

RESEARCH ARTICLE

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Verification methods of Hazard Analysis and Critical Point System in dairy industry

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Abstract

Hazard Analysis and Critical Control Points (HACCP) is an internationally recognized system for identifying and controlling hazards in the food chain. One of seven principles of HACCP is Establish Verification Procedures. Verification means that the HACCP plan must be validated. Once the plan is in place, make sure it is effective in preventing the hazards identified. Test the end product; verify that the controls are working as planned, perform ongoing verification of the system if measuring and monitoring equipment is in control; what are corrective actions showing and if records are being maintained as required. The aim of this paper is verification of all parameters (chemical and physical parameters) for acceptance of fresh milk for the production of yogurt in Dairy “Bylmeti” and verification the values of milk pasteurization for yogurt. The acidity of milk is measured by Soxhlet-Henkell method. The fat was determined by the Gerber method and density was determined by the lacto-densimeter. Other parameters were determined by the “Lactoscan” instrument. By the results that are done for five days we can see mostly those parameters are in accordance with Tetrapak standard where this paper is based.

Introduction

Hazard Analysis and Critical Control Points (HACCP) is an internationally recognized system for identifying and controlling hazards in the food chain [1, 2]. The HACCP concept was developed in the 1960s by the NASA (National Aeronautics and Space Administration), the Pillsbury Company and the U.S. Army Laboratories at Natick as the reaction to the requirements for safe foods for space flights [1, 3, 4]. According to European legislation, the hazard analysis critical control point (HACCP) concept has been applied in the food chain since 1998 and has been incorporated in the new food hygiene package since January 2006[5]. On-farm HACCP (hazard analysis critical control points) monitoring requires cost-effective, yet accurate and reproducible tests that can determine the status of cows, milk, and the dairy environment [6]. HACCP is based on seven principles: Conduct a Hazard Analysis, Identify the critical control points, Establish Critical Limits, Establish monitoring procedures, Establish Corrective

Actions, Establish Record Keeping Procedures and Establish Verification Procedures [7, 8]. Verification means the application of methods, procedures, tests and other evaluations, in addition to monitoring, to determine compliance with the HACCP plan [5].

Material and Methods

Yogurt is one of the most popular fermented dairy products which has a wide acceptance worldwide with or without the addition of some natural derivative of milk, such as skim milk powder, whey concentrates, caseinates or cream with a gel structure that results from the coagulation of the milk proteins, due to the lactic acid secreted by defined species of bacteria cultures [9, 10].

For this paper, we have used cow milk from dairy “Bylmeti” for the production of yogurt. In the following scheme, we can see the general diagram of the production of yogurt in this factory. We have done the physical and chemical analysis. For determination of acidity to milk was used Method Soxhlet, the fat was determined by the Gerber method. The density

was determined by lactodensimeter, proteins, specific weight, and dry matter were measured by the lactoscan instrument which is used for determination of milk's parameters.

Results and Discussion

The results are summarized in Table 1 and 2, which shows all results for each parameters of fresh

milk and pasteurized temperature for five days. Our results match mostly parameters of standard with minor exceptions. Results indicated that the dairy factory "Bylmeti" implemented the standard operational procedures. However, needs some minor performance changes, especially in milk acceptance from farmers.

Table 1: Verification of physical-chemical parameters of acceptance of milk for 5 days, compared with the standard rate of Kosovo.

<i>Parameters</i>	<i>Temperature</i>	<i>Acidity</i>	<i>Fat</i>	<i>Protein</i>	<i>Dry matter</i>	<i>Antibiotic</i>	<i>Specific Weight</i>	<i>Date</i>
Norm	+ 4 °C	range 6.5-7.8 °SH	Range 3.2 %	Above 3.0 %	Above 8.5 without fat	negativ	1,028- 1,032	
Verification	6.2	7	4.20	3.16	7.55	—	1.028	22/09/14
	6.3	7	4.20	3.18	7.62	—	1.029	23/09/14
	6.3	7	4.20	3.22	7.72	—	1.029	24/09/14
	8.2	7	3.95	3.09	7.40	—	1.028	25/09/14
	11.3	7	4.20	3.25	7.80	—	1.028	26/09/14
Documentation								
Literature was used for validation	Tetrapak standard	Tetrapak standard	Tetrapak standard	Tetrapak standard	Tetrapak standard	Tetrapak standard	Tetrapak standard	Tetrapak standard

According to the Tetrapak Standard, the temperature of fresh milk has to be +4 °C, but for hot days it is allowed to be accepted until +8°C because that analysis was done on spring. In those results just one case is above the allowed value, it is 11,3°C. This milk is accepted in this temperature just for making of curd. From results, we can see all results are between ranges 6.5-7.8 which this line is inside of allowed

border. The presence of antibiotic is negative and has to be negative all the time because the presence of antibiotic in milk inhibits dairy starter microorganisms and cause problems to the fermented milk products. The fat content of milk is the proportion of milk/weight and in this case, all values are inside of allowed value. The density of milk (g/l) changes with temperature of the milk..

Table2. Verification of temperature pasteurization of milk for yogurt within 5 days

<i>Norm</i>	<i>Pasteurization Temp. of milk for yogurt</i>				<i>Literature</i>
Range 90-95°C	94.7°C	92°C	95.3°C	94.2°C	Tetrapak standard
	93.2°C	93.8°C	91.6°C	92.7°C	
	92°C	94°C	96°C	93°C	
	92°C	94°C	92°C	92.5°C	
	92.8°C	93.5°C	95.2°C	92.9°C	

Milk has a weight density between 1.028-1.032 and we can see all results are between this ranges. Dry matter values depend on the percentage of dry ration, milk production, and climate

Those factors can indicate in decreasing of the dry matter because the sample was taken in spring, in this season dry matter are lower than in winter. Pasteurization of yogurt takes place at 92 ° C for 15''. Yogurt has white to white-yellow color with characteristics flavor and with acidic taste and it is hermetically closed with plastic packaging. In table 2, we can see all temperatures value are within of range 90-95°C. The measurements were done every 15 minutes for five days.

Conclusions

Using an expert analysis to develop HACCP system has led to the selection of important problems and risk factors. A further development of the hazard analysis into a farm specific HACCP system would include assembling an on-farm HACCP team consisting of farmers and advisors for the practical application of control points, alarm values, and monitoring schemes. One aspect of verification is evaluating if the facility's HACCP system is functioning according to the HACCP plan. Another important aspect of verification is the initial validation of the HACCP plan to determine, that all hazards have been identified, and if the HACCP plan is properly implemented, these hazards will be effectively controlled. Information needed to validate the HACCP plan often includes (1) expert advice and scientific studies and (2) in-plant observations, measurements, and assessments.

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