

Full Length Research Paper

Survey and dominant pathological conditions of pig farms in the centre region of Burkina Faso

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The aim of this study is to provide a better understanding of the pork sector in Burkina Faso. A survey was conducted among 32 veterinary clinics and practices to determine the primary swine pathologies and the sanitary management of these diseases. Regarding husbandry practices, the study revealed that 43% of surveyed farmers practiced intensive farming, while 53% practiced semi-confinement, and 4% practiced extensive farming. In terms of biosecurity measures, 56% of piggeries lacked a fence and gate at the entrance, 19% had footbaths but lacked rotoluves, and 65% were associated with other livestock species, including poultry (57%) and ruminants (36%). The pathologies reported by farmers and animal health professionals predominantly included parasitic diseases (32% internal parasitosis and 68% dermatoses), piglet anaemia (71%), red mullet (57%), African Swine Fever (ASF) (61%), foot-and-mouth disease (29%), and neonatal gastroenteritis (36%).

Key words: Dominants, pathologies, pathological conditions, pigs, piggery, Burkina Faso,

INTRODUCTION

Africa is currently experiencing significant and simultaneous upheavals across socio-economic, political, and technological realms. Socially, the continent has witnessed substantial population growth since gaining independence. The United Nations (UN) projects Africa's population to reach 2.5 billion by 2050, doubling the current figure of 1.2 billion. Additionally, it is estimated that 56% of the population will reside in urban areas by 2050, compared to the current 40% (UN, 2017, 2018). This population surge is particularly pronounced in countries like Burkina Faso, where the population has grown rapidly from 5.6 million in 1975 to over 14 million in 2006 and approximately 21 million in 2019 (INSD, 2022).

This demographic expansion is believed to contribute

to an increase in Gross Domestic Product (GDP), currently standing at \$4.7 billion, which is forecasted to nearly triple by 2050. This growth is expected to result in enhanced purchasing power for African consumers (FAO, 2018). In Burkina Faso, the combination of population growth, urbanization, and rising per capita incomes has led to a surge in demand for animal products, estimated at 19 g/head/day of animal protein. However, production often falls short of meeting this demand. The annual demand for milk, poultry, and pork is increasing by 2.9 and 4.1%, respectively, compared to the growth rates of 2.1 to 4.1% for the same products.

Given this context, intensifying animal and agricultural production with short-cycle species adapted to local

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climatic conditions emerges as a viable solution to mitigate the negative impacts of rapid population growth. Pigs, with their short reproduction and production cycle, high feed efficiency, and adaptability to various ecosystems, are particularly promising in meeting the escalating demand for meat and meat products (FAO, 2006).

Despite the significant number of inhabitants globally (Cilek and Tekin, 2004, 2005), pig farming in Burkina Faso has received minimal attention from development projects focusing on short-cycle species within the food self-sufficiency strategies devised by public authorities. Consequently, this subsector faces considerable challenges, particularly in terms of health. With this in mind, the objective of this study was to conduct surveys and document pig breeding and marketing in Burkina Faso's production basin, specifically in the Centre region, and to describe the primary pig pathologies encountered along with their respective sanitary management practices.

MATERIALS AND METHODS

The present study was conducted in Burkina Faso within the Central Porcine Basin, spanning from September 14, 2022 to March 25, 2023. It encompassed two phases: the pre-survey phase, lasting 45 days (September 14 to November 15, 2022), which involved building a stakeholder database in the pork sector and testing and refining the questionnaires.

The survey phase, from November 21 to March 25, 2023, focused on data collection. This included 95 pig farms, 32 veterinary clinics and practices, 38 pig sellers, 78 consumers, 27 feed manufacturing plants, and interviews with 05 leaders of socio-professional organizations of livestock farmers. The sampling method employed was random, along with a non-probability approach where individuals were selected as encountered. The research methodology followed a sector study approach, sequentially examining pig producers, veterinary clinics and practices, pig feed manufacturers, pig traders, butchers, and socio-professional organizations of pig farmers and pork meat consumers. Data were gathered through questionnaire-based interviews, although the specific type of questionnaire (structured or unstructured) was not specified. The collected data were analyzed using Kobotoolbox 2022 version 4.4 software and then transferred to Microsoft Excel spreadsheet version 2019 for economic result calculations and descriptive statistical analyses, including proportions and means, focusing on parameters such as proportions for discontinuous variables and means for continuous variables.

