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Maintenance and development of the Domestic Animal Diversity Information System DAD-IS

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Names of Countries and Territories (NOCS)

Food and Agriculture Organization of the United Nations (UNFAO)

<http://termportal.fao.org/faonocs/appl/>

Global Administrative Unit Layers (GAUL)

Food and Agriculture Organization of the United Nations (UNFAO)

<http://www.fao.org/geonetwork/srv/en/main.home?uuid=f7e7adb0-88fd-11da-a88f-000d939bc5d8>

United Nations Cartographic Section, Department of Field Support.

<http://www.un.org/Depts/Cartographic/english/htmain.htm>

I. Introduction

1. DAD-IS¹ is the Domestic Animal Diversity Information System hosted by FAO. It is a communication and information tool supporting the development of strategies for the management of animal genetic resources. It provides the user with searchable, dynamic, multilingual databases of breed-related information and images, management tools, and a library of references, links and contacts of Regional and National Coordinators for the Management of Animal Genetic Resources. It provides countries with a secure means to control the entry, updating and accessing of their national data. In 2014 an average of 2860 web- visits per month were counted with a peak value of more than 3200 visits in May.

2. As a result of about three decades of work (the development of DAD-IS going back to the year 1982²), the Global Databank for Animal Genetic Resource within DAD-IS offers:

- Information on more than 8 000 breeds of livestock and poultry from 182 countries and 38 species
- Information on breed characteristics, distribution and demographics
- More than 4 000 images
- Tools for generating user-defined reports
- An extensive library of full-text publications and links
- Multilingual interface and content

II. International relevance

A. FAO

3. The FAO Conference, in its 34th Session, endorsed the Global Plan of Action for Animal Genetic Resources³ in Conference Resolution 12/2007, and, among the recognition of the need for new and additional resources, also noted the important role of FAO to support country-driven efforts in the implementation of the Global Plan of Action.⁴ The 36th Session of the FAO Conference in 2009 requested that FAO ensure adequate Regular Programme support for the implementation of the Global Plan of Action.⁵

4. The important role of DAD-IS is best described in the Global Plan of Action under Strategic Priority 15 “Establish or strengthen international information sharing, research and education” which states that the FAO Domestic Animal Diversity Information System (DAD-IS) has to “Continue to develop, as a global communication tool and clearing-house mechanism for animal genetic resources”.

5. The Commission on Genetic Resources for Food and Agriculture (Commission), which is responsible for overseeing the implementation of the Global Plan of Action, already in its Ninth Regular Session in 2002 had stressed the crucial importance of data and information-sharing for the conservation and sustainable use of animal genetic resources, and in order to share solutions to common challenges⁶. It agreed that DAD-IS should be further developed for this purpose. In later sessions, the Commission requested that DAD-IS should be maintained and further developed, taking into account the needs of Member States^{7, 8, 9, 10} and requested FAO to provide technical support to facilitate data collection and entry by developing countries¹¹.

¹ <http://dad.fao.org/>

² Developing an institutional framework for the management of animal genetic resources:
<http://www.fao.org/docrep/010/a1404e/a1404e00.htm>

³ For more information please visit: <http://www.fao.org/docrep/010/a1404e/a1404e00.htm>

⁴ C 2007/REP, paragraph 144.

⁵ C 2009/REP, paragraph 68

⁶ CGRFA-9/02/Report paragraph 15.

⁷ CGRFA-10/04/ Report paragraph 46.

⁸ CGRFA-11/07/Report paragraph 24.

⁹ CGRFA-12/09/Report paragraph 39.

6. As DAD-IS is the tool for the monitoring of the resources indicator for the implementation of the Global Plan of Action, the Commission, in its Twelfth Regular Session, requested FAO to make status and trends reports on animal genetic resources available to the Commission at each of its regular sessions. Those status and trend reports on animal genetic resources have to follow an agreed format¹², that is to include the Convention on Biodiversity (CBD) headline indicator on “trends in genetic diversity of domesticated animal species of major socioeconomic importance” once it has been developed¹³.

