

Capacitación del técnico medio en tecnología de los alimentos en inocuidad de los productos lácteos

Training of the average technician in food technology in the safety of dairy products

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RESUMEN: La capacitación del técnico medio en tecnología de los alimentos, es de impacto social. El presente artículo es el resultado de una investigación que aborda la problemática de la capacitación del técnico medio en tecnología de los alimentos para desarrollar un sistema de conocimientos, hábitos y habilidades relacionadas con la inocuidad de los productos lácteos, para ofertar un producto terminado con calidad. Para ello se implementó un programa organizado en cuatro temas. Los resultados de su aplicación se evidencian en el desarrollo de las habilidades y competencias adquiridas por los técnicos medios para ofertar un producto inocuo.

Palabras clave: Capacitación del técnico medio; Tecnología de los alimentos; Inocuidad de los productos lácteos.

ABSTRACT: The training of the average technician in food technology has a social impact. This article is the result of an investigation that addresses the problem of training the average technician in food technology to develop a system of knowledge, habits and skills related to the safety of dairy products, in order to offer a quality finished product. To this end, a program organized into four themes was implemented. The results of its application are evidenced in the development of skills and competencies acquired by average technicians to offer a safe product.

Keywords: Medium technician training; Food technology; Dairy products safety.

Introduction

The training of the average technician in food technology is of great importance to ensure the quality, metrology and safety of food produced and marketed, it provides knowledge of food science, chemistry, microbiology and food safety to control the technological processes in terms of

raw materials, process and finished product, It is also necessary to take into account that their training promotes the technological and scientific-technical development of the companies as well as promotes the motivation towards science and technological innovation in order to be more efficient every day.

In this area, the need for training the average technician in food technology has become a central aspect for the systematic updating of knowledge, the development of skills and the consolidation of attitudes, so that they express it in an adequate performance. Particularly in dairy product safety training, it must be taken into account that, in the last twenty years, technologies and knowledge regarding food production, control and handling have undergone changes and this imposes agile and accessible mechanisms for the permanent training of human resources.

In this sense, the training of human resources raises the level of preparation of workers and technicians, since they are the ones who sustain the goods and services of companies and organizations, hence the need to provide them with the contents related to the safety of dairy products, to avoid foodborne diseases and market safe products.

From science, fundamentally the Educational Sciences and Pedagogical Sciences, the use of the term training is recurrent, as several authors have devoted themselves to its analysis, from which they recognize its nature and to what and to whom it is directed, its objectives, ways and methods, as well as the fundamental forms of training, particularly in these aspects, authors such as: Añorga Morales (1999); Añorga Morales et al. (2000); Álvarez de Zayas (2006); Castro Escarrá, (2006) and Lorié Sierra (2017), who distinguish them as a way of organizing postgraduate activity: continuing education, permanent training, professional improvement, and upgrading; all of them are users of university graduates and the labor and human resources of an entity.

However, in the valuable contributions of these researchers, it is considered that a concept for the structured and coherent training of the intermediate technician in food technology with an educational, preventive and comprehensive approach to ensure the safety of dairy products in the production processes has not yet been achieved.

Hence, the elements discussed above, contribute a significant methodological value to the purposes of this research, by contributing to the importance of the training of the average technician in food technology in dairy product safety, which allow approaching the real diagnosis that these professionals present in the development of technological processes of dairy products, as well as the commitment to meet social demands.

In view of this, the scientific problem identified is: How to contribute to the training of the average technician in food technology to guarantee the technological process of the safety of dairy products? And the objective is: to design a program that contributes to the training of the average technician in food technology in the safety of dairy products to guarantee from the productive context safe products that do not harm the health of the population.

Development

Training is a vital aspect for the personal and professional development of individuals, aimed at improving work performance and increasing productivity to foster innovation and reduce costs. By providing training to workers, they are given the opportunity to acquire new knowledge, skills and abilities that enable them to perform their jobs more effectively and efficiently. In addition, training can increase workers' motivation and commitment by demonstrating to them that the company is interested in their professional development and growth.

In particular, Añorga, J. (2000), recognizes that the term training from the context of pedagogy has various meanings, placing it essentially within the forms of postgraduate education: continuing education, continuing education, professional development, and improvement; all of them are used by university graduates and the labor and community resources of a country, in correspondence with the social relevance of a specific social context.

As a result, this author recognizes training as:

The process of study activities and permanent, systematic and planned work, which is based on real and prospective needs of an entity, group or individual and oriented towards a change in the knowledge, skills and attitudes of the trained, enabling their integral development, which allows increasing the effectiveness of professional and managerial work and has as a fundamental component the preparation and improvement of the graduate not only in the branch in which he/she graduated but in his/her qualification as an executive, manager, entrepreneur. Añorga, J. et. al (2010, p. 35)

Therefore, several types of training are recognized which, although they do not differ in the way they are carried out in practice, do have a marked differentiation in their content, depending on the user or entity to whom the training process is directed, hence the following are recognized: training for managers, business training, human relations training, service training, industrial training, leadership training, in-service training, technical training, professional technical training and environmental labor training.

