

Uses of local African pigs in food and traditional practices in Southern Benin

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Abstract

Local pigs are very important in food and traditional practices in Africa. This study aims to document diverse traditional uses of Local African Pigs in Southern Benin. A transverse and retrospective survey was used for data collection from 420 people which were consumers, butchers, resource persons, and conservators of the tradition. The results showed that pig meat was mainly used for the human diet (98.10%). The majority of consumers were public servants (25%). Pig meat occupied the first rank among meats most consumed (92%), but consumers reported that African local pig's meat had the best taste. It was consumed under various culinary specialties in specialized restaurants and at home. The pig and its derivative products were also used in customs (72.62%), traditional medicine (52.38%), endogenous religions (35.71%), and occultism (3.1%). Pork meat is the most consumed meat in southern Benin (92%), but according to consumers, meat from the local pig breed is the one that provides the best taste (69.30%). It is consumed under various culinary specialties (boiled, fried, and grilled form) in specialized restaurants as well as in families. Local pig in particular and their derivative products were also used as gifts for many divinities and sacrifices to ward off bad fates and to cure various diseases. Regarding the importance of local pigs in Southern Benin, it is essential to implement strategies for their conservation and sustainable management.

Keywords: Zoogenetic Resources; *Sus scrofa domesticus*; Pig meat; Diet; Sociocultural practices; West Africa

1. Introduction

Pork meat has played a major role in human food for thousands of years [1]. In West Africa, people's eating habits are changing, especially in urban areas [2]. The growing demand for animal products in developing countries mainly concentrated in urban and peri-urban zones, is a consequence of urbanization associated with income growth and new socio-cultural expectations of populations Mopaté et al. [3]. The analysis of food behavior in West African cities has shown a change in consumption with product diversification [2]. The consumption of animal products in sub-Saharan Africa has not been the subject of any specific study to assess the main trends of Boutonnet et al. [4]. However, animal products are very rarely the basis of meal composition. They are one of the ways of preparing the sauce of the main dish at home or are consumed individually outside the home Boutonnet et al. [4].

In Benin, pork consumption is increasing with a wide variety of culinary specialties, particularly in Southern regions where Muslims are a minority [5]. The increase in the number of pig meat restaurants and the affluence they are experiencing attest to the high demand for pigs in Benin [6]. Butchers specializing in pig processing innovate culinary specialties and develop strategies to make them available and accessible to consumers. However, very little investigation has been devoted to pork consumption and other uses of pigs in Benin. Thus, it appears essential to explore not only the characteristics of users but also their appreciation and preference depending on whether the meat comes from local or exotic breeds of pig.

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In addition to its food and nutritional importance, the pig (Figure 1) and its by-products also play a very important role in worship, culture, and traditional medicine in Southern Benin. This implication of pigs in endogenous, socio-anthropological, and cultural realities were unknown to the public and indeed deserves to be explored. This will allow us to have a better knowledge of the different uses of pigs and its derived products.



Figure 1 Local African Pigs in Southern Benin

2. Materials and methods

2.1. Area of study and sampling

The study was conducted in seven (7) departments in Southern Benin (Figure 2). A total of 420 users of pigs and derived products were interviewed individually for data collection using a semi-structured survey. The data collected concerned characteristics of users (gender, marital status, sociolinguistic group, education level, religion, socio-professional group, age, experience in using pigs and derived products), use of pigs for food purposes (monthly income of the consumer, monthly expenditure on pig meat consumption, frequency of pig meat consumption, criteria for assessing meat, preference of meat according to pigs breed, preferred culinary dishes) and the use of pigs and derived products in worship, culture and traditional medicine in Southern Benin.

