

THE PHILIPPINE NATIVE PIG BREED INFORMATION SYSTEM: A WEB-BASED RECORD KEEPING APPLICATION FOR NATIVE PIG FARMERS

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ABSTRACT

A web-based information system that collects and organizes standardized farm records of different Philippine native pigs was developed. The information system provides an interface to encode data and automatically generate summaries and performance reports. Farm visits to six different native pig Institutional breeding farms were conducted to consolidate and standardize collection of farm records. Standard record forms were distributed so that the farm personnel can already use them while the development of the information system is on-going. The database of the information system was then designed and the web application was developed using software tools. Philippine Native Pig Breed Information System can be accessed at <http://pab-is.pcaarrd.dost.gov.ph/nativepigs/>. Registered farm users can log-in and access the features of the information system. Further, the website showcases information on the morphology, body measurements and reproductive performance of six native pigs of the Philippines, which can be viewed by the general public and stakeholders.

Keywords: Philippine native pigs, breed, information system

INTRODUCTION

The Philippine native pig is a valuable genetic resource. In addition to being sources of food and livelihood, native pigs are strongly connected to Filipino culture and tradition. Native pigs are resilient to harsh environmental conditions and can thrive with minimal management interventions, resulting in lower maintenance costs (Baguio, 2017). For continuous production and supply of native pigs, reliable sources of breeding stocks are needed by small scale or commercial native pig raisers.

Institutional breeding farms are stationed strategically in provinces either known to be one of the major suppliers of native pigs in the market or home to a unique breed or strain of native pig. Six native pigs namely, Benguet, Yookah, ISUbel, Markaduke, Q-Black, and Sinirangan were purified following specific breed standards or criteria on appearance and performance. As breeding farms, pertinent animal records are kept and organized. Hard copies of record forms have been developed for swine raisers (PCAARRD, 2010). These

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forms include recording animal inventory, number of breeding, farrowing and weaning, sow and litter-, and boar performance, and mortality. Based on these forms, production indices can be calculated.

Hard copies of farm records are important but manual retrieval of individual animal performance or farm reports, generation of production indices, and tracing pedigrees are challenging. Thus, through the development of a web-based Philippine Native Pig Breed Information System, encoding of data, management of information, generation and retrieval of reports can be accomplished real-time. Furthermore, by having a common online portal, information published by Institutional breeding farms on the native pig's standard appearance and performance may be made available to the public viewers and stakeholders such as policymakers, entrepreneurs, and academicians. The process of developing the Philippine Native Pig Breed Information System will be described in this paper.

MATERIALS AND METHODS

An overview of the development of the Philippine Native Pig Breed Information System is shown in Figure 1.

The development started with visiting Institutional breeder farms to study their data collection practices and to check the inventory of the animals. These farms established by Benguet State University, Eastern Samar State University, Isabela State University, Kalinga State University, Bureau of Animal Industry-National Swine and Poultry Research Development Center, Nueva Vizcaya State University and Marinduque State College participated in the research and were visited all year round to study their data collection practices and validate the initial data collected including the inventory of the animals. This step is essential in developing the standardized forms and data collection procedures that became the bases for the design of the information system.

To be able to collect the same data across farms, animal records were organized using standardized record forms. A total of five record forms that capture most data that were important for breeding and swine production were devised. These include morphology and morphometric traits, body weights at different ages, reproductive performance (breeding, sow, and litter) and mortality and sales. These record forms became the basis of the design

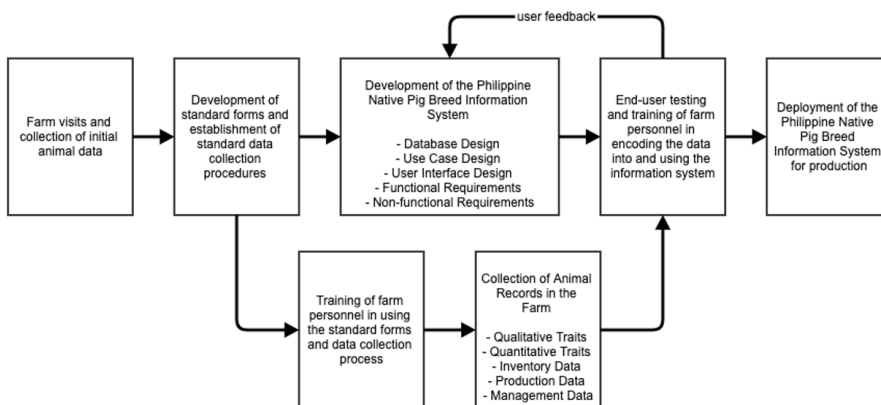


Figure 1. The step-by-step process in the development of the Philippine Native Pig Breed Information System.

of the information system and was consolidated into a record keeping manual entitled, Practical and Organized Record Keeping (PORK) for Native Pig Farmers.