In particular, it is considered necessary to clarify that industrial training and technical training are conceived as: educational processes, where industrial training is intended to prepare the worker to perform highly complex tasks in the productive or manufacturing industry; while technical training is aimed at various processes of human resources of an entity, to update and improve the current or prospective professional performance, promoting consolidation and development of knowledge and skills of a medium level of technological complexity.

In this article, technical training is assumed because it is directed to the technical personnel of the productive entity with the purpose of achieving better performance in the work performed as an intermediate technician in food technology in the dairy industry, which results in greater efficiency and quality and safety of the food they produce by increasing their preparation to check, supervise, guide and direct the production process effectively.

With respect to the food safety category, it can be considered that it has been addressed by several international organizations, among them:

The Food and Agriculture Organization of the United Nations (FAO, 2016) which considers that food safety is the absence, or safe and acceptable levels, of hazards in food that may harm the health of consumers.

So, foodborne hazards can be microbiological, chemical or physical in nature and are often invisible to the naked eye, bacteria, viruses or pesticide residues in some cases. Food safety therefore has a key role to play in ensuring safe food at every stage of the food chain, from production to harvesting, processing, storage and distribution.

While for the Ministry of Public Health, (MINSAP, 2018), food safety can be defined as the set of conditions and measures necessary during the production, storage, distribution and preparation of food to ensure that once ingested, they do not represent a health risk.

Once the different criteria provided by both organizations have been analyzed, food safety in the dairy industry is defined as:

The actions carried out and directed in the production processes to achieve a finished product with organoleptic and sensory characteristics (appearance, smell, taste and texture), physicochemical and microbiological that meets the parameters set by the Territorial Office of Standardization (OTN). Riverí Charón (2022, p.10)

This requires a high level of cleaning and disinfection, as well as quality in the solutions used for this purpose to maintain the technological equipment during closed-circuit cleaning, the flow,

concentration, time and temperature of the solution used, in addition to the disinfection of floors, walls, ceilings and the environment surrounding the premises where the food processing is located, without excluding the hygiene of the handlers.

Food safety implies continuous checks from the start of production, ensuring the quality of raw materials, processes and finished products, including drinking water, as well as during distribution, determining the critical control points to avoid contamination, sustainability in the quality of food by maintaining the cold chain, providing the customer with a healthy product that does not harm the health of human beings.

As a consequence, there is a considerable increase in health care systems, as well as a significant reduction in economic productivity. For such reason, on December 20, 2018, the United Nations General Assembly adopted to celebrate every June 7 the World Food Safety Day, an initiative promoted in 2016 by Costa Rica to promote healthy nutrition worldwide.

In Cuba, on that day, trainings are issued by the Department of Nutrition of the Ministry of Public Health with the purpose of alerting, raising awareness to all food producers to ensure throughout the food chain quality and safety. Adequate nutrient intake is essential to eradicate hunger, hence food safety is everyone's business.

Therefore, the production of safe food contributes to strengthen sustainability and promotes economic development and poverty alleviation, so the Ministry of Public Health of Cuba (MINSAP) fortifies a system that covers the production chain through inspection and sanitary certification, also maintains a surveillance program of foodborne diseases which are a major cause of mortality, the germ responsible for most food contamination are pathogenic microorganisms, which are eliminated during the pasteurization process in order to obtain a healthy product free of harmful agents.

In the dairy industry, the greatest risk of contamination of a product is due to the fact that they are perishable and easily decomposed, so they easily lose their physical-chemical, microbiological and sensory characteristics, hence their attention by the technical personnel in food technology, in charge of checking, controlling and monitoring technological processes and thus avoiding outbreaks of foodborne diseases.

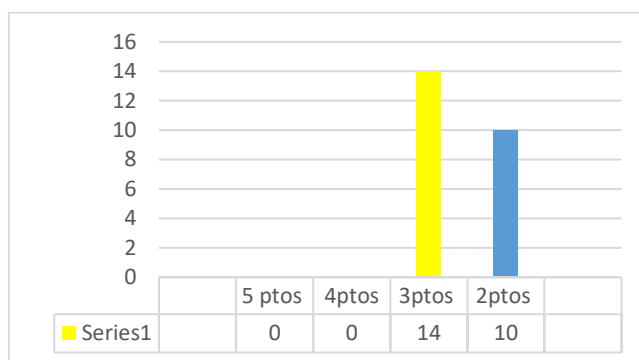
The research was carried out in the Guantánamo Dairy Products Company, with the medium technicians in food technology. A census population of 24 technicians was selected.