2.2. Statistical data processing and analysis

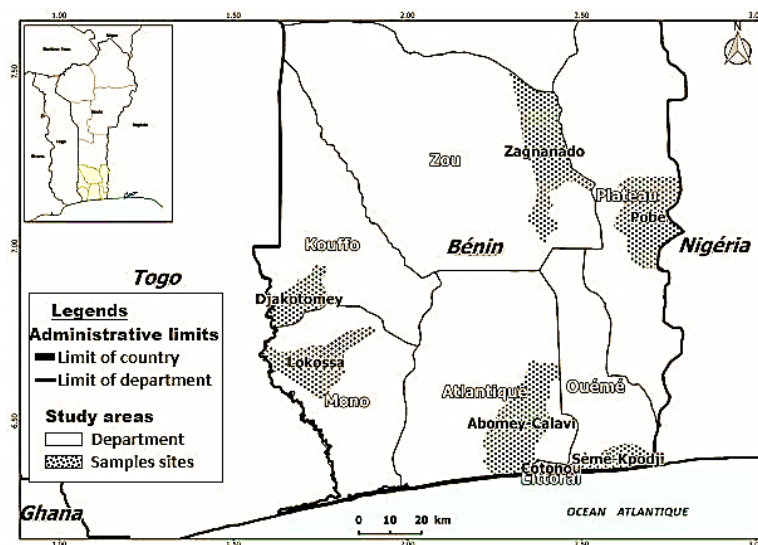


Figure 2 Area of the study

The frequencies of qualitative variables were calculated using Minitab 16 software. The Chi² test was performed to analyze the frequency variation according to departments at a threshold of 5%. An analysis of variance was performed

to determine the variation of pig’s consumer experience according to departments. The multiple comparison of means was performed using the Turkey test with a significance level of 5%.

3. Results

3.1. Usefulness of pigs and derived products in Southern Benin

Pig and its by-products are widely used in Southern Benin on several fields (Figure 3). Indeed, pigs were mostly used in diet as a source of animal protein (98%), in Customs (traditional ceremonies and funerals) (72.62%). Likewise, pigs and their by-products were very important in traditional medicine (52.38%) for healing various diseases. Sacrifices and worship of various deities require also the use of pigs and pig products in Southern Benin, all the same with regard to certain occult practices.

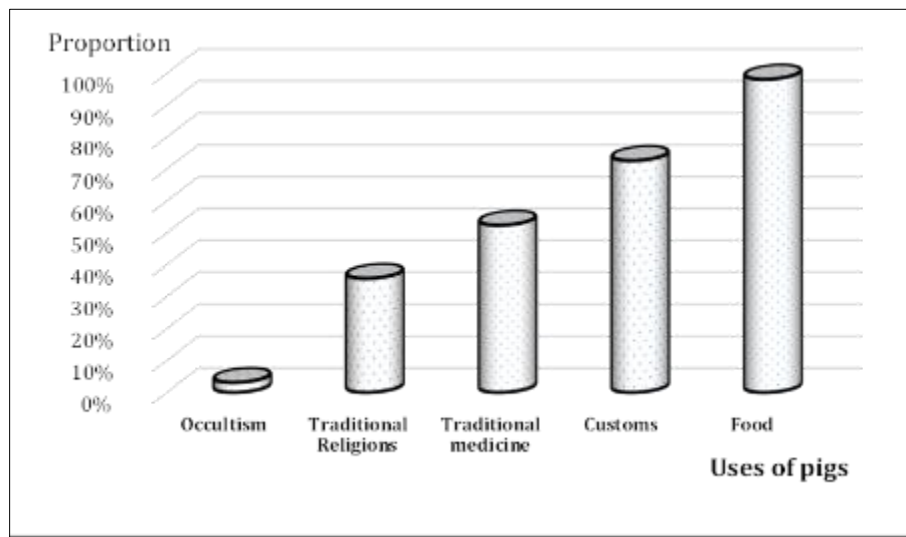


Figure 3 The different uses of pigs and derived products in Southern Benin

3.2. Characteristics of consumers of pig meat in Southern Benin

Consumers of pig were almost men (96.4%), with only 3.6% of women specifically met in the Mono and Couffo departments (Table 2). The majority were married followed by single men. The sociolinguistic groups of consumers were Fon, Adja, and Yoruba. The consumers of pig meat were more 90% literate against 8.6% illiterates. Christians consumed more pig meat than Animists (74.3% compared to 25.7%). Among the consumers of pig meat, salaried employees were the majority and pupils were the minority (5.7%). Other consumers were economic operators, workers, drivers, and bakers (Figure 4). The age of majority of them ranged from 20 to 40 years old (49.29%) and over 40 years old (48.57%) (Figure 5). Experiences in pig meat consumption (Table 2) varied significantly from 11 years in Couffo to 27 years in Ouémé, with an average of 22 years for the overall departments ($p < 0.001$). No significant difference was detected between the experience of pig meat consumption in the Atlantique, Littoral, Plateau, and Zou departments.

