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TECHNOLOGIES USED IN SWIN FARMING FOR TRACEABILITY PREPONDERING ANIMAL WELFARE

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INTRODUCTION

The pork production chain in Brazil has one of the best economic performances on the international scene, which is due to technological and organizational advances incorporated in recent decades [8].

Technological changes are intensely present in national agro-industrial chains and one of the expanding technologies is pig farming. The sector's success is linked to these technological advances in pig farming, which increasingly rely on data control and analysis to guide traceability and production practices. Traceability is the first step to meeting the new demands of consumers around the world, who are becoming increasingly demanding regarding the quality and safety of food. Producers need traceability as a management tool for capturing and recording zootechnical and management data. Commercial companies want identification so that they can offer customers quality products of known origin [3]. Finally, consumers tend to demand knowledge about the origin of the meat they consume. For this reason, the objective of this project is to carry out a bibliographical review and help in the production of a new tracking technology for pigs, investing in research and development, which according to 8 these innovations are low in both the public and private sectors. Traceability can provide rural producers with quick and efficient processing of their herd's zootechnical data, generating strategic control tools, in addition to providing the industry with a reduction in the risks of asymmetric information, establishing greater relationships with producers and providing greater security. to your customers. This way, studying possible forms of traceability in pig farming will bring important elements for future interventions that aim to produce quality, safe and competitive products on the world market [3].

Therefore, new technologies in swine farming are important and are available for the implementation of an electronic and computerized system with the aim of automating farms, taking care of animal welfare, certifying origin, industrialization, transportation and marketing, enabling a perfect correlation between the final product and the raw material that gave rise to it [3]. The technological level of rural producers and the lack of incentives from public and private bodies are the main challenges for establishing electronic traceability in pig farming.

The objective of this project is to provide relevant information through a bibliographic review, in order to encourage the industry to invest in research and development of new technologies in traceability in pig farming. The focus will be on improving the precision of this process, which will allow the producer to have more management control and data analysis, in addition to producing quality products for commercial companies. This way, consumers will have access to quality and safe food on the world market, increasing the reliability of the sector.

METHODOLOGY

To carry out this work, the literature review methodology was adopted, using literature research published at national and international level. The research was carried out in a descriptive and qualitative manner on websites, scientific articles, books and other materials from reliable and proven sources. The search bases used were Scielo, Pubmed, Google Scholar and CAPES during the period from September 2022 to December 2022.

ABSTRACT THEME

There are many technologies used today in precision pig farming, technological resources today are indispensable for all stages of work on a farm. They range from the production itself, to environmental factors,

traceability, animal welfare and food quality [14, 8] These innovations are expressed in the development of products and processes to make the competition process of companies in the area dynamic within the domestic and foreign markets, because products that were previously sold without differentiation are now offered with greater added value.

The demand for clean, healthy and safe products is growing rapidly in the world market, especially for foods of animal origin. Thus, there is a need to establish technological instruments that assist in production management, inspection, collection of zootechnical data from birth to slaughter to obtain quality, food safety, efficiency and effectiveness in production [3]. The main technologies currently used in pig production are: Automation of all production stages through integrated equipment via intelligent software; Optimized temperature control in climatic chambers, with eight fans aimed at animal comfort; Use of artificial lighting to stimulate appetite and promote weight gain; Possibility of humanized slaughter methods, with stunning techniques that align with consumer concerns and improve the quality of the meat; IATF – Fixed-time artificial insemination, which provides a more precise insemination carried out before ovulation; Physical barriers to contain traffic, which prevent trampling and animal stress; Removable floors to facilitate cleaning, with simplified fitting and materials that prevent the proliferation of bacteria and protozoa; Sensors for evaluating sound pressure, which enable interventions to reduce animal irritation and prevent injuries; Artificial intelligence, with the use of algorithms that allow smarter decision-making on farms; 3D printing, which allows you to print equipment parts to save time and costs among producers [14].