7. Status and Trends Reports for animal genetic resources were prepared for 2008, 2010, 2012 and 2014¹⁴, the later one including the new set of resource indicators mentioned above. Those reports are solely based on breed population data from DAD-IS. The system has proven very efficient in preparing the status and trends reports mentioned above. Its currently developed modules on production environment descriptors will allow for future modelling.

8. The Commission, in its multi-year programme of work, has foreseen the review of the Second Report on the State of the World’s Animal Genetic Resources for Food and Agriculture¹⁵ in 2017, ten years after the first Report. As in the first Report, DAD-IS plays a crucial role in the development of the Second Report. The draft of the Second Report was anticipated and will be reviewed by the Commission in its Fifteenth Session in January 2015.

9. In addition, the DAD-IS breed distribution maps and modules on production environment descriptors were further developed and will allow to link breed diversity to other aspects of agricultural biodiversity (e.g. crops and their wild relatives, impact of climate change) which can be useful for the development of the State of the World’s Biodiversity for Food and Agriculture report that the Commission will also review at its Sixteenth Session in 2017. In this context the following tools have been developed:

- Hot spot maps of animal genetic resources: The internationally agreed indicators for the diversity of animal genetic resources (number of locally adapted breeds, share of locally adapted breeds and breeds at risk of extinction) were placed in a geographical context to produce hot spots maps – a pioneering work in the field of domestic animal diversity (Figure 1). Mapping hot spots of animal genetic diversity identifies priority areas for characterization, conservation and sustainable development of animal genetic resources. Provision of targeted support to livestock keepers in these areas can improve access to these resources; it would also help to ensure long-term food security
- Adaptation potential of domesticated animals: A tool was developed to identify livestock breeds under the greatest risk of extinction under different climate change scenarios as well as breeds with the highest adaptation potential. The current geographic distribution of breeds was used to model their adaptation potential, considering several temperature and humidity characteristics. This information served for defining potential current and future habitats. Future habitats were modelled according to the “Hadley Global Environment Model 2 - Earth System” and four levels of representative concentration pathways were selected. Differences between the potential current and future habitat are mapped according to a simple colour scale, where areas of loss appear in red, areas of no expected change in dark green and areas of habitat gain in light green (Figure 2). This tool can contribute to strengthening capacities of national governments, livestock keepers and farmers to protect and enhance food security under a changing climate, by allowing informed decisions on the adaptation potential and management of animal genetic resources.

¹⁰ CGRFA-14/13/Report, paragraph 31

¹¹ CGRFA-14/13/Report, paragraph 59

¹² CGRFA-12/09/Report paragraph 39.

¹³ CGRFA/WG-AnGR-5/09/3.2 Appendix A.

¹⁴ CGRFA/WG-AnGR-5/09/Inf. 7; CGRFA/WG-AnGR-6/10/Inf. 3, CGRFA/WG-AnGR-7/12/Inf.4. 4, CGRFA/WG-AnGR-8/14/Inf.4.

¹⁵ CGRFA/WG-AnGR-8/14/Inf. 2

10. In several sessions, the Commission invited donors to provide support to enable the maintenance and development of DAD-IS^{16, 17}. The following donors have contributed to DAD-IS development in the past decade: Switzerland, France, Sweden, Norway, the Netherlands, Spain and Japan. The European Commission supported DAD-IS through two EU-Genres projects (EFABIS and FABIS-net) which resulted in a Memorandum of Understanding between the FAO, the European Regional Focal Point on Animal Genetic Resources (ERFP) and the European Association for Animal Production (EAAP) about the future development and maintenance of DAD-IS.

11. In the PWB 2012–2013,¹⁸ work on DAD-IS contributed to Organizational Outputs B03 – Better management of natural resources, including animal genetic resources, in livestock production; F03 – Policies and programmes are strengthened at national, regional and international levels to ensure the conservation and sustainable use of biological diversity for food and agriculture and the equitable sharing of benefits arising from the use of genetic resources; and F05 – Countries have strengthened capacities to address emerging environmental challenges, such as climate change and bioenergy.

