MEASURES TO PRESERVE THE BIOSECURITY OF SWINE FARMS EXPLOITED IN ALTERNATIVE PRODUCTION SYSTEMS

NEAMȚU ALIN[1], ZOICAN EUGEN CĂTĂLIN[1], VĂDUVA LOREDANA[1], PETROMAN IOAN[1*]

[1]University of Life Sciences "King Mihai I" from Timisoara, Faculty of Management and Rural Tourism

Corresponding author's e-mail: i_petroman@yahoo.com

Abstract. *Obtaining production in alternative systems, using traditional rustic breeds must be well organized through prophylactic therapies with an emphasis on food security, the state of having reliable access to a sufficient amount of traditional foods, at affordable prices, being an essential condition in good practices to preserve quality food and prevention of contamination and transmission of diseases through food obtained from the Mangalita breed. In order to reduce the presence of pathogens in critical control points at live animals on production phases and in carcasses at each stage of processing and utilization, biosecurity managerial measures are required to provide for the maintenance of hygiene in rest areas, decontamination when pigs are loaded or unloaded fat at authorized slaughterhouses and on the technological flow of obtaining carcasses, meat processing and market distribution. Veterinary sanitary management measures implemented on farms must contribute to the reduction of infections and diseases as prevention methods by ensuring adequate maintenance conditions, good hygiene standards in shelters and solving animal health problems, as a necessity to have less diseases, lower mortality and better production results and efficient utilization.*

Key words*: swine, Mangalita breed, production systems, biosecurity*

INTRODUCTION

Mangalita swine meat and products are appreciated by consumers in the countries where this traditional breed is exploited, Hungary, Bulgaria, Romania, Slovakia, for its aroma, tenderness and fatty, well-marbled texture. Both the specialists in the field and the swine breeders of the Mangalita breed agree that raising animals of this breed presents both technological, economic and social advantages and disadvantages. The main advantages of raising and exploiting the breed are given by the organoleptic and physico-chemical quality of the meat obtained when slaughtering animals with multiple processing possibilities: [1, 13, 14]

• the meat is delicious - aromatic and rich in omega-3 fatty acids;

• swine need minimum conditions of maintenance and food, lending themselves to exploitation in alternative production systems;

• swine have a calm and docile temperament, which makes them easy to handle compared to other breeds of pigs in outdoor exploitation;

• swine are adaptable and resistant to almost any climatic conditions;

• they are good foragers on large areas in exploitation on pasture or in the forest;

• they are ideal for obtaining alternative meat on pasture, the feed being supplemented with barley;

• piglets are weaned in the first part of their lives and adorable for farm tourism visitors as they are multi-colored;

• pigs are ruminants, foragers and can clear an area that requires the removal of unwanted vegetation;

In the breeding and exploitation of Mangalita breed swine in current conditions, due to biosecurity restrictions regarding the spread of specific viral diseases, there are also a multitude of disadvantages that limit the exploitation of the species in alternative production systems, outdoors and on pasture, due to sanitary-veterinary management to avoid animal health risks although: [15, 16]

• the profitable breeding of these Mangalita swine breed requires higher prices than in the case of other breeds; [17, 19]

• purebred specimens may be difficult to find, due to restrictions on the trade of pigs in areas where there are classical or African swine fever outbreaks;

• pigs grow slowly and are therefore not recommended for mass market production, but for the production of traditional products with a long shelf life;

• pigs are ruminants and can cause damage in pasture areas and not only if the optimal density on the land surface is not respected;

• pigs are usually slaughtered at age of 15 months, which means more time is needed to grow and fatten them.

The production from a pig farm is regulated according to the assortment of meat that the farmer has in mind [2, 12]:

- bacon pigs: bred for long backs, with a thin to moderate layer of fat, they can be economically converted into bacon;

- heavy pigs (125-128 kg): fatter and proportionally shorter, bred for high growth rate and good feed conversion, they are used for mixed production - fresh pork, some bacon but mostly for production of dry raw ham and salami [3, 4, 9] "continental" breeds: they tend to make even more fat than heavy pigs; [5, 7] calves: the meat of these males that have been used for reproduction is usually strongly marked by the smell of the male sex hormone;

- young, uncastrated males, slaughtered at or before puberty, have good feed conversion and conformation and may not have this characteristic smell;

- sows reconditioned after the sixth parity, are used to obtain meat products.

