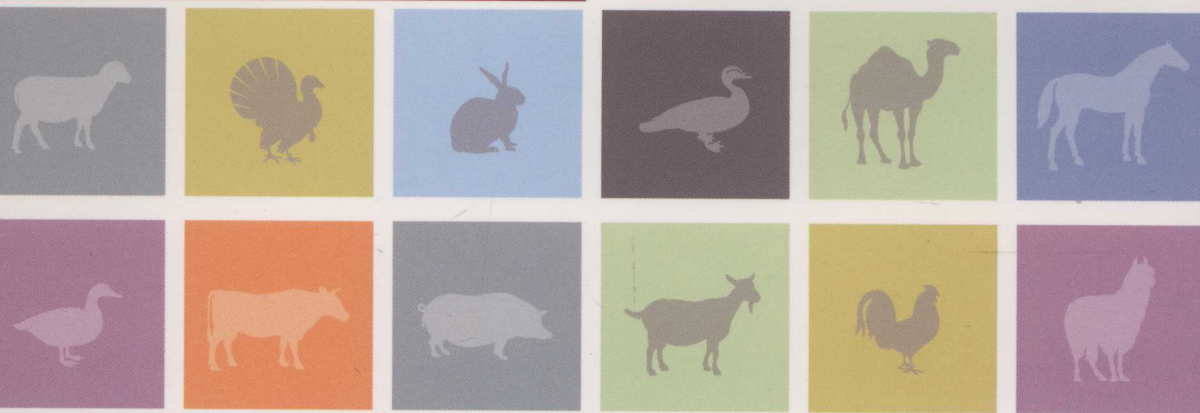


FAO ANIMAL PRODUCTION AND HEALTH



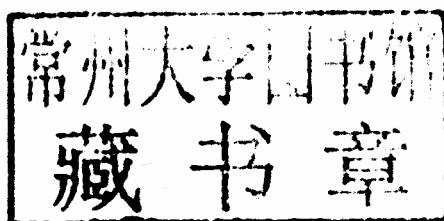
guidelines

SURVEYING AND MONITORING OF ANIMAL GENETIC RESOURCES

COMMISSION ON
GENETIC RESOURCES
FOR FOOD AND
AGRICULTURE



SURVEYING AND MONITORING OF ANIMAL GENETIC RESOURCES



Recommended Citation

FAO. 2011. *Surveying and monitoring of animal genetic resources*. FAO Animal Production and Health Guidelines. No. 7. Rome.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views of FAO.

ISBN 978-92-5-106973-8

All rights reserved. FAO encourages reproduction and dissemination of material in this information product. Non-commercial uses will be authorized free of charge, upon request. Reproduction for resale or other commercial purposes, including educational purposes, may incur fees. Applications for permission to reproduce or disseminate FAO copyright materials, and all queries concerning rights and licences, should be addressed by e-mail to copyright@fao.org or to the Chief, Publishing Policy and Support Branch, Office of Knowledge Exchange, Research and Extension, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

Acknowledgements

The first draft of these guidelines was prepared by Workneh Ayalew, Ilse Köhler-Rollefson, Oswald Matika, Siboniso Moyo, Dafydd Pilling, Beate Scherf, John Woolliams and Hongjie Yang at a workshop held in Peebles, United Kingdom, in March 2009. Further rounds of discussion and revision culminated in the production of a revised draft, which was presented and discussed at the Sixth Session of the Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture in November 2010. The guidelines were presented to and endorsed by the Commission on Genetic Resources for Food and Agriculture at its Thirteenth Regular Session in July 2011. The case study on recording and monitoring in Ireland was provided by Margaret Good. The figures in Section 1 were prepared by Anna Waldmann.