12. In the PWB 2014–2015¹⁹ under FAO's new Strategic Framework and Medium Term Plan, work on DAD-IS maintenance and development contributes to four Outcomes of SO 2 – Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner, specifically: 3 products under Output 20401 - Relevant data and information is assembled, aggregated, integrated and disseminated, and new data generated through analyses and modelling – jointly with partners; 1 product under Output 20402 - Methodologies, norms, standards, definitions and other tools for the collection, management, aggregation and analysis of data are formulated and disseminated, and 2 product under Output 20403 - Capacity development support is provided to institutions at national and regional levels to plan for and conduct data collection, analyses, application and dissemination.

B. Convention on Biological Diversity

13. Beyond FAO, DAD-IS role as clearing house mechanism and early warning tool for animal genetic resources for food and agriculture has been recognized by the Convention on Biological Diversity (CBD) since the mid 1990s²⁰.

14. In decision X/2, the tenth meeting of the Conference of the Parties to the CBD²¹, held from 18 to 29 October 2010, in Nagoya, Aichi Prefecture, Japan, adopted a revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets, for the 2011-2020 period. Target 13²² is defined as follows: “By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.” DAD-IS is thus a critical tool for the monitoring of the achievement of the Aichi targets. Within this umbrella, the Commission, in its Fourteenth Session, requested FAO to include the set of resource indicators in future reports on the status and trends of animal genetic resources and to publish the process indicators in future synthesis progress reports on the implementation of the Global Plan of Action.²³

15. As farmed and domestic animals are recognized by the Convention of Biodiversity to represent an essential part of biodiversity, and the CBD is currently strengthening its effort on the

¹⁶ CGRFA-10/04/ Report paragraph 46.

¹⁷ CGRFA-14/13/Report, paragraph 31

¹⁸ C 2011/3.

¹⁹ C 2013/3 Medium Term Plan 2014-17 and Programme of Work and Budget 2014-15; CL 148/3 Adjustments to the PWB 2014-15, Annex 5 Rev.1 updated May 2014 in PC 115/2 Annex 1: Results Framework – MTP 2014/17 / PWB 2014-15.

²⁰ For more information please visit: <http://www.cbd.int/doc/publications/cbd-ts-34-en.pdf>

²¹ UNEP/CBD/COP/DEC/X/2.

²² UNEP/CBD/COP/DEC/X/2 Annex I paragraph 13.

²³ CGRFA-14/13/Report paragraph 28

implementation of its “sustainable use” objective, DAD-IS is likely to become even more important in assisting global efforts to communicate the critical roles and values of animal genetic resources and in decision-support to facilitate the sustainable use, development and conservation of these resources. In this context DAD-IS also provided the data for FAO’s contribution to the Global Biodiversity Outlook 4²⁴ and the Biodiversity Indicator Partnership. It is also key in FAO’s results-based management, where solid indicators to assess progress and impact of FAO’s work are needed.²⁵

III. Current Status

16. Since more than 10 years, DAD-IS maintenance and development has mostly relied on project funds which are coming to an end in December 2014. The European Commission which supported DAD-IS development with two consecutive projects, had been a major donor. As a result of these EU funded projects (EFABIS project²⁶ and the follow-up project EFABISnet²⁷), a complex network of information systems on animal genetic resources was established, linking regional information systems and/or national information systems in individual countries to DAD-IS, the centre of a global network of standalone information systems. As part of the project obligations, the European Regional Focal Point (ERFP), the FAO and the European Federation on Animal Science (EAAP) signed a Memorandum of Understanding in February 2012 committing themselves to the long-term maintenance and development of the network of European Farm Animal Information Systems (EFABISnet) and DAD-IS.

17. In the global breed database within DAD-IS, FAO holds country breed data on behalf of countries. As DAD-IS is the only repository of such kind and recognized by the CBD, there exists no immediate replacement for DAD-IS. All countries that stored their breed data in DAD-IS expect a continuation of this service by FAO, and the European region expects the continued compliance with the MoU on DAD-IS maintenance and development that FAO has signed with ERFP and EAAP, and the data synchronization.