To obtain safe products, measures are needed to reduce transmitters at critical points, because meat obtained in these alternative systems has been confirmed as a vehicle for the transmission of pathogens in many European countries: in Denmark, 95 cases out of 100,000 pigs; in the Netherlands, 450 cases per 100,000 pigs. While slaughterhouses cannot guarantee that their products will always be free of bacterial pathogens, efforts must be made to reduce the incidence of pathogens (especially antibiotic-resistant ones such as Staphylococcus aureus [7, 10] and therefore to reduce the ultimate risk to the consumer. Currently, hazard analysis at critical control points (HACCP) is generally considered the most effective means of achieving this during pig slaughter. [8, 11, 18]

MATERIALS AND METHODS

Obtaining safe products requires managerial measures at critical control points to reduce transmitters throughout the technological flow of pork production in alternative systems. For this, in this scientific endeavor, we sought solutions that contribute to food security along the entire flow, from the maintenance of animals in the open air and on pasture, from loading and unloading at processing units to obtaining carcasses and distribution on the market of meat and swine meat products from the Mangalita breed operated in small professional farms in Timis County using critical control points in obtaining quality productions, because there is a strong correlation between contamination levels in all places considered critical points from loading-unloading, preparation for slaughter and on the processing line to obtain the carcasses and up to the refrigeration and distribution of the meat to the market.

RESEARCH RESULTS

To reduce the presence of pathogens in the critical control points of the incidence of Salmonella in live animals on production phases and in swine carcasses at each stage of processing and utilization: preparation for slaughter, stunning, bleeding, evisceration,

cutting, storage in the slaughterhouse, utilization biosecurity measures are required on the market, so as to provide:

- the lack of hygiene of rest areas in open-air exploitation increases contamination;

-washing the swine with water or disinfectant solutions upon boarding or disembarkation at the processing unit, to clean the skin before the minimum 12-hour antemortem rest period;

- immersion in the scalding tank decreases the total bacterial contamination on the carcasses;

- searing decreases the total bacterial contamination on the carcasses;

- hair removal and brushing increase carcass contamination.

We can conclude that improper maintenance in the operation of the Mangalita breed in alternative production systems, improper transportation, operations to obtain carcasses, scalding, searing, evisceration and cooling can be used as critical control points in obtaining quality productions, because there is a strong correlation between airborne contamination levels detected using air samplers and laying plates at all locations considered critical on the processing line except for carcass brushing and chilling, where there is no published correlation between the two control methods. For small integrated professional farms that export the Mangalita breed outdoors or in alternative systems on pasture, the implementation of prevention technologies based on good practices is required. The veterinary sanitary management measures implemented according to the production system must contribute to the reduction of:

- the use of anti-microbials;

- infections and diseases as methods of prevention, meaning, by prevention:

a. adequate maintenance conditions;

b. good hygiene standards in shelters;

c. solving animal health problems, although in modern swine farming in alternative systems, there is no well-founded justification for the repeated use of prophylactic treatments, farmers often consider the prophylactic use of antimicrobials, despite the associated high costs, as a necessity to have less disease, lower mortality and better production results. Moreover, the production of fat pigs from the Mangalita breed has become in the researched area, Timis County:

1. an extremely organized production system;

2. well-implemented integronic production management in the Mangalita meat chain;

3. standardized management procedures are used to prevent production losses through exits from the herd: illness, death, other causes;

4. animals control at the place of origin, for food security;

In this type of production using the highly organized traditional Mangalita breed, standard prophylactic therapies are easier and less labor intensive than clinical treatment of sick animals and after losses have occurred. We believe that the focus on food security, the state of having reliable access to a sufficient amount of traditional foods, at affordable prices, is an essential condition in good practices for preserving food quality and preventing contamination and transmission of diseases through food. For the Mangalita rustic breed, the terms "disease", "infection" or "health" have a different meaning in exploitation in alternative production systems, with different consequences:

- the state of health of the animals that must be taken into account from the point of view of human consumption;

- animals should not get sick at all;

Preventive management measures must become appropriate tools for animal health and safety by introducing preventive barriers to unwanted agents/substances, while in case

of weak points "entry points" gates, roads, feed logistics, loading ramps, processing units, the human resource to apply technical alternatives because the food chain includes animals from birth to slaughter in specialized units and movement by categories between different locations:

- starts with inputs like animals and fodder;
- it ends with obtaining the carcasses and materials used as well as the waste from each location involved and with animals ready for slaughter.
- slaughtered animals change into meat during slaughter and further processing. Because of people handling animals at every stage, the human ecosphere is also involved. The complexity of the food chain requires a deep perspective to understand the interrelationships behind the procedures, technical transparency being at the forefront in finding risks.