Contents

Acknowledgements	ix
SECTION 1	
Introduction	1
Why survey and monitor animal genetic resources?	4
Scope of the guidelines	7
Links to other guideline publications	7
Baseline surveys and monitoring surveys	9
Species coverage	10
Target audience	11
Structure of the guidelines and advice for users	11
SECTION 2	
Tools for surveying: the basics	15
The tool box	18
Mapping expeditions	19
Breed search tours	19
Transects	20
Aerial surveys	21
Household surveys	22
Rapid appraisals – an overview	24
Group interviews and exercises	28
Key informants	29
Breed societies	31
Censuses	32
Matching tools and objectives	33
Mixing tools	33
SECTION 3	
Developing a national surveying and monitoring strategy	41
Step 1. Obtain the mandate	43
Step 2. Organize the planning process	48
Step 2.1 Identify stakeholders and form the Strategy Working Group	50
Step 2.2 Establish the mode of operation of the Strategy Working Group	50
Step 3. Assess national needs for AnGR-related data	51
Step 3.1 Consider strategic objectives and review the current state of knowledge	51
Step 3.2 Consider the sequence and schedule for data-gathering activities	54
Step 3.3 Identify priorities	55

Step 3.4 Summarize the outcomes of Steps 3.1 to 3.3 and prepare a paper to communicate them to relevant stakeholders	56
Step 4. Identify potential approaches to data collection	56
Step 5. Review the state of resources, capacity-building needs and funding options	59
Step 6. Review the legal status of the survey data and outline procedures for data storage and access	60
Step 7. Draft the strategy	60
Step 8. Conduct a review of the strategy document and obtain formal endorsement	61
 SECTION 4	
Planning a survey	63
Step 1. Clarify the objectives of the survey	66
Step 2. Review the composition of the Survey Team and establish clear management structures	68
Step 3. Assemble and collate background information and data	71
Step 4. Review the legal framework	71
Step 5. Start preparing the "blueprint" of the survey	72
Step 6. Develop the Communication Plan	72
Step 7. Develop the sampling frame and the Analysis Plan	75
Step 7.1 Develop the sampling frame	75
Step 7.2 Develop the Analysis Plan	81
Step 8. Develop the Data Management Plan	82
Step 9. Develop the Field Operations Plan	83
Step 10. Finalize and approve the blueprint	84
Step 11. Maintain documentation and costing	84
 SECTION 5	
Preparing for the field	85
Step 1. Prepare questionnaires	87
Step 2. Prepare the kit for the field workers	89
Step 3. Draft plans for recruitment and management of field workers and their supervisors	90
Step 4. Recruit field workers	91
Step 5. Conduct a pilot trial in the field	91
Step 6. Train field workers and their supervisors	93

SECTION 6

Working in the field**95**

Communicating in the field

97

Promoting data quality

97

Making unforeseen sampling decisions

98

Amending field protocols

98

Avoiding bias in recording

98

Achieving informative dialogues with interviewees

99

First contact

99

Conducting a household interview

100

The end of an interview

100

Taking photographic records

100

SECTION 7

Data management**103**

Plan data management in advance of data collection

105

Arrangements for ownership and custodianship of survey data

106

Choosing the software to use for data management

106

Documenting operating procedures

108

Standardizing procedures for managing the raw data

109

Establishing procedures for data entry

109

Establishing procedures for data checking

110

Establishing procedures for data coding

112

Establishing procedures for data storage and security

113

SECTION 8

Data analysis**115**

Step 1. Review the schedule for the analysis

117

Timing in relation to data collection

117

Resources allocated for analysis

118

Step 2. Analyse the data

118

Model fitting

118

Missing data

118

Statistical packages

119

Circulating "emerging results" to partners

119

Step 3. Add value by linking to complementary databases

120

Step 4. Prepare the report of the analysis

121

SECTION 9

Reporting and communicating results 123

Step 1. Match the outcomes of the survey to the interests of relevant stakeholders 126

