SUSTAINABLE LIVESTOCK PRODUCTION IN AFRICA:

LESSONS FROM THE DANISH SPECIFIC PATHOGEN-FREE SYSTEM FOR THE MANAGEMENT OF SWINE DISEASES IN AFRICA

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Powering the African Economy

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Abstract

This article draws lessons from the Danish Specific Pathogen-Free (SPF) system to manage swine disease in Africa. It focuses on designing and implementing the SPF system in the swine sector as well as identifying some challenges therein. The article provides suggestions on overcoming the mentioned challenges. The article offers a window of opportunities for the African swine sector to grab and free itself from losses resulting from diseases, thereby promoting a sustainable livestock production sector.

Introduction

Cross-border and re-emerging diseases in today's globalized trading environment are among the most critical threats to livestock farming and public health worldwide. Other than public demand for disease-free products, disease eradication improves all kinds of trade relationships and reduces the risk of infections to humans. The African swine fever (ASF) is the most detrimental epidemic diseases in the pork industry since its outbreak in 2007, and there is currently no approved vaccine against ASF (Rowlands et al., 2008).

Eradication and maintenance of a disease baseline are the main ways of managing an epidemic in a geographical area without external inputs. An ideal eradication of swine diseases within Africa's borders seems unrealistic due to different national livestock policies, numerous disease routes and sources. Unlike Africa, Denmark is a single country and it is easier to implement and manage epidemic and pandemic diseases. Denmark has never experienced an outbreak of African swine fever (ASF) thanks to her reliable biosecurity program known as the Danish Specific Pathogen-Free (SPF) (Ministry of Environment and Food of Denmark, 2019).

Other intensive efforts and strategies for eradicating ASF involve placing a wall across border between infected neighboring countries to Denmark (Ministry of Environment and Food of Denmark, 2019). The Danish SPF-system has proven to be the world's most comprehensive health program that promotes healthy swine production (Nielsen, 2014). Therefore, designing an SPF system for Africa's swine sector is virtually the key to free Africa from loss-causing diseases.

What is the Specific Pathogen-Free (SPF) Production System?

Specific Pathogen-Free (SPF) is a global term used to identify animals free of particular diseases. The Danish SPF-system, created in 1971 by SPF-Denmark in partnership with university experts, remains a powerful instrument for monitoring and managing infections (Nielsen, 2014). The SPF-system lowers infection pressure through an organized approach that monitors and tracks health conditions. Monitored data combined with management and intervention techniques minimize and eradicate the incidence of diseases (Salman, 2008). The SPF-system is based on a set of stringent rules concerning biosecurity, health control, and pig transportation between herds.

Essential steps to Consider When Setting Up an SPF System

Breeding and health programs

Low infection pressure and high robustness are achieved through proper animal and environmental management. SPF genetic programs' core focuses on increasing customers' profit and robustness by attaining objectives such as breeding local breeds for robustness, reproduction,

mothering ability, efficiency, growth, and carcass quality. The breeding program aims to balance selection to secure sustainability and achieve total farm efficiency. Many recommendations and regulations provided by breeding and governing bodies improve swine health and welfare. These principles include good housing facilities, biosecurity measures, proper working conditions, and environmental considerations that reduce disease prevalence.

Africa's breeding pyramid for a sustainable disease management system would include a multiplier and production herd, known as Red SPF (multiplier) and Blue SPF (production) in Denmark. The SPF Breeding program requires a high-level efficiency and cost that most farmers lack. The use of gene banks established by the African Union InterAfrican Bureau for Animal Resources (AU-IBAR) across the five African Union regions, namely South, North, East, West, and Central Africa, are excellent gene sources for SPF programs. These broad gene bases consist of indigenous, adapted, exotic breeds introduced for commercial production (AU-IBAR, 2015). Robust and productive swine breeds available in Africa to establish a sustainable and profitable SPF program include F1 crossbred breed, Vietnamese pot-belled pig breed, middle white pig breed, red wattle hog, large black, large white breed, durocbreed and landrace breed (Akinwemoye, 2015; Farming South Africa, 2020). Under a high level of biosecurity measures, these breeds are introduced to various farms with no infectious diseases either by gene selection or during transit.

