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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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

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STATUS OF THE DEVELOPMENT OF THE DOMESTIC ANIMAL DIVERSITY INFORMATION SYSTEM

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I. INTRODUCTION

1. 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 2.5.1b¹ and 2.5.2² of Target 2.5 of the Sustainable Development Goals (SDG). The Commission on Genetic Resources for Food and Agriculture (Commission), at its Sixteenth³ and Seventeenth Regular Sessions,⁴ stressed the importance of DAD-IS as the international clearing-house mechanism for animal genetic resources.

2. At its Seventeenth Regular Session, the Commission requested FAO to further maintain and develop DAD-IS and to continue to collaborate with managers of national and regional systems and other stakeholders to develop and refine procedures for exchange of data. The Commission further requested FAO to complete the translation of the interface, provide additional training material and investigate the possibility of implementing descriptors for ecosystem services, production systems and the geographical distributions of breeds.⁵ The Commission requested FAO to include in DAD-IS data fields for monitoring the diversity of managed honey bees of relevance for food and agriculture.⁶

3. The Commission stressed the need for countries to regularly update their national data in DAD-IS or the European Farm Animal Biodiversity Information System network (EFABIS-net) and other relevant databases, including information on animal genetic resources both *in situ* and *ex situ*, and to provide information on population sizes and breed classifications, in order to ensure that decisions on the implementation of the Global Plan of Action for Animal Genetic Resources⁷ are informed by the most up-to-date data and information available.⁸

4. 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.⁹ The Commission requested the Secretariat to develop an in-house analytical study on the factors influencing the reporting of unknown status for risk of extinction of breeds.¹⁰

5. This document provides a summary of FAO's activities related to DAD-IS since the Commission's Seventeenth Regular Session in 2019. The activities described herein are grouped into two major topics: (i) DAD-IS development, and (ii) activities undertaken to fill the data gaps. More detailed information is provided in the information documents: *Status and trends of animal genetic resources – 2020*¹¹ and *Detailed analysis of the factors influencing the reporting of information in the Domestic Animal Diversity Information System*.¹²

II. DAD-IS DEVELOPMENT

6. FAO continued during the reporting period to further develop DAD-IS with regular programme resources, as requested by the Commission. The activities included (i) development and refinement of procedures for exchange of data in collaboration with managers of national and regional systems; (ii) language translation of the web interface; (iii) creation of data fields for monitoring the

¹ <http://www.fao.org/sustainable-development-goals/indicators/251b>

² <http://www.fao.org/sustainable-development-goals/indicators/252>

³ CGRFA-16/17/Report/Rev. 1, paragraph 46.

⁴ CGRFA-17/19/Report, paragraph 88.

⁵ CGRFA-17/19/Report, paragraph 88.

⁶ CGRFA-17/19/Report, paragraph 92.

⁷ <http://www.fao.org/3/a1404e/a1404e00.pdf>

⁸ CGRFA-17/19/Report, paragraph 89.

⁹ CGRFA-17/19/Report, paragraph 91.

¹⁰ CGRFA-17/19/Report, paragraph 90.

¹¹ CGRFA/WG-AnGR-11/21/ Inf.6.

¹² CGRFA/WG-AnGR-11/21/ Inf.7.

diversity of managed honey bees of relevance for food and agriculture; (iv) the full consolidation of DAD-IS and EFABIS-net into a single information system, while incorporating distinct regional and national home pages as interfaces with specific URL-addresses. This activity included implementation of the Greek, Polish and Slovenian EFABIS-net nodes in the respective national languages and the development of further EFABIS-net specific tools for data visualization; (v) creation of tools allowing the export of the SDG Indicators 2.5.1b and 2.5.2; and (vi) change of the list of countries or areas according to the *UN Standard Country or Area Codes for Statistical Use*¹³ commonly referred to as the M49 standard.

7. The DAD-IS user interface has been made available in all UN languages; the password protected data entry section for both DAD-IS and EFABIS-net¹⁴ is available in English, French and Spanish. However, a system for automatic translation among UN languages of text fields entered by National Coordinators for the Management of Animal Genetic Resources (NC-AnGR) has yet to be established. Testing of a system for automatic translation among English, French and Spanish is currently underway.

8. An application programming interface (API) was developed in collaboration with the managers of the Animal Germplasm Resource Information Network (Animal GRIN),¹⁵ allowing the exchange of data between DAD-IS and other systems, including Animal GRIN of Brazil, Canada and the United States of America. Furthermore, a tool has been developed to allow the bulk uploading of both population size data and cryoconservation data from national information systems to DAD-IS by using comma separated value (CSV) files.