RESULTS

Characterisation of the actors of the pig sector in the production basin of the centre in Burkina Faso

Socio-professional characteristics of pig farmers

During our study, 95 farms were visited. Pig farming was the primary activity for only 3% of those surveyed, with the remaining farmers engaging in pig farming as a secondary activity along side their main pursuits. All farms were

Table 1. Socio-professional characteristics of pig farmers.

Characteristics		%
Sex	Man	72
	Wife	38
Profession	Farmer	19
	Official	18
	Merchant	8
	Porciculturist	3
	Retirement	9
	Other	43

privately owned, except for the CMAP piggery, which operated as a state center under the authority of the Ministry of Livestock.

Additionally, 47 pig farmers (49%) were affiliated with a farmers' association or group, while others either lacked awareness of such organizations or were uninterested. Their experience in pig farming varied, with 5% having less than 2 years of experience, 24% between 2 and 5 years, and 71% more than 5 years. Twenty-one percent of farmers had received training, primarily focusing on pig feeding (18.95%), pig reproduction (14.73%), and biosecurity (6.31%).

Among herders, 16% had received support from various development projects in the last five years, including PADELB. Table 1 presents some of the characteristics of hog producers.

Characterization of health care structures

During the course of this study, 22 veterinary practices and 10 veterinary clinics and pharmacies were surveyed. All respondents attended to pigs, albeit their rarity compared to other species. The results indicate that it is only in the province of Kadiogo (Ouagadougou and Koubri) where there are so many veterinary practices and clinics. Table 2 shows the characteristics of veterinary care structures surveyed in the central pig basin in Burkina Faso.

Socio-economic characteristics of pig sellers

The pig and pork marketing system in Burkina Faso involves various actors, including buyers/dealers, butchers/processors, supermarkets, roasters, and sellers of pork cooked in sauce. A total of 38 pork sellers were surveyed, revealing that the sale of pork was predominantly carried out by men (72%), with women participating in smaller numbers, primarily in the marketing of baked pork or pork soup (8%). Baked pork vendors emerged as the primary players in meat sales in the study

Table 2. Characteristics of veterinary care structures surveyed in the central pig basin in Burkina Faso.

Commune	Type of structure		%
	Cabinet	Clinical	
Ouagadougou	10	9	59
Ziniaré	5	0	15.6
Koubri	0	1	3.1
Loumbila	2	0	6.25
Saaba	4	0	12.5
Paved	1	0	3.1
Total	22	10	100
Grand Total	32		

area, with 30 vendors (78%) predominantly situated near refreshment stands, known as "maquis". These vendors, aged between 25 and 60 years old, primarily engaged in pork sales as their main business. Interestingly, none of the baked pork vendors had received formal training in cooking or food processing, instead acquiring experience through apprenticeships. Livestock producers were minimally involved in pork processing and marketing, with only 3% of farmers establishing charcuterie operations aimed at enhancing the value chain of their activities.

Pig farming and pig marketing and consumption systems

Pig farming

Types of production and farming methods: In the production basin of central Burkina Faso, the predominant type of pig farming encountered is farrow-to-finish, accounting for 92.64% of cases. Regarding breeding methods, three types were observed: permanent, semi-confined, and extensive enclosure, with proportions of 43% (41/95), 53% (50/95), and 4% (4/95) respectively, as shown in Table 3.

Pig breeds exploited in the central pig basin in BurkinaFaso

In the central pig basin, three types of pig breeds were found in the pig farms visited. These are the local breed (46%), improved mixed breeds (43%) and exotic breeds (11%). Table 4 shows the frequency of breeders were the Large White (80.74%), the Land Race (6.31%), the Duroc (5.95%), the Piétrain (4.21%), the Hampshire (2.1%), and the Large Black (1.05%), with respective proportions of 12.63, 6.31, 5.95, 4.21, 2.1 and 1.05%. The Large White was found in all the modern farms in the study.

The analysis of the data on farm sizes surveyed indicates a range of 3 to 800 pigs per farm, with an average of approximately 67.02 animals per farm. Notably, 48% of producers maintained fewer than 20 pigs, while 21% managed more than 60 pigs. Pig production was primarily concentrated in the province of Kadiogo, accounting for 69.29% of the pig population in the central basin, followed by Bazèga province at 15.48%. Additionally, pig farming was commonly associated with other species among respondents, with 65% reporting such associations. Particularly, it was most frequently linked with poultry (57%), followed by small ruminants (36%), and to a lesser extent, cattle, fish farming (3%), and rabbit farming (2%).

