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ANIMAL GENETIC RESOURCES INFORMATION

BULLETIN D'INFORMATION SUR LE RESSOURCES GÉNÉTIQUES ANIMALES

BOLETIN DE INFORMACION SOBRE RECURSOS GENETICOS ANIMALES

Food and Agriculture Organization of the United Nations
Organisation des Nations Unies pour l'alimentation et l'agriculture
Organización de las Naciones Unidas para la Agricultura y la Alimentatción

UNEP

Initiative for Domestic Animal Diversity
Initiative pour la Diversité des Animaux Domestiques
Iniciativa para la Diversidad de los Animales Domésticos

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Editorial
AGRI – Looking Forward

In 1980, FAO and UNEP (UN Environment Programme) jointly convened a Member Country Expert Consultation in Rome on *The Conservation and Management of Animal Genetic Resources (AnGR)*. This consultation was not one for experts in their own right; the *experts* participating were nominated by their governments and attended as representatives of the relevant FAO and / or UNEP member countries. This implied that the recommendations reached were meant to be addressed by the two international organisations concerned.

At the time, the conservation of AnGR with reference to the livestock farming sector was quite a novel idea to many of those opinion-makers who considered the sustaining of local domestic animal resources to be contrary to livestock improvement and modern animal agriculture development. *In contrario*, today the term *AnGR and Biodiversity* are fully *a la mode*.

In the late 1970s little information was available, in both developed and developing regions of the world. The 1980 consultation recommended unanimously that FAO, in collaboration with UNEP, must consider AnGR as a priority sector and find the funds to develop it and that FAO should involve all interested and relevant parties and take the leadership to establish:

- classification criteria for endangered breeds;
- technical methods and standards for live (*in-situ*) and cryogenic (*ex-situ*) conservation;
- methods of conservation;
- regional data- and gene banks;
- comprehensive documentation of livestock breeds in China and the USSR;
- training in conservation methods;
- a Newsletter to be published regularly.

These are the origins of AGRI (Animal Genetic Resources Information Bulletin), that evolved from a simple technical Newsletter in 1983 to a full fledged specialised publication. Today it is recognised world-wide as the only acknowledged livestock genetic resources journal.

It is the intention of the Animal Production and Health Division (AGA) of FAO to accentuate and develop further this position regarding AGRI, with the sustaining support of all relevant INGOs, as the mouthpiece for animal genetic resources conservation and utilisation and confirm AGRI's role in the dissemination of information on populations of AnGR, farming systems conditions and genetic parameters.

From No. 32, further effort will be made to sustain this indispensable publication, allowing colleagues from all over the world to share and exchange, even further, their information and know-how on farm animal populations. This will also strengthen AGRI as a media for presenting the FAO and other international programmes, past, present and future, and actions in the conservation and use of genetic material.

The Editors

Editorial
AGRI – Un regard sur le passé

En 1980 la FAO et l'UNEP (Programme des Nations Unis pour l'environnement) ont organisé une Consultation d'experts des pays membres à Rome pour discuter de la *Conservation et la Gestion des Ressources Génétiques Animale (AnGR).* Les experts qui ont participé à cette consultation avaient été només par leur gouvernement et prenaient part en tant que représentants de leur pays auprès de la FAO et/ou de l'UNEP. En conséquence, les recommendations établies avaient pour but l'application au niveau des deux organisations concernées.

A l'époque, la conservation des AnGR, en particulier du secteur de l'élevage, représentait une nouveauté pour la plupart de ceux qui forment l'opinion publique qui considéraient la conservation des ressources génétiques des animaux d'élevage contraire à l'amélioration de l'élevage en soi et au développement moderne de l'agriculture animale. *In contrario,* aujourd'hui les termes *AnGR et Biodiversité* sont à la mode.

Vers la fin des années 70 il existait très peu d'information à ce sujet aussi bien pour les régions développées que pour celles en voie de développement. En 1980 une consultation a recommendé à l'unanimité que la FAO, en collaboration avec l'UNEP, considère les AnGR comme un secteur prioritaire et, à ce propos, puisse trouver les fonds nécessaire pour son développement. Pour cela, la FAO devait se proposer comme leader du secteur et impliquer toutes les institutions importantes intéressées afin d'établir:

- les critères pour la classification des races en danger;
- les méthodes techniques et les standards de conservation *in situ* et de la conservation cryogénique (*ex situ*);
- les méthodes de conservation;
- les banques de gènes et de données au niveau régional;
- une documentation compréhensible des races d'élevage en Chine et en USSR;
- la formation en méthodes de conservation; et
- une Newsletter à publier régulièrement.

Voilà l'origine de AGRI (Bulletin d'Information pour les Ressources Génétiques Animales) qui a évolué d'une simple Newsletter technique en 1983 jusqu'à devenir une publication spécialisée. Aujoud'hui elle est reconnue dans le monde comme la seule revue consacrée aux ressources génétiques des animaux d'élevage.

C'est la volonté de la Division de Production et Santé Animale (AGA) de la FAO de mettre l'accent et de développer ultérieurement la position de AGRI, à travers le soutien de toutes les INGO intéressées, pour le rendre le porte-parole de la conservation des ressources génétique et de leur l'utilisation, et confirmer ainsi le rôle de AGRI dans la vulgarisation de l'information sur les populations AnGR, sur les conditions des systèmes d'élevage et des paramètres génétiques.