Table 1 Characteristics of Pig Meat Consumers

Variables		Atlantique	Littoral	Ouémé	Plateau	Zou	Mono	Couffo	Chi ² Test
Gender (%)	Male	100a	100a	100a	100a	100a	85b	90b	*
	Female	0	0	0	0	0	15a	10a	
Marital status (%)	Married	70	90	85	90	80	70	60	ns
	Divorced	0	5	0	0	0	0	5	
	Widowed	0	0	0	0	0	5	0	
	Single	30	5	15	10	20	25	35	

Sociolinguistic group (%)	Fon	55a	60a	80b	15c	90bd	35e	100d	***
	Adja	15a	20a	5b	0	5b	55c	0	
	Yoruba	30a	20ab	15bc	85d	5e	10e	0	
Education level (%)	Illiterate	0	0	10	20	10	20	0	ns
	Primary	0	5	20	15	20	10	20	
	Secondary	35	30	35	30	50	20	40	
	University	65	65	35	35	20	50	40	
Religion (%)	Christian	100a	80ab	75bc	55d	60d	80ab	70bc	*
	Animist	0	20a	25a	45b	40b	20a	30a	

Numbers with the same letter on the same line do not differ significantly. *** : Significant difference at the 0.1% threshold, ** : Significant difference at the 1% threshold, * : Significant difference, ns : Non significant difference.

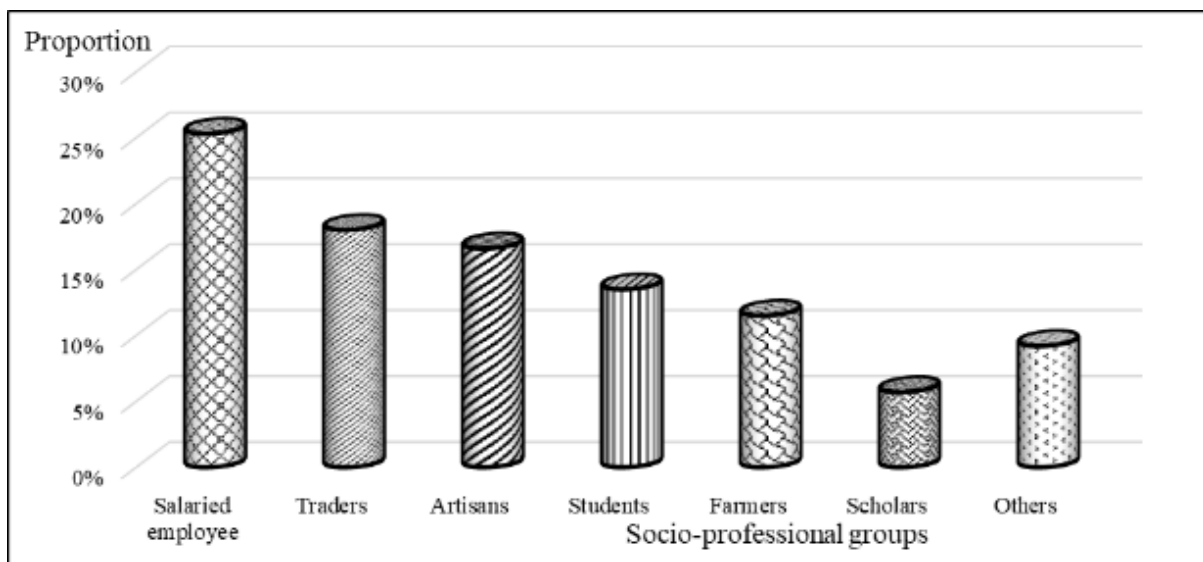


Figure 4 Socio-professional groups of pig meat consumers in Southern Benin

Table 2 Pig meat consumption experience in Southern Benin

Department	Experience (Years)	Standard deviation	F	P
Atlantique	24.4a	9.34	9.57	***
Littoral	23.5a	8.13		
Ouémé	27.8a	8.64		
Plateau	25.35a	8.32		
Zou	21.5a	9.66		
Mono	17.15ab	8		
Couffo	10.85b	5,6		
Total	21.51	9.75		

Numbers with the same letter in the same column do not differ significantly. ***: Significant difference at the 0.1% threshold.

