Universitatea Tehnică a Moldovei

CERCETĂRI PRIVIND FABRICAREA IAURTULUI DIN LAPTE YILI ȘI ELABORAREA SISTEMULUI DE SIGURANȚĂ A ALIMENTULUI

Masterand: **Liu Cuilan**

Conducător: **Cumpanici Andrei**
dr.,conf. univ.

Chişinău 2021

ABSTRACT

Yogurt is rich in nutrients and unique in flavor, and its quality and safety have become a major concern for consumers. The product quality of yogurt, like other food products, is affected by many factors such as raw and auxiliary materials, production process, production equipment, processing personnel, production environment, etc. Problems in any one of them may lead to irreversible changes in the quality of yogurt.

HACCP (hazard analysis and critical control point) is a preventive system for food quality and safety, which is international recognized in recent years, the application of HACCP becomes a trendy and necessity all over the world. It is based on the effective implementation of GMP and SSOP and the food production hazard analysis of the whole process. Therefore, several key processes or links affecting food safety can be determined to set critical control point. What's more, the critical control point should be controlled strictly in order to eliminate and reduce the potential hazard to acceptable safety level in food production, storage and sales process.

The development status of dairy products and HACCP system at home and abroad were analyzed on the basis of fully consulting relevant literature in this paper. According to the implementation guidelines of HACCP of food enterprises and the actual production situation of YL Food Co., LTD. the HACCP control and management system of YL future star nutritional juice yogurt beverage was established. According to the production process, the hazards of each process were analyzed, key control points were identified, key limit values were established and corrective measures were formulated to prevent the problem before it occurs.

According to the GMP and SSOP of yoghurt' production from YL Food Co., LTD，related technical managers established a HACCP team for yoghurt to analyze the physical, chemical and biological hazards in the production of yoghurt, use the logical reasoning method of the determination two to determine the key control point(CCP) in the HACCP system. determine three critical control points including the Ultra-Pasteurization(hyperpasteurization)（CCP1, Tunnel sterilization:（CCP2）as well as corresponding assessment indexes and preventive and corrective measures; Meanwhile, raw materials and packaging materials safety and health protection system, recall and traceability systems as well as equipment and facilities maintenance program were also set up. Eventually, the HACCP system of yoghurt was established.