Main swine pathologies encountered and their management in the Central Pig Basin in Burkina Faso

Arrangements in the event of illness

In the case of disease management, 48% of consulted farmers utilized veterinarians' services. However, the survey of veterinary clinics and practices revealed infrequent consultation for pig species, suggesting a significant portion of individuals involved in swine pathology management operated clandestinely. Additionally, 35% of farmers opted to sell their pigs when faced with disease, citing dissatisfaction with past veterinarian services and the prevalence of African Swine Fever (ASF) as contributing factors. Moreover, 17% of respondents practiced self-medication, drawing on years of experience to prepare local decoctions for swine disease treatment, despite potential risks. For instance, boiled sorrel seeds were employed for ASF treatment, while coal, water from wet granites, and salt were used for internal deworming, including for ladrerie, and drain oil for scabs and other dermatoses treatment. Notably, some breeders also utilized salt in cases of anorexia.

Main pathologies encountered

The results of the statistical analysis conducted on the field-collected data reveal that 93% of pig farmers have observed pathologies in their pigs. Table 5 provides a list of the most commonly mentioned pathologies and their corresponding treatments. Notably, the prevalence of certain diseases such as scabies, anaemia, and diarrhea was notably high during the rainy season, specifically from June to October. In terms of prevention, 9.37% of health professionals reported vaccinating pigs against pasteurellosis using the Pasteurellade vaccine. This vaccination was typically administered based on recommendations from veterinary technicians or at the request of the farmers. It is important to note that to date, there are no mandatory vaccines for pig farming in Burkina

Table 3. Types of production and livestock farming in the central production basin of Burkina Faso.

Types of production	Breeder	Breeder-fattener	Fattener	Total
Actual	3	88	4	95
%	3	93	4	100
Farming method	Extensive	Semi-extensive	Intensive	Total
Actual	4	50	41	95
%	4	53	43	100

Table 4. Main pig breeds exploited in the Central Pig Basin in Burkina Faso.

Race	Local	Improved or mixed						Exotic
		Large white	Land race	Duroc	Piedtrain	Hampshire	Large black	
-	-	80.74	6.31	5.95	4.21	2.1	1.05	-
Percentage	46			43				11

Table 5. Dominant Pathologies of Pigs in the Central Pig Basin in Burkina Faso.

Swine diseases	Proportion %	Treatments	
		Veterinary products	Traditional products or practices
ASF (Kathmadou)	61	Nothingness	Sorrel seed, moringa
Brucellosis	25		
Foot-and-mouth disease (Nozada)	29		
Redmullet	57	Antibiotictherapy (Iomoxin, penistrep, oxytetracycline etc.)	quinilone, Nothingness
Neonatal gastroenteritis	36		
Post-weaning diarrhea (Edema disease)	25		
Piglet anemia or the 21st day crisis	71	Fercobsang, DextranIron	Nothingness
Transmissible gastroenteritis (GET)	11	Nothingness	Nothingness
Internal parasites	32	Ivermectin, cevamec, levalap, albendazol	Coal, moringa, potash, granite water
Scabies	68	Ivermectin, kepromec, vectocid	Drain oil, potash
Respiratory diseases	11	Protective hepato	Nothingness
Urinary diseases	4	Nothingness	Nothingness
Other (deficiency, inappetence, injury)	32	Vitamins (introvit, teracalcium, intrafer)	Salt, Molasses

Biosecurity in pig farming in the pig basin in Burkina Faso

The analysis of biosecurity practices focused solely on farms with pigsties. Concerning overall building design, 56% of the barns lacked a fence and gate at the entrance. Footbaths were present in a minority of farms (19%), and rotoluvia were absent entirely. Most footbaths remained dry and were only utilized in the event of an African Swine Fever (ASF) alert. Additionally, 55% of the visited farms had buildings oriented in the direction of prevailing winds and sun (East-West). The majority of these farms (65%) were associated with poultry (57%), ruminants (36%), and other species. In cases of mortality, only 5% of farmers either incinerated the carcasses or buried them on-site. The vast majority (94%) of remaining farmers found ways

to clean the pigs and sell the meat for consumption. Furthermore, 48% of surveyed farmers observed quarantine procedures upon the introduction of new animals. Notably, a significant proportion of extensive and semi-extensive farms allowed pigs to roam permanently or seasonally (57%).