There are also genetic markers, which find many fields of application within pig farming and range from genetic improvement to traceability [11].

In swine traceability there are several systems that can be applied, such as traditional, electronic, biometric and laboratory tests. They are chosen by producers according to their accessibility, cost and practicality of operation. In traditional systems, numbered plastic earrings and tattoos are easily read by humans and are a cheap technology [13]. There is also the ear dent where this system is limited, as it allows individual control of up to 1,599 animals, it is a painful process and difficult to apply and not compatible with animal welfare standards. The tattoo has the possibility of erasing over time, making it difficult to see. Plastic earrings have the possibility of falling out or being removed by other animals; Reading errors and impurities may occur in the bar code/numbers, making reading difficult or unfeasible [3].

Electronic systems include earrings, rings, necklaces with transponders, in addition to subcutaneous transponders. Transponder identification is fast and accurate in the slaughterhouse [13]. Earrings, rings and necklaces are quick and easy to read, low cost, and can be easily removed during slaughter, however, they may fall out, lose information collected or be removed by other animals in batch [3]. Biometric systems are carried out by reading the retina, scanning the iris. The retinal blood vessels are unique to each animal and stable throughout its life, while in the iris, their designs are unique to each animal and stable over time, but it is not certain when they stabilize [13]. Unfortunately, this method has the disadvantage of taking a long time to obtain a reading of the animal's retina/iris and the need to frequently control the animal [3].

The systems that require laboratory analysis are synthetic peptide vaccination, stable isotope feeding and DNA analysis [13].

For a synthetic peptide to be produced, its gene needs to be cloned and inserted into heterologous expression systems so that they secrete large quantities of these antigens and they are identified [1]. Isotopes and vaccination are attractive for tracing a biological product back to its origin, but there is a high chance of administration errors, in addition to consumer prejudice [13]. DNA analysis technology using SNP profile identification meets the producer's requirements with reservations. DNA analysis is a system that follows the meat to the final consumer, it is a means of anti-fraud identification. DNA is unique, biodegradable, is not lost and can enter the human food chain [13], but it is costly and animal identification does not occur in real time [3].

The facial recognition technology system - known as FRT - to continuously monitor, identify and even feed their herds has also been targeted by large producers. The FRT is able to differentiate pigs by analyzing their snouts, ears and eyes. As it is a "highly expressive" animal, cameras are even capable of recognizing suffering on the animals' faces. This automated style of breeding has the potential to be safer, cheaper and generally more effective, reducing costs, reducing breeding time and improving welfare outcomes for the animals themselves [12].

The Biomarkers Definition Working Group defines biomarkers as: an objectively measurable characteristic evaluated as an indicator of a normal biological process, a pathogenic process or a pharmacological response to a therapeutic intervention; therefore, a physiological indicator, such as blood pressure, is a biomarker of hypertension, for example. In pig farming there are applications ranging from meat quality, litter size, carcass composition and resistance to *E. coli*. Considering the role of pigs as an animal protein source in human nutrition and the importance of these animals as reservoirs of viral agents, this technology can be added to the breeding and traceability process to guarantee and monitor aspects of animal comfort, animal and human health and quality in final product [5].

There is currently a great demand from the consumer market for the animal breeding process to be environmentally beneficial, ethically defensible, socially acceptable and relevant to the objectives, needs and resources of the community it was designed to serve [7]. An animal is considered to be in a good state of well-being if (with scientific evidence) it is healthy, comfortable, well-nourished, safe, capable of expressing its innate/natural behavior, and if it is not suffering from pain, fear and anguish [9].

FINAL CONSIDERATIONS

In this review we saw the need to develop a pork traceability technology from animal production on farms, to the consumer's table, therefore, we intend that with this bibliographical review, research is carried out with the aim of developing technologies associated with traceability from beginning to end. end of pork, mainly advocating preservation of animal welfare.

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