CONTENTS

1. INTRODUCTION 8

1.1 Background and significance of the study 8

1.1.1 Research Background 8

1.1.2 Research significance 8

1.2 Basic concept definition 9

1.2.1 Definition of Food Safety 9

1.2.2 The concept of a food safety management system 9

1.2.3 HACCP theoretical definitions and key points 9

1.2.4 ISO22000 definition and content 10

1.2.5 Differences and links between ISO22000 and HACCP 11

1.3 Benefit analysis of implementing HACCP 11

2. LITERATURE REVIEW 13

2.1 The legal framework for the production and marketing of dairy products 13

2.1.1 Dairy production 13

2.1.2 Dairy products sales 14

2.2 YL Yoghurt Product Description 14

2.2.1 Sensory characteristics 14

2.2.2 Physical and chemical indicators 14

2.2.3 Health indicators 14

2.2.4 Package Type 15

2.2.5 Storage conditions 15

2.3 Factors affecting the safety and quality of Yili yogurt 15

2.3.1 Raw milk safety issues 15

2.3.2 Fermentor safety issues 15

2.3.3 Safety during operation 15

2.3.4 Safety in the production environment 16

3. RESEARCH MATERIALS AND METHODS.....17

3.1 Methods for the determination of microbiological indicators 17

3.1.1 Method for detecting of Salmonella 17

3.1.2 Method for detecting of Escherichia coli 17

3.1.3 Method of detecting the total number of bacteria 18

3.1.4 Methods for detecting coliform bacteria 18

3.1.5 Detection of Listeria monocytogenes 18

4. DEVELOPMENT OF THE FOOD SAFETY MANAGEMENT SYSTEM 20

4.1 Establishment of a food safety team 20

4.2 Quality control plan for milk and auxiliary materials upon receipt 20

4.2.1 Acceptance of qualified raw and auxiliary materials, packaging materials 20

4.2.2 Storage 20

4.2.3 Raw milk reception 21

4.3 Quality plan for the production of YL yoghurt 23

4.3.1 Pre-treatment process 23

4.3.2 Ultra-pasteurization process 24

4.3.3 Adding spices 24

4.3.4 Filling process 24

4.3.5 Tunnel sterilization process 24

4.3.6 Packaging Process 24

4.4 YL Finished Yoghurt Quality Plan 24

4.5 Hygiene plan for technical equipment and machinery 25

4.5.1 Cleaning standards 25

4.5.2 Dairy equipment and pipeline surface deposits and their nature 25

4.6 Production site hygiene plan 26

4.6.1 Key control areas 26

4.6.2 General Control Area 26

4.7 Description of the finished product and intended use 26

4.8 Diagram of the YL yoghurt production process 28

4.9 Hazard analysis 28

4.9.1 Type of hazard analysis 28

4.9.2 Hazard assessment methods 28

4.9.3 Hazard Analysis Table 31

4.9.4 Identify critical control points 58

4.10 Key limits, monitoring procedures and corrective measures 64

4.10.1 Key Limit Values 64

4.10.2 Establishing monitoring systems and corrective measures 65

4.10.3 Validation and documentation procedures 65

4.11 HACCP Schedule 65

CONCLUSION.....67

REFERENCES 68

1. INTRODUCTION

1.1 Background and significance of the study

1.1.1 Research Background

The development of open international trade promotes the application of HACCP system in China's food processing industry， Since the first application of HACCP guidelines in 1990 to the national requirements for the standardized application of HACCP certification system in 2002, the popularity and application of the HACCP system in China's food industry is gradually improving, involving the specification of the scope is also gradually expanding[1]. In 2018, the CNCA has added allergen management and food fraud prevention to the system's new certification requirements, which shows that the comprehensive establishment of a HACCP system for domestic food manufacturers has become a major plan for long-term development, facilitated by global trends [2].

Thanks to the huge demand for dairy products from a population of 1.4 billion, and the emergence of new brands, categories and flavours as a result of consumer upgrading, China's yoghurt market leads the world in volume and growth rate. According to data, sales of yoghurt products in China grew from 45.6 billion yuan in 2012 to 220 billion yuan in 2022, with a compound annual growth rate of 9.2%. Its share of the overall dairy market jumped from 20% in 2014 to 36% in 2019 and is expected to rise further to 42.2% by 2024 [3].

After decades of accumulation, we have developed a complete production process system, a product standard system, a supply chain system from farm to table, as well as a scientific research and technology commercialization system led by governments at all levels and with the active participation of university research institutes[4]. However, compared to developed countries, we still have significant shortcomings in the control of milk sources (animal feeding and quality control of raw milk) and in our own technology, especially in the research of bacterial strains. In this regard, if domestic yoghurt processors are to seek long-term development and achieve greater profit margins, they should start with product quality by improving the HACCP system and GMP management system, and by diversifying their product range to meet the higher international market requirements while ensuring quality, thus increasing overall product profitability and sales volume [5].

In summary, we can see the importance of food safety and the criticality of food safety production, both for the protection of domestic food safety and for the higher requirements of yogurt in the international trade market. Therefore, this research project systematically investigates the process of establishing HACCP system, the optimization of supporting production process and the implementation of HACCP system in YL company, and finally proposes the practical application of HACCP system in YL company by closely combining the principle and method of HACCP system management with the production practice of yogurt products. In the end, by combining the HACCP system management principles and methods with the production practice of yogurt products, we proposed a practical solution for the application of HACCP system in YL company, in order to provide guidance and reference for the production practice process of similar yogurt producers, so as to improve the production management level of similar yogurt producers. Reduce the production of unqualified and unsafe products, reduce the loss of enterprises in unsafe products, and improve the production efficiency and profitability of enterprises [6].

1.1.2 Research significance

Dairy products have become an important dietary source for modern people, the public's awareness of safe consumption is increasing, dairy product quality and safety problems are frequent, quality and safety hazards still exist, the rapid development of the dairy industry in the context of the study of China's dairy product quality and safety risk assessment and supervision has important theoretical and practical significance [7].

First, it is conducive to improving the theory of dairy product quality and safety evaluation and early warning. On the basis of a comprehensive analysis of dairy product quality and safety risk factors, two sets of dairy product quality and safety monitoring index systems will be established, and comprehensive evaluation theories and methods will be applied to evaluate and warn about the quality and safety of dairy products, so as to improve the theory of dairy product quality and safety evaluation and early warning.

It is conducive to enriching the theoretical analysis of dairy product quality and safety [8]. The use of economic information asymmetry theory and signalling game theory to analyse the behavioural game between relevant subjects in the dairy industry chain is conducive to enriching the theoretical analysis of dairy product quality and safety.

