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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 4 of the Provisional Agenda

INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON ANIMAL GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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DETAILED REPORT ON THE DEVELOPMENT OF THE DOMESTIC ANIMAL DIVERSITY INFORMATION SYSTEM

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I. INTRODUCTION

The Domestic Animal Diversity Information System (DAD-IS) was established in 1996 as the tool for the recording of information on the world's livestock breeds and is used as the primary source of data for monitoring the status of the global diversity of animal genetic resources for food and agriculture. DAD-IS is also the source of the data used for calculating Indicators 2.5.1b[1] and 2.5.2[2] of Target 2.5 of the Sustainable Development Goals (SDG).[3] The Commission on Genetic Resources for Food and Agriculture (Commission), at its Seventeenth Regular Session,[4] stressed the importance of DAD-IS as the international clearing-house mechanism for animal genetic resources.

At its Eighteenth Regular Session, the Commission requested FAO to further maintain and develop DAD-IS and to include in DAD-IS tools for visualizing data on the diversity of managed honey bees. It further requested FAO to investigate the potential integration into DAD-IS of data fields related to: ecosystem services; production environment descriptors; publicly available information on breeders, producers and breeding organizations; and genetic and genomic data and indicators of genetic diversity. The Commission requested FAO to develop a tool allowing automated translation of DAD-IS content provided by National Coordinators for the Management of Animal Genetic Resources (NC-AnGR) from and into English, French and Spanish and to investigate the feasibility of translation across all official UN languages.[5]

It noted the need for countries and FAO to raise awareness of the United Nations Statistical Commission on the necessity to broaden the scope of SDG Indicator 2.5.1b to include all breeds registered in DAD-IS, to account for the entire spectrum of animal genetic resources, and for FAO to report the outcomes of this awareness raising to the Commission and the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture (Working Group).[6]

The Commission stressed the need for countries to regularly update their national data in DAD-IS or in the European Farm Animal Biodiversity Information System network (EFABIS-net), including data on the diversity of managed honey bees and information on the conservation of animal genetic resources both *in situ* and *ex situ*. It further stressed the need for other database owners to continue to work with FAO on improving the interoperability of national and regional databases with DAD-IS in order to ensure that decisions on the implementation of the Global Plan of Action and achievement of SDG Target 2.5 are informed by the most up-to-date data and information available.[7]

The Commission requested FAO to allocate Regular Programme resources to the continued maintenance and development of DAD-IS and to continue providing technical support to countries on the estimation of breed population sizes and on the use of DAD-IS and to share with countries the methodology developed for collecting and estimating breed population data in a cost-efficient way.[8]

This document provides a detailed summary of FAO's activities related to DAD-IS since the Commission's Eighteenth Regular Session in 2021. The activities described herein are grouped into three major topics: (i) development of the information system; (ii) broadening the scope of SDG Indicator 2.5.1b; and (iii) technical support to countries to fill data gaps. More detailed information on the content of DAD-IS is provided in the information document *Status and trends of animal genetic resources – 2022*.[9]

[1] http://www.fao.org/sustainable-development-goals/indicators/251b
[2] http://www.fao.org/sustainable-development-goals/indicators/252
[3] https://sdgs.un.org/goals
[4] CGRFA-17/19/Report, paragraph 88.
[5] CGRFA-18/21/Report. Paragraph 75.
[6] CGRFA-18/21/Report, paragraph 78.
[7] CGRFA-18/21/Report, paragraph 78.
[8] CGRFA-18/21/Report, paragraph 77.
[9] CGRFA/WG-AnGR-12/23/4/Inf.1.

II. DEVELOPMENT OF THE INFORMATION SYSTEM

FAO continued during the reporting period to further develop DAD-IS with Regular Programme resources, as requested by the Commission. The related activities included (i) development of DAD-IS tools for visualizing data on the diversity of managed honey bees and for reporting on stingless bees, which are technically not honey bees in terms of being from the *Apis* genus, but are honey-making bees living in colonies that are subject to management; (ii) improvement of data entry and addition of DAD-IS data fields related to the diversity of managed bees, ecosystem services and publicly available information on breeders, producers and breeding organizations; (iii) automatic language translation of DAD-IS content, that is text fields provided by National Coordinators, from and to English, Spanish, French and Russian; (iv) improved options for exporting data and a search tool to find organizations; and (v) tools allowing for visualization of data on uses and ecosystem services provided by breeds.