A partir du No. 32 un effort supplémentaire sera fait pour soutenir cette importante publication qui permet à nos collègues dans le monde de partager et d'échanger leurs informations et connaissances sur les populations d'animaux d'élevage. Ceci permettra aussi de renforcer AGRI en tant que outil de communication pour présenter les projets de la FAO et d'autres programmes internationaux; passé, présent et futur, et plus globalement les actions entreprisent dans le cadre de la conservation et l'utilisation du matériel génétique.

Les Editeurs

Editorial
AGRI – Un vistazo al pasado

En 1980 la FAO y la UNEP (Programa de las Naciones Unidas para el Ambiente) organizaron una Consulta para expertos de los países miembros en Roma para discutir de la *Conservación y la Gestión de los Recursos Genéticos Animales (AnGR)*. Los expertos que participaron en esta reunión habían sido nombrados por sus gobiernos y tomaban parte en ella como representantes de los países ante la FAO y/o la UNEP. Por ello, las recomendaciones acordadas tenían como objetivo su aplicación a nivel de las dos organizaciones implicadas.

En aquella época la conservación de AnGR, y en particular referida al sector de la producción animal, representaba una novedad para la mayor parte de los opinionistas, que consideraban la conservación de los recursos genéticos de animales domésticos contraria a la mejora de la producción animal en sí y al desarrollo moderno de la agricultura. *In contrario,* hoy en día los términos *AnGR y Biodiversidad* están más bien *à la mode*.

Hacia finales de los años 70 existía muy poca información a este respecto, tanto para las regiones desarrolladas como para aquéllas en vía de desarrollo. En 1980 una consulta recomendó por unanimidad a la FAO, en colaboración con la UNEP, que considerase los AnGR como un sector prioritario y, a tal propósito, pudiera encontrar los fondos necesarios para su desarrollo. Para ello, la FAO debía proponerse como líder del sector e implicar todas aquellas instituciones importantes interesadas, para establecer:

- los criterios para la clasificación de las razas en peligro;
- los métodos técnicos y los estándars para la conservación *in-situ* y la conservación criogénica (*ex-situ*);
- los métodos de conservación;
- las bases de datos y bancos de genes a nivel regional;
- una documentación comprensible sobre las razas domésticas en China y en URSS;
- la formación en métodos de conservación; y
- una Newsletter de publicación regular.

Y este fue el origen de AGRI (Boletín de Información sobre los Recursos Genéticos Animales), que ha pasado de una simple Newsletter técnica en 1983 hasta convertirse en una publicación especializada. Hoy en día está reconocida a nivel mundial como la única revista dedicada a los recursos genéticos de animales domésticos.

La División de Producción e Higiene Animal (AGA) de la FAO tiene la intención de impulsar y desarrollar ulteriormente la posición de AGRI, a través del apoyo de todas las INGO interesadas, para convertir la revista en el porta voz de la conservación de los recursos genéticos y su utilización, confirmando así el papel de AGRI en la difusión de la información sobre las poblaciones AnGR, las condiciones de los sistemas de explotación y los parámetros genéticos.

A partir del No. 32 se llevará a cabo un esfuerzo suplementario para sostener esta importante publicación que permite a nuestros colegas en el mundo compartir e intercambiar sus informaciones y conocimientos sobre las poblaciones de animales domésticos. Esto permitirá también reforzar AGRI como herramienta de comunicación para presentar los proyectos de la FAO y de otros programas internacionales; pasado, presente y futuro, y más globalmente las acciones llevadas a cabo en el marco de la conservación y la utilización del material genético.

Los Editores

The State of the World Animal Genetic Resources. The Logical Step Forward in the FAO Animal Genetic Resources Programme

An article in AGRI 29 by Dr. Bhat (India) and the full AGRI 30 issue in Arabic, English, French and Spanish described the objectives and process of the State of the World (SoW) of Animal Genetic Resources (AnGR). The objective of this paper is to recap the salient features in those two documents and report on the overall progress made towards achieving the SoW-AnGR objectives, particularly during these past six months. To be efficiently conclusive, this project will most probably be longer than that indicated in the original planning stage.

The FAO AnGR program was started with two main components in mind, the first is documentation of what AnGR exist and establish national, regional and global structures to deal with AnGR issues, and the second, what should be done about these AnGR to enhance their role in the development of agriculture. The former was carried out by asking individual countries about their AnGR and documenting the data that came from the countries in the Domestic Animal Diversity Information System (DAD-IS) that was made available on the internet and off-line on CDs in different editions. Also that work resulted in the publication of three editions of the World Watch List for the Domestic Animal Diversity (WWL-DAD), documenting livestock breeds and their risk status. In a project of such enormity, not all data could be verified at the country level but some iteration did take place with the fact remaining that the data quality differed from one country to another.

National and regional structures were formed by establishing national and regional focal points beside the global focal point which is at FAO in Rome. An important output of these activities was increasing the degree of awareness among countries and the donor community and involving all true stakeholders. At that stage it was only logical to proceed towards realizing the second major component of the program; i.e. " *what should be done about these AnGR to enhance their role in the development of agriculture*". Table 1 shows the list of the activities, SoW planned time-frame and status.

Table 1. List of the activities, SoW planned time-frame and status.