It is conducive to ensuring the quality and safety of dairy products. As an ordinary nutritional product in modern life, the quality of dairy products is directly related to the health and safety of the public. The series of dairy product quality and safety problems that have occurred in China have given us a wake-up call. By studying the factors affecting the quality and safety of dairy products, scientific monitoring and evaluation of dairy product quality and safety, and taking effective quality and safety control measures can help ensure the quality and safety of dairy products [9].

Although YL Company, the subject of this study, has established a food safety management system and its employees are able to strictly comply with and implement these specific requirements in their work, there are many factors that affect food safety in practice, such as during the procurement of raw materials, the procurement of auxiliary materials, the receipt and storage of raw materials and auxiliary materials, the production and processing of products, the storage and turnover of products and logistics. The food safety of products can be affected by random chance factors such as intentional or unintentional misuse of personnel, changes in ambient temperature, humidity, sunlight and other weather conditions, faults in machinery and equipment, improper operating methods, etc[10]. If Company 's food safety management is negligent or if a food safety incident occurs for other reasons, not only will there be a risk of compensation, but it may also affect Company 's goodwill and sales of its products, and may even lead to Company 's bankruptcy. As a result, Company has potential business risks that extend to failures in food safety management.

The research in this paper is based on an in-depth study of the problems with the food safety management system and proposes an optimisation plan for the company's food safety management system for yoghurt production, which will help the company to establish a sound food safety management system [11].

1.2 Basic concept definition

1.2.1 Definition of Food Safety

The definition of food safety varies depending on the point of view, but there are four main quadrants from which to understand the definition of food safety. Firstly, in terms of the definition of food safety law, food safety means that food is non-toxic, non-hazardous, meets the nutritional requirements that it should have, and does not pose any acute, sub-acute or chronic risk to human health. Secondly, in the price quadrant, the concept of food safety means that food should be affordable to consumers in terms of everyday food consumption, i.e. not particularly expensive for the majority of consumers [12]. Again, in the food safety quality quadrant, food should provide nutrition that helps people grow healthily and ensure food safety and food hygiene. Furthermore, from the health quadrant, food safety should also ensure that the environmental aspects of the food are not contaminated by harmful substances, or even that the environment in which the food is produced is contaminated on a large scale [13]. Overall, food safety needs to ensure that consumers do not suffer from maintenance of the raw materials, production and processing of food, as well as the storage, transportation and then consumption end of the sales process, all in accordance with national food safety standards and laws and regulations.

1.2.2 The concept of a food safety management system

Food safety management is a set of activities closely focused on food risks, aimed at reducing, minimising or eliminating food safety risks and producing nutritious and healthy food. In a scientifically designed, rational, smooth and tightly operating food safety management system, the government does not have to use on-site supervision and inspection to monitor the production and processing of food in enterprises and the circulation of food in the market, which is the direction pursued in building the structure of a socialist food safety supervision and management system in the new era of China [14]. The formation of a good food safety management system in a country is the result of the joint efforts of the consumer, the government and the main actors in the production industry. The government, as a strong supervisory body, has an unshirkable responsibility to ensure that food is safe and reliable for consumers and that their health is not threatened by problematic foods.

Thus, the food safety management system is not a separate subjective function in achieving its safety management objectives, but rather a comprehensive multi-subject functional mechanism combining government, business and consumer end-point feedback, within which the rules for the implementation of food safety management standards are embedded [15]. Includes food safety manuals, procedure documents, level 3 documents, level 4 documents, PRPs（Prerequisite Program）、OPRP（Operational Prerequisite Program）、HACCP and CCP（Critical Control Point），formation of an integrated food safety management system system.

1.2.3 HACCP theoretical definitions and key points

HACCP（Hazard Analysis and Critical Control Point，According to the standard "Basic Terminology for the Food Industry", HACCP is defined as a comprehensive method and model for controlling food hazards during the production (processing) of food,

targeting the raw materials needed for food production and the related production process technology, equipment use and food quality control set by the enterprise in the actual production process [16]. By building a monitoring model for the production and distribution of food in these areas that directly affect food safety, and through monitoring and prevention mechanisms, food safety problems can be identified and detected at an early stage, thus minimising the production of unsafe food by companies and ensuring the health and safety of consumers.

