audit on the condition of three areas of manufacture covered by GMP system. The audit addresses plant operations under these categories: effective manufacture; quality assurance; and maintenance of quality and systematic search and elimination of malfunction. Based on the audit findings, a phased plan for introducing GMPs can developed. A plan is included in the Annexes.

In summary, the sanitary condition of dairy production plants ranges from very poor to acceptable. For the most part technological know-how in dairy processing is rudimentary. But key management personnel appear to be interested in understanding and supporting improved production techniques and stricter adherence to sanitary standards, and we hope that owners or general managers will provide appropriate incentives to production technologists and QA/QC managers. A competent staff will be a good long term insurance policy for a profitable enterprise.

FIELD ACTIVITIES TO ACHIEVE PURPOSES

03 March 2006

Arrived in Kosovo/Prishtina.

06 March 2006

Held a brief discussion of my assignment for KCBS with Albert Wanous and Zijadin Gojnovci. We made a plan of the work with our clients and chose the dates for my conducting the trainings on "Microbiology of milk and milk products"; "Milk reception and quality analyses of receiving milk"; and "Cleaning and disinfection of the milk reception center".

Meeting with Dairy Plant AJKA. We discussed and chose the introduction of new products.

07 March 2006

Visit with BAS EAR project, Mister Ekrem Hoxha to discuss its assistance to KABI Dairy Plant. The new processing facility, expected completion at the end of April in 2006, is planned for production in first year of 10,000 l/day, and in the second 20,000 l/day to process. The implementation plan will be divided in two phases. Discussed KCBS's possible technical and technological assistance for the new plant.

In the first phase, KCBS will work at Kabi dairy plant on setting up the technical project for standardization of dairy products, what products should be processed, setting up new management structure for new processing line with balanced fat content schedule in dairy products (Use butter fat content in dairy products without losses). Will prepare technical plan for investing in new equipment for new processing line 20,000 lit/day, included machinery selections, technical advice in order to see cost benefit from investments. In the second step of implementation, BAS project will take over findings to continue support for KABI in setting up the processing line for each dairy product, to train local technology staff, to demonstrate practical implementation with quality control standards system for each product based on EU standards.

We also discussed technical assistance for the ice cream production line.

07 & 22 March 2006

Company Name: KABI – existing plant, Mr. Nehat Bixhaku
Location of client: Kamenica
Products manufactured: Yogurt (from cow milk), Ayran (new product), Set yogurt, Pasteurized milk – 3.2%, and Feta cheese
Product evaluations: Taste of fresh products was acceptable, but they have an anticipated short shelf life; reasons were discussed.

We discussed and selected milk products, which will be more profitable for manufacture and new machines for reception processing and pre-packing at the new plant. These machines are produced to European standards. We prepared an optimal schedule and work distribution at the old plant and discussed the technological processing and profit; in case they will standardize reception milk.

- They lose from 50 kg up to 70 kg of 100% fat in a day. This could be an additional profit from 200 – 240 kg of 22% sour cream. It costs 50-70 cent for 200 gr in the markets. Therefore the additional profit could be €300-400 per day.

- 1200 liters of whey is thrown away every day from which 50-55 kg of Ricotta can be made. Additional profit could be €80-90 per day.
- They have a machine for Kashkaval production, but it isn't used. Its use would bring extra profit as there is no additional investment and Kashkaval is more valuable than Feta.

Then we visited the new plant with a working area of two thousand square metres. It must be prepared a new project meeting HACCP requirements. We discussed the production technology and introduction of new products – processed cheese, ayran, sour cream, butter and kashkaval, as discussed with BAS in the morning.

Conclusions:

There is no microbiological control at milk reception centers, and no control over the quality of raw milk delivered from the MCCs to KABI.

Recommendations:

1. Start up production of Kashkaval yellow cheese with existing/unused equipment.
2. Start up production of sour cream with 22% fat content.
3. Start up production of Ricottas from whey, earning extra €380-490 per day.
4. Prepare technological project meeting HACCP requirements at the new plant.
5. Prepare fat balance for all milk products.
6. Prepare calculation for all milk products

A list of points to be considered in KABI's development is attached in Annex 8.

08 & 24 March 2006

Company Name:	ABI, Arben Musliu
Location of client:	Prizren
Products manufactured:	Yogurt (from cow milk), Ayran, Set yogurt, Sour cream Pasteurized milk –3.2%, Kashkaval, Mozzarella, Ricotta.
Product evaluations:	All products tasted were of very good quality. Expected shelf life was considered longer than normally expected for local products.

Controls for Soft white cheese/Feta were discussed.