Activities	Proposed time line*	Status
Preparation of tools and guidelines	Sep 2000 - Jun 2001	Completed
Regional training	Jul 2001 - Feb 2002	Partially completed
NCC[a)] begins CR[b)] development	Sep 2001- Apr 2002	In the pipeline
In-country training	Sep 2001- July 2002	Gradually initiated
Supporting-data collection	Aug 2001 - July 2002	Gradually initiated
Drafting CR and consultation	Feb 2002 - Jul 2002	

[a)]NCC = National Co-ordinating Committee.
[b)]CR = Country Report.
*Indicative dates.

Proposed Submission of Country Reports: August 2002

For SoW reports to gain credence and act as an instrument for the facilitation of global actions to utilize and conserve AnGR the governments of the world have been involved in the process since the early inception of SoW and their engagement is continuously perused through FAO intergovernmental mechanisms/fora. Table 2 shows the governmental commitments to the program and their targeted involvement.

Country Reports

Country Reports are the basic elements of SoW. They are an opportunity to create a vision and strategic directions for the better management of AnGR and to clearly establish priorities for action and needs. Their preparation is very important both in content and in the process itself.

Structure of Country Reports

The country report should comprise six main parts as reported in table 3.

The Country Report is meant to be a **Strategic Policy Document.** It should provides answers to three basic questions:

1. Where we are?
2. Where do we need to be?
3. How to get to where we need to be?

Table 2. The governmental commitments to the program and their targeted involvement

	ITWG-AnGR[a)]	CGRFA[b)]
Adoption of SoW-AnGR	2nd meeting, 2000	9th meeting, 2001 (postponed to 2002)
Progress evaluation Strategic Priority Actions Report and Follow-up Mechanism	3rd meeting 2002	
Format of the SoW-AnGR Report	4th meeting, 2003	10th meeting, 2003
Draft of the SoW-AnGR Report Preceded by a review by Stakeholders		
Negotiated First SoW-AnGR Report and options for implementation	5th meeting, 2005	11th meeting, 2005
Anticipated CGRFA reporting to Convention on Biological Diversity (CBD):	2004	and 2006

[a)]Intergovernmental Technical Working Group on Animal Genetic Resources for Food and Agriculture.
[b)]Commission (FAO) on Genetic Resources for Food and Agriculture.

Table 3. The six main parts of the Country Report

1	State of Farm Animal Genetic Resources
2	Changing Demands on National Livestock Production
3	State of National Capacity
4	National Priorities for the Conservation and Utilization of AnGR
5	International Co-operation in Farm Animal Biodiversity
6	Other Elements

It should then consider the **Priority Issues** surrounding these questions, and **Needs**. However, a Country Report:

- is not an inventory of AnGR
- is not an update of the WWL-DAD
- is not a report to satisfy international reporting commitment

Training

Training is a crucial component of SoW. The plan is to train some 320 national professionals by the end of March 2002. The objectives, programme and expected outcomes of the training programme are:

- Develop a group of experts for supporting the SoW-AnGR process, to assist countries to:
  - Organise and manage preparation of Country Reports (CR); and
  - Enhance regional co-operation and co-ordination.

Training workshops make use of material especially prepared for that purpose both in printed form and in Sow-AnGR Module in DAD-IS on-line.

Funding of SoW

Funding for SoW indeed imposes a great challenge. All parties concerned must cooperate to find sufficient funding to fulfil the objective of the program. The main sources of funding are:

- FAO Regular Program;
- extrabudgetary resources, i.e. trust fund donor countries, development organisations like UNDP and World Bank etc.; and
- direct national contributions.

Communication with countries

FAO AnGR Group had released Communication No. 1 in April 2001. Now, upon completion of regional trainings, FAO is releasing the Communication No. 2, in order to assist countries in their follow-up activities. The document is reproduced in this article.

Preparation of the Country Report for the State of the World's Animal Genetic Resources Communication # 2

This communication follows the letter of invitation sent by the Director-General of FAO on 7 March 2001 and Communication #1 sent in April 2001. The purpose of this document is to update you on the status of the process leading to the first *Report of the State of the World's Animal Genetic Resources* (SoW-AnGR).

Participation and essential steps forward

The invitation letter was sent to 180 member nations, one member organization and 8 countries which are not members of FAO. To-date 100 responses were received, out of which 97 countries indicated their interest to participate in the State of the World's Animal Genetic Resources process. In view of a good progress made so far, we suggest you to consider the following actions:

- Countries, ministries, which did not respond yet to the invitation of the Director-General of FAO, dated 7 March 2001, are requested to follow-up the matter with appropriate government authorities.
- Countries which responded positively to the invitation by the Director-General, are advised to allocate appropriate human and financial resources to successfully complete the task
- It is important to note, that in particular the recommendation in the "Guidelines for the Development of Country Reports" to form a broad and balanced National Consultative Committee (NCC) with a Chairperson and a National Technical Secretary as the driving force for developing the Country Report.
- We ask you to inform FAO on the name and full address of the Chairperson and a National Technical Secretary of NCC. This will allow FAO's SoW-AnGR secretariat to provide technical assistance as required for the Country's preparatory process, and to effectively communicate with the respective persons in each participating country. Correct address will also facilitate mailing of relevant technical materials to the person in the country.

Regional Training of Trainers Workshops (RTOT WSs)

To-date 8 Regional Training of trainers (RTOT) Workshops (WS) have been conducted with participants from approx. 140 countries.

RTOT WSs have been conducted for the following regions:

- Anglophone Africa in Ethiopia, in June 2001.
- South and Central America in Mexico, in September 2001.
- North Europe in Denmark, in October 2001.
- South Europe in Hungary, in October 2001.
- North America in United States in November 2001.
- South-East Asia in Bangkok, in November 2001.
- West Africa in Senegal, in December 2001.
- North Africa in Tunisia, in January 2002.