The DAD-IS tools for visualizing bee data comprise (i) a bee data sheet[10] providing the profile of national bee populations; (ii) a tool on diversity of bee species[11] showing the composition of bee sub-species in a country or region and on trends,[12] thereby allowing DAD-IS users to monitor changes in the number of bee colonies over time; as well as (iii) a tool for exporting bee related data.[13] The password protected data entry module was broadened, now allowing the entry of data related to 15 species of stingless bees. A further new data entry module allows NC-AnGR to provide more information on the types and functions of organizations dealing with livestock breeds or managed bees. A search tool[14] assists DAD-IS users to find information about organizations responsible for a specific breed or operating within a specific country.

The updated data entry module gives NC-AnGR the possibility to choose the respective uses of breeds and to indicate the ecosystem services to which they contribute by selecting check boxes that categorize the services as either provisioning, maintenance and regulating or cultural. Explanatory text for the respective production environments where these ecosystem services are provided can also be entered. Tools for visualization of uses and ecosystem services have been developed allowing filtering results by the specific uses and ecosystem service or region and species. Text fields provided by NC-AnGR are now automatically translated from and to English, French, Spanish and Russian. Furthermore, an improved data export tool[15] is available in those languages and allows users, if desired, to export only sub-sections of metadata, namely (i) characteristics; (ii) uses and ecosystem services; (iii) breed classification; (iv) performance; and (v) risk classification.

The DAD-IS breed name list was shared with the developers of the Online Mendelian Inheritance in Animals database (OMIA),[16] which catalogues inherited disorders, traits, and genes. Doing so ensures that the two systems are syntactically interoperable. Breed names were standardized so that the names in OMIA match those in DAD-IS. This standardization will allow users of both systems to correctly combine information from the two sources. The aim of this collaboration is to develop a Vertebrate Breed Ontology (VBO)[17] using for livestock breeds the breed names provided to DAD-IS, which will leverage semantic relationships and facilitate research on the links between genotypes, environments and phenotypes.

During the second half of the current 2022–23 biennium, the major activities planned for development and maintenance of DAD-IS include (i) routine bug-fixing, as needed; (ii) development of a data entry

[10] https://www.fao.org/dad-is/bees-data-sheet/en/
[11] https://www.fao.org/dad-is/more-on-bees/moreonbeescontent/bees-diversity/en/
[12] https://www.fao.org/dad-is/more-on-bees/moreonbeescontent/bees-trend/en/
[13] https://www.fao.org/dad-is/data-export-bees/en/
[14] https://www.fao.org/dad-is/organization/en/
[15] https://www.fao.org/dad-is/dataexport/en/
[16] https://omia.org/home/
[17] https://www.youtube.com/watch?v=cF5CzexHI78

module allowing the storage of the geographic distributions of national breed populations as a first step to link to natural production environment descriptors; and (iii) improvement of automatic translation of DAD-IS content and user-friendliness of the system.

III. ACTIVITIES UNDERTAKEN RELATED TO SDG INDICATOR 2.5.1b

In collaboration with national experts and members of the Working Group Bureau, the Secretariat of the ITWG-AnGR and the FAO Office of the Chief Statistician (OCS), which oversees the development and validation of SDG indicators under FAO custodianship, prepared a document proposing the broadening of the SDG indicator 2.5.1b, to include all breeds registered in DAD-IS. This document was formally approved by the Inter-agency and Expert Group on SDG Indicators (IAEG-SDG),[18] the body created by the United Nations Statistical Commission to develop and implement the global indicator framework for the Goals and Targets of the 2030 Agenda for Sustainable Development.

The document proposed that the core methodology for calculation of SDG Indicator 2.5.1b remain unchanged, while the numbers of breeds with sufficient material stored are reported separately for local and transboundary breeds. For transboundary breeds with material stored in different countries, a distinction is made between the quantities of material stored at the national level for national reporting and mathematically aggregated at regional or global levels for the respective regional or global reporting. DAD-IS visualization tools and data export tools related to this indicator have been amended accordingly.

IV. TECHNICAL SUPPORT TO COUNTRIES TO FILL DATA GAPS

The document on the *Status and Trends of animal genetic resources – 2022*[19] reconfirms that breed-related information still remains far from complete. To help overcome the lack of information, FAO continued to provide technical support to countries based on three pillars: (i) organization of DAD-IS related training workshops and continued translation of training material in other UN languages; (ii) financial and technical support to countries to address the lack of breed-level population size data; and (iii) provision of simplified procedures and direct support to upload information related to new data fields.

