

선발된 아프리카와 아시아 국가들을 위한 가축유전자원 정보시스템 구축

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Country based Domestic Animal Genetic Resource Information System (C-DAGRIS) for Selected African and Asian Countries

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ABSTRACT

Accurate information on the genetic and phenotypic characteristics and diversity of the indigenous Farm Animal Genetic Resources (FAnGR) is the basis on which their present and future sustainable utilization and conservation should be made. The paper describes the objectives, structure, functionality, content, utility and future prospects of the Country- Domestic Animal Genetic Resources Information System (DAGRIS) of ILRI. This electronic database is designed to cater for the needs of researchers, policy makers, development practitioners, teachers, students and farmers in developing countries for efficient access to available published and grey literature from past and present research results on the origin, distribution, diversity, present use and status of selected Farm Animal Genetic Resources (FAnGR) of the countries. Development of the country-modules of c-DAGRIS in English and French for Anglophone and Francophone countries is finalized and ready to be used.

(Key words : Farm Animal Genetic Resources, genetic and phenotypic characteristics, diversity, information system, country DAGRIS)

INTRODUCTION

Information on the extent and use of existing diversity in indigenous Farm Animal Genetic Resources (FAnGR) is the basis for their present as well as future sustainable utilization and conservation. Phenotypic and production system characterizations are ideally conducted within the framework of the country's National Strategy and Action Plan for AnGR or other livestock development strategies and programmes, to supply AnGR-related data that are needed by policy makers, development practitioners and researchers for planning and implementing sustainable management programmes for these resources (FAO, 2012). Information generated regarding FAnGR can only

be channeled to their sustainable utilization if readily accessible to the various stakeholders through a well-organized information communication platform or system.

Such information system and agricultural knowledge communication platform is generally lacking or at the best incomplete in developing countries (Ajani, 2013). Many development practitioners face a challenge in accessing timely and relevant agricultural knowledge resources, especially those that are country specific (Fanos *et al.*, 2012).

Countries in Africa and Asia maintain a wide but declining diversity of indigenous FAnGR. National research and teaching institutions in these countries have limited capacity to develop and maintain systematic information systems needed to support

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livestock utilization and breeding improvement. The need for effective inventory as well as efficient mechanisms for information sharing is well recognized. Many countries are grappling with these issues at a time when they have limited in-country capacity while at the same time conscious of the need for nations to take responsibility for the management and improvement of their own genetic resources and associated data, consistent with the Convention on Biological Diversity (CBD). Global information systems or data bases have long been put in place (Helen *et al.*, 2012) to support countries in their endeavors to conservation of Animal Genetic Resources through sustainable utilization (FAO, 2012). The DAD-IS, developed and managed by FAO, provides users with searchable databases of breed-related information on 14,000 breed population, representing 35 species and 181 countries member (DAD-IS, 2011). The Domestic Animal Genetic Resources Information Systems (DAGRIS), was being developed and managed by ILRI since 1999 as an easily accessible and efficient electronic information resource (<http://dagris.ilri.cgiar.org/>) in recognition of the growing demand for comprehensive source of information on indigenous FAnGR of countries in Africa and Asia. However, neither of the major global databases is operationally linked to any national institution for active involvement now or in the future (Workneh *et al.*, 2004). Lack of full information for all breeds of specific countries (Helen *et al.*, 2012) and absence of information on some species that are used in food and agriculture such as fish and honey bees (IBC, 2007) have had a negative implication on utilization of the global information systems at specific country level.

A country-based FAnGR Information system would best meet the needs of each nation.

This paper reviews the conceptual and methodological approaches followed in developing a country based Domestic Animal Genetic Resources Information System (C-DAGRIS) as a tool for well-informed decision making in sustainable utilization and conservation of Animal Genetic Resources.