The documentary analyses carried out allowed confirming the insufficient planning of the contents of dairy products safety in the training of the medium technicians in food technology, since a preliminary diagnosis of the training needs in correspondence with the performance of each worker in his job, or the introduction of new technologies, is not taken into account.

During the application of the pedagogical test, of the total of 24 medium technicians in food technology, ten for 41.6 % were evaluated with the category of two points; 14 for 58.3 % were evaluated with three points; and null the category of four and five points. This demonstrates the insufficient knowledge they have about contents related to the safety of dairy products. As can be seen, the highest percentages were in the categories of Poor (10) and Fair (14).

Aspects shown in Figure 1:

Figure 1: Initial pedagogical test results.



Source: Self elaboration

The inadequacies detected show the need to propose new ways to improve the training of the average technician in food technology by dealing with contents related to the safety of dairy products from a training program that contributes to guarantee a finished and safe product that complies with the sanitary hygienic requirements regarding the physical-chemical, microbiological and sensory characteristics.

Decree-Law No. 350 "On worker training" was taken into account in preparing the program. For its implementation, it has been considered convenient to enforce the provisions of Article 22.2.

The program is conceived for the training in theoretical-practical and investigative contents that will allow medium technicians in food technology to carry out the productive process with quality. The contents of this program contribute to the systematization and deepening of the fundamentals related to the safety of dairy products that lead to a quality production level; it includes basic knowledge and skills for the management of the process in the company.

Training program for intermediate food technology technician in dairy product safety.

Title: Safety of dairy products.

IES or authorized center: Universidad Guantánamo.

Faculty or department: Faculty of Education. Biology Department

Course main teacher or training tutor: Higinio Riverí Charón

E-mail: higiniorch@gmail.com

Scientific degree: _____

Academic degree: Chemical Engineer.

Scientific teaching category: Assistant Professor.

Number of academic credits: 1

Modality: Full time () Part time (X) Distance ()

In the case of distance learning, please specify Names and Surnames, e-mail and Scientific Degree of the tutors.

Justificación:

The premise of training is the preparation, implementation, monitoring and evaluation, where the method par excellence to be used is the collaboration with a participatory approach of labor entities, managers, technicians, technologists and political organizations for the permanent updating of the diagnosis, characterization and development of strategies for actions aimed at each of the problems detected.

It is important to prepare the average technician in food technology in content related to the safety of dairy products to develop knowledge, skills and values, in the face of possible risks or deviations that may occur in the technological processes of transformation of the raw material to ensure compliance with the parameters to be controlled, as well as the established requirements of safety of dairy products.

Training as a starting point for the continuous training of the average technician in food technology in dairy product safety content, allows to improve the checking, control and inspection of the production processes and to avoid that once the finished product is ingested, it does not cause harm to human health, thus preventing foodborne diseases (FBD) in the short, medium and long term.

The above reveals the need for training of this technician because of the perishable foods such as dairy products, fermented and easily decomposed, which change their organoleptic and sensory characteristics to any external agent, which are also intended for the most sensitive sector of society,

children, sick and elderly, therefore their care and caution during processing, storage and distribution to the customer.

Therefore, the efficiency of the training work is expressed in the quality of the pedagogical process. Nowadays it reaches an extraordinary social importance, in the educational field it constitutes a fundamental direction of the work of the Ministry of Education. It is a question of developing a preventive pedagogy that offers the theoretical and practical elements to avoid the emergence of difficulties in the average technicians in food technology during the developmental teaching-learning process.

Students: Medium technician in food technology.

Entry Requirements: To be a graduate of medium technician in food technology or other branches for that purpose.

Program structure:

General objective. Theoretical and methodological foundation of the contents related to the safety of dairy products in the technological processes of the Guantánamo Dairy Products Company.

During the course of the program, the intermediate technician in food technology should acquire skills, habits and values that enable them to fulfill the general objective stated above, and the following specific objectives:

- Describe the flow diagrams of each one of the processes.
- Identify the critical control points in the production process.
- Apply the procedure described in the Technological Charter and the Cleaning and Disinfection Manual.
- Know and identify pathogenic microorganisms that affect the safety of dairy products.
- Apply mass calculation.
- Argue the importance of dairy product safety in production processes.

b) (Contents (knowledge, skills and values to be formed).

Topic I: Safety. Theoretical and methodological assumptions.

Objective. To substantiate the theoretical-methodological assumptions related to food safety with emphasis on dairy products.

Knowledge system:

- **Food safety. Definition**
- **Food safety. Definition**

- **Safety of dairy products. Definition.**
- **The importance of dairy product safety in production processes.**

Topic 2: Flow charts in production processes.

