

August 2012



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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 5 of the Provisional Agenda

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

Seventh Session

Rome, 24-26 October 2012

REPORT OF A CONSULTATION ON THE DEFINITION OF BREED CATEGORIES

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REPORT OF A CONSULTATION ON THE DEFINITION OF BREED CATEGORIES

I. Introduction

The Commission on Genetic Resources for Food and Agriculture, at its Thirteenth Regular Session, requested its Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture “to work further on the definition of breed categories, in addition to the already agreed definitions of local and transboundary breeds of livestock.”¹ This document reviews breed classifications used by individual countries and by FAO, and discusses a potential new classification system.

A first draft of this document was prepared on the basis of a literature review and broad informal electronic consultations facilitated by DAD-Net with its currently more than 1600 members worldwide. The document takes into account comments received from the Task Force “Risk Status and Indicators” of the European Regional Focal Point for Animal Genetic Resources as well as comments received from National Coordinators for the Management of Animal Genetic Resources.²

II. Background

The immediate background to the Commission’s request for further work on breed categories was a proposal put forward in the report of the Workshop on Indicators to Measure Trends in Genetic Diversity of Domesticated Animals³, organized by FAO in February 2010 (see also: FAO, 2010a and FAO, 2010b⁴). The workshop recommended a new classification system in order to enable the calculation of a set of indicators for trends in the genetic diversity of domesticated animals within the framework of the Convention on Biological Diversity’s (CBD) headline indicator for “Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socioeconomic importance”. The Commission had previously agreed, at its Twelfth Regular Session in 2009, that the CBD headline indicator (once it had been developed) should be included in the reports on the status and trends of animal genetic resources (AnGR) produced by FAO every two years.⁵ Trends in the genetic diversity of “farmed and domesticated animals” are now an element of Aichi Biodiversity Target 13, adopted by the Conference of the Parties to the CBD in October 2010 as part of the CBD’s Strategic Plan for Biodiversity 2010–2020⁶.

One of the proposals put forward by the Workshop on Indicators to Measure Trends in Genetic Diversity of Domesticated Animals was the development of an indicator based on the share of native and non-native breeds in national populations. This indicator would be similar to indicators developed under the SEBI2010⁷ project (indicator SEBI 006⁸). The indicator would be complemented by a summary measure of breed risk status (similar to the figures currently

¹ CGRFA-13/11/Report, paragraph 82.

² Comments were received from the Cook Islands, Poland, Senegal, Sierra Leone, Sweden and the United Kingdom.

³ Report: Workshop on Indicators to Measure Trends in Genetic Diversity of Domesticated Animals (available at http://www.fao.org/ag/againfo/programmes/en/genetics/documents/ITWG_AnGR_6/indicator_report.pdf).

⁴ CGRFA/WG-AnGR-6/10/2 and Martyniuk, E., Pilling, D. & Scherf, B. 2010. Indicators: Do we have effective tools to measure trends in genetic diversity of domesticated animals? *Animal Genetic Resources*, 47, 31–43.

⁵ CGRFA-12/09/Report, paragraph 39.

⁶ COP10 decision10/2 (<https://www.cbd.int/decision/cop/?id=12268>).

⁷ <http://www.bipnational.net/IndicatorInitiatives/SEBI2010>

⁸ <http://www.eea.europa.eu/data-and-maps/indicators/livestock-genetic-diversity/livestock-genetic-diversity-assessment-published>

presented in FAO status and trends reports⁹). The workshop recognized that the “local vs. transboundary” breed classification system, currently used by FAO to categorize breeds according to their distribution, would not serve as a basis for calculating the proposed indicator of diversity. The workshop therefore recommended that a new “native vs. non-native” classification should be developed and that this classification should be implemented in the Domestic Animal Diversity Information System (DAD-IS) as a basis for calculating the indicator at global and regional levels. The workshop also recommended that once a native vs. non-native classification is available, it would be worthwhile calculating national breed richness figures for native breeds as a basic indicator of diversity. Thus, the workshop concluded that the following indicators should be calculated at national, regional and global levels, each broken down by species:

- 1) number of native breeds;
- 2) proportion of the total population accounted for by native and non-native breeds;
- 3) number of breeds classified as at risk, not at risk and unknown.