The following RTOT WSs are planned:

- Near East in Egypt, in February 2002.
- Russian speaking group in Russia, in March 2002.
- Caribbean to be determined.
- Pacific Islands to be determined.

Training and other materials to support within country process

Training Pack

A comprehensive Training Pack to support regional and country training activities is now available in all (five) official languages of the Organization, namely English, French, Spanish, Arabic and Chinese. The Training Pack is available in hard copy and will be also made available in the DAD-IS SoW-AnGR on-line module at http://www.fao.org/dad-is. Training Packs will be mailed in January 2002 in quantities as requested by participants of the RTOT WSs.

DAD-IS SoW-AnGR Module (off-line)

In addition to the Training Pack, reporting software has been developed. The DAD-IS SoW-AnGR Module is available on CD-ROM. It is operational in all official languages.

DAD-IS SoW-AnGR Module (on-line) at http://www.fao.org/dad-is

The on-line DAD-IS SoW-AnGR Module has been developed in addition to the stand-alone system provided on CD-ROM. The on-line Module is focused on up-to-date information for all stakeholders beyond the NCC.

It provides on-line support to countries starting when countries are considering their action of the FAO D-Gs invitation through acceptance of the invitation and establishing their National Consultative Committee, to taking first action to mobilize the necessary financial resources, and initial work to the first Regional Training Workshop and NCC, with the address as for the parent DAD-IS system (http://www.fao.org/dad-is/). It will need to be developed further over time and e.g. provide for the follow-up mechanism.

The on-line DAD-IS SoW-Module will contain the following features:

- *What's New on the State of the World's AnGR Process*: global and regional events and activities; summary of library updates; suggested actions now.
- *SoW-AnGR Library*: key documentation supporting the SoW-AnGR Process
- *Resource Mobilization*: sample project proposals; donor contributions, and links to funding agencies.
- *Stakeholders, Countries, National Co-ordinating Committees and International Non-Governmental Organizations*: contact details and SoW-AnGR progress.
- *SoW-AnGR Module Stage 1*: information on DAD-IS software assisting countries to develop Country Reports.

All stakeholders are encouraged to regularly monitor the information provided in this Module.

Guidelines for the Development of Country Reports

These Guidelines have been approved by the Intergovernmental Working Group on Animal Genetic Resources (see also: http://www.fao.org/ag/cgrfa/AnGR.htm#ITWG) and are available in all official languages of FAO. You may request the printed copies or see the electronic version at http://www.fao.org/dad-is.

SoW Brochure

The Brochure titled "Conserving and Developing Farm Animal Diversity" is available in all official languages of FAO. This brochure has been developed to inform decision-makers. You may request the printed copies or see the electronic version at http://www.fao.org/dad-is.

SoW-AnGR process and the Convention on Biological Diversity

The Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) recommended in its seventh meeting that the Conference of the Parties of the Convention on Biological Diversity at it's Sixth meeting in The Hague, 7-19 April 2002 is:

"Considering the importance of animal genetic resources for sustainable agriculture and food security, the serious erosion of these resources, and the need for measures for their conservation and sustainable use,

a) Welcomes the process initiated by the Food and Agriculture Organization of the United Nations for the preparation of the first Report on the State of World's Animal Genetic Resources, as a contribution to the Convention's programme of work on agricultural biodiversity, as adopted by decision V/5;

b) Encourages Parties to participate in the development of the first Report on the State of World's Animal Genetic Resources, in particular through the preparation of country reports;

c) Underlines the need for countries to be able to participate fully in the preparatory process for the first report on the state of world's animal genetic resources, and implement follow-up actions identified through the process".

Further information

We will keep you continuously posted on the further developments. Updates will also be regularly posted in the SoW area of DAD-IS at http://www.fao.org/DAD-IS**.** We recommend that your NCC regularly consult this Web page.

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The role of Rare Breeds International as a global organization for the conservation of farm animal genetic resources

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Summary

Rare Breeds International (RBI) is the global non-governmental organization (NGO) concerned with the conservation of animal genetic resources (AnGR). It works in conjunction with FAO and with other organizations associated with livestock production. RBI members form a grassroots network that is rich in experience and knowledge of native breeds and affiliated national organizations maintain a valuable database of AnGR. Information is disseminated through major international conferences which are held at intervals of three years and through annual regional meetings. The cumulative expertise of the RBI membership facilitates a wide variety of projects, which range from policy interaction with governmental agencies to emergency rescue action and breeding programmes for relic breeds. RBI communicates mainly through publication of proceedings of major conferences and also by dedicated and linked websites.

Résumé

Rare Breeds International (RBI) est une organisation non gourvenementale (NGO) qui s'occupe de la conservation des ressources génétiques animales (AnGR) au niveau mondial. L'organisation réalise son travail en collaboration avec la FAO et d'autres organisations associées à la production animale. Les membres de RBI forment la base d'un réseau riche d'expérience et de connaissance des races natives et les organisations nationales qui adhèrent maintiennent une base de données importante de AnGR. L'information est divulgée à travers des conférences mondiales au niveau international qui se tiennent tous les trois ans et à travers des réunions annuelles régionales. L'ensemble d'expertise rassamblé grâce aux associés de RBI facilite la mise en oeuvre de projets d'une grande variété, qui vont de l'interaction politique avec les agences gouvernementales concernées par les actions de récupération d'alerte aux programmes d'amélioration des races en disparition. RBI communique surtout à travers la publication de compte rendu des conférences mondiales mais aussi à travers son site Web et les différents liens à l'intérieur.