Standard data collection procedure was developed through visiting the farms multiple times and meeting with the farm personnel of the Institutional breeder farms. The morphological features of the animals were to be collected at 180 days of age, the process for collecting the quantitative data such as morphometry and performance were summarized in a manual that served as a guide for the farm personnel. The data collected were also based on the Food and Agriculture Organization (FAO) checklist (FAO, 2012). After the record forms and the standard data collection procedure were established, the farm personnel kept paper records of the animal data while the information system was being developed.

An information system is an organized system of collecting, storing, organizing, analyzing, and communicating information. It utilizes a database management system (DBMS), which is a computer application that makes the interaction between the user, other applications, and the database possible. The design of the database primarily lies in the data to be deposited and its relationship with other data or variables. The information system can be deployed on the cloud, which enables the application to be accessible using a web browser and the information to be made available to its target users on-demand, anytime, anywhere.

The Philippine Native Pig Breed Information System was developed using the following tools: MySQL for the database, PHP and Javascript as the server-side scripting languages, Laravel as the PHP framework, and Materialize CSS framework for the user interface.

The system has three types of users: the farm encoder, who can add, update, and delete the native pig data and can view the reports generated by the system; the administrator, who manages the users and the website content such as the news articles and reports, and the guests, who can view the summary of the performance of the native pig breeds through the website. A newly registered user will be prompted by the system to add the current animal inventory on the farm. Existing users can update the records and add more animals into the system. The flowchart shows that the users of the system can add the following data: the breeder records, breeding records, sow and litter records, grower records, growth records, gross morphology and morphometric characteristics, and mortality and sales (Figure 2). Reports are generated based on the data that the farm user has encoded in the system.

Actual farm data were used in end-user testing and training in the use of the system. Feedback from the farm personnel was collected and they were incorporated into the system as needed. Finally, the Philippine Native Pig Information System was deployed on a server with the following specifications: Ubuntu 18.04.03 LTS as the server's operating system, Apache v. 2.4.29 as the webserver, and Composer v. 1.6.3 and the dependency manager for PHP. The system was made available online so that the farm personnel can access it anytime using a web browser.

RESULTS AND DISCUSSION

The present research developed a web-based Philippine Native Pig Breed Information System that can be accessed at <http://pab-is.pcaarrd.dost.gov.ph/nativepigs> (Figure 3). The system collects raw animal data from different Institutional native pig breeder farms around the Philippines. The website showcases a summary of the different breeds'

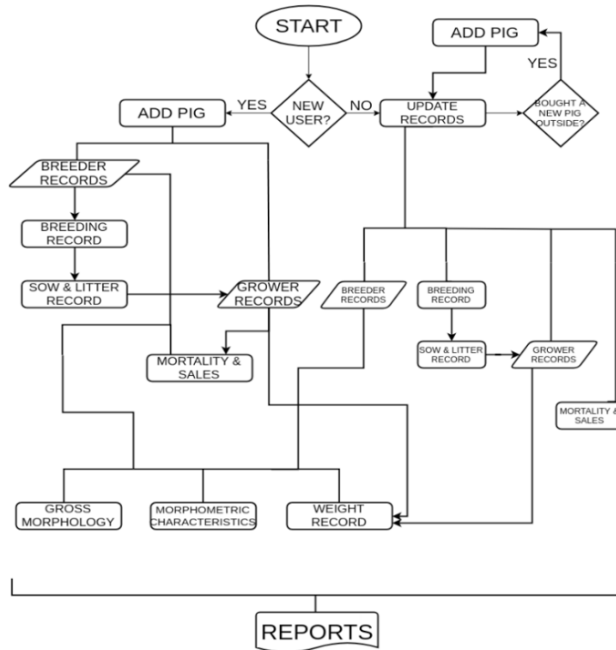


Figure 2. Process of encoding the animal data into the information system.