A review of the information reveals that since the 1960s, NASA has been working with PILLSBURY to develop a HACCP system to ensure the safety of the food consumed by astronauts on the moon, which has played an important role in ensuring the food safety of astronauts and the US nation[17]. The Chinese food industry began to introduce this standard in the early 1990s, analysing the raw materials, auxiliary materials and packaging materials used in food production from a systematic perspective in three dimensions: biological, chemical and physical, and analysing the entire process of production and processing, the equipment used, the packaging and storage environment, as well as the operational behavioural factors that affect food safety in these processes. Through this analysis, the key aspects of food safety are identified, monitoring procedures and standards are established for the key aspects identified, and effective corrective measures and verification procedures are developed for possible deviations to promote a significant improvement in food safety in China.

The key elements of the HACCP theory, the food safety assurance system theory, are the following three levels, the first of which is the process safety assessment of raw and auxiliary materials for food, i.e. the potential safety prevention of raw and auxiliary materials at every stage of the distribution process [18]. The second level is the setting up of a critical safety control point structure, based on the assessment of food safety in the above-mentioned segments and on the different characteristics of the different food production and processing enterprises in terms of internal workshops, industry and distribution. HACCP is a high standard for food safety management in the food industry and plays a key role in analysing and diagnosing potential food safety problems, identifying critical control points, setting critical limits and developing corrective measures for food problems[19]. The use of HACCP to establish a food safety management system provides a clear, accurate and complete record and documentation of food hazards in the production process and the operation of the system.

HACCP is divided into 5 steps and 7 principles. The fourth principle is to establish monitoring procedures for the critical control points, the fifth principle is to establish corrective measures in the event of a CCP critical control point going out of control, the sixth principle is to establish a validation procedure to prove that the HACCP system is working effectively and the seventh principle is to establish a record control system for all operational processes [20].

1.2.4 ISO22000 definition and content

Definition of ISO 22000: A food safety management system developed by the ISO/TC34 Technical Committee on Agri-Food specifically for use within the food chain.

ISO22000 applies to food manufacturers, the wholesale and retail sector, but also to food-related logistics companies, suppliers of packaging materials and so on. In other words, the system can be established for anything related to the food chain[21].

The HACCP concept, born in the 1960s, is the origin of the ISO22000 system, which was established with the main objective of establishing an effective system of analysis for food production and related companies to reduce food safety hazards. To ensure food safety from the agricultural product to the table[22]. This in turn regulates the management of raw materials, the quality control of the production process and the logistics of the cold chain. To ensure that the products delivered to consumers are safe and secure.

The ISO 22000 system is divided into four key elements, namely communication, system management, prerequisite programmers and HACCP principles. Communication is the foundation for the effective operation of the ISO22000 system. Communication includes both internal and external communication. Communication includes food quality guidelines, responsibilities and authorities, staff training, product safety, food safety laws and regulations, hazard identification and acceptable levels, etc. Channels of communication of information are generally the responsibility of the company's food safety team and the food safety team leader. System management refers to the process of using a proven food safety management system and integrating it into the company's daily management system. The HACCP principle is at the heart of the entire ISO system[23]. Its seven principles are applied as a methodology for the entire system establishment process. It shows that hazard analysis is at the heart of the planning for the realization of safe food, with the product characteristics, intended use, flow chart, processing steps and control measures and communication in the preparatory steps as input to the hazard analysis and its updating; it also requires the organic integration of the HACCP plan and the prerequisites and prerequisite programmes [24].

The international standard CAC/RCP I.1 "General Principles of Food Hygiene 1997 Revision 3" defines HACCP as a food safety control system that identifies, analyzes, prevents and controls key hazards in the food production and processing process [25]. The HACCP system is an important tool for safeguarding and controlling food safety. The system is based on prevention and focuses on the detailed analysis of possible hazards during the food production process, identifying the links that lead to food safety problems, establishing key control points, and establishing corresponding preventive measures to reduce the number of products with food safety problems in the food production process, reduce the number of unqualified products, and thus reduce the hazards of products with food safety problems to end consumers.

1.2.5 Differences and links between ISO22000 and HACCP

The difference：

(1) The systems are different ISO 22000 and HACCP are different standards. The CAC (Codex Alimentarius Commission) is the developer of HACCP, which sets out the hazards and critical control points as the principles of the system.