Keywords*: Rare breeds, Native breeds, Genetic resources, Genetic conservation.*

Introduction

The significant development of national organizations established to identify and conserve endangered breeds of farm livestock began in the 1960s. In some countries, such as Hungary, conservation programmes were developed through State agencies, but in most countries the initiative was taken by NGOs. Work on the conservation of endangered animal genetic resources started in Britain by a group of committed individuals in a working party in 1968, before being

formalized as a recognized body in 1973. It stimulated the creation of similar organizations in other countries and by the late 1980s the movement had become widespread. There was some flow of information and interchange of ideas between national organizations, but in general they operated in isolation. At an international conference organized by one of the authors (LA) at Warwick University in England in 1989, it was determined to establish a global organization and a Working Committee was created leading to the formation of Rare Breeds International (RBI) in 1991.

Delegates at the conference, representing many national and international organizations and associations, covered a wide spectrum of opinion and cultures, but they agreed that there was a need for a global NGO to facilitate and monitor the conservation of endangered breeds of domestic livestock. It was envisaged that this NGO would coordinate the activities of national and local groups and act as a focus to stimulate conceptual progress and encourage improved methodology. Most of the major national breed conservation organizations, such as Traditional Livestock Foundation (UK), Rare Breeds Survival Trust (UK), SERGA (Spain), American Minor Breeds Conservancy (USA), Pro Specie Rara (Switzerland) and many others, subsequently joined RBI.

The objective of this paper is to give information on the structure, activities and action mechanisms of RBI.

Structure of RBI

RBI is governed by an elected Board of Directors, each of whom must be resident in a different country and are assisted by the Founder Trustees and an Advisory Council. The administrative secretariat is based with European Association of Animal Production (EAAP) in Rome. The cumulative expertise and experience of the directors and members, details of which are held on a database of subject matter specialists, provides a valuable resource for the application of genetic conservation programmes in any part of the world.

The mandate adopted by RBI is to prevent the loss of diversity in animal genetic resources of farm livestock. It fulfils its objectives by providing a framework for the exchange of ideas and experience, by the dissemination of new concepts and programmes and by holding regular international meetings. It augments this work by facilitating and supporting the work of regional, national and local organizations, or working with individuals if necessary. It encourages the formation of conservation groups in countries and areas where no such activity exists and can undertake direct conservation work in such areas.

Information network

The membership network, which RBI has developed to collect and disseminate information, is based on grassroots activity of individuals or groups working with national populations of a breed, or with special groups within a breed. Delegates at major conferences and annual regional meetings are drawn largely from these members and the programmes are designed to facilitate interaction and exchange of information relating to the conservation of AnGR.

Grassroots activity

There are several problems associated with the collection of information on global animal genetic resources, but a particular problem arises where this function is carried out by an individual or an organization that is only in contact with governmental institutions. Information obtained from quasi-governmental sources may be remote from reality and information provided by breed societies has a natural bias. As a result, published statistics have often been derived from misleading data which can lead to flawed policy. Important information on the hierarchical structure or numerical status of a breed, which can be sourced from the

knowledge of indigenous peoples, has been overlooked. In addition, systems of animal husbandry, value-added traits and the marketing of unique products and by-products, which contribute to the meaningful characterization of domestic animal genetic resources, are frequently not considered relevant and have been omitted from the database. The FAO programme on the management of farm animal genetic resources seeks to bridge this gap and it is here that RBI plays an important role.

Local interest groups have access to essential information on local breeds. RBI members at grassroots level are able to carry out data collection and cooperate with national coordinators where an FAO initiative is in operation, or they may obtain information and transmit it to FAO directly. RBI is concerned with all endangered breeds of livestock, but it has a particular interest in native adapted breeds, known variously as landraces, indigenous breeds and autochthonous breeds. However, it recognizes that exotic breeds may be globally endangered in some cases and they must also be monitored.

Global conferences

The activities of RBI fall into a framework of international conferences which are held at intervals of three or four years. These provide a forum for the dissemination of information and for peer scrutiny of conservation programmes. They usually comprise sessions on national or regional reports, breed reports, philosophy and methodology of conservation and the application of new technologies. The first conference in Britain (Warwick, 1989) was followed by major meetings in Hungary (Budapest, 1991), Canada (Kingston, 1994), Nepal (Kathmandu, 1998) and Brazil (Brasilia, 2000).

The Millennium Congress in Brasilia in 2000, which was organized by EMBRAPA of Brazil, the University of Brasilia and RBI, attracted 150 delegates from all continents. A pre-Congress tour to the Pantanal region demonstrated the practical application of programmes for the specially adapted breeds of Pantaneiro cattle and horses and there was a satellite meeting of the Ibero-american group. Topics covered in plenary sessions and poster sessions alerted delegates to the status of native breeds in various countries and regions and on another level described the latest developments in biotechnology. The programme included information on *in situ* conservation through both national and breed reports, genetic and phenotypic characterization, the relevance of biotechnology for conservation, utilization of AnGR and the social and educational implications of rare breeds. There was close interaction with FAO and the official programme included a meeting of national coordinators.

