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THE ROLE OF THE VETERINARIAN AND AN INTEGRATED BIOSECURITY MODEL FOR SMALL AND MEDIUM-SIZED AGRI- FOOD COMPANIES

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Abstract: Global food safety faces growing challenges with the rise of zoonoses, climate change and increasingly stringent regulatory demands. This article presents an integrated model that unites the essential role of the veterinarian as a public health agent with the implementation of adaptable biosecurity protocols for small and medium-sized agri-food companies. Using a qualitative methodology based on documentary review and analysis of case studies reported in the literature, the study proposes practical solutions to raise sanitary standards, increase regulatory compliance and strengthen economic sustainability. This model, which has already been successfully validated in Brazil, will be scaled up and adapted to the US context, contributing directly to the reduction of health risks, the strengthening of traceability and the resilience of production chains in the face of global health emergencies.

Keywords: veterinarian; biosafety; food safety; public health; HACCP; regulatory compliance; traceability; One Health; climate change.

INTRODUCTION

The production of food of animal origin occupies a strategic position in guaranteeing public health and global sustainability (WORLD HEALTH ORGANIZATION, 2022). The veterinarian acts as a vital link between science, legislation and sanitary management, ensuring that food is safe, nutritious and produced under ethical conditions (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2023). In a scenario marked by the advance of zoonoses, climate change and new market requirements, it is essential to integrate biosafety protocols and specialized training, especially in small and medium-sized agri-food companies (SMEs), which often lack the robust infrastructure to meet national and international requirements (EUROPEAN

FOOD SAFETY AUTHORITY, 2024; SILVA et al., 2024). The model proposed in this article, tested and proven in Brazil, represents an innovative and replicable approach for the international context (SOUZA et al., 2024).

METHODOLOGY

This study uses a qualitative approach based on:

- Documentary review of national and international regulatory guidelines (FOOD AND DRUG ADMINISTRATION, 2024; UNITED STATES DEPARTMENT OF AGRICULTURE, 2024; CODEX ALIMENTARIUS, 2023);
- Analysis of case studies on biosafety and training programs in small and medium-sized agri-food companies (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2023; SOUZA et al., 2024);
- Evaluation of good practices reported in scientific literature and by professional organizations (WORLD HEALTH ORGANIZATION, 2022; EUROPEAN FOOD SAFETY AUTHORITY, 2024).

Based on these inputs, a conceptual model was developed that integrates preventive protocols and specialized training to reduce health risks, increase regulatory compliance and strengthen economic sustainability in the agri-food sector.

THE STRATEGIC ROLE OF THE VETERINARIAN IN FOOD SAFETY

Veterinarians are key players in a number of critical areas:

- **Prevention of DTAs:** They act to control zoonoses such as salmonellosis, listeriosis, campylobacteriosis, toxoplasmosis and avian influenza (H5N1), ensuring healthy raw materials (WORLD HEAL-

TH ORGANIZATION, 2022; EUROPEAN FOOD SAFETY AUTHORITY, 2024).

- **Health inspection and control:** They supervise slaughterhouses, slaughterhouses, dairies, feed mills and fish, honey and other industries, ensuring compliance with animal health and welfare standards (UNITED STATES DEPARTMENT OF AGRICULTURE, 2024).
- **Quality management and traceability:** They implement SOPs, HACCP, Good Manufacturing Practices (GMP) and robust traceability systems, which are essential for efficient recalls and brand protection (CODEX ALIMENTARIUS, 2023; FOOD AND DRUG ADMINISTRATION, 2024).
- **Combating antimicrobial resistance:** They monitor the rational use of antibiotics and other veterinary inputs, contributing to One Health (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2023; EUROPEAN FOOD SAFETY AUTHORITY, 2024).
- **Socio-economic impact:** Companies under veterinary leadership reduce losses, increase the shelf life of products, strengthen their position in the market and increase their economic sustainability (SOUZA et al., 2024).

AN INTEGRATED MODEL: BIOSAFETY AND SPECIALIZED TRAINING

The proposed model integrates two main fronts to raise sanitary and operational standards, especially in SMEs:

PROACTIVE BIOSAFETY PROTOCOLS

- Development of specific SOPs for each production stage (CODEX ALIMENTARIUS, 2023);
- Strict adoption of HACCP, GMP and FSQA (FOOD AND DRUG ADMINISTRATION, 2024);
- Implementation of practical and accessible checklists;
- Constant monitoring of microbiological, chemical and physical risks (EUROPEAN FOOD SAFETY AUTHORITY, 2024);
- Use of health indicators (KPIs) to evaluate and adjust measures.

These protocols are designed flexibly, taking into account the size of the company, the type of product, regional conditions and the requirements of the markets served (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2023; SILVA et al., 2024).

MULTI-LEVEL SPECIALIZED TRAINING

- Practical modules adapted to local realities (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2023);
- Training at operational, tactical and strategic levels;
- Training internal multipliers (SILVA et al., 2024);
- Use of digital tools and online platforms;
- Awareness of regulatory requirements for audits, inspections and exports (FOOD AND DRUG ADMINISTRATION, 2024).

STRATEGIC BENEFITS FOR SMEs

- Reduction of economic losses (SOUZA et al., 2024);
- Extending the useful life of products;
- Improving institutional image;
- Easy access to financing and certifications;
- Resilience to health crises and emergencies.

DISCUSSION AND IMPLICATIONS

Companies that integrate veterinary inspection, preventive biosecurity and specialized training are able to reduce health risks, increase traceability and regulatory compliance, open doors to new markets and strengthen consumer confidence (WORLD HEALTH ORGANIZATION, 2022; FOOD AND DRUG ADMINISTRATION, 2024; CODEX ALIMENTARIUS, 2023). This model is especially relevant for SMEs, which often lack the infrastructure and expertise to meet legal requirements, but can achieve high performance with adapted and effective solutions (SILVA et al., 2024).

CONCLUSION

Modern food safety requires a holistic approach. The veterinarian connects science, legislation, management and public health in an integrated system (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2023). Implementing biosafety protocols and training programs strengthens the capacity of companies, particularly small and medium-sized ones, to meet regulatory and market demands (CODEX ALIMENTARIUS, 2023). Adopting this model is not just a compliance measure, but a smart strategy for sustainable development and global health protection (WORLD HEALTH ORGANIZATION, 2022; SOUZA et al., 2024). In times of growing health challenges, investing in veterinary expertise and biosecurity is investing in the future of safe, sustainable and ethical food.

ABOUT THE AUTHOR

Pamela Cristina da Silva Valquerizo is a specialist in food safety, health risk control and team training in the animal products sector, with over 13 years' experience in implementing regulatory protocols, developing technical manuals and leading specialized training courses. She is the author of the book "The Role of the Veterinarian in the Inspection of Products of Animal Origin" (2023) and the international work "Guardians of the Plate: The Veterinarian's Role in Food Safety and Inspection" (2024), as well as an active member of the International Association for Food Protection (IAFP) and the Association of Food and Drug Officials (AFDO). His work connects practical expertise and academic advancement, contributing to raising food safety standards at an international level.

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