Step 2. Develop specific messages for each group of stakeholders 126

Step 3. Consider communication methods 126

Step 4. Consider the impact of disseminating the survey results 127

Step 5. Develop and implement the communication strategy 127

Step 6. Evaluate lessons learned on the survey process 127

Step 7. Prepare the Final Report of the Survey 131

SECTION 10

Translating results into action 133

Organize a stakeholder workshop 135

References 139

BOXES

1	The case for action	3
2	Definitions – surveys, monitoring and censuses	7
3	Collaboration with other sectors – piggyback surveys and beyond	18
4	Pros and cons of mapping expeditions – a summary	19
5	Pros and cons of breed search tours – a summary	20
6	Pros and cons of transect methods – a summary	21
7	Pros and cons of aerial surveys – a summary	22
8	Can imaging technology contribute to AnGR surveys?	23
9	Pros and cons of household surveys – a summary	25
10	Triangulation – an example	25
11	Participatory surveying and monitoring	26
12	Pros and cons of rapid appraisals – a summary	28
13	Pros and cons of group exercises – a summary	29
14	Pros and cons of using key informants – a summary	30
15	Monitoring with breed societies – opportunities and challenges	32
16	Pros and cons of obtaining data from breed societies – a summary	33
17	Is there potential for integrating AnGR surveying and monitoring into national agricultural censuses?	34
18	Pros and cons of obtaining data via censuses – a summary	36
19	Questions to be answered by surveys – some examples	37
20	Maintaining continuity in survey outputs	39
21	Issues ideally included in the mandate for a surveying and monitoring strategy – a checklist	44
22	The Animal Husbandry Law of the People's Republic of China	45
23	National legislation on the conservation of Slovenia's animal genetic resources	46
24	The Animal Improvement Policy for South Africa	47
25	Provisions for surveying, monitoring and documentation in the United Kingdom's National Action Plan on Farm Animal Genetic Resources	48
26	Provisions for surveying, monitoring and documentation in Germany's National Programme for Conservation and Sustainable Use	49
27	Composition of the Strategy Working Group	50
28	Demographic data needed to update national breed population records in DAD-IS	52
29	Examples of organizations and individuals with potential roles in data collection or as key informants	57
30	What is meant by "precision"?	66
31	How long does a survey take?	69
32	Establishing responsibilities within the Survey Team	70
33	The timing of surveys	73
34	Using Gantt charts	74
35	Coping with a heterogeneous landscape in a transect survey – an example	79
36	Providing an audit trail in statistical analysis	81
37	Designing questionnaires – some tips	88
38	What a respondent needs to know about the survey – a checklist	89

39	Using analogue field measures	90
40	Field workers recruited from different sources – potential strengths and weaknesses	92
41	Example of a training schedule for field workers and supervisors	94
42	Variations in local customs – examples from Zimbabwe	99
43	Conducting interviews – some tips	101
44	Excel is not database software – an example from the United Kingdom	107
45	The development of recording and monitoring technology – experiences from Ireland	111
46	The report on the data analysis – a checklist	120
47	Potential areas for discussion at a stakeholder workshop	136
48	How a national survey can influenced policy – experiences from China	137

TABLES

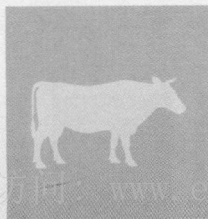
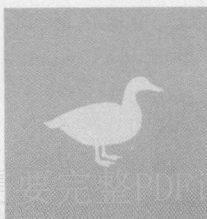
1	Key sections of the guidelines for Strategy Working Groups and Survey Teams	12
2	An indication of the usefulness of different tools to address different survey questions (when used as a single strategy)	38
3	Combining quantitative and qualitative survey methods – an example from crop production in the United Republic of Tanzania	40
4	Framework for summarizing the availability of AnGR-related data	51
5	Framework for summarizing objectives and priorities for data collection	56
6	Organizations and individuals that are potential key informants or collaborators in data collection – some examples	58
7	Identifying communication messages – some examples of how survey outputs may be relevant to specific stakeholder groups	128
8	Strengths and weaknesses of different communication methods	130

