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RESEARCH FRAMEWORK FOR THE DEVELOPMENT OF CREOLE PIG'S NICHE MARKET IN MARTINIQUE: A HOLISTIC APPROACH

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Keywords : local breed, natural park, Martinique, pig

Abstract

The Creole pig has always been part of the rural and suburban landscape of Martinique. Currently, this breed is not integrated into a research and conservation program. The Natural Park of Martinique Region (PNRM) has the objective to maintain and valorize the genetic heritage of Martinique's Creole pig and develop a niche business. Based on PNRM knowledge, some Creole pigs live freely in the mountains in the North, in the South coast and in a few disparate traditional breeders located in the countryside. It is essential to carry out an inventory of the local pig population to propose a scheme for conservation and economic development. In order to favour the appropriation of the Creole pig niche, the PNRM, as a decision maker, acts in a systemic and holistic way by considering the whole Martinican territory and the pig sub-sector: producers involved in the COOPMAR pig farmers' cooperative, researchers of INRA (FWI), the food chain and at least (in a second phase) the consumers and the Martinican society. First of all, the pig farmers are involved (private family farms and specialised pig producers). Researchers and technicians from PNRM and INRA-URZ (Animal production research unit) and INRA-PTEA (Tropical platform in animal experimentation) are performing experimental studies both in controlled conditions and in farms, in order to: i) determine phenotypic and genetic characteristics of Martinique's Creole pigs in comparison with other pig breeds from the Caribbean area; ii) help at designing genetic management to maintain the population and avoiding inbreeding; iii) help at defining feeding management by a) establishing, at the whole territorial food chain, an inventory of co or by-products available for pig feeding; b) implementing experimental studies in technology for conservation; c) implementing feeding and growing experiments and finally iv) help at defining eco-friendly production systems a) aiming at generate an adequate revenue and b) focusing on ecosystem services such as meat quality, socio-cultural services and circular economy.

Introduction

The local pig of Martinique, often call "black pig" or "plank pig" or "wild pig" has been an element of the rural and peri-urban landscape from many years (Létang 2013). He had played a relatively important part in the economy of subsistence or small-scale farmers. However, the small black pigs are now very rare throughout formal production units, due to indiscriminate breeding with imported exotic breeds due to the development of intensive pig systems with purchased industrial feed. Currently, the local pig of Martinique is not integrated into a research and conservation program. The Natural Park of Martinique Region (PNRM) has the objective to maintain and valorize the genetic heritage of Martinique's biodiversity. The PNRM's medium term objective is to maintain the Creole pig population and to develop a niche business. Since 1970s, INRA has performed studies to characterize the Creole pig breed of Guadeloupe. Studies have been performed on morphologic characteristics (Barrau 1978; Lauvergne and Canope 2000), growing performance (Canope and Raynaud 1982; Renaudeau et al. 2003), reproductive performance (Gourdine et al. 2006), carcass and meat qualities (Deprès et al. 1992; Renaudeau et al. 2005b; Renaudeau and Mourot 2007) and heat adaptation (Gourdine et al. 2007; Renaudeau et al. 2005a; Renaudeau et al. 2006). Based on PNRM knowledge, some Creole pigs live freely in the mountains in the North, in the South coast and in a few disparate traditional breeders located in the countryside (Seychelle, 2015). It is essential to carry out an inventory of the local pig population to propose a scheme for conservation and economic development (Audinay 2014, personal communication). The research project aims at i) determining phenotypic and genetic characteristics of Martinique's Creole pigs in comparison with other pig breeds from the Caribbean area; ii) designing genetic management to maintain the population and avoiding inbreeding; iii) defining feeding management by a) establishing, at the whole territorial food chain, an inventory of co or by-products available for pig feeding; b) implementing experimental studies in technology for conservation; c) implementing feeding and growing experiments and finally iv) defining eco-friendly production systems a) aiming at generate an adequate revenue and b) focusing on ecosystem services such as meat quality, socio-cultural services and circular economy. The objective of this paper is to present the one-year research project (February 2016 – February 2017) on the Creole pig of Martinique which lay stress on the genetic part (i and ii) and the feeding resources inventory part.

Material and methods

1. The holistic approach

The PNRM, as a decision maker, acts in a systemic and holistic way. Different stakeholders characterized by different skills are involved in the project, including apart from PNRM, the National Institute for Agricultural Research (INRA), pig farmers' cooperative (COOPMAR), Regional Chamber of Agriculture of Martinique, and farmers. A schematic presentation of the project is described in Figure 1. The project can be divided in experiments implementing by INRA (genetic and feeding analysis) and research actions managed by INRA (conception and evaluation of farming systems and evaluation of ecosystem services). Table 1 summarizes the "rules" of each stakeholder.