9. At its Seventeenth Regular Session, the Commission requested FAO to include in DAD-IS data fields for monitoring the diversity of managed honey bees of relevance for food and agriculture.¹⁶ In response, and in close collaboration with a specific task force of the European Regional Focal Point for Animal Genetic Resources and Apimondia, the International Federation of Beekeepers' Associations, data fields for monitoring the diversity of managed honey bees of relevance for food and agriculture have been agreed upon, and FAO developed a prototype for entering these data. This prototype was shared with all NC-AnGR, thus allowing them to test the system. Feedback and suggestions for improvement received from the NC-AnGR during two rounds of testing were implemented in a module for data entry for bee-related data. The module was made available to all NC-AnGR under the password protected section of DAD-IS. As of 31 January 2021, nine countries had provided some data on bees. While a country's data on bees can be entered and monitored by the respective NC-AnGR, the data are not yet visible for the public, as tools for their visualization remain to be developed.

10. During the second half of the current 2020–21 biennium, the major activities planned for development and maintenance of DAD-IS include (i) routine bug-fixing, as needed; (ii) development of data dissemination tools for managed honey bees; and (iii) implementation of automatic translation of DAD-IS content, that is, text fields provided by NC-AnGR, from and into English, French and Spanish. The possibilities for automatized translation from and into Arabic, Chinese and Russian will be investigated.

III. ACTIVITIES UNDERTAKEN TO FILL DATA GAPS

11. The document on the *Status and Trends of animal genetic resources – 2020*¹⁷ reconfirms that breed-related information remains far from complete. For about 60 percent of all reported local breeds, status for risk of extinction (risk status) is not known because of missing population data or the lack of

¹³ <https://unstats.un.org/unsd/methodology/m49/>

¹⁴ <http://www.fao.org/dad-is/regional-national-nodes/efabis/en/>

¹⁵ https://nrrc.ars.usda.gov/A-GRIN/database_collaboration_page_dev

¹⁶ CGRFA-17/19/Report, paragraph 92.

¹⁷ CGRFA/WG-AnGR-11/21/ Inf.6.

recent updates. This is the case despite the fact that the Commission, at its Sixteenth¹⁸ and Seventeenth¹⁹ Regular Sessions, stressed the need for countries to regularly update their national data in DAD-IS. Among the 8 771 breeds (local and transboundary) reported in DAD-IS, 26 percent are currently classified as being at risk of extinction; 13 percent are classified as not at risk; 54 percent have unknown risk status and 7 percent are reported to be extinct. The proportion of breeds with unknown status for risk of extinction has decreased slightly from 2018 (59 percent).²⁰

12. The risk status can be calculated only for breeds with population size data in DAD-IS, and the most recent population size data may not be older than ten years; otherwise, status for risk of extinction is considered unknown.²¹ Drawing a precise global inference on the state of the diversity of animal genetic resources for food and agriculture is not possible when the risk status is unknown for a majority of the world's livestock breeds. Therefore, the Commission, at its Seventeenth Regular Session, requested the Secretariat to develop an in-house analytical study on the factors associated with missing population size data for breeds. An objective of this study was to propose solutions to reduce the portion of breeds in DAD-IS with unknown population size (and consequently, unknown risk status). The study used descriptive statistics to identify the most important factors that contribute to the lack of population size data, a prerequisite for knowing the risk status of breeds. The information document *Detailed analysis of the factors influencing the reporting of information in the Domestic Animal Diversity Information System*²² contains the details of this study.

13. The study confirmed that the main reasons for data gaps identified and presented to the last session of the Commission²³ remain valid. Lack of breed population data at country level and problems with access to existing breed population data were the most frequently reported reasons. These were followed by a lack of awareness by NC-AnGR of their duty to report breed population data in DAD-IS, and lack of knowledge by NC-AnGR on how to enter data into DAD-IS. Also, many countries have not named an Alternate NC-AnGR, who may provide valuable assistance to the primary NC-AnGR for tasks related to DAD-IS.

14. The in-house analytical study revealed geographic region to be the factor with the strongest statistical association with the presence or absence of breed population data and thus with known versus unknown status for risk of extinction, although substantial variation was observed among countries within the same region. Differences among species were also observed, with pigs having the lowest proportion of recent population updates among the main species.