Annual meetings

In the years intervening between major conferences, annual meetings are held in conjunction with another appropriate conference or symposium in order to enable local members to become more involved and to maximize the opportunity for cooperation with other organizations. Meetings have been held in Spain (Cordoba, 1992), Denmark (Aarhus, 1993), Czech Republic (Prague, 1995), South Africa (Pilansberg, 1996), Tanzania (Arusha, 1997) and Austria (Zurich, 1999).

In August 2001 RBI returned to Hungary for its annual meeting, which took place immediately before the annual meeting of EAAP. An associated tour in Hortobagy National Park in eastern Hungary enabled delegates to see conservation programmes for native breeds such as Grey Steppe cattle, Mangalitza pigs and Racka sheep, followed by a symposium in Budapest and a meeting of FAO National Coordinators for Animal Genetic Resources

Projects

RBI identifies and explores issues which have a broad application to the conservation of endangered breeds of livestock. These are

developed where appropriate into a programme of activity from which principles of policy and procedures of application can be derived. It also identifies specific local problems and the opportunity to foster cooperation between members and these offer opportunities for national or regional projects.

Major projects

Two essential projects were initiated early in the life of RBI. The first created a structure for an ongoing census of endangered breeds that had breeding populations in several countries. This had great significance both for seriously endangered breeds, where global population statistics might provide a wider range of conservation options and for breeds where major populations exist outside the country of origin. For example, in the first case, several small populations of Red Poll cattle provide the basis for an international breeding policy, while in the second case a large population of Berkshire pigs in the USA moves the global population of the breed outside the parameters of vulnerability. The second project sought to define agreed criteria of population size of breeds of livestock on which standards of vulnerability could be based.

Papers on both these projects were presented at the international conference in Kingston in 1994 (Alderson, 1995; Bodo, 1995). The breed census is now up-dated by the FAO World Watch List and future efforts will be directed to working with FAO on an accurate consolidated listing of endangered breeds.

Two other major projects are ongoing and are closely related to the pool of expertise represented within RBI. The first seeks to provide guidance on the creation of national NGOs with the intention of increasing the number of countries with an active national programme. The second is concerned with the preparation and refinement of a protocol for genetic impact studies, which will form an essential ingredient of RBI advice to government departments to alert them of the dangers of importation of foreign breeds. This will serve to prevent the erosion of the pool of native livestock as a result of substitution by exotic breeds.

Other projects

On a more local level, activity concentrates more on issues not being addressed directly by other agencies. RBI is approached to provide specialist advice and to facilitate donor funding for selected projects of regional or national importance. Projects currently under consideration include:

- characterization of East African sheep and goat breeds;
- survey of multi-horned (polycerrous) sheep;
- global survey of endangered European multi-national breeds, such as Lipizzaner horses, Red Poll cattle, Ushant sheep and Tamworth pigs;
- collection and collation of knowledge of indigenous peoples to evaluate potentially endangered landraces;
- development of programme for maintenance of biodiversity in native breeds in Nepal;
- status and conservation of Turkoman horses in Iran;
- utilization of native adapted breeds in sustainable systems of livestock production; and
- establishment of an electronic communication network on the conservation of farm animal genetic resources.

Communications

The publication of proceedings of the major international conferences are the most important and permanent record of the work of RBI (Alderson, 1990; Alderson and Bodo, 1992; Crawford *et al*., 1995; Mariante, 2000). They have become acknowledged references in the field of genetic conservation and give the movement recognition in both scientific and political circles.

Papers from annual meetings are carried in other journals. AGRI is an important medium and three papers from the 1999 meeting in Zurich were included in AGRI 27, but RBI papers also appear in many other journals. They serve to strengthen the link between original research and its application in practical breed conservation programmes.

A brochure and a dedicated website both provide information on RBI and serve to encourage membership and support. An exhibition in London in October 2001 of bronze sculptures of endangered breeds was supported by RBI, as a powerful extension of the concept of conservation through promotion.

Cooperation

The effectiveness of much of the work of RBI relies on cooperation and the development of active partnership with other organizations. RBI has created links with FAO, UNEP, IUCN, WWF and WAAP, which ensures that duplication is avoided and productivity is enhanced. Annual meetings have brought RBI into direct cooperation with EAAP, the South African Society for Animal Science and the Tanzanian Society for Animal Production. Participation of RBI in stakeholder meetings of SOW-AnGR and observer status at sessions of the FAO Commission on Genetic Resources for Food and Agriculture, links genetic conservation to sustainable food security and rural development.

RBI is involved with committees and groups of the Convention of Biodiversity (CBD) of the United Nations concerned with the conservation of domestic animal diversity and was represented at the first conference of the Parties in 1994. This has enabled it to take proactive steps to ensure that its policies and programmes are compatible with the broad principles of the CBD.

Conclusions

The cornerstone of current initiatives for the conservation of domestic animal genetic resources on an international level is the Domestic Animal Diversity Information System. This global databank is a valuable aid to the formulation of effective conservation programmes, but its efficacy will depend upon the validity of raw data. RBI will play a major role in facilitating the network of grassroots activity necessary to collect and collate this information. In view of its status as the specialist global NGO for the conservation of farm animal genetic resources, RBI can achieve its objectives through the following actions:

- assistance with the creation of national or local organizations for genetic conservation;
- ongoing communication through leaflets, website, specialist papers, annual meetings and global conferences;
- identification of critical conservation needs and facilitation of assistance for key projects;
- professional advice on *in situ* and *ex situ* conservation;
- maintaining effective communication and working with FAO to realize Domestic Animal Diversity initiatives.