Objective. Explain flow charts in production processes. Area where work should be done to ensure the safety of dairy products.

Knowledge system:

- Flow diagram. Definition
- Process. Definition
- Critical points. Definition and identification. Parameters to control.
- Cleaning and disinfection procedures. The technological charter.

Topic 3: Pathogenic microorganisms that affect the safety of dairy products.

Objective. To identify pathogenic microorganisms that affect the safety of dairy products.

Knowledge system:

- Pathogenic microorganisms.
- Characteristics of pathogenic microorganisms.
- Actions for the treatment of pathogenic microorganisms that affect the safety of dairy products.
- Influence of energetic areas on pathogenic microorganisms affecting the safety of dairy products.

Topic 4: Mass calculations.

Objective. To apply mass calculations in production processes.

Knowledge system

- Composition of raw materials
- Units of measurement.
- Analysis of results.

Skills system:

- Substantiate of the tools for the realization of the diagnosis to determine the training needs of the medium technician in food technology.
- Establish the relationships between the contexts of action with a personalized approach.
- Demonstrate the theoretical and methodological assumptions for training in dairy product safety content.

- To substantiate the legal norms for the control of dairy product safety.
- To substantiate the methodological assumptions that characterize the average technicians in food technology in order to prevent dairy product safety violations.
- To exchange professional impressions and experiences on dairy product safety in the production scenario.

Specific values to which it contributes:

- Ethics in their professional performance that allows them to fulfill the preventive and educational function from personal example.
- Human sensitivity, love and respect for customers because of the products destined to a vulnerable population.
- Unconditional personal responsibility and commitment to the exercise of the profession.
- Sense of belonging, is the commitment and dedication to the work performed to obtain safe products that do not affect human health. Social commitment, we owe it to the people, the community and the individual, to respond to the social demands of the population from the economic and environmental point of view.
- Discretion is to have the restraint, caution to make the right decisions in the face of a risk or deviation of the safety of dairy products. Fairness and thus comply with the requirements, standards, procedures and principles. Humanistic and optimistic projection in its conception of the world expressed in respect, communication, participation, exchange, help and commitment in its personal and professional performance.

c) Didactic and/or professional methods (for training in professional scenarios)

Heuristic conversation, the problemic method and independent work will be used as didactic methods.

d) Organizational forms of the activities (lecture, discussion workshop, laboratory and others)

- Lectures.
- Discussion workshop.

e) Scenarios, materials and means. In the case of the scenario, the productive process is used according to the available resources:

The training will be developed in the context of the preparation of the medium technician in food technology of the Guantánamo Dairy Products Enterprise, for this purpose the texts and digital materials that address the topic of food safety and particularly dairy products will be available.

As means, the blackboard and the computer will be used for the use of presentations in Power Point format, in addition to block diagram schemes where the stages of each process are represented, as well as in the representation of flow charts.

f) Evaluation system (systematic and final)

Systematic evaluation is proposed through the development of workshops.

The program culminates with the presentation of a final work containing the contents dealt with, which will be defended through teams formed by selecting topics that fit the proposed objectives.

g) Bibliography

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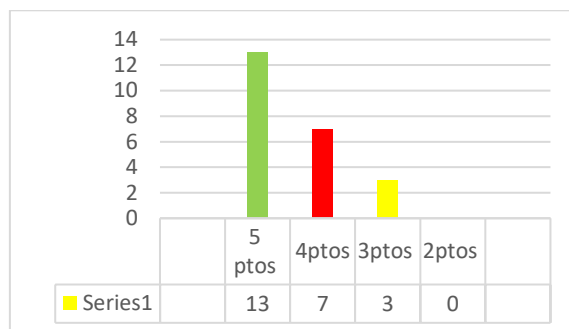
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Final results of the proposal implementation

The proposed program was implemented over two years. In the first year, the average technicians were trained in food technology, and in the second year, the level of knowledge reached was verified based on the quality achieved during production.

The results obtained with the report of the pedagogical experience, project a positive evaluation and demonstrate the feasibility of the application of the proposal by verifying the results achieved by the medium technicians in food technology after applying the proposal, it can be seen that of a total of 23 technicians, 13 achieved 5 points representing 56.5 %; seven of them 4 points representing 43.4 %, three with three points for 13 % and in the category of 2 points there were none for 0 %. This shows a quantitative increase according to the figures; however, a substantial qualitative development was demonstrated as shown in Figure 2:

Figure 2: Results of the pedagogical test after



Source: Self elaboration

Conclusions

The implementation of the program constitutes an effective tool for the training of the average technician in food technology, since it was developed from the transformations that occur from the social demands of having a safe product. In addition, it represents an instrument that contributed to the training process of the food technology technician in dairy product safety to ensure food safety.

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