Good practices as preventive measures include internal control at farms, slaughterhouses, distribution and market capitalization of the food chain. (Table 1)

Table 1

Managerial measures for food safety

Causes of contamination	**Sources**	**Opportunities**			**Results**
	Pathogens	**Farms**	**Slaughterhouses / Distribution**	**Capitalization on the market**	**Public health**
Free circulation	Geographical barriers reduce the free movement of live animals	Increased contact with pathogens	Complex supply chains; Different levels of hygiene	-	Increased risk of contamination
Growth and exploitation-production system	Adjustment	Contact with sources of infection	Contamination on embarkation	-	Increased risk of contamination
Processing	Adjustment	Lack of preparation of animals for processing	Contamination on boarding, unloading at the slaughterhouse, premortem rest, preparation for slaughter and the flow of obtaining meat		Increased risk if best practices are not implemented at critical points
Evolution	Transfer virulence factors;	New tanks	Increased survival	Increased infectivity	Increased risk
Food source	Pathogens	Vegetable products from the pasture, cereals, fruits	Improper processing, low scalding water temperature, lack of heat treatment, improper packaging	Improper handling, transport, packaging and sale conditions	Increased risk
Ecological production	Low anti-microbial resistance, due to the hardiness of the breed	Pasture or paddock infections with germs	-	-	Unclear risk

Source: [14]

Animal and product health control over time had a "traditional" form, associated with clinical inspection - ante mortem - and post mortem, and an "alternative/modern" form associated with risk:

- was confused with clinical inspection and pathological necropsy;
- covers the entire spectrum of food safety objectives;
- has control/inspection techniques for each phase of the food chain;
- it is characterized by a lack of risks, positioning of samples and observations with the best chance of successfully verifying the presence/absence of the pathogen or contamination;

- a system of technical prevention measures - biosecurity in:

a. the primary production of Mangalita meat;

b. hygiene in secondary production: processing, distribution and recovery.

Along the food chain (Figure 1.), there are risks related to the requirements and traditions existing in the area regarding growth and exploitation, processing systems, type of products and the availability of analytical techniques, economics, local politics regarding pork production in alternative pasture and outdoor systems. However, the main risk of contamination on the entire production system is the pathogens that can be transmitted by infected swine during the exploitation of meat consumers and traditional Mangalita meat preparations.

Table 2.

Control along the food chain to avoid contamination in alternative production systems

Food Chain	Lines of Defense/ Place	Insurance
primary production	first place	biosecurity of the Mangalita farm
sacrifice	second place	general hygiene and at critical control points;
processing	third place	control technology and hygiene
capitalization on the market	fourth place	food control technology, good food practices, and human resource hygiene;

Source: [14]

CONCLUSIONS

Solving the problems of animal health and food safety, in the modern exploitation of swine from the Mangalita breed in alternative systems, requires the existence of an extremely organized production system throughout the meat supply chain. An integronic production management where standardized management procedures are used to prevent production losses through exits from the herd and control at the place of origin of the animals, processing and capitalization, for food security. For the Mangalita rustic breed, the terms "disease", "infection" or "health" have a different meaning in exploitation in alternative production systems, with different consequences regarding the health status of the animals that must be taken into account from the point of view of human consumption and that animals should not get sick.

Preventive management measures must become, throughout the technological flow of obtaining, processing and valorizing meat, adequate tools for the health and safety of animals by introducing preventive barriers for pathogens while, in the case of weak points of their entry into farms, slaughterhouses, places of capitalization, the application of technical alternatives between different locations is required with the input of animals and feed and ending with the obtaining, processing and capitalization of meat and meat products. The main risk of contamination on the entire production system is represented mainly by the pathogens that can be transmitted by infected pigs during exploitation, transport, processing and capitalization, to consumers of meat and traditional Mangalita meat products.

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