Discussion on the technical and technological assistance for buying new dairy machinery. Equipments for processed cheese production, automatic Feta cheese production line (technology for ultra filtration) and a machine for the production of Kashkaval from dry casein. Preparation for training of quality control of bought milk, storage, cleaning and disinfection of the center MCC and demonstration of physic-chemical analyses of milk. At least 20 MCCs should participate from 2-3 dairy plants. Also with ABI, prepared the schedule to help a training program for microbiology testing for dairy plants, to be organized at Agriculture Institute in Peja. One member and representative of Institutions will participate.

Prepared for ABI a technical plan and needs for purchasing processing equipments for cream cheese, new line feta cheese ultra filtration and cost benefit plan of investments. Packaging equipment has been recommended.

Conclusions:

This plant will have all the equipment necessary to become a leader in the region if not in Kosovo.

An important task will be to educate the producer/small farmer to deliver milk in the best possible condition to a centralized collection points in the surrounding region.

This plant should consider a milk pricing policy conducive to encourage small farmers to increase their production. This could also ensure stability and long term success for this operation.

Recommendations:

- Set up the laboratory so it will be functional when production starts using the new equipment being installed.
- Testing should be limited to obtaining key information on process performance and maintenance of sanitary conditions.
- Since this plant will be completely remodeled using mostly new equipment and is well designed, it should not be a problem to enforce GMPs and GSPs (Good Manufacturing Practices and Good Sanitation Practices). Such effort will have an immediate payback in the form of high quality products with potentially longer shelf life.
- Management should understand and recognize the importance of competent production technologists and QA/QC personnel and provide appropriate compensation. Such an approach represents the best insurance for a long-term leadership position in the dairy industry.
- Continued educational efforts supporting key production and QA/QC personnel is strongly recommended.

08, 14, 15 & 16 March 2006

Company Name; Ajka
Location of client: Lutoglava
Products manufactured: Yogurt (from cow milk), Ajran, Set yogurt, Pasteurized milk-3,2%, Yellow cheese, Ricotta
Product evaluations: All products tasted were of very good quality. Expected shelf life was considered longer than normal for local products.

Started up the production of three new products: Cream cheese, Feta cheese and Katak (high salt, low moisture yogurt)

Conclusions:

Plant utilities are typically oversized but may come in handy when production capacity will be pushed higher.

This plant seems to practice cleaning and sanitation with appropriate chemicals and a clear understanding of principles involved.

A number of laboratory QC procedures were discussed, demonstrated, and appropriate recommendations made. Pertinent handouts were reviewed.

Recommendations:

- Continue to evaluate economical and attractive packaging for dairy products.
- Continue the policy of having competent people on the management and production team.
- Testing should be limited to obtaining key information on process performance and maintenance of sanitary conditions. Many detailed recommendations were given to Mr. Ramadan
- As this plant will be reconstructed, it shouldn't be a problem to instruct GMPs and GSPs (Good Manufacture Practice and Good Sanitation Practice). Such an effort will have immediate recovery in the form of high qualitative goods with potential longer shelf life.

Other Comment:

The new products were presented at the marketing and promotion event in Prishtina. Mr. Ramadan made very positive comments about the assistance provided by KCBS.

10 March 2006

Company Name: Shala
Location of client: Bare
Products manufactured: Yogurt (from cow milk), Set yogurt, Pasteurized milk-3,2%, Soft White cheese, Sour cream
Product evaluations: Mostly fair tasting products with anticipated short shelf life, a consequence of what appears to involve inadequate cleaning and sanitary practices and poor raw milk quality.

Conclusions:

The recommendations of my previous visit haven't been fulfilled. For example:

- There is no control at the milk reception. Temperature, density, SNF, protein, lactose, acidity of the milk is not under control. (PH meter hasn't even been made calibration, as well as milk analyzer).
- There is no control of treated milk and ready milk products.
- Feta cheese is made of non- pasteurized milk.
- Sour cream isn't pasteurized.
- Pasteurization is left without cleansing.
- I saw 700 l of milk being received with pH 4.9.
- I calibrated pH meter and prepared ferment for Feta cheese.
- Starter cultures currently purchased need to be kept in storage at temperatures recommended by the manufacturer in order to maintain full viability and perform reliably. If this is not done, performance in production cannot be expected.

Sanitary conditions in the plant are very poor.

Maintenance and housekeeping appear to be non-existent.

A new facility is needed if output is to increase or quality improvements are of serious interest.

Processing plant has the potential to expand its volume of daily capacity of productivity as well as to make better its qualitative parameters. (Presently, processing is 100-1200 l/day).

There is an agricultural base that can be expanded in terms of cows milked, if feed supply is expanded accordingly, and the processing plant could handle up to 5,000 L/day. (Additional or larger vats would be needed)

Efforts made so far in this operation with the assistance of KCBS appear to have been quite successful. Continued efforts seem very worthwhile because there is an agricultural base and processing capacity available that could lead to greater success in a vertically integrated operation. The company also has two outlets, which are quite attractive, in the nearby town of Mitrovica.