Disease control

Methods of combating diseases highly depend on monitoring strategies about a disease condition. SPF disease surveillance tools and techniques allow for identifying new infections and how to make changes for existing ones. It could include Geographic Information System (GIS) software for livestock location, control and eradication of viral diseases in the event of a disease outbreak. SPF strategies and tools for Africa must involve disease reporting and specimen submission by livestock farmers as well as community, district and provincial veterinary offices. Depending on surveillance information and the severity of a disease, its eradication within a herd for Africa should work on three main approaches.

Total depopulation/repopulation

The primary strategy and backbone for eliminating diseases are complete depopulation or repopulation of livestock. New and improved breeds from African regional gene banks must be available and sufficient to replace infected breeds either at the multiplier or production level.

Test and removal

It involves timely testing of a herd and eliminating infectious animals deemed as a threat. SPF farms subjected to veterinary services provide detailed analyses and statistics of herd health statuses. All statistics about animal health regarding diseases, levels, and severity are recorded and managed through a central system.

Partial depopulation

Alternatively, to total depopulation/repopulation, partial depopulation reduces losses while preserving genes. The process temporarily changes a production flow system, using strategic drugs to kill target animals, and replaces stock from the already established SPF herd or gene banks.

Declaration of health status

Single health status must be declared for connected herds and made publicly available for traceability. The health status of animals must be tracked during all production, trading, transport and logged digitally. Declaration for an SPF herd consists of three parts: Health status, Supplementary status information and Conditional status.

Health Status

SPF farms safety levels, production stage and diseases are designated using a specified color code, one or more suffixes, which are always stated first in the health status. For example, multiplier herd for pigs with enzootic pneumonia (Myc) diseases are represented as Red SPF + Myc in Denmark.

Supplementary status information

It contains detailed information about any exceptional health and sales conditions that do not directly influence the herd's health status, such as Salmonella bacteria. According to SPF principles and agreements, farmers are obliged to report Salmonella symptoms when detected and their trade movements.

Conditional status

They provide information on suspicious events with undesirable herd infection, deviation from the declared health status or health rules of the SPF and temporary sales restrictions, including sales prohibitions.

Conditions for SPF status

Based on a set of stringent rules concerning biosecurity, health control and animal transport between herds, producers sign a written agreement and contracts with other management sectors. Such sectors include Transportation Service, Health Status Management, Veterinary Advisory Service and Commercials under one central management system in accord with farmers. All these sectors are called SPF under a specific set of principles. In Denmark, pig's transportation follows carefully defined regulations in specially designed SPF vehicles that provide adequate protection

against infection during transport. Exemplified rules that govern an SPF agreement include (Move Your Brand, 2020):

- Protection against disease: receipt and delivery of pigs, distance to neighboring herds, visitors, deliveries of feed and litter
- Health inspection: daily inspection by personnel, monthly inspection by external veterinarians, reporting of undesirable symptoms, monthly/annual testing of blood samples
- Purchase of pigs: with known health status.
- Transportation of pigs between herds: in approved vehicles according to SPF protocols.

The SPF-system is effective only for semi-intensive and intensive livestock farming systems that provide the best management and active biosecurity measures compared to extensive or free-range farming. However, they are less expensive and will require special status and well-defined policies.

The Health Status Management

In Denmark, The Health Status Management is under the control of SEGES, a professional knowledge and innovation house that works with everything that has to do with farming. For Africa, the AU-IBAR has the upper hand in managing health status effectively. AU-IBAR already serves as the National Central Livestock Registry, a national gene depository and examination Centre for Genetic materials and a herd-recording promoter (AU-IBAR, 2015). All animal herds disease status and tracking at AU-IBAR's care will enable buyers to plan their purchases to suit their herds' health status. In that regard, AU-IBAR and other farming institutions can best identify business potentials and provide the best farming business tools while keeping track of all animal disease status and management.