FIGURES

1	Summary of the main activities involved in planning and implementing a survey	8
2	Overview of suggested roles and responsibilities in the development and implementation of a surveying and monitoring strategy	12

SECTION 1

Introduction



SECTION 1
Introduction

Introduction

Knowledge of animal genetic resources for food and agriculture (AnGR) is fundamental to the sustainable use, development and conservation of these resources. Yet such knowledge is often unavailable to those who need it, whether livestock keepers or other stakeholders whose decisions affect AnGR management. The continuous evolution of livestock production systems means that knowledge needs to be updated regularly so that management can be adapted to changing circumstances. There is an urgent need for systematic and well-organized action to collect, process and disseminate AnGR-related data (Box 1).

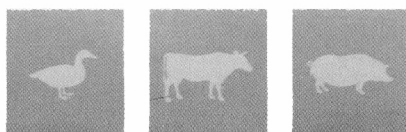
BOX 1

The case for action

- For about 36 percent of the breeds¹ recorded in the Global Databank for Animal Genetic Resources², no data are available on the size and structure of the population.
- The inventory of the world's breeds is incomplete – when surveys have been conducted they have revealed previously unrecorded breeds.
- Few local breeds have been comprehensively characterized – meaning that many valuable traits probably remain unknown or undocumented.
- Few studies have effectively compared breed performances taking into account the production environments in which the animals are kept and the full range of products and services that they provide.
- Among breeds whose population size and structure are recorded, more than 30 percent are categorized as being at risk of extinction. They may be lost before their characteristics are fully studied and recorded.
- The geographical distribution of most breeds is poorly documented, hampering effective management: for example, in the event of disease epidemics or other disasters.
- The world's livestock production systems are being transformed at an unprecedented rate – posing an enormous challenge to the sustainable management of AnGR.
- Global climate change is likely both to threaten AnGR diversity and to increase its importance as an asset with which to adapt livestock production to changing conditions.

¹ Breeds are here defined as follows: “either a subspecific 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” (FAO, 1999).

² The backbone of the Domestic Animal Diversity Information System (DAD-IS – <http://www.fao.org/dad-is>).



The *Global Plan of Action for Animal Genetic Resources*, adopted as the first internationally agreed framework for the management of AnGR by 109 countries at Interlaken, Switzerland, in 2007, and subsequently endorsed by all FAO members (191 countries and the European Community) notes that:

“Understanding the diversity, distribution, basic characteristics, comparative performance and the current status of each country’s animal genetic resources is essential for their efficient and sustainable use, development and conservation. Complete national inventories, supported by periodic monitoring of trends and associated risks, are a basic requirement for the effective management of animal genetic resources. Without such information, some breed populations and unique characteristics they contain may decline significantly, or be lost, before their value is recognized and measures taken to conserve them” (FAO, 2007a).

The Convention on Biological Diversity (CBD) calls on countries to identify and monitor their biodiversity, including agricultural biodiversity. It recognizes that these activities are fundamental to the conservation and sustainable use of genetic resources. It calls, in addition, for the identification and monitoring of factors that threaten or are likely to threaten biodiversity¹.

WHY SURVEY AND MONITOR ANIMAL GENETIC RESOURCES?

The need for surveying and monitoring is well expressed in the phrase “you can’t manage what you don’t measure” – with effective management of AnGR being needed to achieve development objectives (food and livelihood security, sustainable utilization of natural resources, etc.) and to deal with the ever-evolving relationships between livestock, human communities and production environments. The following subsections outline some of the main benefits of introducing or strengthening surveying and monitoring activities.

Enhance knowledge of population size and structure and monitor trends. Comprehensive breed inventories and data on the size and structure of breed populations are prerequisites for effective management of AnGR, particularly to identify breeds that are at risk of extinction. Baseline data and regular monitoring of breed populations are thus essential. The country-based early warning and response systems called for by the *Global Plan of Action for Animal Genetic Resources* will rely on the outputs of national surveying and monitoring strategies (FAO, 2009b).