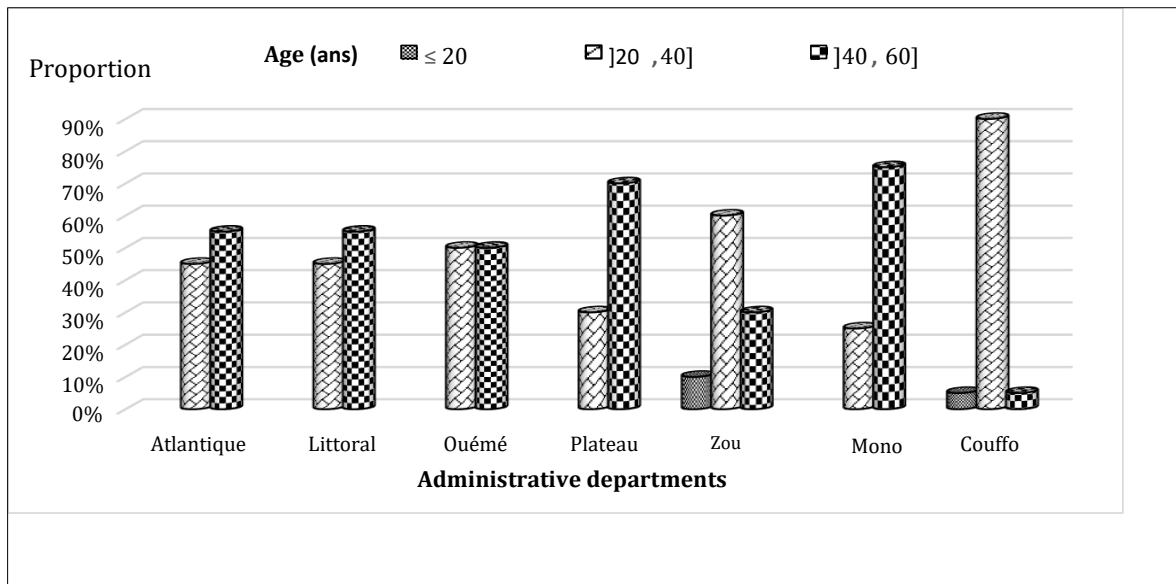


Figure 5 Age classes of pig meat consumers in Southern Benin

3.3. Habits of eating pig meat

All consumers felt a passion for pigs and 78.6% of them implicated in the choice of meat consumed in their household (Table 3). As for the rank occupied by pig meat among those consumed, 92% of consumers placed it in the first place according to its taste. More pig was consumed in bushes (47.1%) than in family at home and at job (Figure 6). Most consumers (54.3%) consumed pig 3 to 4 days a week, followed by 1 to 2 days a week (22.1%), 5 days a week (20%), every day of the week (2.9%) and occasional consumers (0.7%), respectively (Table 3).

Table 3 Consumption habits of pig meat

Variables		Atlantique	Littoral	Ouémé	Plateau	Zou	Mono	Couffo	Chi ² Test
Implication to the choice of pig meat (%)	Yes	75	95	90	80	80	75	55	ns
	No	25	5	10	20	20	25	45	
Rank of pig meat within meats consumed (%)	1 st	90a	100ab	100ab	100ab	85a	73,7c	95ab	*
	2 nd	10	0	0	0	10a	10,5a	5b	
	3 rd	0	0	0	0	5a	15,8b	0	
Place of consumption of pig meat (%)	Restaurant	48.7	45.5	45.5	48.8	52.9	44.8	42.3	ns
	Family	33.3	40.9	36.4	41.5	41.2	55.2	42.3	
	Job	17.9	13.6	18.2	9.8	5.9	0	15.4	
Pig meat consumption's frequency (%)	7day/7	0	0	0	0	20	0	0	***
	5day/7	25a	0	45b	15c	10c	40b	5	
	3 to 4day/7	50a	85b	55a	75c	45a	25d	45a	
	1 to 2day/7	25a	15b	0	10b	25a	30a	50c	
	Occasional	0	0	0	0	0	5	0	

Numbers with the same letter on the same line do not differ significantly. ***: Significant difference at the 0.1% threshold, *: Significant difference at 5% threshold, ns : Difference not significant.