DISCUSSION

Socio-professional characteristics of actors in the pig sector in the central pig basin in Burkina Faso

Characteristics of pig farmers

The study revealed that the majority of pig farmers were

adult males. These findings align with previous studies conducted by Ayssiwede (2004) in Benin and Umutoni (2012) in Bobo-Dioulasso, Burkina Faso. However, they differ from those reported by Buldgen et al. (1994) and Missohou et al. (2001) in the groundnut basin and Lower Casamance, Senegal, respectively. These studies focused on traditional environments where women pastoralists were more predominant than men. This variance can be attributed to differences in study areas. In traditional settings, farming methods typically require minimal investment, and land scarcity is less pronounced compared to urban and peri-urban centers. Additionally, urban women often engage in commercial activities or hold positions in public or private sectors, leaving pig farming to be predominantly pursued by men. For rural women, pig rearing becomes an accessible option as other livestock species are typically reserved for men. Only a minority of farmers (21%) received training in pig farming (covering reproduction, health, feeding, and biosecurity) before or during their farming activities. The majority of breeders initiated their farming endeavors without formal training, relying on their own experiences and advice from fellow breeders. This lack of training adversely impacts farm performance, yields, and consequently hinders the development of the pig sector (FAO, 2012).

Characteristics of pig traders

The pig and pork marketing system in Burkina Faso involves various actors, including buyers/resellers, butchers/processors, supermarkets, roasters, and sellers of pork cooked in sauce. These sellers are predominantly adult men who consider this activity their primary source of income, unlike livestock herders who view animal husbandry as a secondary pursuit. The limited participation of women in pork sales and the relatively young age of sellers can be attributed to the challenging nature of handling and transporting pigs, which may be difficult for women and the elderly. Livestock producers play a minor role in pork processing and marketing. Sellers of cooked pork dishes emerge as the primary contributors to pork sales in Burkina Faso. While similar findings were reported by Ayssiwede (2004) in Benin, they contrast with those of Lalèyê (2007) in Senegal, who noted that the majority of pork sellers were managers of bar-restaurants, with pork sales being a secondary aspect of their businesses.

Characteristics of animal health professionals

Healthcare facilities in Burkina Faso are predominantly comprised of veterinary practices, with clinics being underrepresented in the field of veterinary medicine and primarily concentrated in Ouagadougou. Notably, there is a lack of specialists among veterinarians and veterinary

paraprofessionals who specifically deal with pigs. While some professionals have completed internships in swine medicine, the absence of specialization in a single species is common in West Africa's veterinary care landscape. This observation aligns with findings from Cameroon (Mohamadou, 2007) and Burkina Faso (Sawadogo, 2022), which have also characterized animal health professionals accordingly.

Pig farming, pig marketing and consumption systems in the central pig basin in Burkina Faso

Pig farming

Types of production and farming system: In the Central Pig Basin, three types of farms are identified, with mixed farming, specifically farrow-to-finish farming, being the most prevalent (92.64%). Although there are farms specializing in fattening or piglet production, they are encountered in smaller proportions. Additionally, three farming systems are observed, namely extensive, intensive, and semi-intensive systems. Semi-confinement is the predominant practice among breeders, with over half adopting this method. While semi-confinement reduces costs associated with feed, housing, and labor during straying periods, it exposes pigs to various issues such as diseases, mortality, inbreeding, theft, among others, leading to suboptimal performance on these farms.

Despite the existence of Law No. 2018-165 RCEN/PKAD/CO, which prohibits animal husbandry in urban areas and the straying of domestic animals, and despite the resurgence of African Swine Fever (ASF), with stray pigs being the primary victims, instances of permanent straying pigs persist. Although similar findings were reported in the Central African Republic and Lower Casamance in Senegal (Abdallah-Nguertoum, 1997; Missohou et al., 2001), they contrast with those found in Benin and South Benin (Ayssiwede, 2004; Ohouko et al., 2020), where permanent confinement was the predominant mode of pig farming. This difference may be attributed to measures implemented following the ASF epidemic in 1997, which included strong recommendations for permanent confinement.

Pig breeds exploited in the central pig basin in Burkina Faso

The local breed was the most prevalent breed on pig farms in the Central Production Basin of Burkina Faso. For enthusiasts of this breed, its ease of breeding, resistance to diseases, and adaptation to family breeding conditions, including wandering, make it favorable. However, some breeders resort to breeding this breed due to the lack of means to acquire improved breed pigs. Among the

improved breeds encountered, the Large White was the most common compared to others such as Landrace, Pietrain, and Hampshire. Breeders favor the Large White for its high prolificacy, rapid growth rate, and widespread availability across the country. Additionally, this breed is preferred by processors during purchases due to its superior muscle yield at slaughter, offering a larger profit margin. Similar findings were reported by Abdallah-Nguertoum (1997), Missohou et al. (2001), and Ayssiwede (2004), who also observed a predominance of the local breed in pig farms in the Central African Republic, Senegal, and Benin, respectively. However, the proportions reported by Abdallah-Nguertoum and Missohou (1997) and Abdallah and Missohou (2001), respectively of 86.7 and 66.7% were notably higher than the 46% observed in our study.