Detailed information on the development of the indicators is given in the final report of the workshop.¹⁰

III. Breed classification systems currently used at national level

In December 2011, a message was posted on FAO’s e-mail-based discussion network, DAD-Net, requesting members of the network (currently more than 1600 people worldwide) to provide information on whether, and for what purposes, terms such as “autochthonous”, “native”, “indigenous”, “heritage”, “patrimonial”, “naturalized” or “locally adapted” are already used by countries for classifying livestock breeds.

In total, 25 e-mails referring directly to the topic were received. The e-mails were authored by 34 people, 20 of whom were the officially nominated National Coordinators for the Management of Animal Genetic Resources of their respective countries.

The regional distribution of responses was as follows:

Region	Countries
Africa	Chad, Ghana, Mozambique
Asia and Pacific	Pakistan
Europe	Austria, Finland, France, Hungary, Ireland, Netherlands, Spain, Sweden, Switzerland, United Kingdom
Latin America and the Caribbean	Argentina, Bolivia (Plurinational State of), Brazil, Chile, Costa Rica, Cuba, Ecuador, Guatemala, Mexico, Paraguay, Suriname, Uruguay
Near East	Egypt
North America	Canada, United States of America

Analysis of the responses revealed that the terms “native”, “indigenous” and “autochthonous” are frequently used and in many countries are considered to be more or less synonymous. They are quite often – but not always – explicitly linked to the origin of the breed.

Another term frequently used to classify breeds – often in addition to “native” – is “locally adapted”. This classification is not based on the breeds’ origin. Rather it relates to a certain time span that is regarded as sufficient for a breed to become adapted to local conditions.

⁹ CGRFA/WG-AnGR-6/10/Inf.3 and CGRFA/WG-AnGR-5/09/Inf. 6.

¹⁰ Report: Workshop on Indicators to Measure Trends in Genetic Diversity of Domesticated Animals (available at http://www.fao.org/ag/againfo/programmes/en/genetics/documents/ITWG_AnGR_6/indicator_report.pdf).

Terms used to describe breeds that do not fall into the groups mentioned above include “(recently) imported”, “commercial” and “exotic”.

To substantiate the findings from DAD-Net, a keyword research in scientific publications was carried out. The search, using the Scopus abstract and citation database, detected 222 hits for the keywords “native breed”, 192 for “indigenous breed”, 124 for “exotic breed”, 42 for “imported breed”, 39 for “adapted or locally adapted breed”, 38 for “autochthonous breed” and 22 for “introduced breed” in the subject area “life sciences”. This shows the widespread use of certain breed classification terms. The keywords “naturalized breed” (13 times), the combination “landrace and livestock breed” (8 times), “standardized breed” (5 times), “heritage breed” (3 times) and “integrated breed” (2 times) were found less frequently.

Widespread use does not imply that the various breed categories are always used in the same way. This was recognized by the SEBI2010 project with respect to its SEBI 006 indicator: “at this stage, the livestock genetic diversity indicator should be interpreted with care because there is still no agreement among countries on the definition of 'native' and 'non-native' breeds. The figures provided are those reported by individual countries, based on their own definitions and this obviously determines the patterns.”¹¹

As noted above, the terms “native”, “indigenous” and “autochthonous” are frequently linked to the origin of breed. In North America, and in Latin America and the Caribbean, a native breed (if the term is used at all) is defined quite consistently as a breed domesticated and developed before the first European settlers arrived. In contrast, European countries use a wide range of reference points in history as a basis for defining whether or not breeds can be considered to have originated in the respective country. Frequently, the timeframe is linked in some way to the country’s history. The Task Force “Risk Status and Indicators”¹² of the European Regional Focal Point (ERFP) recently developed definitions of the terms “native” and “locally adapted” for Europe.¹³ At a meeting in March 2012, the Task Force agreed that a native breed is “a breed created originally from genetic material that was available in the country when the initial breed development commenced”.

Recently developed scientific tools based on molecular genetic information allow assessment of the origins of livestock species. However, it is also known that many current domestic animal populations and breeds originate from more than one wild ancestral population, and that in some cases there has been genetic admixture or introgression between species that do not normally hybridize in the wild. These admixture and hybridization events probably occurred after the initial domestication. They were often linked to human migration, trading or simply the result of the requirements of agricultural societies for new livestock phenotypes. Therefore, even with the use of molecular genetic information, the geographical “origin” of a breed cannot be verified for most breeds.