Figure 6 Pig meat consumers' affluence in a bush in Southern Benin

3.4. Criteria of pig meat appreciation and preference of consumers

Several criteria were used by consumers to appreciate pig meat in Southern Benin (Table 4). Among these, the taste of the meat (32%) and its low fat content (25.8%) were the most important criteria. Other criteria used were smell (16.4%), tenderness (13.9%), and color of the meat (11.9%). These criteria varied according to department with a significant difference ($p < 0.01$).

Table 4 Consumers appreciation and preference of pig meat

Variables		Atlantique	Littoral	Ouémé	Plateau	Zou	Mono	Couffo	Chi ² Test
Criteria for appreciation of pig meat (%)	Taste	29.9a	37b	27.4a	32.8a	29.9a	30.8a	39.2b	**
	Fat poverty	25.4a	37b	27.4a	32.8ab	19.4ac	24.6a	13.7cd	
	Smell	16.4a	18.5a	15.1a	13.1a	16.4a	13.8a	23.5b	
	Tenderness	20.9a	1.9b	13.7ac	8.2d	23.9a	21.5a	2b	
	Color	7.5a	5.6a	16.4b	13.1b	10.4bc	9.2bc	21.6d	
Reason for appreciation of local pig (%)	Taste of meat	87a	90.9a	55.6b	54.1b	69bc	71.4c	57.1b	*
	Fat poverty	13a	9.1a	44.4b	45.9b	31bc	28.6bc	42.9b	
The Pieces most preferred	All pieces	19.2a	8.2b	26.3ac	43.8d	25ac	43.3d	48.1d	*
	Chair	27.3a	30.6a	23.7a	18.8ab	22.2ab	20ab	18.5ab	
	Red viscera	25a	32.7ab	23.7a	15.6ac	25a	0	3.7d	
	Ears	18.2a	16.3a	15.8a	15.6a	13.9ab	13.3ab	18.5a	
	White viscera	6.8a	12.2b	5.3a	3.1ac	11.1b	10b	3.7ac	
	Head	4.5a	0	2.6a	3.1a	2.8a	13.3b	7.4ab	

Numbers with the same letter on the same line do not differ significantly. **: Significant difference at the 1% threshold, * : Significant difference at the 5% threshold.

Almost all consumers of pig meat (99.3%) were able to distinguish local pig meat from exotic pig meats. Regarding the consumer's preference, meat that come from local pig was more appreciated because of its flavor (66.7%). The most

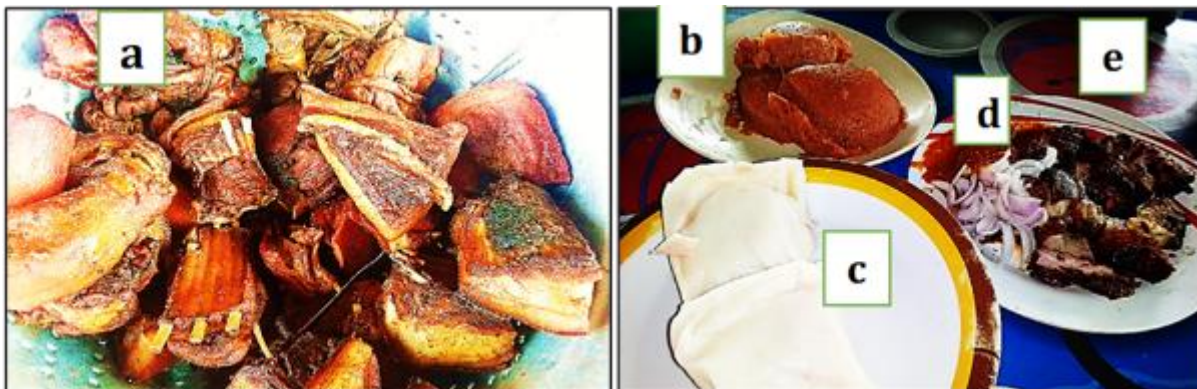
piece of carcass appreciated by consumers varied significantly from one department to another ($p < 0.5$). Consumers who liked all the different pieces were the majority. However, some people preferred the flesh, red of white viscera, ears, or head.