To address the gap in knowledge on how to use DAD IS, FAO continued its series of DAD-IS related virtual training workshops in November 2021. The first of these workshops, held in July 2021, was provided in English, French and Spanish and covered both basic training on DAD-IS use and data entry as well as training elements for experienced users. A second workshop, held in September 2021, was used to inform and discuss the development of new tools and data fields in DAD-IS, while the third one, held in November 2021, focused on the specific needs of Russian-speaking NC-AnGR in Europe and Central Asia. Thanks to these workshops, more than 80 countries received training. In November 2022, a virtual workshop was organized to not only inform and train NC-AnGR on the most recent developments in DAD-IS, but also to discuss the degree of data completeness and to present results of a DAD-IS users' satisfaction survey. To allow convenient participation from different time zones, participants could choose between a morning and an afternoon session. Interpretation in all six UN languages was provided. FAO continued to provide direct training upon request and to answer all individual questions related to DAD-IS. Further, FAO continued the translation of the *Quick Guide for National Coordinators on Data Entry* (available now in English, French, Russian and Spanish)[20] and the *User Manual* (available now in English, French, Russian and

[18] https://unstats.un.org/sdgs/iaeg-sdgs/
[19] CGRFA/WG-AnGR-12/23/4/Inf.1.
[20] https://www.fao.org/3/cb0697ru/cb0697ru.pdf

Spanish),[21] and of two videos, one on *How to use DAD-IS (*available now in also in French[22] and Spanish[23]), and a second on *Trends in Risk Status (*available now also in French[24] and Spanish[25]).

FAO continued to assist countries in accessing existing data, estimating population sizes and entering data into DAD-IS. During the reporting period seven countries[26] received financial and technical support. The field activities associated with these projects have been temporarily delayed by the COVID-19 pandemic and a cyberattack on the Service Provider in Indonesia. FAO collaborated with Apimondia, the International Federation of Beekeepers' Associations, [27] to provide direct support to five countries in Asia and Africa[28] to collect and enter data related to the diversity of honey bees managed for food and agriculture into DAD-IS.

To help address the specific problem of the lack of breed population size data, FAO developed and tested a methodology to collect and/or estimate breed population data. The methodology employs a stratified sampling approach, which allows NC-AnGR and other stakeholders to estimate population sizes in a cost-effective manner. A first draft document on the methodology was developed, translated into French and Spanish and shared via email with all NC-AnGR for comments in September 2022 via e-mail. The Government of China provided the translation of the draft document into Chinese.

To help fill gaps in data on uses and ecosystem services as well as on the adapteness classification of national breed populations, FAO supported countries by developing a simplified procedure for data entry and offering support to upload data on uses and ecosystem services on behalf of the NC-AnGR. Through an electronic mail request in June 2022, all NC-AnGR were asked to update the uses and ecosystem services of their national breed populations by completing an attached form listing the country specific national breed populations. The NC-AnGR were asked to provide written consent allowing FAO to then upload to DAD IS the information provided in the form.[29] As of September 2022, completed forms were received from 41 countries (18 from Europe, 13 from Africa, 4 from Latin America, 3 from Asia, 2 from Near East and 1 from Pacific), containing information on ecosystem services for 4 324 national breed populations, including 3 896 for which the adaptedness classification was provided or updated.

V. CONCLUSIONS

Under the governance of the Commission and based on suggestions received from NC-AnGR, DAD-IS has been further developed during the reporting period. The development and improvement process is continual. The focus of improvements to DAD-IS has been on increasing user-friendliness and facilitating the comprehension of the content. The large variety of visualization tools allows even the less experienced user to create simple graphs and tables, while more experienced users can use the data export tools for their own analyses. The most effective way to improve the utility of DAD-IS for decision making on management of animal genetic resources will be to increase the completeness and timeliness of information for existing data fields rather than adding new data fields.

[21] https://www.fao.org/3/cb0698ru/cb0698ru.pdf
[22] https://360.articulate.com/review/content/4489a6f3-8e14-4331-967b-14d3b5c97885/review
[23] https://360.articulate.com/review/content/7b55836e-9bc3-47a5-bcc0-9586cd5ee32a/review
[24] https://360.articulate.com/review/content/ff5b9a4e-8815-4d8a-bf9a-c9062779e42f/review
[25] https://360.articulate.com/review/content/7b55836e-9bc3-47a5-bcc0-9586cd5ee32a/review
[26] Algeria, Argentina, Indonesia, Libya, Mauritania, Morocco, Tunisia.
[27] https://www.apimondia.org/
[28] Botswana, Lesotho, Philippines, Thailand, Vietnam
[29] CGRFA/WG-AnGR-11/21/3; CGRFA/WG-AnGR-11/21/Inf.4.