Recommendations:

Management should recognize the need for more solid production know-how, hire suitable personnel, and demand higher standards of performance. This would certainly allow manufacturing dairy products of higher quality and having a longer shelf life.

Decide whether to stay in the game and make necessary improvements or wait for the competition to take over.

11, 12, 17, 18 & 25 March 2006

Company Name: Rona
Location of client: Ferizaj
Products manufactured: Feta, Yellow cheese/ Kashkaval/, Ricotta and Butter
Product evaluations: All products tasted were of very good quality.

Organized a training course; introduced General Hygienic Instructions which included wash and disinfection of the equipment; prepared technical starter cultures for "Crèam cheese" and "Feta" cheese; and demonstrated GMP for cheese processing from raw milk up to final product.

3,2 tons of raw cow milk was processed for "Feta" cheese. The fat content of the milk was 2,9%, density 1,027, dry materials 8,1 %, proteins 3,5 %, lactose 4,1 %, added water 4 %, pH 6,68, acidity 7,2 °, SH. We got 1 kg of cheese from 5, 7 liters of milk.

Control "Feta" cheese was processed from this milk and the whole technological process was introduced step by step up to the final product.

Anew product was made Cream cheese. The product was appreciated by the processor.

We got 1 kg of cheese from 2,2 liters of milk/Fet-11%,dry material- 8,5,acidity- 7,8°SH.

The cheese was appreciated by the processor and sold in the market

Rona has plans to increase milk-processing volume (20 tons per day) by December 2006.

Rona required assisting on their technological project for the new factory with processing facility of 20,000 lit/day and on calculation of the processed products and on assistance in consultancy of purchasing of the equipment they need and help them in installation and start of the factory.

The plant does not comply with GMP, but a 4-hour meeting was held with the Director, to discuss the fundamentals of HACCP and ISO9001-2000 in some detail, including the reasoning behind the requisite that GMP are in full compliance before working on implementing HACCP, actions to be taken, expected time horizons, and the benefits of

eventually having HACCP and ISO in place. The main purpose of this meeting was to increase awareness.

Conclusions:

There is no microbiological control at milk reception centers, no control over the quality of ready product.

Their laboratory is able to control only the main physical and chemical parameters of milk reception.

Daily dump of whey into waste leads to the loss of 50 kg of albumin cottage cheese (from 1 ton) and 20 kg of butter (fat content 72 %). The price of 1 kg of butter is 2 Euro, 1 kg of albumin cottage cheese is from €1.3 - €1.5. This corresponds to additional income of €225 per day from cheese and from butter €120 Euro per day.

As there is no standardization of processed milk (fat\casein content), the dairy factory loses 80 kg of butter (72 %) per day or 160kg of crème cheese (25%) from disposing of sub-standard product. This corresponds to an unnecessary loss of up to €460 per day.

Production personnel have much experience in making the cheeses they make, but lack basic scientific and technological training regarding *the meaning* of what they do, from measuring titratable acidity to predicting cheese yield based on milk composition.

The whey that comes from “Feta” and “Kashkaval” types of cheese is dumped into waste water though it could be used in the processing of albumin cottage cheese, and if it is separated after processing of Kashkaval cheese, it is possible to get butter.

The rennet used, “TOPLICANKA” Brand, had a declared strength on the label of 1:5,000 (1 liter per 5,000 liters of milk). However, its true strength was of the order of 1:400. That is the reason why I used rennet “Chy max” Christian Hanson (2 gr per\100 liters).

The “pasteurizer” has a holding time of about 5 seconds, and the heated milk (72°C) is then pumped to a holding tank, from which it is later pumped through a heat exchanger, to be cooled to the cheese-making temperature (35°C, for example). Hence, this *is not* a true HTST Pasteurizer, in which thermal treatment is 72°C/16 s. Here, milk can be either under-pasteurized, or over-pasteurized; in the first case this would be a food safety concern and, in the second, it would be a cheese quality concern, due to unwarranted variation in both texture and composition.

There is extensive use of wooden utensils, which enter into contact with the milk, after pasteurization. This is unacceptable practice.

The plant does not have a moisture balance, to determine the moisture content of the cheeses it produces.

Recommendations:

- Microbiological laboratory testing in milk collection centers and in dairy plant.

20 & 21 March 2006

Company Name:	Lahor
Location of client:	Shtpce
Products manufactured:	Feta, Yellow cheese/ Sharski/, Yogurt, Set yogurt
Product evaluations:	All products tasted were of very good quality.

Potential for processing raw milk is up to 2,000 lit/day, but currently collecting only 500 l milk per day.

Lahor dairy plant has needed to improve and to process dairy products with new technology, they would like to process "Feta" cheese and Crème cheese. I presented the new processing technology and methods. Prepared technical starter cultures for "Feta" cheese, demonstrated GMP for cheese processing from raw milk up to final product.