3.5. Culinary specialties of pig meat in Southern Benin

Table 5 Culinary dishes of pig consumers in Southern Benin

Variables		Atlantique	Littoral	Ouémé	Plateau	Zou	Mono	Couffo	Chi2 Test
Boiled meat with :	Piron	52.2a	66.7b	61.5ab	57.1ab	30c	29.6c	60ab	***
	Akassa	8.7a	16.7b	26.9c	28.6c	25c	22.2c	0	
	Others	0	0	3.8a	3.6a	25b	25b	5a	
None		39.1a	16.7b	7.7c	10.7c	20d	22.2d	35a	
Fried meat with:	Piron	39.1a	36.4a	35.1a	37a	37a	35.3a	27.3ab	***
	Akassa	43.5a	36.4ab	35.1ab	37ab	33.3ab	50ac	72.7d	
	Others	17.4a	27.3b	29.8b	25.9b	29.6b	5.9c	0	
None		0	0	0	0	0	8,8	0	
Grilled meat with:	Piron	42.9a	25b	35.3ab	44.2a	34.6ab	42.9a	52.2c	***
	Akassa	47.6a	71.4b	58.8c	44.2a	36.5ad	48.6a	21.7e	
	Others	9.5a	3.6b	5.9ab	11.6a	28.8c	5.7ab	0	
None		0	0	0	0	0	2.9a	26.1b	
Boiled meat in sauce Kpêtè with:	Piron	16.7a	20a	20a	30b	20a	9.1c	0	***
	Akassa	50a	80b	76b	60ab	20.6c	27.3c	0	
	Others	0	0	0	3,3a	20.6b	0	0	
None		33.3a	0	4b	6.7b	38.2a	63.6c	100d	

The numbers followed by the same letter on the same line are not different significantly ***: Significant difference threshold of 0.1%.



a= Fried meat, b= Piron, c= Akassa, d= pimento+onion+salt, e= smoke-curing of pig meat

Figure 7 Culinary specialties of pig meat

Pig meat was consumed in Southern Benin in various forms with different dishes (Table 5) of which boiled form with Piron (48.9%) or Akassa (19.7%). In the fried form, pig meat was consumed more with Akassa (40.7%) than with Piron. Fried pig meat was also used to accompany other dishes. The grilled form of pig meat was also consumed more with Akassa (46.7%) than with Piron (39.6%), while others consumed it with other dishes (Figure 7). On the other hand,

some consumers did not appreciate the grilled form of pig meat. Pig meat boiled in sauce Kpêtè was more consumed by people with Akassa (45.6%) contrary to others who did not appreciate pig meat boiled in sauce Kpêtè.

3.6. Uses of Local African Pigs in cultural practices and traditional medicine in Southern Benin

In Southern Benin, pig was used in various fields. Pigs were largely used in funeral ceremonies and to worship various divinities in different departments. Especially in Ouémé department, a pig was used in the dowry for the marriage. Pig meat was widely used to organize the parties and receptions of guests at various festive events. In Zou department, the pig was adored as a fetish called "Hanlan" which was composed of "Han" (pig) and "Lan" (meat) in the national language Fon.

Regarding traditional medicine, most of the products coming from pigs were used to cure various diseases (Table 6). The consumption of pig's fat was molten under the sun and pig meat was used to cure measles. Only coating the sick person's body with the fat, making them drink the fat, and eating the meat were enough to achieve therapeutic. The fat molten under the sun was also used to treat burn lesions. Pig droppings were used to cure the madness. The consumption of pig meat prevented witchcraft, an extensive phenomenon in Africa. The whole pig was used in the night sacrifice of Fâ divination (oracle) to deliver from witchcraft. The drinking of sow's milk is delivered from alcoholism.

The sprinkling of water in which the fresh pig meat delivered from evil spirits, bewitch, and sorcery. Pig's fat molten under the sun was used to cure smallpox. It was also used to treat hives. Pig bile was used to treat stomach aches. Drinking the fresh blood of pigs delivers from venom of any snake species with any dangerousness. Pig droppings associated with leaves of *Heliotropium indicum* are used as a remedy to fight against the assaults of witchcraft.