OBJECTIVES

The main objective of the project was to develop country based Domestic Animal Genetic Resources Information System (C-DAGRIS) for selected African and Asian countries with plans to extend it to the entire Sub-Saharan African continent and Asia during phase 2 of the project. The specific objectives

of this project were: i) to develop country-based Domestic Animal Genetic Resources Information Systems (DAGRIS) (in English and French for Anglophone and Francophone countries, respectively) with facility and functionality to capture comprehensive and reliable information on genetic characteristics, productivity and utilization of country livestock compiled and continuously update, ii) to build the requisite human capacity to ensure maintenance of the country-based DAGRIS and the effective use of this information to sustainable utilize (i.e. improve and conserve) the indigenous FAnGR, and iii) to establish a network for communicating and exchanging such information among and between the various African institutions.

1. What is New in Country-DAGRIS

The need for the development of country DAGRIS were obtained by reviewing earlier user's feedback on global DAGRIS and recommendations of the workshop upon reviewing the mockup country DAGRIS. The approach followed in developing country DAGRIS was aligned to the global DAGRIS (developed and managed by ILRI since early 1990s). The newly developed country DAGRIS keeps all the features of global DAGRIS with the following additional features in to it.

- A non-curative data (information) capture module: to capture any relevant breed-level characterization information that is yet to be reviewed and validated for inclusion into Country DAGRIS;
- Country DAGRIS using an open source system to minimize / avoid any third party software implications when deployed in the countries;
- A module to automatically publish species/breed related news as obtained from related sources (news feeds);
- Included a module to capture images and descriptions not specifically related to a particular breed or species but animal agriculture in the country (image gallery);
- Included a discussion forum module to allow moderated discussions on topics related to breed characterization information and related topics in the country;
- Provide multi-level access to the database so that users shall only tasks they are allowed to do. For instance, content editors can only add and edit records while content managers can define content types and parameters in the system of specific country; and
- Bulk import and export of data shall be possible to allow

data be pre-prepared in excel like format and be migrated to the system in bulk.

- Several contributed modules and new modules were developed to customize the intended objectives of Country-DAGRIS
- The graphic design for the countries was developed in such a way that it represents the individual countries
- Country DAGRIS was tested using sample data to confirm whether requirements were satisfied based on global DAGRIS users comments and comments gathered from the mockup presentations
- Country data available in global DAGRIS was migrated for six African countries (Ethiopia, Eritrea, Kenya, Rwanda, Tanzania and Uganda) and for four Asian countries (Bangladesh, Pakistan, Sri Lanka and Vietnam)

2. Overview of the New System

Country DAGRIS is web based database system that allows registration of breeds, trait, species and other related information at country level. The country DAGRIS is to be managed by the respective national institutions in selected African and Asian countries. The information is planned to be used by national researchers, development workers students, policy makers etc. as a sources of information for sustainable utilization and conservation of Animal genetic resources in the country.

After evaluating various open source web content management systems, country DAGRIS was implemented using Drupal. This web content management system was selected as it meets most of the requirements mainly:

- It is free and open-source content management system (CMS) and content management framework (CMF) written in PHP and MySQL database. Countries are not required to buy any software to manage and use country DAGRIS
- It runs on any computing platform that supports both a web server capable of running PHP to store content and settings.

3. System Architecture

Country DAGRIS has a client server architecture where data storage takes place in the backend database server and a graphical user interface through which users interact to the database to store and retrieve data. The graphical user interface is subdivided into several modules providing specific functionality. Some of these modules include data entry, import/export, report generation, system administration etc. Fig. 1 shows the overall system architecture and user interaction with the system.

4. Content Types

The type of contents maintained in the country DAGRIS include breed related and other general information. Breed

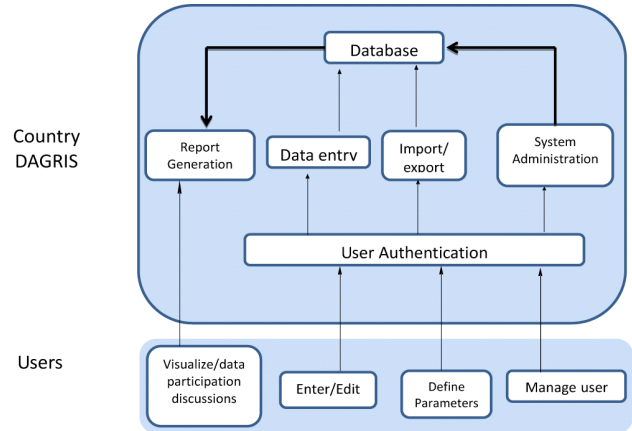


Fig. 1. System architecture.