Biosecurity in pig farms in the Central Basin of Burkina Faso

The analysis of biosecurity practices revealed that the majority of farms lacked physical barriers such as fences, gates, footbaths, and rotoluves. This allowed pets, rodents, and birds to freely roam around the farms and coexist with pigs, exposing them to significant risks. According to Cox (2006), physical barriers are crucial measures for reducing the risk of infection, serving as the primary critical control point for preventing the entry of infectious diseases onto the farm.

Moreover, most farms were associated with other species such as poultry, ruminants, rabbits, or other animals, resulting in frequent visits by various individuals. The movement of people, vehicles transporting materials and feed, and intermediary traders traveling from farm to farm increased the risk of introducing pathogens into the barns. Additionally, the mixing of species created an environment conducive to the emergence of various pathologies, such as the transmission of pathogenic influenza strains and foot-and-mouth disease.

Cleanliness emerged as a significant issue on pig farms in Burkina Faso. For some farmers, maintaining cleanliness was considered an exception in pig farming because they believed "pigs like dirt." The immediate surroundings of these farms were contaminated with various types of waste, and cleaning and disinfection were not regularly conducted by all farmers. Few buildings had proper facilities such as canals and fake manure for the disposal of waste. The failure to implement minimum biosecurity practices by a majority of pig farmers posed a risk not only to pig health but also to farm performance (Djimenou et al., 2017).

Furthermore, a significant proportion of extensive and semi-extensive farms allowed pigs to stray permanently or seasonally. This type of farming posed a constant risk factor, as pigs roamed around garbage cans, brush, and

ponds in search of food, potentially coming into contact with numerous pathogens and serving as reservoirs of germs for confined farms.

Main pathologies and their management in the central pig basin in Burkina Faso

Parasitosis emerged as the most common disease in pig farming in Burkina Faso, consistent with findings reported by Ayssiwede (2004), Alexis et al. (2016), and Ohouko et al. (2020), with mange being the primary parasitosis encountered. According to Ayssiwede (2004), the prevalence of mange may be attributed to poor hygiene in pig barns and the inclusion of various agricultural refuse and greens in pig feed. Similarly, Ohouko et al. (2020) linked it to the unavailability and inadequate monitoring of prophylactic schedules. Piglet anaemia, also known as the 21st day crisis, was identified as another significant pathology by stakeholders. This situation is attributed to the lack of iron administration to piglets during the first three weeks of life by some farmers, compounded by recurrent shortages of iron-containing drugs in veterinary clinics.

Among infectious diseases, African Swine Fever (ASF) stands out as a formidable threat, having taken an endemic form in Burkina Faso. Sporadic cases occur on farms without official announcements or biosecurity measures to contain its spread, posing a substantial risk to pig farming. Other diseases such as red mullet, foot-and-mouth disease (FMD) or "Nozada" in the local Morea language, brucellosis, and diarrhoea in piglets were also reported by farmers and animal health professionals. The prevalence of certain diseases such as scabies, anaemia, and diarrhoea was notably high during the rainy season, from May to October, attributed to insufficient food availability on livestock farms, which reduces their resistance to these diseases.

The management of these pathologies often involved veterinary intervention or the utilization of local knowledge based on medicinal plants and other indigenous materials. These results echo those obtained by Missohou et al. (2001), Ayssiwede (2004), and Ohouko et al. (2020), demonstrating the historical practice of pig farmers utilizing local plants for feeding or treating swine pathologies.

Conclusion

The objective of this study was to assess the status of pork breeding and marketing in the central production basin of Burkina Faso. It aimed to describe the socio-economic characteristics of stakeholders in the pork sector and outline the main pig pathologies and their management. Our findings reveal that participants in the pork sector in the central production basin of Burkina Faso are

predominantly male, with many engaging in pig farming as a secondary activity alongside their primary occupation, except for full-time pork sellers. Regarding farm management, our study identified three farming systems: intensive, semi-intensive, and extensive, as well as three types of farming: farrow-to-finisher, farrow-to-finish, and fattening. The primary pathologies observed in pig farms predominantly involve parasitosis, notably mange.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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