The transfer of administrative responsibilities to EAAP has given RBI further impetus as an effective global NGO and has enabled the directors to focus more clearly on developmental and technical activity.

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Motives for utilizing the Blacksided Trønder and Nordland: A native cattle breed in Norway

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Summary

A survey was conducted in order to investigate what motives farmers have to utilize one of the old, native cattle breeds in Norway, Blacksided Trønder and Nordland Cattle (STN). The questionnaire, which was sent to 1 772 farmers who inseminated with the STN breed from 1987 to 1997, revealed clear opinions on the differences between this breed and the predominant breed of the country, the Norwegian Cattle (NRF).

The farms in the survey were characterized by having herd sizes above the national average, as well as having owners interested in extensive farming and to a certain extent aware of the special breeding challenges of small populations. The results showed that the STN breed was regarded as being significantly different for traits that may be considered as important in extensive production systems. The more idealistic motives linked to the genetic resources aspect showed a high priority.

The survey also revealed an obvious need for more research and objective information about this old native breed.

Résumén

On a mené une enquête pour étudier les raisons pour lesquelles les éleveurs utilisent une des races bovines les plus anciennes en Norvège, la race Blacksided Tronder et Nordland Cattle (STN). Le questionnaire, qui a été envoyé à 1 772 éleveurs qui utilisent l'insémination avec STN depuis 1987 à 1997, a révélé les différences essentielles entre cette race et la race prédominante en Norvège, la NRF.

Les élevages de l'enquête se caractérisaient par la taille des troupeaux qui était dans la moyenne des tailles nationales et par l'intérêt montré par ses éleveurs pour l'élevage extensif et le défi que représente la conduite d'une race spéciale d'une petite population. Les résultats ont montré que la STN était surtout considérée pour les différences significatives qui la rende importante dans des conditions de production extensive. Les raisons d'idéologie liées à l'aspect des ressources génétiques ont également montré une grande priorité.

L'enquête a aussi révélé le besoin essentiel d'une recherche plus approfondie et d'une vulgarisation plus objective au sujet de cette vieille race native.

Keywords*: Cattle, Breeding goals, Alternative breeds, Blacksided Trønder, Nordland Cattle.*

Introduction

For a couple of decades there has been renewed interest in the old native cattle breeds in Norway. Conservation work has been carried out during the last fifteen years and several initiatives have been undertaken to save the remaining animals of six old cattle breeds. Both governmental and private initiatives have been put into conservation and breeding strategies. For all breeds, there has been a remarkable increase in the number of farms, population sizes and the amount of frozen semen collected.

The documented scientific information on the specific traits of these old, native cattle

breeds is at present, very scarce. With the renewed and increasing interest in these breeds and the emerging more extensive farming systems, there is an obvious need for such information and for new research. At the start of this work, it was important to investigate the motives the farmers had for choosing the old, native breeds, which are expected to be smaller framed and lower producing, rather than the predominant modern Norwegian Cattle (the NRF-breed).

The most popular of the old native breeds, Blacksided Trønder Nordland Cattle (STN), was chosen as the research target, both in order to gain new knowledge about an alternative, native old breed, and to improve the possibilities for stronger and more sustainable development of the breed. To obtain answers to why farmers breed and utilize STN, a questionnaire was developed with the purpose of investigating the farmers' expectations and experience with this breed. This paper presents the result of the enquiry which was sent to farmers who inseminated with STN-semen in the period 1987-1997.

Description of the STN Breed

Historical background

In Norway, in the late 1800s, the cattle population was divided into a large number of local breeds, assumed to be superior to "imported" breeds and specific to the region where they were bred. At the World Fair in Oslo 1918, more than 20 breeds of cattle were shown. Each valley, fjord and district had developed their own breed, normally based on uniformity in colour and patterns, etc. Obviously it was impossible to develop an active breeding policy with more than 20 breeds of cattle, even if the total cattle population was 1 050 000 in 1918 (Berge, 1950). During the following decades the number of cattle breeds was reduced through merging of breeds into a synthetic breed, the