related data from global DAGRIS was used as an initial content for each country to populate the respective country DAGRIS. The type of breed related information captured in country DAGRIS are general breed information, trait data, breed images and population data for the breeds. In addition the following general information can be captured in country DAGRIS:

- Non-curative data (new for country DAGRIS)
- Bibliographic data
- Image gallery (catalogue) (new for country DAGRIS)
- Discussion forum (new for country DAGRIS)
- News feeds
- Related links

5. System Features

The following list shows the various features of country DAGRIS.

1. Data browsing and searching: Entry to published data and viewing is possible in two ways, browsing and searching. One can browse the breed list and pick a specific breed to see all related information about that breed such as its name, location, its main use in, habitat, trait data, images, population data etc. It is also possible to search content in the database by species and specific content types. There is no need to login into the system in order to browse and search data, all users are able to view any published data.
2. Data entry and editing: Entering new data and editing existing content is also possible to selected privileged users. Once



Fig. 2. DAGRIS - Ethiopia home page.

content has been entered into the system and an existing one has been edited, it needs to be published before it is available for viewing. Only content editors and managers are able to view unpublished content and it is their responsibility to finally publish it.

3. Data Import / Export facility: Imported and exported data in batch mode instead of one by one. Batch import facility available to content editors and managers where they can prepare the data in other formats outside the system and push it to the system at once.
4. Master data preparation: Depending on the specific need the database can be extended by allowing it to accept data for more species, trait types and add variables for which data must be captured in the system. This is a feature available to content managers only.
5. System Administration: Users management is done by a system administrator who will create new users and assign the appropriate roles and permissions. The system administrator also monitors the system to ensure the smooth operation of the system by making the necessary adjustments.

As indicated above country DAGRIS has multiple level of access where each user has specific permission on the system. General public, content editors, content managers, system administrators have different level of access.

In addition to the above features, country DAGRIS can be deployed in the local language of the country due to the multi-lingual capability of the underlying system.

6. The Way Forward

Now that first version of Country-DAGRIS is available for the ten countries, the following are the points that need to be considered as a way forward.

- Identifying national focal institutes that are able and willing to manage C-DAGRIS;
- Setting up of necessary IT infrastructure for the management and dissemination of country databases;
- Training on the management of breed-level data on indigenous AnGR and system management to research and academic staff of the national focal institutions; and
- Establish and strengthening communication and information exchange network between focal institutes

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적 요

재래가축의 유전자원(FAnGH)의 유전학적 및 표현형적인 특성과 다양성에 대한 정확한 정보는 가축의 현재와 미래의 지속 가능한 이용 및 보존에 중요한 역할을 한다. 본 논문은 과제에 참가한 각 나라별로 목적, 구조, 기능, 내용, 이용성 그리고 미래의 전망 등을 국제축산연구소의 각국별 재래가축 유전자원 정보시스템(DAGRIS)이라는 데이터베이스에 기술하였다

이 DAGRIS는 전자 데이터베이스로 개발도상국의 연구자, 정책 담당자, 개발 실행자, 교육자, 학생 그리고 농업인들의 요구에 부합되게 설계되었다. 또한 각국의 선발전 가축유전자원(FAnGR)의 기원, 분포, 다양성, 현재 사용도 및 상태 등에 관한 과거와 현재의 연구 결과로부터 논문으로 게재되거나, 문헌 등을 쉽게 접근하기 좋게 개발되었으며, 영어와 불어 사용자를 위하여 영어와 불어로 c-DAGRIS의 국가별 모듈을 개발하고 사용될 수 있게 만들었다.

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