Table 6 Local uses of swine products in traditional medicine

Products derived from pigs	Role(s)
Fat	To cure measles, smallpox, hives, and burns.
Liver's bile	To cure stomach aches
Fresh Blood	To cure snake venom
Excrement	To fight witchcraft and madness
Sow's milk	To fight alcohol dependence
Meat (consumption)	To prevent against witchcraft

4. Discussion

Pig is a major source of animal protein for people in Benin, particularly in the South of the country. It is a way to combat poverty and malnutrition because of the high demand of its production Djimènou et al. [7] and the nutritional qualities of its meat [8,9]. Pig meat is widely consumed in Southern Benin because it is where Christians are a large majority contrary to Muslims who are in the minority. But beyond the food function of pig and pig products in Benin, other functions have been recognized in various fields, especially those related to culture, customs, and endogenous practices. This study has made it possible to highlight the characteristics, appreciations, and preferences of consumers of pig meat according to breed and to collect local uses of pigs and derived products, especially in ancestral practices in Southern Benin.

This study shows that pig and pig products are used in different fields including food, customs, traditional religions, traditional medicine, and occultism. Regarding the food function of pig and pig products, consumers of pig meat are largely dominated by married men. These results are in agreement with those reported by Mopaté et al. [3] in N'Djaména where only 12% of consumers of pig meat were women against 88% of men. This showed that women do not frequent bushes as much as men. Also in the socio-anthropological field, frequentation of bar-restaurants by women without the company of their husbands was very depreciated by society in African countries and more particularly in Benin. The majority of consumers of pig meat in Southern Benin were Christians, i.e. 74.30% against 25.70% which were animists. These results differ from those reported in Tchad [3], where almost all consumers of pig meat were Christians (99%). This proportion of animists encountered was justified by the fact that Benin identified itself as the country of Vodoun in Africa. The absence of Muslims among pig consumers indicates the strict observance of Islamic prohibition on pigs. Pig meat was consumed in Southern Benin by a variety of socio-cultural groups, which confirmed

the results of Boutonnet et al. [4] who report that the consumption of animal products will depend on a range of anthropological and cultural factors that were relatively changeable.

Consumers belonged to several socio-professional groups, the majority of which were salaried employees. This showed that, even though pig meat was accessible to all, the wealthiest social stratum had more privilege. These results are in agreement with the perceptions of [2] who reported that meat consumption varies according to economic factors such as the price of meat and consumer income. Antwi-Boateng et al. [10] evocated the same economic factor in their study on the assessment of factors influencing the consumption of pork and poultry meat in Ghana. In this study, most respondents (54.5%) were of the view that there is better value for money with the consumption of poultry meat than pork (26.8%). This might explain why the poultry industry is doing well than the pork industry in Ghana. Similarly, Boutonnet et al. [4] pointed out previously that the consumption of animal products will be linked to the evolution of lifestyles. The authors quoted above reported also food styles will also depend on the changes in income, urbanization, and product prices. Other authors reported that the most important factor influencing pork consumption is finance [11-13].

Experiences in pig meat consumption of 21 ± 9.75 years estimated in this study were above the 16 ± 12 years reported by Mopaté et al. [3] in Tchad and justified that this meat was part of the eating habit of most respondents from childhood. The majority of consumers said that pig was the most important meat consumed in Southern Benin because of its organoleptic quality [8,9,14,15]. Pig meat was much more consumed in bushes than in households and services. This showed that pig meat restaurants were a quick alternative to passionately satisfy hunger during the day without having recourse to home. Regarding the frequency of consumption, five categories of consumer groups were identified in Southern Benin against three in N'Djaména [3]. The majority group was the one whose frequency of consumption was 3 to 4 times a week, in contrast to N'Djaména, where the group most frequent of consumption was once a week. Assessment criteria such as flavor and fat poverty of the meat used by consumers in Southern Benin were in agreement with those reported in Senegal [2]. According to consumers, local pigs had both criteria perfectly. These characteristics of local pig meat justify its choice by the majority of consumers to the detriment of meat from exotic pigs. Other authors had already reported that local breeds were appropriate for new forms of valorization because they enjoy from consumers, a high degree of sympathy, and an excellent reputation for the organoleptic qualities of their meat [16].

The preference of the pieces varied according to the parts of carcass as previously reported by Mopaté et al. [3]. All parts of the animal's body were consumed in Benin, apart from hair and digestive tract contents, unlike in N'Djaména, where casings were eliminated from consumption by pork butcher [3]. The valorization of all pig parts showed the importance of pigs in the food habits in Southern Benin and its role in fighting malnutrition.