"Feta" cheese was processed from 150 liters of milk and the whole technological process was introduced step by step up to the final product. "Feta" cheese was the new product for Lahor factory. The white cheese processed by them was made from the non-pasteurized milk.

Demonstrated testing and cleaning process in dairy plant, pasteurization, and fermentation and storage requirements of dairy products, as well as detailed process of receiving milk.

Conclusions:

KCBS met Kosovo Veterinary Food Agency on coordination activities and needs in future for inspection and licensing process, pasteurization and processing standards to be improved in the Lahor dairy plant.

Recommendations:

KCBS staff will work with Lahor to improve their operations such as to qualify for licensing. I will assist Lahor dairy plant to find new market to sell dairy products.

20 & 21 March 2006

Company Name: Bosna Restaurant

Location of client: Prishtina

Products manufactured: Burek

I assisted at Bosna restaurant in Prishtina on developing Ricotta cheese for burek processing.

24 March 2006

Training held in Krusha e Vogel, Prizren. Presentation on "Milk quality based on GMP standard requirements for Milk Collection Centers". 14 MCC owners from Abi dairy plant and one MCC from Golaj dairy plant participated.

28 March 2006

Training held in Peja Agriculture Institute A seminar was presented on March 28, 2006. The seminar title was "CLEANING AND SANITIZING" and "Dairy Bacteriology" was structured as follows:

- "Dairy Bacteriology": Basic Knowledge of Microorganisms Important to the Dairy Industry.
- "Antibiotics in Milk": Detection of Antibiotic / Drug Residues in Milk and Dairy Products.
- "How Microorganisms grow": What stimulates or inhibits growth? How does this knowledge provide control over the manufacturing process and influences quality?
- "Properties of Chemical Sanitizers": Ten properties Evaluated for Seven Types of Chemical Sanitizers.

- “Basics of Chemical Safety”: Safe Chemical Handling. Chemical Safety Guidelines. Chemicals are Necessary Ingredients in the Food Industry.

The afternoon session included practical demonstrations of laboratory testing procedures for acidity measurements and microbiological analyses using 3M Petrifilm count plate techniques, antibiotic test/ Snap test/ and microbiology control on starter culture. Additional details can be found in the Annex 1.

Selected handout material from the following list was also made available to participants:

- Properties of chemical sanitizers
- Chemical safety
- Antibiotics in milk
- Activity Test Procedures
- Tests you should be running in Your Milk Monitoring Program
- Hand Washing: Is It Really Necessary?
- Microbiological Count Methods
- Plant Inspections: Suggested Procedures

Additional details can be found in the Annex 2.

A list of laboratory equipment delivered to KCBS staff is included in the Annex 3. Some time was spent explaining instrumental laboratory techniques to KCBS staff.

TASK FINDINGS AND RECOMMENDATIONS

GENERAL

Although my experience in the dairy industry in Kosovo was limited to only 7 plant visits, it seemed to provide a good cross section of current conditions. It ranged from the worst (old plant with poor sanitary conditions) to the best (remodeled/new plant with aseptic Tetra Pak equipment/ Devoli-last taim/). Summaries of topics discussed during plant visits are listed in Annex 4. My findings include:

- Sanitary condition of dairy production plants ranges from very poor to acceptable.
- For the most part technological know-how in dairy processing is rudimentary. Few exceptions stand out.
- Key management personnel appear to be interested in understanding and supporting improved production techniques and stricter adherence to sanitary standards.
- Any educational support that can be provided to the developing dairy industry in Kosovo should yield improvements.
- Educational effort need to be provided on a very basic level and accompanied with practical demonstrations in order to be effective and have a long term impact.
- A training course location should ideally be in one of the processing plants in order to be able to emphasize the practical aspects. Theory, laboratory demonstrations, and practical applications in a production plant would certainly represent the most effective training approach.
- From discussions with Mr. Zijadin Gojnovci 3-5 day training courses for one plant only, or for a small group of people from several plants should be very effective.
- A more difficult task might be to convince owners or general managers to provide appropriate incentives to production technologist and QA/QC managers. A competent staff can be a good long term insurance policy for a profitable enterprise.

SEMINARS AND PRESENTATIONS

Numerous appreciative comments were made by seminar participants and in meetings with clients on information and support provided by KCBS to the dairy processors in Kosovo.

Attendees commented favorably on material presented. Importance of C&S and DAIRY MICROBIOLOGY was acknowledged and the need for improvements confirmed. The educational format of presentations with practical demonstrations of laboratory techniques was well received. Overall the personnel seems to be eager to learn and understand dairy production practices, as they should be practiced today. How much will be applied and in what time frame is a matter to be determined in follow-up contacts by KCBS's staff.