(2) The scope of application is different to that of food production and related to the HACCP standard. However, ISO22000 has a much wider scope of use and the various management systems and requirements established by companies can be integrated into the system. It covers the entire production process. One of its aims is to ensure that the quality of the products is consistent and to improve the management of the company [26].

(3) The ISO22000 system establishes a traceability system and a withdrawal mechanism for unsafe products. Food products need to be withdrawn in the event of quality problems, and a traceability system is established to investigate any link from the raw material supplier to the final product. In this way the consumer is held accountable and the risk to the consumer in using the product is reduced. The ISO 22000 system specifies the requirement to implement a withdrawal mechanism, while HACCP does not [27].

The connection： The ISO 22000 system is based on HACCP, which was first used by NASA in the development of aerospace food to ensure the safety of astronauts, and was designed and developed as ISO 22000, which inherits the principles of HACCP and incorporates some of the principles and methods of ISO 9001, gradually improving them and eventually forming its own standard. The ISO 22000 system is therefore more conducive and suitable for systematic control by food-related companies.

1.3 Benefit analysis of implementing HACCP

Traditional product quality control is an afterthought. Usually, product defects can only be found through later inspections. However, this method cannot show which part of the product quality is problematic [28]. At the same time, on the basis of the above confirmed product quality problems, the company aims to find quality risks. Points will be repeatedly tested many times, and these experimental processes will consume a lot of additional inspection costs. In fact, the defects of the products that have been tested for quality problems have already formed, so the company pays not only the inspection costs, but also the product itself[29]. This post-solving problem control mode is very unrealistic and impractical to find potential hazards through centralized testing of the final product. There are great limitations and lags in the practical operation process, and the final cost is often relatively high. At the same time, this method has great limitations in collecting and analyzing the root causes of product quality problems and obtaining meaningful and representative safety information [30].

The reason for the HACCP system is that it is a pre-control system for food quality and safety management and a preventive technical management system[31]. It uses the principles and methods of food technology, microbiology, chemistry and physics, quality control and risk assessment to prevent, control and control the entire product processing process from the source to the processing to the market circulation to the consumption process. Information feedback, etc., incorporate every product safety production link into the food safety production process, breaking through the traditional one-sided inspection of finished products, and can more effectively reduce product quality problems through preventive methods. According to statistics from the U.S. Food and Drug Administration (FDA), companies involved in aquatic product processing have a 20%-60% reduction in the probability of product quality and safety issues that run the HACCP system than those that do not run the HACCP system [32].

Of course, the operation of the HACCP system also requires more manpower, facilities and other costs. Since the establishment and operation of the HACCP system are based on the word "fine", in this case, if you want to meet the operating standards and requirements of HACCP, you need to invest more human resources in hygiene maintenance, data recording and storage , Testing and inspection, etc.

In addition to using the HACCP system to control the quality of product production, many food processing companies, in order to adapt to the needs of the international market and the requirements of purchasing companies, will choose to conduct HACCP system certification audits through third-party certification, and the process of passing the audit is also Need to pay a large part of human and economic costs [33].

Focusing on the benefits and costs brought by the implementation of the HACCP system by various production enterprises, on the one hand, from the internal point of view of the enterprise, the implementation of the HACCP system by the enterprise has improved the safety and quality of products and reduced the direct economic losses caused by substandard products. The standardization of the production process of the product saves the management cost of the enterprise, improves the production efficiency, and enhances the staff's quality awareness. On the one hand, from the perspective of external effects, the company's product quality has improved, the company's market recognition has increased, its popularity has increased, and its brand value has increased[34]. To a certain extent, it has indirectly increased its market share and can be realized to a greater extent. High-quality products at competitive prices. On the other hand, from the perspective of achieving social benefits, the improvement of product quality is directly related to the development of people's livelihood, and indirectly creates immeasurable benefits for the society. From the perspective of the long-term development of the enterprise, and from the perspective of corporate accounting benefits alone, there is a clear contrast between the cost paid by the enterprise and the actual benefits finally realized[35]. Coupled with the positive impact on social welfare and social and economic benefits, the implementation of the HACCP system for product quality control and control by the company is more beneficial than avoiding the company or the society.

REFERENCES

[1] CHEN H, LIOU B K, HSU K C, et al. Implementation of food safety management systems that meets ISO 22000:2018 and HACCP: A case study of capsule biotechnology products of chaga mushroom[J]. J Food Sci, 2021,86(1):40-54.

[2] GBT 19538-20 04， Guide to the Hazard Analysis and Critical Control Point (HACCP) system and its application [J].