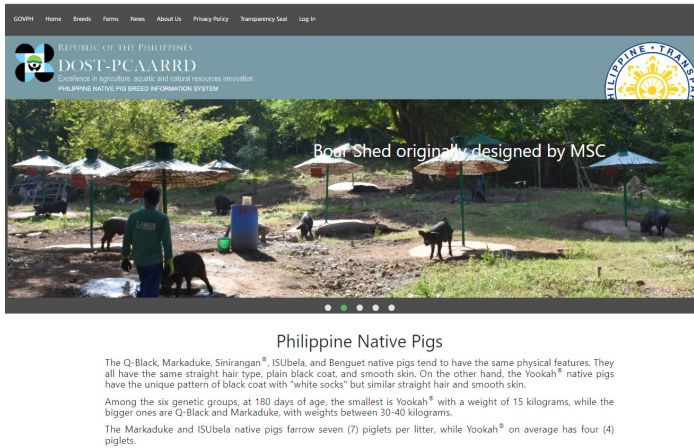


Figure 3. The Philippine Native Pig Breed Information System home page.

predominant characteristics and performance (Figure 4) based on the reports of the breeder farms.

The functional requirements were implemented and they formed the features of the information system (Table 1). Features for farm encoders were mostly for encoding native pig data into the system and generation of farm reports. These features are accessible to farms with approved registration and log-in credentials. Moreover, features for administrators were for user management and generation of reports that consolidate all the data from the registered farms. The Administrator manages all the activities in the information system including the user activities, user accounts, breeds, and farms. He can also access all the

reports from all the farms that were generated by the system. Guest users can only view the published reports by the administrator.

Upon logging in as a farm encoder, one would see the farm dashboard (Figure 5) which displays the current inventory of pigs in the farm. The dashboard also shows a graph of the monthly performance report of the pigs for the current year. It shows the number of animals bred, farrowed, weaned, born alive (male and female), and average birth and weaning weights. The menu at the left (see Figure 6) shows the features for recording of data (1) and the reports (2). The farm encoder can navigate through the features by clicking on any item on the menu.

Farm encoders can generate the reports by clicking the Reports item in the menu (Figure 5,6). An example of the reports that the system generates is the gross morphology report (Figure 6). It shows a summary of the qualitative traits of the breeder pigs. The summary is presented in tabular and in graphical formats. The system provides a summary for all breeders and for each year. Other reports include the pig's pedigree, morphometric characteristics of the pigs, growth and production performance, animal inventory, and mortality and sales. These reports can be downloaded in pdf or csv formats.

Two state universities provided searchable databases on the different breeds of livestock and poultry. One of the longest-running databases was developed by the Department of Animal Science at Oklahoma State University in Stillwater, USA (OSU, 2020). More recently, Seoul National University, South Korea created their own Native Pig and Chicken breed database (Jeong *et al.*, 2014). These breed databases provide information on the origin, distinguishable or unique features, and the conservation status of the breed. Similarly, the Domestic Animal Diversity Information System (DAD-IS, 2020) and Domestic Animal Genetic Resources Information System (DAGRIS, 2020) are web-based breed databases.

The Philippine Native Pig Breed Information System is innovative and unique from the databases available in the web. While there is a common homepage for the different users, features of the system can be accessed depending if the user is a registered farm encoder, administrator and guest. Through the Philippine Native Pig Breed Information System, it is possible to integrate the data from different Institutional native pig farms and to publish the information in the homepage.

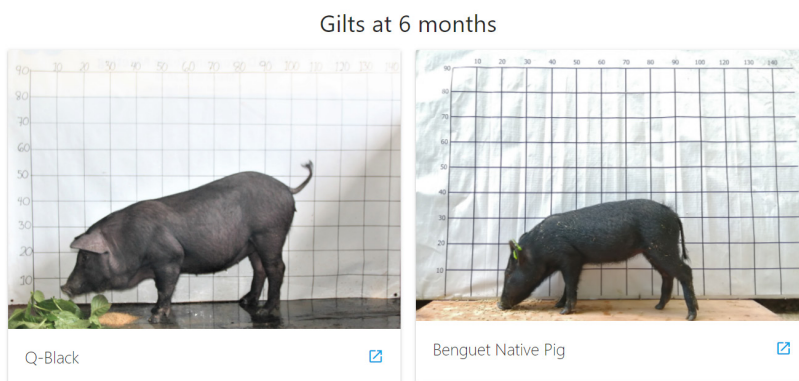


Figure 4. Sample photos of Philippine Native Pigs (6-month-old female) provided by research partners. When the arrow icon is clicked, the profile of the breed will be shown.

Table 1. Major features of the Philippine Native Pig Breed Information System.