Cooperation between authorities, pig farmers and veterinarians

An excellent collaboration between different stakeholders like the Danish Crown, Veterinary Advisory Service Contracts (VASCs), farmers, producers and other international bodies explains the Danish SPF-system's success. Africa will need to align giant companies involved in pork production like Pork Expo Africa, MALU and BIOMIN to achieve a similar outcome. Through central cooperation with an SPF system, they can draw up policies on disease management. Policies like mandatory veterinary visits for all SPF farms under VASCs as in Denmark will ensure that veterinarians provide herd health advice and written reports about the disease. To prevent exploitation, veterinarians can supply medicine to enable the farmer to initiate treatment but can only charge the medicine's set price with no extra fees. Therapy for further treatment should be provided on prescription by pharmacies. The authenticity of these pharmacies protects and ensures that farmers can obtain sufficient and quality products like vaccines and medications.

Constraints and Suggestions for Establishing an SPF System in Africa

The most prevalent constraints for pig production are lack of resources to provide adequate housing conditions for pigs, robust and productive breeds, high feed costs, poor access to animal

health services, and lack of knowledge and information. Moreover, most African Swine farmers are small-scale and backyard producers, making it extremely difficult to eradicate diseases (FAO, 2003). A strong institutional and political will for effective management of diseases require measures like:

- Improve access to finance for pig farmers to invest in SPF pig operations
- Ensure minimum standard SPF plans for pig husbandry using available materials
- Traceable and transparent management system on pig production, health, management and marketing
- Supervise, reinforce, and encourage SPF pig breeding programs and cooperatives that focus on local breeding objectives in terms of lower feed and good mothering abilities and profitability
- Develop strategies for producers and entrepreneurs to comply with the standards that successfully deliver genetic materials and products without infections
- Construct fences as necessary biosecurity measures for every SPF farm
- Use existing information on local feedstuffs and research on pigs' nutrition to establish a solid supply line with potential distributors that promote and encourage local feed production
- Improve pig healthcare by training farmers and veterinarians and providing essential health services through community-based animal health institutions and pharmacies in inaccessible regions
- In some instances, indigenous knowledge is cost-effective, practical, and environmentally friendly, like utilizing local plant remedies to prevent and cure diseases.

Window of opportunity

Significant obstacles to pig production in Africa include disorganized pig marketing due to poor infrastructure for slaughtering and processing pigs, quality controls, prices and market fluctuations, high transaction costs, lack of suitable transport, and long marketing chains involving many actors (Penrith et al., 2013). SPF-system in full collaboration with private and public sectors can provide marketing strategies and opportunities that improve profitability, efficiency and development through:

- Well-trained farmers, veterinarians and other personnel
- Quick and real-time services take full responsibility to supervise and provide recommendations on pig farming and meat inspection at slaughter slabs
- The farming cooperative takes the central role in the food enterprise, enabling them to adapt and respond to new market conditions quickly
- Stable markets that enable farmers, producers and entrepreneurs to follow a consistent supply chain, preventing diseases outbreaks through adequate biosecurity measures
- Efficient transfer of knowledge and resources within the value chain becomes natural as farmers become colleagues rather than competitors
- A high level of specialization by partners in the production chain ensures efficiency, transparency, and traceability
- Public-private partnerships become a tradition that incorporates research and innovation where no partner has full monopoly

- Profits from the supply chain are returned to farmers, allowing farmers to increase their production through cooperation.

The Way Forward

Countries need to cooperate in programs against trans-boundary disease, especially neighboring countries often having similar production systems and disease risk profiles. Corporation can take either the form of officially formed organizations or networks of mutual benefits and cost savings through joint preparedness planning. Livestock and animal health policy should be oriented to both the large- and small-scale sectors with pro-poor interventions for most vulnerable members.

Discriminating between the "controllable" and "uncontrollable" environment – which covers aspects of technical skills development, collaboration, inspiration, communication, and the working environment – can quickly erupt (Anteneh, 1989). Providing such a service at the baby stage of implementation requires dedicated personnel like veterinarians capable of exploring the controllable environment so that livestock production performs better (Anteneh, 1989).

Above all, the burden of responsibility in carrying out such a process in the livestock sector lies on officials and veterinary services. Veterinarians need to hold most, if not all, the leading roles in Africa's livestock and veterinary services. This new orientation will require that they do not just "run" the technical interventions but manage these services.

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