[3] Feng Ce.Spotlight on China's yogurt market How much more fame can bloom [J]. Dairy and People, 2021(03):12-21.

[4] Yang lige, Wu weng, Liu zhenjin. Current status and development trend of yogurt quality testing technology and yogurt flavor research [J]. Heilongjiang Animal Husbandry Veterinarian

, 2011(01):49-50.

[5] Liu Xiumei. Establishment of a HACCP system for the processing of Greek-style yoghurt [J]. China Dairy Industry, 2014(07):59-61.

[6] Song liang. Domestic and international dairy market status and development forecasts [J]. China Dairy Industry, 2020(09):2-6.

[7] Huo Hong, Cui tiantian. Research on quality and safety control of fresh milk processing based on HACCP and SPC [J]. China Dairy Industry, 2017,45(12):43-46.

[8] Sun, Hongyi. Total quality management, ISO 9000 certification and performance improvement[J]. International Journal of Quality & Reliability Management, 2000, 17(2):168-179.

[9] Guo liya, Du bingyao. Comparative analysis of variations in heat treatment processes based on milk [J]. China Dairy Industry, 2021(05):91-99.

[10] Tan zhixin. Analysis of quality defects and control in the production of stirred yoghurt [J]. Modern food, 2019(22):67-69.

[11] Liu yang, Xu guangxin. Common quality problems and control measures in the production of solidified yoghurt [J]. China Dairy Industry, 2020(5):67-69.

[12] Guo liya, Wu xufang. Comparative analysis of the main heat treatment processes for milk [J]. China Dairy Industry, 2021(04):70-74.

[13] Poli M , Pardini S , Passarelli I , et al. The 4A's improvement approach: a case study based on UNI EN ISO 9001:2008[J]. Total Quality Management and Business Excellence, 2015, 26(11):1-18.

[14] NF Melão, Guia S M . Exploring the impacts of ISO 9001 on small- and medium-sized social service institutions: a multiple case study[J]. Total Quality Management & Business Excellence, 2013.

[15] Xu long, Zhang dongjie, Li hongliang. Research progress in yogurt development [J]. Agricultural products processing（Second half of the month）, 2019(6):87-89.

[16] Ma ande. Research on the industrial production process of yoghurt [J]. Agro-processing, 2015(11):23-26.

[17] Joanna, Trafiałek, Matthias, et al. HACCP-based procedures in Germany and Poland[J]. Food Control, 2015.

[19] El-Sharoud, Walid M . Developing a time and effort-effective, highly sensitive TaqMan probe-based real-time polymerase chain reaction protocol for the detection of Salmonella in milk, yoghurt, and cheese[J]. International Dairy Journal, 2015, 40:62-66.

[20] Moran F , Sullivan C , Keener K , et al. Facilitating smart HACCP strategies with Process Analytical Technology[J]. Current Opinion in Food Science, 2017, 17.

[21] Kafetzopoulos D P , Psomas E L , Kafetzopoulos P D . Measuring the effectiveness of the HACCP Food Safety Management System[J]. Food Control, 2013, 33(2):505-513.

[22] Huo xiaona, Cao zhiqiang. China's yogurt market competition pattern and development trend [J]. China Dairy Industry, 2018(03):8-10.

[23] Eriksson, J, G, et al. Early growth and coronary heart disease in later life: longitudinal study.[J]. Bmj British Medical Journal, 2001.

[24] Jia xiaojiang. Study on the Application of HACCP Food Safety Management System in SY Company [D]. Hebei University of Economics and Business, 2015.

[25] Hu yong, Shi yong, Xu ning. HACCP awareness and understanding based on traditional brewing food processes [J]. Science and Education, 2020(12):72-73.

[26] Zhao mingxuan. Establishment of HACCP system to extend the shelf life of yogurt [J]. China Cows, 2005(03):44-46.

[27] Research progress in the application of HACCP system in the food industry _Yang chenbin[J].

[28] Song zhixue. Cyanide and methanol process research and HACCP construction in compound fruit wine brewing [D]. Guizhou University, 2020.

[29] Song liang. Domestic and international dairy market status and development forecasts [J]. China Dairy Industry, 2020(09):2-6.

[30] Adrian Gauna. Foreign yoghurt development trends and the application of probiotics [J]. China Dairy Industry, 2016(02):18.

[31] Lu jian. Research on the application of HACCP-based food safety management system in yogurt production [D]. Nanjing Agricultural University, 2004.

