

ANIMAL GENETIC RESOURCES INDICATORS IN GERMANY

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Animal Genetic Resources Indicators in Germany

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Abstract

The proposed OECD indicators are discussed from the German Perspective. The collection procedure of the data required for the indicators is given, all data are available in a national database to provide answers for each of the indicators. In a critical appraisal the indicators themselves are supported. However, shortcomings are pointed out. These are: lack of measures for intra population variation, missing intended use of definitions of endangerment, their actual determination, and finally the appraisal in terms of actions a that certain values of the indicators would lead to.

1 Introduction

The stated goal of the November 2001 Expert Meeting on Agri-Biodiversity Indicators in Zurich is the critical review of the indicators developed in previous conferences. The relevant indicators for plant and animal genetic resources are listed in the OECD paper "Environmental Indicators for Agriculture, Volume 3 - 2001" as

1. For the main crop/livestock categories (e.g. wheat, rice, cattle, pigs) the total number of crop varieties/livestock breeds that have been registered and certified for marketing.
2. The share of key crop varieties in total marketed production for individual crops (e.g. wheat, rice, rapeseed, etc.).share of varieties in total marketed production (crop) (not applicable)
3. The share of key livestock breeds in respective categories of livestock numbers (e.g. the share of Friesian, Jersey, Charolais, etc. in total cattle numbers).
4. The number of national crop varieties/livestock breeds that are endangered.

2 OECD indicators

In the following we shall address each of the four indicators taken from "Environmental Indicators for Agriculture Vol. 3, OECD Publication 2001"

1st indicator: "For the main crop/livestock categories (e.g. wheat, rice, cattle, pigs) the total number of crop varieties/livestock breeds that have been registered and certified for marketing. "

On behalf of the German Federal Ministry for Consumer Protection, Food and Agriculture (BMVEL), the Information Centre for Genetic Resources (IGR) of the German Center for Documentation and Information in Agriculture (ZADI) establishes the central documentation for animal genetic resources in

Germany (TGRDEU). In order to provide information for future measures and coordination, data from research institutes, breeding associations, their umbrella organisations and other organisations active in the field of conservation and utilisation of animal genetic resources as well as data from the federal government and the Länder (the federal states in Germany), are collected and pooled in a database. The database focuses on horse, cattle, pig, sheep and goat collecting basic data for each registered breed. The following information is collected:

1. Passport-data

(a) Basic information

These information indicate and describe breeds and persons, institutions and organisations, who are responsible for a breed.

- i. Inventory data: In 1999 a new procedure for collecting inventory data has been adopted. For each breed a responsible breeding association is determined and the organisation which can annually supply the number of registered herdbook animals for that breed.
- ii. Data on origin of the breeds: Here, information on the genealogy of a breed, its organisation, herdbook registration and further historical aspects are collected. In addition, information about the development of the breed, especially the breeds that have been crossed-in, is available.
- iii. Ex situ conservation: Information on ex situ conservation of semen and embryos, that is kept as a genetic reserve, such as storage place, time, and number of sperm portions and embryos will be collected.

(b) Characterisation data:

- i. Breed description: Every breed has an official breed description, as defined by the breed associations. As there is no consistent code for a breed description it is sometimes difficult to collect all necessary information. In these cases descriptor lists will be developed in consultation with between the umbrella organisations of the breeders as well as the heads of animal breeding divisions of the Länder.
- ii. Utilisation Information: on the type of utilisation (e.g. in landscape management) are collected.
- iii. Specific characteristics: Many breeds have specific characteristics or asserted features. Due to the high variation of these traits they can not be brought into one systematic framework. Thus, the information collected is in verbal form.
- iv. Management / Farming: Information about management and farming may differ between breeds. The development of a systematic of acquisition of such information is intended.
- v. Genetics: A documentation of genetic specifics and genetic distances among the breeds is planned.

Clearly, on the basis of the data collected in Germany the statistics requested in the OECD indicator 1 can be provided.

Moreover, the data and information within TGRDEU are the national input to international information-systems, such as the Domestic Animal Diversity - Information System (DAD-IS), which is run by FAO and the databank of the European Association for Animal Production (EAAP), which is run at the Department of Animal Breeding and Genetics of the School of Veterinary Medicine in Hannover.

Especially the DAD-IS system is the most comprehensive information systems on animal genetic resources in agriculture worldwide. It is much more than an inventory about animal genetic resources. Thus, DAD-IS can be used as an official source for much of the factual information required for the OECD indicators on a world wide scale.

3rd indicator: "The share of key livestock breeds in respective categories of livestock numbers (e.g. the share of Friesian, Jersey, Charolais, etc. in total cattle numbers)."

In most cases the source breed of animal products is not considered important and, therefore, not recorded. As a result the share of the dominant breed has to be derived from the number of registered herdbook animals as recorded in TGRDEU. While this will result in a reasonably accurate estimate in purebred production populations, this may not be so in crossbred production populations. Here, adjustments will have to be made.

4th indicator: "The number of national crop varieties/livestock breeds that are endangered."