18. From the IT side, DAD-IS software was developed under the EU project in the mid-2000s. However, maps and GIS tools have been added. On the other side the Statistics Division of the FAO has launched a new version of the FAOSTAT²⁸, which is part of the organization's mission to improve data collection and dissemination for development and the fight against global hunger and malnutrition. The new platform continues to offer free and easy access to data for 245 countries and 35 regional areas from 1961 through the most recent year available. Enhanced features include browsing and analysis of data, an advanced interactive data download, and enhanced data exchange through web services. The dissemination tool “FENIX” developed by FAO could allow in future to link DAD-IS data with FAOSTAT as FENIX is designed to work with multiple databases for cross-sectorial analyses. The application of FENIX would lead to

- (i) an increased performance (e.g. regarding creation of charts, maps and tables on-the-fly, perform real-time calculations or downloading of large volumes of data);
- (ii) higher flexibility (e.g. in handling large varieties of data, ability to add/remove tools, capacity to accommodate user requirements; and more complex analysis as FENIX is interlinked with R statistical package).

IV. Way forward

19. In collaboration with FAO’s Chief Statistician, options for linking of DAD-IS into FAO-STAT are being explored. The approach discussed would be to link DAD-IS to FAOSTAT via FENIX, which would allow to combine breed data with all production and socio-economic aspects covered by FAOSTAT. The outreach of DAD-IS and its use by researchers would increase through

²⁴ UNEP/CBD/COP/12/9

²⁵ CGRFA/WG-AnGR-7/12/7 Targets and indicators for animal genetic resources

²⁶ <http://www.eaap.org/content/efabis.htm>

²⁷ http://eaap.org/Content/efabis_net.htm

²⁸ <http://faostat3.fao.org>

this link. The flexibility of FENIX would allow to present standard reports requested by the Commission not only from global but also from regional (requests were received by the African Union–Interafrican Bureau for Animal Recourses) or even country perspective. Such system is expected to help a much larger number of countries to improve data collection and it will increase efficiency in information management through a series of database tools for handling, validating and publishing data. The FAO Statistics Division would be able to advise countries to strengthen data exchange networks. Therefore, links between national institutions and international/regional organizations are expected to become stronger.

20. The options for long-term maintenance and development of DAD-IS could be realized most efficiently in a phased approach, as this allows flexible refinement and reorientation as new requirements (e.g. requests of the Commission) or technologies emerge. Costs for each phase are currently estimated at approximately 400 000USD.

- A first phase would focus on modifying DAD-IS -without touching the core structure of DAD-IS and EFABIS - by allowing smooth data synchronisation, improving the user friendliness of established reports, developing new reports and linking DAD-IS to FAOSTAT to allow creation of reports combining data on animal genetic resources with manifold other data related to countries' food and agriculture data.
- A second phase would include improving of user friendliness for data entry (eventually automatically controlled data entry) and developing a tool to allow automatic data uploading from existing national systems and modernizing parts of the backend in a stepwise approach.
- A third phase could include re-centralizing the database by keeping only one global node for data storage. A result of re-centralization of the database would be that the complex synchronisation processes between DAD-IS and the existing regional European node EFABIS and its 18 national nodes will become redundant. Therefore in the long term, maintenance costs at country level are expected to be very low, even if the initial development costs at FAO level would be higher than in the other options. The data and application centralization process allows countries to build their own interfaces for managing and disseminating information. This flexible approach enables easy adaptation of the system to the stakeholders' needs. A careful needs assessment would be undertaken to identify national and regional requirements in terms of functionalities and data: e.g. ability to enter species not yet covered in DAD-IS (e.g. bees), data entry tools supporting national languages etc.. Different options for uploading data in the database will be offered, such as online data entry, mobile apps or automatic upload of data for countries where national systems exist. Data would be quality-controlled by the application before uploading.