[32] CHEN H, LIOU B K, HSU K C, et al. Implementation of food safety management systems that meets ISO 22000:2018 and HACCP: A case study of capsule biotechnology products of chaga mushroom[J]. J Food Sci, 2021,86(1):40-54.

[33] Song zhixue. Cyanide and methanol process research and HACCP construction in compound fruit wine brewing [D]. Guizhou University, 2020.

[34] Soman R , Raman M . HACCP system – hazard analysis and assessment, based on ISO 22000:2005 methodology[J]. Food Control, 2016:191-195.

[35] Yang lige, Wu wen. Current status and trends in yoghurt quality testing technology and yoghurt flavour research [J]. Heilongjiang University, 2013(12):75-77.

[36] Wang kehui, Li wei, Chen qian. Research status and development trend of flavored yogurt in China [J]. Guangdong Chemical, 2009,36(05):120-121.

[37] Zhang xiaojun. Advances in the application of UV sterilization technology in dairy product sterilization processes [J]. China Dairy Industry, 2019,47(04):47-52.

[38] Huang yadong. Application of HACCP in yoghurt production in small dairies [J]. Modern Food Technology, 2007(06):86-88.

[39] Lang na, Liu haixia. Application of HACCP system in the production of flavored solidified yogurt [J]. Tianjin Science and Technology, 2007(01):61-62.

[40] Sun wei. A study on the improvement of quality management in SG Dairy [D]. Harbin Institute of Technology, 2014.

[41] Huang qian. Analysis of factors affecting the quality of yoghurt [J]. Agro-processing, 2014(03):55-57.

[42] Hao lirong. Yoghurt packaging and trends [J]. China Dairy Industry, 2009(01):47-49.

[43] Yu yanli, Lu jiayi. The establishment and application of HACCP system in yogurt production process [J]. Anhui Agricultural Science, 2016,44(35):124-125.

[44] Yin boxin. Application of HACCP in yoghurt production in small dairies [J]. Modern Food Technology, 2007(06):86-88.

[45] Lian xiaojuan. Determination of Salmonella in food [J]. Gansu Veterinary Animal Husbandry, 2020,50(10):60-63.

[46] Xuo haibo, Xu qiong, Wu dongping. Application of HACCP system in the production of solidified glass bottle yogurt [J]. Jiangsu Seasoned Foodstuffs, 2021(02):23-26.

[47] Dong xiaoxia. Trends in the evolution of production patterns of the world's major dairy products [J]. China Dairy Industry, 2018(08):24-29.

[48] Dong jin. Management System Establishment and Application Research of HACCP in MN Future star Nutritional Juice Yoghurt Drink[D]. Shandong Agricultural University, 2019.

[49] Li quanyang. Progress in the study of buffalo milk components and their functional properties [J]. Food Science, 2011,32(03):305-309.

[50] GB 4789.2-2016[J].

[51] GB 4789.30-2016[J].

[52] GB 4789.3-2016[J].

[53] Liu peng. Establishment and application of HACCP in yoghurt production [J]. Information on the food industry in China and abroad, 2001(05):40.

[54] GB 4789.36-2016[J].

[55] Hua xubing. Application of HACCP systems in yoghurt production [J]. China Dairy Industry, 2002(10):36-37.

[56] Ju yinfen. Application of HACCP in the production of short shelf-life children's yoghurt products [J]. China Dairy Industry, 2016(03):49-53.

[57] Guo qingquan. Changes in the physicochemical properties and microbiological indicators of plain yoghurt products during storage [J]. Food Industry Technology, 2000(06):18-19.

[58] Shen xiang. An introduction to cleaning of dairy production equipment and facilities [J]. Food Safety Guide, 2019(31):32-34.

[59] Wang wenbin. Rapid immunoassay for the detection of major foodborne pathogenic bacteria in milk and dairy products [D]. Jiangnan University, 2017.

[60] [1]LG UNI-CONFORMA ISO 9001-2015, Quality Management System Requirements [S].

[61] Xu haiqiang. Research advances in freshness preservation technology in milk processing [J]. Food industry, 2013,34(02):116-120.

[62] Xu yue. Research on quality and safety monitoring of dairy products based on HACCP perspective [J]. Innovation in science and technology, 2018(34):147-149.

[63] Song yuee. HACCP in stirred yoghurt [J]. China Dairy Industry, 2006(08):55-59.