A persistent problem seems to be the lack of knowledge of detergent strength and sanitizers' concentration. Materials purchased often have no clear application instructions, making correct dosing a guessing game.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE ACTIVITY

KCBS's technical assistance to the dairy industry in Kosovo was perceived by numerous contacts made on this assignment as very beneficial with tangible results. Therefore, the following points merit further considerations by KCBS's staff:

- Continued support along these lines will further insure and solidify positive results. Most beneficial seems to be personalized in-plant and practical demonstrations in a production environment; i.e. handholding from theory to implementation in the plant.
- Training of production and QA/QC personnel on a broad spectrum of issues will raise the educational level of such personnel. Only few, if any, have solid professional experience and/or an educational background.
- Short courses or training programs should strongly emphasize practical aspects with hands-on demonstrations in a plant/production environment.
- Educate milk producers on raw milk quality standards, the importance of sanitary milking practices, and the critical aspect and benefit of rapidly cooling raw milk.
- Throughout the dairy industry the concept of an "uninterrupted refrigeration chain" should be stressed as the single most important quality parameter that can insure a longer shelf life of dairy products.
- Repeatedly stress the importance of proper cleaning and sanitizing practices as a critical quality assurance tool. (In HACCP terminology: a "critical control point"). Advise plants to order C&S supplies to include technical literature and material safety data sheets (MSDS). This will eliminate the uncertainty on how to use cleaners and sanitizers. Reputable companies supply this information routinely.
- The "poster idea" proposed by the KCBS staff on key issues such as sanitation, rapid milk cooling after milking, employee personal hygiene, etc. merits serious consideration. Also newsletter articles and technical bulletins on very specific and practical aspects are a worthwhile follow-up effort. Specific technical bulletins on a single issue could be a valuable educational tool. Such articles could be a regular feature in the "Newsletter of the Kosovo Dairy Processing Association". Suggested publications are listed in Annex 5.
- Making top management and/or owners aware of the long-term benefits of a competent production and QC staff should be considered despite the fact that this is a "hot potato" to tackle. Providing incentives to employees will definitely be a difficult task to address, but owners and managers should be encouraged to implement incentive programs rewarding key production and QA/QC personnel for top performance that leads to quality improvements.
- The formation of a centralized testing laboratory run by the "association" merits consideration and should be promoted with association members.
- In order to assess the impact of past efforts made a monitoring protocol or questionnaire could be a helpful follow-up tool. Armed with such information, future activities can be targeted and better planned.

ANNEXES

- ANNEX 1 - TITLES OF PRESENTATIONS
- ANNEX 2 - TITLES OF HANDOUT MATERIAL
- ANNEX 3 - LIST OF LABORATORY EQUIPMENT DELIVERED
- ANNEX 4 - TOPICS DISCUSSED DURING PLANT VISITS
- ANNEX 5 - IDEAS FOR TECHNICAL BOOKLETS OR NEWSLETTER ARTICLES
- ANNEX 6 - PLAN FOR INTRODUCTION OF GOOD MANUFACTURING PRACTICES
- ANNEX 7 - SAMPLE PLANT INSPECTION FORM
- ANNEX 8 - TYPICAL QUESTIONNAIRE - KABI

ANNEX 1 - TITLES OF PRESENTATIONS

CLEANING & SANITIZING: TOC / OUTLINE of SLIDES

1. Cleaning & Sanitizing
2. Basic Definitions
3. Objectives of Cleaning & Sanitizing
4. Components of Cleaning
5. How Soil Promotes Recontamination
6. Relationship between Cleaning & Sanitizing
7. Selection Guide
8. Three Categories of Food Contaminants
9. Two Classifications of Food borne Illness
10. Measures to Prevent Food borne Illness
11. Safe Food Concept
12. Frequent Causes of Food borne Illness
13. Sanitation Program
14. (1) Benefits of a Sanitation Program
15. (2) Benefits of a Sanitation Program
16. Water Quality
17. Water Quality
18. Hardness Concentration and Classification
19. Nature of Soils in the Dairy Plant
20. Characteristics of Soils
21. Soil Types and Detergent Properties
22. Chemistry of Cleaning
23. Glossary of Detergents
24. Cleaning Methods
25. Application Guidelines for Cleaners (1)
26. Application Guidelines for Cleaners (2)
27. The 4 Variable Factors in Cleaning
28. Concentration vs. Efficiency
29. pH Strength of Solutions
30. pH Scale
31. pH as Indicator of Detergent Strength
32. Titration
33. Temperature Effect
34. Effect of Cleaning Time
35. Cleaning Wheel of HTST units
36. Cleaning Wheel of HTST units
37. Corrosion Prevention
38. Sanitizing (1)
39. Sanitizing (2)
40. The Ideal Sanitizer
41. Sanitation Program
42. Bactericidal Effectiveness of Chemical Sanitizers
43. Microbiology of Sanitation
44. Spoilage of Dairy Products
45. Effects of Processing on Microorganisms
46. Controlling the level of Bacteria in Milk