The consumption of pig meat is accompanied by the promotion of products derived from the processing of maize and cassava, including Akassa and Piron. Akassa was a dish based on maize, often packaged in vegetable leaves. The Piron was cooked with gari, a granulated flour from the processing of cassava, pig soup, and spices. The seasoning of Piron means that consumers of pig meat do not consider it necessary to accompany it with Kpêtè sauce but rather with pimento. Pig meat was used in fried, grilled, or boiled form either to accompany Akassa and Piron in restaurants or other dishes, especially when it was eaten in households. This involvement of certain food products in the consumption of pig meat in Benin revealed not only its anchorage in the food habits of populations but also its openness to develop agricultural sectors in particular maize and cassava productions.

Regarding ancestral practices, the pig, in particular the local breed, has great importance in tradition in Benin. Thus, pig breeding in Benin is not only intended to produce to feed the population but also for homage to the dead through funeral ceremonies, and to deities through offerings and libation sacrifices as a worship in Southern Benin. These results confirmed those observed in Cameroon, more precisely in High Relief of Western where the pig plays a predominant social role in the tradition [17]. The authors reported also that pigs were used for offering to deities through funerals and various social events such as nuptials and baptisms. In Congo Brazzaville, pigs had long been used as an exchange for men between the Beembe and other ethnic groups including Kaamba, Doondo, and Suundi, but also more and more among the Beembe themselves, with other uses later [18]. The same author reported that the pig was currently included in matrimonial compensations, conflict settlements, funeral meals, and religious rituals. In Benin, the use of pigs in traditional ceremonies has already been mentioned by Djimènou et al. [19] in the Southern region. For certain ethnic groups in Southern and central Benin, the pig was considered a sacred animal, a god worshipped by a certain fringe of the population. This was in agreement with that reported in Himalayan regions and in Bangladesh, where the pig was a sacred animal species, assimilated even to a god, and was also used as an offering to various deities [20,21]. Slaughtering of pigs in Hindu religion in Bangladesh was considered as the best offering to satisfy God in religious rituals [21].

The uses of pigs and their derivative by-products to ward off bad fates, such as illness and death of family members or livestock, as well as in marriages, births, and funerals in both Bangladesh and Benin showed that these countries had similar traditional practices about the usefulness of pigs. This study also showed that pigs and pig products were also used in occultism and traditional medicine in Benin. These results were in agreement with those reported in Congo Brazzaville [18]. This author mentioned that pig was used under the name "pig of infamy" to expiate for incest offenders in order to appease the anger of ancestors. In Southern Benin, pig fat was used to treat various diseases such as hives, smallpox, measles, and burn lesions, while in Congo Brazzaville, pig fat, carefully collected in vials, was used as an ointment for young people who oiled their bodies with it to give them shine [18]. In addition to this cosmetic use, it was a formidable weapon in the fight against witchcraft. Indeed, the lintels of house doors were coated with this grease to prevent witches from entering and thus ward off their evil spells [18]. This author reported that the sorcerer ate pig fat to temper his desire to bewitch and added that this practice was perpetuated in Congo. In each of the different practices using pigs, users pointed out that the local breed of pig was preferred. This was justified by the fact that ancestors who had instituted cultures and traditional practices had not known any other breed of pigs out of the local breed. As tradition was customary, civilizations passed down from generation to generation, the local pig becomes irreplaceable. Thus, the loss of this genetic patrimony will not only be a severe blow to the rural economy but may also have a negative socio-cultural impact, seeing that domestication has long been practiced and domestic animals are now part of the culture of communities [22].

5. Conclusion

This study has highlighted the food, socio-anthropological, cultural, and medicinal functions of pigs and derived products in Southern Benin. It shows that apart from the contribution of pig farming to fight against poverty by increasing producers' income and fighting malnutrition, it also provides sociocultural, religious, and therapeutic needs within populations in Southern Benin. Whatever the use fields of pigs and derived products, the local breed of pig is the one that best meets the expectations of users from a dietary and traditional point of view. Thus, a local pig is of paramount importance in the daily life of Beninese people in Southern Benin. For this reason, Local African Pigs need to be preserved by sustainable management strategies.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this article.

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