While several of the European DAD-Net contributors mention that their countries have a legal regulation covering breed classification (e.g. Austria, Finland, Hungary, the Netherlands, Spain, Sweden and Switzerland), this is explicitly not the case for Canada and the United States of America where the terms “native”, “autochthonous” or “indigenous” have no standing as generic terms or as legal definitions.

¹¹ <http://www.eea.europa.eu/data-and-maps/indicators/livestock-genetic-diversity/livestock-genetic-diversity-assessment-published>

¹² <http://www.rfp-europe.org/index.php?id=530>

¹³ http://www.rfp-europe.org/fileadmin/SITE_ERFP/TF_Risk/TFRisk_Tekirdag2011.pdf

IV. Breed classification systems used by FAO

The breed concept originated in Europe and was linked to the existence of breeders' organizations. In developed countries, breeds are defined in terms of a set of phenotypic standards, the use of breed herd books and the existence of formalized breed societies that are often supported by legislation. In contrast, in developing countries many livestock-keeping communities and governments apply the term more loosely and identify breeds rather with geographic localities, ethnic identities, and the local uses and traditions of their owners than with phenotypic attributes. FAO thus uses the following broad definition of the breed concept:

“either a sub-specific group of domestic livestock with definable and identifiable external characteristics that enable it to be separated by visual appraisal from other similarly defined groups within the same species or a group for which geographical and/or cultural separation from phenotypically similar groups has led to acceptance of its separate identity”.¹⁴

The above definition can be used globally because it accounts for the social, cultural and economic factors that influence the decision as to whether a given population is regarded as a breed. A breed classification system intended for global use would, likewise, have to be rather generic.

Several breed categories have already been defined in FAO documents. The *guidelines for the development of country reports* (FAO, 2000)¹⁵ and *The legal framework for the management of animal genetic resources* (FAO, 2005)¹⁶ defined the following categories:

Locally adapted breeds: “which have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country.”

Indigenous breeds, also termed **autochthonous** or **native breeds:** “originating from, adapted to and utilized in a particular geographical region, form a subset of the Locally Adapted Breeds.”

Exotic breeds: “which are maintained in a different area from the one they were developed and including breeds that are not locally adapted. Exotic breeds comprise both **recently introduced breeds** and **continually imported breeds**.”

Recently introduced breeds: “whose importation was within the last 5 or so generations for the species concerned, and which were imported over a relatively short period of time. These would include breeds that were imported in the recent past but that have not been reintroduced since that time.”

Continually imported breeds: “whose local gene pool is regularly replenished from one or more sources outside your country. Many of the breeds used in intensive production systems or marketed by international breeding companies would be in this category.”

Domesticated populations are also distinguished from wild and feral populations. The following definitions are offered in the *State of the World's Animal Genetic Resources for Food and Agriculture* (SoW-AnGR).¹⁷

Wild populations: “represent either wild relatives of domesticated livestock, wild populations that are used for food and agriculture, or populations undergoing domestication.”

Feral populations: “animals are considered to be feral if they or their ancestors were formerly domesticated, but they are now living independently of humans; for example, dromedaries in Australia.”

¹⁴ <http://lprdad.fao.org/cgi-bin/getblob.cgi?sid=-1,50006152>

¹⁵ FAO. 2000. *Guidelines for the development of country reports* (available at <http://www.fao.org/docrep/meeting/021/am228e.pdf>).

¹⁶ FAO. 2005. *The Legal Framework for the management of animal genetic resources* (available at <ftp://ftp.fao.org/docrep/fao/009/a0276e/a0276e00.pdf>).

¹⁷ FAO. 2007. *The State of the World's Animal Genetic Resources for Food and Agriculture*, edited by B. Rischkowsky & D. Pilling. Rome (available at <http://www.fao.org/docrep/010/a1250e/a1250e00.htm>).

During the preparation of *The State of the World's Animal Genetic Resources for Food and Agriculture* (SoW-AnGR) a further classification system was developed as follows.

Local breeds: “breeds that occur only in one country.”

Transboundary breeds: “breeds that occur in more than one country. These are further differentiated as: **Regional transboundary breeds:** transboundary breeds that occur only in one of the seven SoW-AnGR regions¹⁸. **International transboundary breeds:** transboundary breeds that occur in more than one region.”