Enhance knowledge of breeds’ geographical distribution. Breeds that are very restricted in their distribution are likely to be particularly vulnerable to some threats (e.g. disease epidemics). If such breeds are identified, steps can be taken to address these vulnerabilities. Therefore, breed distributions need to be mapped and then monitored over time.

Enhance knowledge of breeds’ characteristics. Knowledge of breeds’ characteristics is essential to their use and development. Many local breeds have traits that make them well adapted to harsh production conditions. They may also provide unique products

¹ Article 7 of the Convention on Biological Diversity
(available at <http://www.cbd.int/convention/articles.shtml?a=cbd-07>).



that are not yet utilized or marketed to their full potential. If breeds are not characterized, opportunities to use and develop them to improve livestock production may be overlooked. Surveys are thus needed to explore and document breeds and their uses in their production environments. In many countries, performance recording systems have not been established for most local breeds. Where this is the case, surveys are an important way to improve knowledge of the breeds' performance².

Enhance knowledge of cross-border genetic linkages: Because of cross-border exchanges of genetic material a national breed population may be part of a common gene pool whose range extends beyond national boundaries. In other words it is appropriate to consider the national population to be part of a transboundary breed. Establishing whether or not this is the case may be important for cross-border cooperation in managing the population. Identifying national populations that should be linked at transboundary level is also important for regional and global assessments of AnGR diversity. Surveys conducted in areas close to international borders are an opportunity to investigate cross-border exchanges.

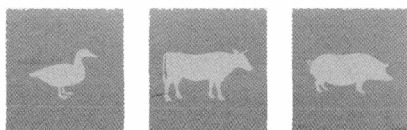
Enhance knowledge of breeds' production environments. Comparisons of breed performance are only useful if they take into account the production environments in which the animals are kept. Collecting data on the inputs used in animal production as well as the outputs obtained allows a more realistic assessment of productivity. Additionally, recording the production environment in which a breed has been kept over time, and to which it has probably become adapted, is an indirect method of characterizing the adaptations of the breed itself. Effectively matching breeds to production environments is an important means of avoiding the costly mistakes that may occur when breeds are introduced to new areas.

Document cultural aspects of livestock production and breed utilization. Indigenous breeds often play key roles in cultures, religions, traditions and social practices. Understanding these roles is important in the planning and implementation of interventions aimed at promoting better use and development of AnGR at community level. Knowledge of the social context may also be important for understanding the distinctiveness of particular livestock populations. Surveys are a means to record the social and cultural aspects of livestock keeping and how these change.

Document indigenous knowledge. Livestock keepers who have maintained and developed their local breeds over many generations have usually also accumulated a wealth of knowledge on the breeds and their production environments. Understanding the roles and significance of indigenous knowledge is part and parcel of planning effective AnGR management interventions. Indigenous knowledge is often under threat. Where this is the case, it is particularly important that it is documented.

Identify and monitor threats to animal genetic resources. Threats to AnGR are many and diverse. Ensuring that action is taken to protect breeds from extinction requires that these threats be identified. If particular threats are becoming more significant, these trends need to be recognized as soon as possible.

² Methods for phenotypic and molecular characterization are described in more detail in the respective guidelines in this series (FAO, 2011b; FAO, 2011c).



Support strategic planning for the sustainable utilization of animal genetic resources. Without good knowledge of AnGR, decision-makers at national level and in the breeding industry will be unable to develop strategic plans for sustainable use and development. Knowledge of all the breeds that might be drawn upon, and of the production environments in which the animals can be kept, is needed in order to develop or strengthen animal breeding programmes (FAO, 2010a). The information gained from monitoring through repeated surveys is important for identifying trends that need to be addressed in future plans, and provides a basis for assessing progress in the implementation of existing plans and policies.