15. To overcome both the lack of information and of reporting, the Commission, at its Seventeenth Regular Session, requested FAO to provide technical support to countries on the estimation of breed population sizes and on the use of DAD-IS.²⁴ The support to countries was based on three pillars: (i) development of additional training material; (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 cryoconservation data.

16. To address the gap in knowledge regarding on how to use DAD IS, FAO developed a collection of training materials. FAO prepared a new DAD IS user manual (available in English²⁵ and Spanish²⁶) on the general use of the system. In addition, an e-learning module was developed to

¹⁸ CGRFA-16/17/Report/Rev. 1, paragraph 46.

¹⁹ CGRFA-17/19/Report, paragraph 89.

²⁰ CGRFA/WG-AnGR-10/18/3, paragraph 12.

²¹ CGRFA-14/13/Report, paragraph 29.

²² CGRFA/WG-AnGR-11/21/Inf.7.

²³ CGRFA/WG-AnGR-8/14/Inf.3 Rev.1, paragraph 11.

²⁴ CGRFA-17/19/Report, paragraph 91.

²⁵ <http://www.fao.org/3/cb0697en/cb0697en.pdf>

²⁶ <http://www.fao.org/3/cb0697es/cb0697es.pdf>

demonstrate the process of data entry. The module has been made available in English,²⁷ French²⁸ and Spanish.²⁹ FAO created the *Quick Guide for National Coordinators on Data Entry* (available in English³⁰, Spanish³¹ and French³²), two videos, one on *How to use DAD IS*³³ and a second on *Trends in Risk Status*.³⁴ FAO continued to provide direct training upon request and to answer all individual questions related to DAD IS.

17. To help address the specific problem of the lack of breed population size data, FAO developed 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. FAO implemented several pilot projects to assist countries in accessing existing data, estimating population sizes and entering data into DAD-IS. In Latin America and the Caribbean, the approach has been successfully implemented. Three countries³⁵ involved in these projects have used the methodology to update their data and the approach is currently being extended to a fourth country³⁶ in the region and to five countries in Northern Africa.³⁷ The field activities associated with these projects have been temporarily delayed by the COVID-19 pandemic.

18. The document *Detailed analysis of the factors influencing the reporting of information in the Domestic Animal Diversity Information System*³⁸ highlights the fact that breed-based censuses to obtain precise population counts are not absolutely necessary for assessing risk status. Determining whether a breed is at risk requires simply knowing whether the population size is greater (or less) than 2 400 animals for highly-reproductive species (multiple-offspring species such as pigs, rabbits and most birds) and 7 200 animals for lowly-reproductive species (animals with typically single or twin births such as cattle, sheep, goats and horses). For most national breed populations, the knowledge necessary to make such a basic assessment may be already available to NC-AnGR or obtainable from local experts. DAD IS is programmed and formatted to facilitate reporting of such data, as sizes of national breed populations may be provided as minimum and maximum values (or only a minimum value) with no constraints on the range between the two values. NC-AnGR may provide an indication of the precision of the data, by specifying the source upon which the data are based (such as a survey or census) and the data's reliability.

19. To help fill gaps in cryoconservation data, FAO supported countries by developing a simplified procedure of data entry by the NC-AnGR and offering support to upload cryoconservation data on behalf of the NC-AnGR. Through an electronic mail request in June 2020, all NC-AnGR were asked to update the cryoconservation status of their national breed populations by completing an attached form listing all their national breed populations. NC-AnGR were asked to provide written consent allowing FAO to then upload to DAD IS the information provided in the form. The document *Detailed analysis of the factors influencing the reporting of information in the Domestic Animal Diversity Information System*³⁹ contains the detailed results of this activity. Due to the intensive communication campaign undertaken by FAO in 2020 to raise awareness on updating cryoconservation data, the proportion of breeds with no information provided regarding their cryoconservation status decreased substantially, from 96 to 48 percent. However, genetic material is reported to be cryoconserved for a very low proportion (9 percent) of local breeds. For only around

²⁷ <https://360.articulate.com/review/content/95908ec3-199a-4e93-8811-1340d673f97a/review>

²⁸ <https://360.articulate.com/review/content/ceeae8d-1628-4dcb-828d-0729f7ba7acc/review>

²⁹ <https://360.articulate.com/review/content/35e42cdd-e11c-4bce-aa87-627b1350dd79/review>

³⁰ <http://www.fao.org/3/cb0698en/cb0698en.pdf>

³¹ <http://www.fao.org/3/cb0698es/cb0698es.pdf>

³² <http://www.fao.org/3/cb0698fr/cb0698fr.pdf>

³³ <https://360.articulate.com/review/content/d2e39269-91fe-44c9-baf0-071fc58a5e88/review>

³⁴ <https://360.articulate.com/review/content/05c40813-5cfc-4ac6-bf3d-3cb901f2f010/review>

³⁵ Colombia, Ecuador, Panama.