The main objective of this latter classification system was to avoid the double counting of national breed populations in global and regional statistics. It also provides an indication of the level at which management decisions need to be taken for the respective breeds. The local vs. transboundary classification has subsequently been used in the biennial status and trends reports on AnGR produced by FAO.¹⁹ However, it should be recalled that this classification is based purely on breeds' distributions with respect to national borders; it has no necessary link to the genetic diversity of the livestock populations described or to the characteristics of the respective breeds.

V. The value of locally adapted breeds

One of the conclusions of the SoW-AnGR was that an important element of sustainable use of AnGR is to ensure that locally adapted breeds remain functional parts of production systems. Adaptive fitness traits, some of which may not yet have been discovered, are of particular importance, as they are genetically complex and cannot easily be achieved by selection over a short period of time. However, use of AnGR inevitably includes development. AnGR are dynamic resources, changing with each generation in interaction with the environment and according to the selection criteria of their keepers. In the SoW-AnGR it is proposed to base breeding efforts on locally adapted genetic resources for sustainable genetic improvement. This will help to avoid the loss of breeds with unique attributes. The presence of diseases may inhibit the introduction of susceptible exotic animals, and thereby necessitate the continued utilization of locally adapted breeds.

In the SoW-AnGR, information provided by countries indicated that, at the time, government policies favoured the use of locally adapted breeds of cattle and small ruminants, but exotic breeds of pigs and poultry.

VI. Use of breed classifications in indicators of genetic diversity

As discussed above, the Workshop on Indicators to Measure Trends in Genetic Diversity of Domesticated Animals recommended two indicators that require a distinction between “native” and “non-native” breeds. This distinction had previously been included in a number of indicators and proposed indicators. Martyniuk *et al.* (2010) provide an overview of these indicators and the arguments that have been put forward in support of the native vs. non-native classification. It can, for instance, be argued that the classification offers a means of distinguishing breeds that are well adapted to local conditions and/or are part of the national heritage of the respective country. Tracking the status of such breeds is likely to be valuable both from the national perspective and from the perspective of monitoring diversity on a global or regional scale. Another argument is that the native livestock population can be expected to be more genetically diverse than that of the non-native, because the latter will usually be dominated by a limited number of intensively

¹⁸ SoW-AnGR regions = the seven regions into which countries were grouped for the purposes of the analysis presented in the SoW-AnGR.

¹⁹ CGRFA/WG-AnGR-6/10/Inf.3 and CGRFA/WG-AnGR-5/09/Inf.7.

selected breeds. This was the main argument put forward in support of such an approach during the expert workshop. A third argument, also put forward during the expert workshop, is that the balance between native and non-native breeds may provide an indication of the extent of a country's self-sufficiency in meeting its needs for AnGR.

Despite the various arguments that can be made in support of the native vs. non-native distinction, it appears that the different ways in which the terms are understood in different countries and regions mean that establishing a global classification system based on this distinction is likely to be impractical.

A more feasible alternative may be to distinguish between breeds that are locally adapted and those that are not. This classification could be based on the generic FAO definition of locally adapted breed given above. The Task Force "Risk Status and Indicators" of the ERF has proposed that FAO's definition of locally adapted breed should be accompanied by the following guiding statement: "The phrase "sufficient time" refers to time present in one or more of the country's traditional production systems or environments. Taking cultural, social and genetic aspects into account, a period of 40 years and six generations of the respective species might be considered as a guiding value, subject to specific national circumstances".

As a complementary term for all non-locally adapted breeds the term "exotic" breed, which include recently imported and continually imported breeds, might be used.

VII. Conclusions

Existing national and regional breed classification systems remain valid for national and regional planning purposes.

Based on the above-described consultations, the following breed classification system should be used in the proposed global-level resource indicator for AnGR.²⁰

Locally adapted breeds: breeds which have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country. The phrase "sufficient time" refers to time present in one or more of the country's traditional production systems or environments. Taking cultural, social and genetic aspects into account, a period of 40 years and six generations of the respective species might be considered as a guiding value for "sufficient time", subject to specific national circumstances.

Exotic breeds: breeds which are not locally adapted. Exotic breeds comprise both, recently introduced breeds and continually imported breeds.

²⁰ CGRFA/WG-AnGR-7/12/7.