As has been described above, inventory data is collected for each breed in Germany. This includes large production populations as well as small and very small breeds. As a result also "endangered" breeds are included here. In the federal structure of Germany the Länder are responsible for the conservation of genetic resources (as they are in general for animal breeding). Here, many programs exist which supply financial support to endangered breeds. In particular in the context of public financial support, the definition of what constitutes an "endangered" breed becomes very important. This issue is currently under discussion on a European Union scale. The European Union had provided support for endangered breeds under its regulation 2078/92 and in the followup under regulation 1257/99 it intended to change the definition of an endangered breed last year. Since then a number of definitions have been circulated which differ in their definition but also their intended purpose. To name but a few: the FAO has a definition in its DAD-IS system based on the number of living females of the breed under consideration. The EU thus far used a different one for financial support with the EU regulation framework which was also solely based on the number of breeding females. The working group on Genetic Resources of the European Association on Animal Production (EAAP) proposed a - what it considered - a more rational definition to the EU which is based on a so called "adjusted number of females". Lastly, on national levels yet more demanding definitions are considered which use the concept of effective population size in population genetics as is currently under discussion in the development of the National Program for Animal Genetic Resources in Germany, which is developed as a part of the State of the World on Animal Genetic Resources (SoW AnGR) Report under preparation by the FAO and its member countries.

While the forth indicator seems rather innocent in its definition it must be noted that there is no easy answer to what the actual threshold should be. Instead, its definition depends on its intended use and the availability of the data it is based on.

3 Conclusions and Suggestions

The three OECD indicators seem to be appropriate to assess biodiversity also in animal agriculture.

1. Indicator 1: The indicator "number of breeds" has a value relative to a status quo as it may have existed some time ago in that it describes what has happened since. However, the conclusions to be draw from various scenarios are not obvious. With a constant number of breeds, clearly, no concern is warranted (except for within breed variation which is dealt with later on). This may be different with decreasing number of breeds. However, the concern may be very different depending on where in the world and on the basis of which kind of informaton the decline happens. This was clearly the result from an international workshop on the Relevance of Animal Genetic Resources to Animal Breeding" organised in the context of the World Exhibition 2000 in Mariensee/Germany. One outcome of this

meeting was a very different view on the importance of different breeds between low and high input systems. While breed replacement in the developed world was done mostly on the basis of a large body of production data, this was usually not the case in areas of low input/high stress environments. As a result a concentration on a few "better" breeds may be advantageous in some situations, while in other cases it may not. Thus, the trend in the number of breeds may be instructive but its value is not always clear.

2. Indicator 3: The share of dominant breeds is also an interesting and important indicator of how much the actual production relies on a specific breed. A big share of single breeds may reflect the existence of rather similar economic and environmental conditions in a certain region and a biological or organisational advantage of certain breeds for those conditions. It will also indicate a lack of similar competitive breeds resulting in pressure on economically less favourable breeds. However here again the valuation of the fact of dominance is not always clear: One could argue, that a large proportion of production from one genotype would be risky. But this argument would certainly be more pertinent with inbred lines than with variable population that constitute breeds, which leads to an issue not dealt with: the within breed variation (see below).
3. Indicator 4: The number of endangered breeds are indeed an important statistic. However, it is not so much the aggregation of all endangered breeds that is important. Rather, endangerment of individual breeds should trigger a series of actions that either lead to support for that breed (after appropriate evaluation of its merit relative to others) or to cryo- or other conservation schemes.

All the indicators are important. The data or information basis for their computation is available in Germany. However, a few aspects seem to be missing:

1. The within population variance does not get the attention it deserves as it constitutes a large proportion of the total genetic variation. One of the reasons for keeping a large number of breeds is the intention to preserve genetic variability. A large proportion certainly exists between breeds. However, by the same argument the rest has to reside within breeds. This is particularly true for animal populations which are generally not inbred but rather out bred populations. The status of intra population variance will have a potentially drastic influence on the assessment of the relevance of a large share of a breed in production. A large proportion of a breed with high inbreeding added may indeed become much more critical. Such a situation may arise unintentionally through an unplanned but high utilisation of a very limited number of sires possible through artificial insemination. It is strongly suggested to also monitor variability within populations which could be used as an early warning system and to include this as another indicator in the OECD list. Obviously the effective population size is the proper indicator from a scientific point of view. Its regular computation may be difficult or impossible in many populations depending on the type and organisation of the electronic herdbook systems implemented.
2. The actual definition of endangerment i.e. its criteria is neither given nor discussed. It must be admitted however, that depending on available information and the intended use the definition will be different. In the context of financial support for endangered breeds it may be discussed for European conditions to encourage the in-situ use of rare breeds rather than support conservation of almost extincted breeds ex-situ. Clearly definitions and criteria for endangered breeds will be different in both cases. If definitions or criteria are given or discussed in the context of the OECD their purpose must be explained. Alternatively it could be stated what it is not intended for, e.g. public financial support.

3. No actions are defined once a certain situation described by the indicators arises. Here the requested development of National Programs for the Conservation of Farm Genetic Resources as requested by the global State of the World Report on Animal Genetic Resources of the FAO could help to achieve clarification and development of policy on the national level.