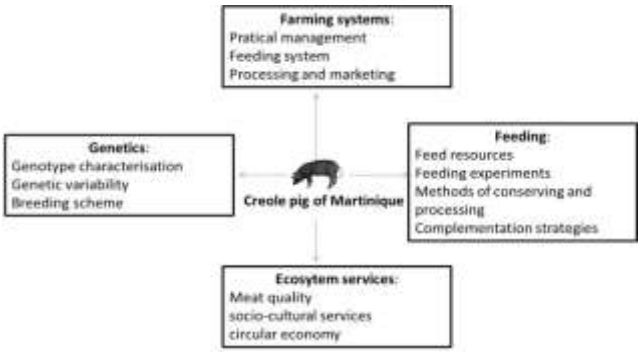

Figure 1– Schematic representation of the research project

Acronym	Description	Contributions
PNRM	The Natural Park of Martinique Region	Decision maker Capture of freely pigs
Rurality - Multiservices	Engineering	Coordinator Management of meeting between partners Administrative tasks Surveys on farmers and feed resources
INRA-URZ	National Institute for Agricultural Research Animal Production Unit Research	Scientific expertise (Farming systems, genetics, nutrition, technological processes) Technical expertise (Pig production) Experiments
COOPMAR	Pig farmers' cooperative of Martinique	Technical expertise Following of farming systems for farmers belonging to the cooperative
CA Martinique	Regional Chamber of Agriculture of Martinique	Technical expertise Following of farming systems for private farmers not belonging to the cooperative Implementing the herd book of the Creole pig of Martinique
Farmers		Implementing breeding schemes and feeding management

Tableau 1. Description of the contribution of each partner in the project

2. Genetic analysis

Based on literature on management of inbreeding (De Rochambeau and Chavalet, 1985 ; Rydhmer et al., 2010), the genetic researches aim at obtaining a minimum of 10 boars and 40 sows (5 sire lines and 5 dam lines) for the founder population. To achieve these goals, farm surveys and blood samples collection on more than 50 animals that phenotypically look like Creole pig breed are needed. The following process is implemented: i) serologic tests to check any sanitary problems (classical swine fever; brucellosis; Aujesky's disease; porcine reproductive and respiratory syndrome virus); ii) genotyping of blood samples with the Illumina's porcine SNP60 BeadChip (Ramos et al., 2009) and analysis of genetic variability and genetic distances between pigs and other Creole pig population; iii) choice of founders based on genetic analysis; iv) serologic tests (pre-quarantine and quarantine); v) Implementation of the breeding scheme. with the following rules: a) maintain sire and dam lines: each boar and each sow will be replaced by one of their son or daughter; b) Movement of boars: a boar of one farm will be mated with females of another farm; c) The number of boars used each year is as large as possible and the renewal rate is fast.

3. Feeding resources inventory

Agricultural wastes (such as grade-outs, return from food factories) can represent a large amount of organic matter which can be turned into animal feed, especially for omnivore monogastrics (San Martin et al., 2016). INRA will be able to propose technological processes to prevent and preserve from the development of dangerous germs such as *Clostridium*, while keeping or increasing the energy or protein contents to satisfy the nutritional requirements of animal. A survey was then established to assess the origin and the availability of wastes in quantity, in quality and frequency.

Results and discussion

1. Characteristics of the local pig of Martinique : preliminary results

Until now, blood samples of a total of 26 pigs (around one third of the targeted number of samples) from 5 farms (Figure 2) were collected. These animals showed phenotypes which are commonly observed in well-known Creole pigs. Most of them are living outdoors. Serological analysis showed that all animals were negative by both classical swine fever; brucellosis; Aujesky's disease; porcine reproductive and respiratory syndrome virus. To our very knowledge, the local pig of Martinique is not yet genetically characterized at the opposite of other Carribean regions such as in Cuba (Velàzquez et al. 1998), Mexico (Sarabia et al. 2011) or Guadeloupe (Canope and Raynaud 1981).

Nevertheless, based on the historical background of the Caribbean area and South America and the well characterized local pig populations in these countries (Burgos-Paz et al. 2013), there are very few doubts that the local pig of Martinique is from Creole types. Moreover, phenotypes of local pigs observed in different farms of the Martinique's territory, argue for this Creole appurtenance.

Figure 2– Geographical location of animals collected

2. Interactions between partners : trust and commitments are the key of the success

The interactions between various stakeholders involved in the project are formalized in several meetings through a technical committee (on average one per two months) where protocols are discussed, revisited and collective decisions are taken. Commitments and trust between each other are the main keys for the success of the project. The success of the genetic and feeding managements is closely related with the economic development of the niche market for which linkages are needed by considering the whole Martinique territory (Figure 3).

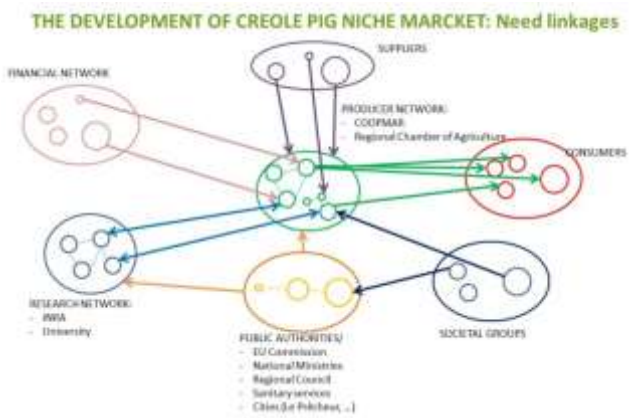

Figure 3– Schematic representations of interactions between stakeholders for the development of the Creole pig niche market (adapted from Geels et al, 2002)

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