DAIRY MICROBIOLOGY: TOC / OUTLINE of SLIDES

1. 3M Petri film Plates: How to use Petri film
2. Product Listing

3. Coli form Counts on Petri film
4. E. coli / Coli form Count Plate
5. Yeast and Mold Count Plate (YM)
6. Examples for preparing dilutions: 1 ml sample
7. Examples for preparing dilutions: 11 ml sample
8. Useful and Harmful Action of Microbes Thermopiles Single-Species Cultures
9. Divosan MH Halogenated acid sanitizer
10. Efficacy of a Sanitizer
11. Effect of Incubation Temperature on Growth of Lactic Cultures
12. Rate of Acid Development in Milk with and without Penicillin
13. Recommended Dilutions
14. Definition of Coli form Tests
15. Direct Microscopic Methods for Bacteria or Somatic Cells
16. Methods to detect abnormal milk
17. Mastitis Tests

HOW MICROORGANISMS GROW: TOC / OUTLINE of SLIDES

1. Slow Cooling of Milk
2. Fast Cooling of Milk
3. Generation Time or Doubling Time of M.O.
4. What Influences the Doubling Time?
5. Yogurt as an Example
6. The Barrier Concept
7. Water Activity (A_w)
8. Time / Temperature Chart
9. The Danger Zone: 7 °C - 60 °C
10. On Farm Pasteurization (L.T.L.T)
11. Effect of Incubation Temperature on Growth of Lactic Cultures
12. Effect of Penicillin on Acid Development

PROPERTIES OF CHEMICAL SANITIZERS: TOC / OUTLINE of SLIDES

Seven Types of Sanitizers

1. Inorganic Chlorine: sodium hypochlorite
2. Organic Chlorine Compounds: di-, tri-chloroisocyanurate
3. Iodine Compounds: iodophors
4. Acid Anionic: organic acids and surfactants
5. Chlorine Dioxide
6. Quaternary Ammonium
7. Peroxyacetic Acid

Properties of Sanitizers

1. Germicidal: *activity, specificity, speed*
2. Form: *stability, toxicity, irritancy*
3. Dilution: *ease of preparing and measuring, stability, toxicity, irritancy, vapors, colors, pH requirements, temperature*
4. Film Formation: *bacteriostatic film, penetration*
5. Water Hardness
6. Organic Matter in Water
7. Corrosion: *solution, vapor space, special conditions*
8. Used For
9. Advantages

10. Disadvantage

CHEMICAL SAFETY: TOC / OUTLINE of SLIDES

1. Safe Chemical Handling
2. Chemical Safety Guidelines
3. Chemicals are a Necessity
4. Health and Safety Depends on
5. GMP's around Chemicals
6. Cost Control of Chemicals
7. Effective Cost Control
8. Effect of Amount of Cleaner on Cost

ANTIBIOTICCS IN MILK: TOC / OUTLINE of SLIDES

1. Antibiotics in Milk
2. Why Test for Antibiotics?
3. Names of Antibiotic Families
4. Qualitative Tests
5. ROSA Reader Rapid One Step Assay
6. SNAP Test Protocol
7. SNAP Steps 1., 2. & 3.
8. Delvotest-P Test Kit

ANNEX 2 - TITLES OF HANDOUT MATERIAL

Steps of Starter Production in a Dairy Plant

- Steps of starter production
- Characteristics of a good lactic starter
- What are lactic cultures?
- Recommendations for in-plant starter production
 1. Mother Culture Production
 2. Bulk Culture Production
 3. Activity Test Procedures

Activity Test Procedures

- Principles of activity testing by titratable acidity (TA)
- Procedures
- Example of interpretations
- Interpretation of “Developed Acid Levels”
- Conclusions

Test You Should be Running in Your Milk Monitoring Program

- Raw Milk Tests
- Processed Milk Tests
- Environmental Tests
- How to set priorities for a milk monitoring program?
- A bad example of handling milk
- A good example of handling milk

Hand Washing: Is it really necessary?

- Dirty hands touch an agar plate
- After 24 hours
- After a cold water rinse
- After a 20 second soap and water wash
- Then using a hand sanitizer

Microbiological Count Methods

- Introduction
- Standard plate count methodology
- Alternative methods for SPC
- Diluting samples
- Counting colonies on plates
- Examples of preparing dilutions
- Measuring diluted samples
- Plate loop apparatus
- Petrifilm plates: 3M Product listing

-

Plant Inspections: Suggested Procedures

- What is an inspection?
- What is the principle?
- A walk through the plant
- What to look for in each area identified
- Examples of selected areas:
 - Milk can receiving area
 - Milk processing area
 - Cheese production area
 - Packaging area
 - General items
- Conclusions
- Sample plant inspection form
- Suggested item code system