User	Feature	Description
Farm encoder	Farm Dashboard	This feature shows a summary of the important farm indices for a certain period.
Farm encoder	Add a new pig	This is where data of pigs are entered. This is used only if the pig to be added in the system either comes from another farm, has no data for its parents, or is from the foundation stock. Pigs can be added either as breeders or growers.
Farm encoder	Breeder Records	This feature lists all the breeders in the system and the information about them which include: gross morphology, morphometric characteristics, and weight, breeding, and sow and litter records.
Farm encoder	Grower Records	All the breeder pig's offspring's data which are added with grower status can be found in this section. Growers added to the system can be tagged as candidate breeders in through this feature.
Farm encoder	Generate Farm Report	This feature allows the farm encoder to generate reports such as the pig's pedigree, morphology and morphometric characteristics of the pigs, growth and production performance, animal inventory, and mortality and sales. The reports can be downloaded in either pdf or csv formats.
Administrator	User Management	This feature enables the administrator to create or delete a user.
Administrator	Farm Management	This feature enables the administrator to create or delete a farm.
Administrator	Breed Management	This feature enables the administrator to create or delete a native pig breed.
Administrator	Generate Report	This feature enables the administrator to view a summary of reports for all farms. The reports can be downloaded in either pdf or csv formats.

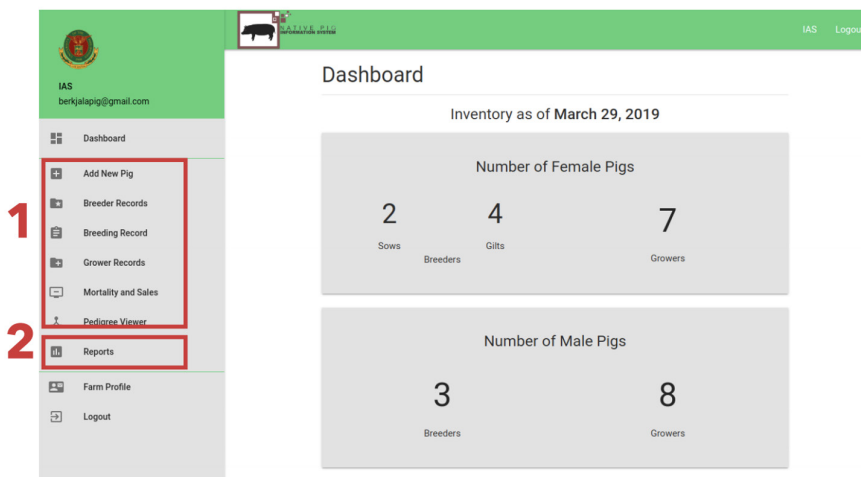


Figure 5. The farm dashboard gives an overview of the inventory of pigs in the farm.

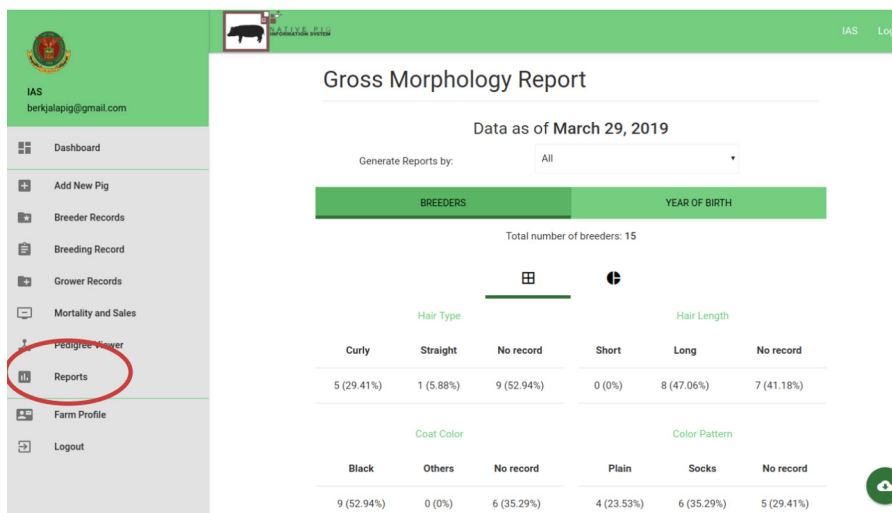


Figure 6. The Gross Morphology Report page shows a summary of the characteristics of the pigs in the farm, based on the data provided by the farm encoders to the information system.

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