³⁶ Argentina.

³⁷ Algeria, Libya, Mauritania, Morocco, Tunisia.

³⁸ CGRFA/WG-AnGR-11/21/ Inf.7.

³⁹ CGRFA/WG-AnGR-11/21/ Inf.7.

3 percent of local breeds is the quantity of stored material estimated to be sufficient for population reconstitution.⁴⁰ FAO has drafted new guidelines on cryoconservation of animal genetic resources for food and agriculture, are available in the document *Innovations in cryoconservation of animal genetic resources – Draft technical guidelines*.⁴¹ When applied, the information in the guidelines may help to increase these percentages.⁴²

20. Whereas breed population data are subject to a cut-off point and thus considered to become unknown after 10 years,⁴³ this is currently not the case for cryoconservation data. To achieve consistency with the procedures for breed population status, a similar 10-year cut-off point for cryoconservation status may be warranted. However, unlike *in vivo* populations, gene bank collections may not be dynamic and, therefore, it may be reasonable for the quantities of cryoconserved material to remain constant for periods exceeding 10 years. In such instances, “updating” of the data in DAD-IS is not necessary, but formal acknowledgment that the data remain valid would nonetheless be needed. It is therefore proposed that FAO introduce functionalities in DAD-IS to allow NC-AnGR to easily indicate that their countries’ cryoconservation status remain unchanged (including for countries that lack a gene bank) and data remain valid.

IV. GUIDANCE SOUGHT

21. The Working Group may review the progress made in the development of DAD-IS and wish to recommend that the Commission:

- stress the importance of DAD-IS as the international clearing-house mechanism for animal genetic resources for food and agriculture;
- request FAO to continue to provide Regular Programme and technical support to further maintain and develop DAD-IS and to continue to increase user-friendliness, especially with regard to tools for regular data updating;
- request FAO to develop a tool allowing automatized translation of DAD-IS content provided by NC-AnGR from and into English, French and Spanish and to investigate the feasibility of translation across all UN languages;
- stress the need for countries to regularly update their national data in DAD-IS or EFABIS-net, including information on the conservation of animal genetic resources both *in situ* and *ex situ*, to ensure that decisions on the implementation of the Global Plan of Action for Animal Genetic Resources and achievement of SDG Target 2.5 are informed by the most up-to-date data and information available, and to request FAO to continue to provide technical support to countries on estimation of breed population sizes;
- request FAO to introduce a cut-off point of ten years for data associated with cryoconservation of national breed populations, beyond which the cryoconservation status of a breed will be considered to be unknown unless indicated otherwise by the NC-AnGR, and further request FAO to develop the functionality in DAD-IS to facilitate confirmation of the cryoconservation status by NC-AnGR informing FAO that their data remain valid, specifically the in case where gene bank collections are unchanged; and
- stress the need for countries to provide basic information on their national data for monitoring the diversity of managed honey bees of relevance for food and agriculture in DAD-IS and request FAO to include in DAD-IS tools for visualizing these data.

22. The Working Group may further wish to discuss the results presented in the document *Detailed analysis of the factors influencing the reporting of information in the Domestic Animal*

⁴⁰ CGRFA/WG-AnGR-11/21/Inf.6; CGRFA/WG-AnGR-11/21/Inf.7.

⁴¹ CGRFA/WG-AnGR-11/21/Inf.4.

⁴² CGRFA/WG-AnGR-11/21/3; CGRFA/WG-AnGR-11/21/Inf.4.

⁴³ CGRFA-14/13/Report, paragraph 29.

*Diversity Information System*⁴⁴ regarding the factors influencing the reporting of breed population size data, and thus determining risk of extinction, and cryoconservation status for breeds. Based on this discussion, they may further wish to make recommendations to the Commission regarding actions to decrease the proportion of breeds with unknown status for risk of extinction or for cryoconservation. These actions may include requesting countries and NC-AnGR to review and apply the recently developed training materials on the use of DAD-IS, making better use of the opportunity to nominate alternate NC-AnGR for DAD-IS related tasks, and to report breed population sizes as estimated ranges of minimum and maximum values when breed-wise census data are not available.

⁴⁴ CGRFA/WG-AnGR-11/21/ Inf.7.