ANNEX 3 - LIST OF LABORATORY EQUIPMENT DELIVERED

Laboratory Equipment					
	Quantities	Item Description	date		3/6/06
Test	1bottle	For inhibitor	3/12/06	yes	yes
Starter culture	10 package	Feta,Cheddar,Crème cheese Butter	1/8/06	yes	yes
3M	4 boxes	Petrifilm: SPC, Y&M, Coli form	1/9/06	yes	yes
Antibiotic test	1 pack.	Snap test	1/10/06	yes	yes

ANNEX 4 - TOPICS DISCUSSED DURING PLANT VISITS

The following list highlights the various topics discussed:

- Starter culture production in plants
- Activity testing of lactic cultures
- Selection of lactic cultures
- Importance of Coli form testing (indicator organism)
- Raw milk quality standards
- Refrigeration chain concept
- Viscosity control in sour cream
- Textural appearance of fermented products
- Significance of titratable acidity (TA) versus pH measurements
- Interpretations of microbiological test results from raw milk, past. milk, products
- Plant inspection commentaries; example of a plant inspection form with comments
- Application rates of cleaners and sanitizers
- Education of farmers/producers on raw milk quality
- Use of functional ingredients in fermented dairy products
- Equipment recommendations
- Laboratory techniques/laboratory set-up/minimal equipment needs
- 3M count plate techniques
- Antibiotic testing

ANNEX 5 - IDEAS FOR TECHNICAL BOOKLETS OR NEWSLETTER ARTICLES

- Plant Inspection Procedures: A Self-Inspection Guide
- Test You Should Be Running In Your Milk Monitoring Program
- Lactic Cultures: Basic Knowledge And Practical Recommendations
- Steps Of Starter Production In A Dairy Plant: Successfully Make Your Own Cultures
- Starter Activity Testing: A One Hour Test To Judge The Performance Of Lactic Cultures
- Things To Consider When Remodeling Or Planning To Build A New Plant
- Staying Informed About Trends In Your Industry: Check Out What The Competition Is Doing.
- When Is Testing For Antibiotics Necessary?
- Why Train Production Personnel And What Should They Know And Understand?
- How Should Production Personnel Interact With Management?
- How Should Management Interact With Production Personnel
- A Simple Self-Audit Plan: Evaluate Your Entire Dairy Production Operation
- How To Make Using Cleaners And Sanitizers Easy For Production People

ANNEX 6 - PLAN FOR INTRODUCTION OF GOOD MANUFACTURING PRACTICES

Practice of Good Manufacture Practice (GMP) is a system providing stable manufacture of the qualitative goods and their control over conformity to standards.

Introduction GMP begins with conducting an audit (3-4 days) on the condition of three areas of manufacture covered by GMP system:

Effective manufacture

Quality assurance

Quality maintenance /the systematized search and elimination of problems.

During the audit checklists are used in all stages of GMP.

After conducting the audit the plan on commissioning GMP system is developed and approved together with administration.

Realization of GMP system as a rule begins with the introduction of the stage *Effective manufacture* and in parallel with the stage *Quality assurance*.

Only after the introduction of first two stages (*Effective manufacture* and *Quality assurance*) it is possible to begin the introduction of the third stage - *Maintenance of quality and Systematic Search and elimination of malfunction*.

Introduction of each stage takes as a rule minimum 5 weeks.

Time of commissioning depends on time of the drawing up and statement of documents necessary for GMP by the customer.

The plan of the introduction of GMP system should include realization of following items:

A. Effective manufacture

1. The validation of structure of the enterprise.
2. Definition and statement of quality policy of the company.
3. The statement of duty regulations.
4. The statement and instructions put into operation workers on each workplace.
5. Storage and transportation of raw material and materials should correspond to the approved norms.
6. The statement of personal plans for development of workers of departments of manufacture and maintenance service, the statement of the consolidated plans of training of workers of departments.
7. The statement of forms of industrial records and procedures of their filling, gathering and storage.

8. The statement of procedures of service of the industrial equipment (Plans THAT).
9. To organize system of storage and the order of spare parts, monitoring of the charge of spare parts on the established volume of released production.
10. Schedules of carrying out THAT.
11. The statement of forms of THAT magazines.
12. Establishment of regular conducting an audit of a production efficiency.