Figure 1: Hot spot maps of animal genetic resources

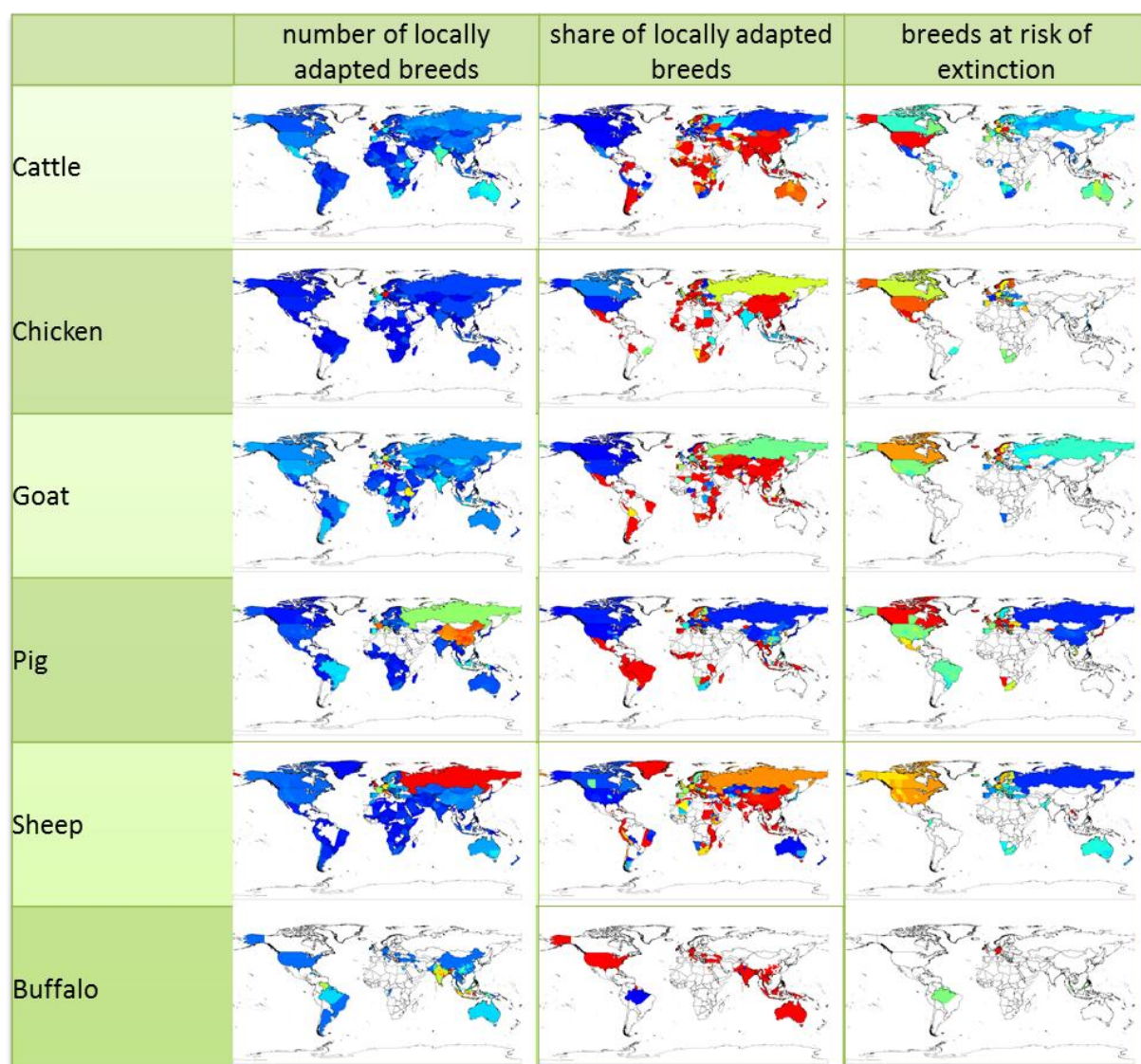


Figure 2: Potential breed habitat under different climatic conditions (e.g. Kamba cattle from Kenya)