Improve livelihoods. Information on livestock, their production systems and the livelihoods of their keepers is central to the formulation of development objectives and strategies that support better livelihoods for livestock keepers and the wider community. This information can be used to:

- improve decision-makers' understanding of the links between livestock keeping and social and economic wellbeing;
- shape strategies that better integrate genetic improvement, nutrition, animal health, marketing and other aspects of livestock management;
- ensure that development strategies are acceptable to livestock keepers; and
- raise awareness of the characteristics of local breeds and their products, including any potential for developing special products targeted at niche markets.

Improve priority setting for conservation programmes. The limited availability of resources for conservation programmes to protect breeds that are at risk means that priority setting is necessary. Decisions as to which breeds to target for conservation require up-to-date information on the risk status of all the breeds under consideration and on any unique characteristics that the breeds may possess.

Raise public awareness. Survey outputs such as descriptions of breeds with particularly interesting characteristics or photographs of animals in their production environments, are likely to be useful in the preparation of publicity materials that can promote understanding of the importance of AnGR among decision-makers and the general public. It has also been proposed that regular "red lists" of at-risk breeds should be produced (FAO, 2009a).

Meet international obligations for reporting on the status of animal genetic resources. Within the framework of the CBD, countries are obliged to report on the status of their national biodiversity. In the case of AnGR, the primary route for reporting on the state of diversity is to FAO, via the Domestic Animal Diversity Information System (DAD-IS). The Commission on Genetic Resources for Food and Agriculture (CGRFA) has agreed that FAO should prepare status and trends reports every two years based on data entered by countries into DAD-IS (FAO, 2009a). It has also been agreed that countries should report on their progress in the implementation of the *Global Plan of Action for Animal Genetic Resources* every four years by submitting country reports to FAO (FAO, 2009a). Well-planned surveying and monitoring programmes will help countries obtain the data they need to meet these various reporting obligations.



BOX 2

Definitions – surveys, monitoring and censuses

Survey: a systematic exercise in data collection, processing and dissemination.

Monitoring of animal genetic resources: a systematic set of activities undertaken to document changes over time in the size, structure, characteristics and distribution of livestock populations, along with changes to their production environments (including their management). In these guidelines, monitoring is considered to be a sequence of surveys, which can be referred to as “monitoring surveys”.

Census: an exercise in the collection, processing and dissemination of data that involves the enumeration of all units (e.g. livestock-keeping households) in the area targeted. Large sample-based exercises are sometimes also referred to as “censuses”. Most countries undertake regular agricultural censuses once every ten years (FAO, 2005a). Countries may also undertake specific livestock censuses, but to date most have not collected data that are differentiated by breed.

SCOPE OF THE GUIDELINES

These guidelines describe approaches and methods for the collection, management, analysis and dissemination of AnGR-related data. The aim is not only to provide advice on technical and operational matters, but also to help countries consider how surveying and monitoring efforts (see Box 2 for definitions) can be tailored to their specific needs and circumstances, and integrated with wider data-gathering activities and other aspects of AnGR management. A number of surveying “tools” are introduced, including both sample-based surveys and less formal techniques. However, the focus is on planning and operational issues. Technical matters are described only in sufficient detail to ensure that the methods chosen are appropriate to the purposes of the surveys in which they are used. The guidelines do not provide detailed information on how to conduct censuses, i.e. surveys in which the objective is to enumerate all livestock alive at a given time. Further advice on censuses can be found in FAO (2005a).

The guidelines suggest that countries’ AnGR-related data requirements can best be met through the development of “national surveying and monitoring strategies” and provide advice on how to develop such strategies. Surveying and monitoring strategies will comprise a number of individual surveys. The guidelines describe the various tasks involved in planning and implementing such individual surveys (Figure 1).

Links to other guideline publications

It is important to recall that these guidelines are part of a set of AnGR-related guidelines (either published or in preparation). While each of these publications addresses a different