B. Quality assurance

1. The lab ware should be in the demanded volume.
2. The personnel of laboratory should be qualified for carrying out analyses. The statement of personal plans for development of workers of a department of quality assurance and the statement of training plans.
3. The statement of personal plans for development of the manager of the quality assurance department and the manager maintenance of quality.
4. The statement of specifications of quality on raw material (milk, packing material, water, etc.).
5. The statement of the specification of quality on an intermediate product (the normalized milk).
6. The statement of the specification of quality on finished goods.
7. The statement of an admissible degree of quality on finished goods (Acceptance Quality Level - AQL).
8. The description and the statement of instructions on carrying out analyses.
9. The description and the statement of procedures of preparation of chemical reagents for laboratory.
10. Use of methods of the statistical analysis by the department of Quality assurance.
11. The description and statement of conditions of the handling, storage and transportation of production.
12. The statement of forms and procedures of conducting records of a department of Quality assurance.
13. The statement of procedures of the control of finished goods at storage.
14. The statement of definition of inappropriate production – rejects of manufacture and an admissible level of waste of manufacture accepted by the company.
15. Development and the statement of algorithm of actions of a quality assurance department at reception of defective product samples from the market and warehouses.
16. Development and the statement of system of the account of consumers complaints.
17. Development and the statement of system of classification (division into categories) and monitoring of defectiva goods of manufacture by gathering and sorting by laboratory of the information on waste and assignment of regular reports to a management.
18. Development and the statement of the procedures regulating the handling with production, mismatching specification.

C. Maintenance of quality and Systematic Search and elimination of malfunction

1. Purpose of the Manager and team on maintenance of quality and carrying out Systematic search and elimination of malfunction.
2. Revealing and the statement of places of possible occurrence of danger and infringement of quality.
3. The description and the statement of procedures of check of control critical points.
4. The description and the statement of Critical admissions on control points.
5. The personnel of a factory is trained in rules of hygiene at the enterprises of the food-processing industry - certificates from a department of Quality assurance and a mark in the personal plan for development of the worker are necessary.
6. Development and the statement system of scheduled audit and revision of procedures on Maintenance of Quality.
7. The description and the statement of the mechanism of switching on search and elimination of malfunction.
8. The description and the statement of Instructions on carrying out of possible procedures of Regular search and elimination of malfunction.
9. The statement of the documentation on carrying out procedures of Systematic search and elimination of malfunction.

ANNEX 7 - SAMPLE PLANT INSPECTION FORM

Company Name: RONA, Kosovo
Date of inspection: 3/17/2006 Plant Visit # 1
Inspected by: Margarita P.Uchordjieva
Inspection report provided to: Manager of Operations

Rating codes: S = SATISFACTORY, U = UNSATISFACTORY

Area or item Inspected	Item code #	Description of item	S	U	Comments or Recommendations
Building outside	B 1	Milk receiving area and loading dock	S		
Building inside	B 2	Ceiling		U	Condensate & mold growth Install ventilation system
	B 3	Walls		U	Condensate & mold growth Install ventilation system
	B 4	Floor		U	Broken tiles and broken floor drains; repair
	B 5	Ventilation system		U	Inadequate causing problems mentioned in B 2, & B 3
Milk processing	MP 1	Vats		U	Vats have no sanitary welds; difficult to clean
	MP 2	Whey drain vat		U	Wooden construction using cotton drain cloth is very difficult to sanitize
	MP 3	Water heating vat		U	Milk stone and deposits from hard water; clean with appropriate detergents
	MP 4	Hoses		U	Not food grade material collapsed brittle; are source of contamination. Replace with food grade, see-through, wire coil reinforced material.
	MP5	Brining barrels		U	Use of to fill a bucket with water as weight is not sanitary; replace with galvanized weights
	MP 6	Miscellaneous items		U	Repair valve handles Disassembles pumps for C&S Replace cotton with nylon cloth in drain vat
Utility lines		Waterlines		U	Rusty, paint chipped, and dripping
Misc. machinery		Pump housings		U	Rusty, paint chipped, and greasy

ANNEX 8 - TYPICAL QUESTIONNAIRE - KABI

The discussions will all be in relation with the new investments.

The discussions and calculations will be based on a long term planning, that is for at least the first 2 years, and all in relation with the new investments

The Market:

- Which products are on the shelves and which are the most sold in volume?
- What is currently the tendency in the consumption of the younger and older people?
- How important is the potential market for the milk-products Kabi could produce?
- Which are the levels of prices of the products and in relation with the quality?
- What is the quality of the designs of the products on the shelves?
- How can Kabi be different from the others; what are our strongest points?

The company should take some time to visit several different shops and supermarkets; up to you to plan these.

Products and production:

- Which group of products should/could we produce in Kabi?
- Which types of product, fresh- extended shelf life- long shelf life?
- How many references should be available on the market?
- Which volumes can be expected to be sold?
- What should be the capacity of the different production lines?
- Which techniques are the most productive, in quality and cost price?
- Which systems to employ?

The company should have at least the quotations and ideas of two different possible suppliers

Availability of milk:

- How much milk is currently available per month over the year?
- What is the planning to obtain the milk necessary?
- Is the farming part of this investment?

Design of the new factory

- Which are the ideas already available?

Cost price of production:

- How is the cost price calculated?

Once the idea is clear, the company should calculate the cost price and margin of the product.

The Organization

What is currently the organization of all the departments of the company?

What can be the most efficient organization in the current factories and in the future/

How to prepare the people for the new productions?

And of course all other points you like to discuss about!