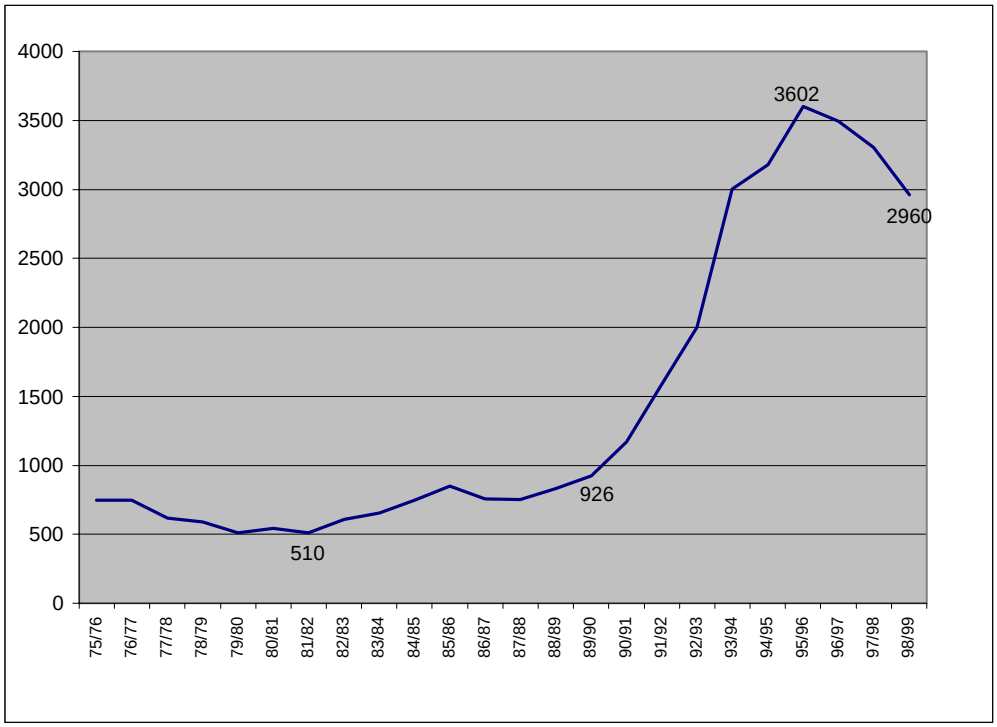

Figure 1. First inseminations with Blacksided Trønder and Nordland Cattle (STN) 1976-1999.

NRF, ending up in 1970 in one dominating breed and a few minor breeds where a few farmers maintained some low numbers of pure-bred animals (Skjervold, 1981). This was the situation when the conservation work started in Norway during the 1980s.

Population size and development

STN is the most popular of the old native cattle breeds in Norway today. The population is estimated to be approximately 1 000 cows and 75 bulls. During the last decade there has been a remarkable increase in insemination with this breed, as seen from figure 1. After many years with a relatively constant number of inseminations, the situation changed around 1990. The number of inseminations peaked in 1996 to 3 602, partly in pure-breeding and partly in cross-breeding with NRF. The total number of first inseminations (excluding beef cattle) in the country was reduced by almost six percent in the same period (1990-1996). Since 1996 there has been a slight decline in the use of semen from the STN breed.

Breed characterization

STN cows are polled, fine boned and colour-sided, mainly black-sided (Figure 2, 5 and 6), however, red-sided animals do occur and they have an estimated milk production of about 4 500 kg / year. The breeding standard (Rasestandard for sidet trønderfe og nordlandsfe, 1997) described the breed as a typical mountain breed, adapted to the conditions of the mountain and valley districts. It is a dual-purpose breed with the main emphasis on milk and with a liveweight between 350 and 500 kg for cows.

Material and Methods

The questionnaire

A questionnaire was developed with the purpose of investigating the motives,

Figure 2. The Blacksided Trønder and Nordland Cattle (STN) cow.

expectations and experiences that farmers have with the breed. The first part of the questionnaire dealt with a description of the participating farms, a recording of pasture and growing season, intensity of production and whether they produced conventionally or organically. The questionnaire also included questions on herd size, number of STN cows versus NRF in the herd, yearly production records and the feeding and grazing system practised. The farmers were grouped into two categories according to their experience with the STN breed; those who had no experience and those who had previous experience with the breed. The answers from the first group will reflect their expectations based on what they have heard about the breed, while the answers from the second group will be based on the farmers' real experience.

Both groups were asked to give their opinion as to the traits in which the breed differed from the predominant breed of the country, NRF, i.e. conformation traits, heat detection, health traits, milk composition, longevity, length of grazing season, pasture damage caused by hooves, net income, extensive grazing, herd behaviour and whether the breed had advantages in organic production systems or for tourist reasons.

The next section of the questionnaire listed possible motives for raising this breed. The options given were of a more idealistic character, i.e. cultural history, a rare breed, an interesting breeding policy, a "different" breed, an important genetic resource; the breeding strategy is challenging the importance of maintaining a dairy breed with smaller framed animals as an alternative to the NRF and other motives.

Finally the farmers were asked about how they procured their STN herd; whether they use natural mating or artificial insemination and what traits they find important when choosing a breeding bull.

Questionnaires were sent to 1 722 farmers, i.e. all the farmers who had inseminated with this breed as recorded in the National Milk Recording System during the last ten years. The intention was to ask those farmers who had used STN-semen during the last five years but by mistake, the selection included up to 10-year-old inseminations. The number of farmers who answered the questionnaire was 441, a response percentage of 26.6. This relatively low response can probably be explained by the long time period of inseminations (up to 10 years since the insemination occurred). Other explanations might be that some of the farmers had inseminated with STN semen without any real planning. Of the 441 answers, 237 of the farmers had no STN experience, while 162 had.

The data were tested for significant differences in opinions between the two groupings of farmers using chi-square tests at a level of one percent.

Results and Discussion

The typical herd in this survey

On average, there were 2.6 STN cows per herd in the survey. Out of an average herd size of 15 cows, the STN cows constituted an average of only 17.5 percent of the herd. The average herd size in Norway in 1997 was 12.9 (Agricultural Statistics, 1997). The group with previous STN experience had on average almost five STN cows while the group with no STN experience had on average 1.3 STN cows. The typical herd of this survey was therefore just above the national average herd size, with both STN and NRF represented.

The average milk yield of the farms with STN experience was 5 549 kg and of those without STN experience 6 061 kg, annually. The annual yield per cow in the country as a whole was 6 222 kg in 1997 (Agricultural Statistics, 1997). The annual milk yield in the experienced group was >10 percent, lower than the national average, while the inexperienced group had a milk yield not significantly different from the national average. This may be explained by two factors; either that the lower producing STN cows are responsible for the lower milk yield in the herds or by the fact that the experienced group had a more established extensive production system which does not

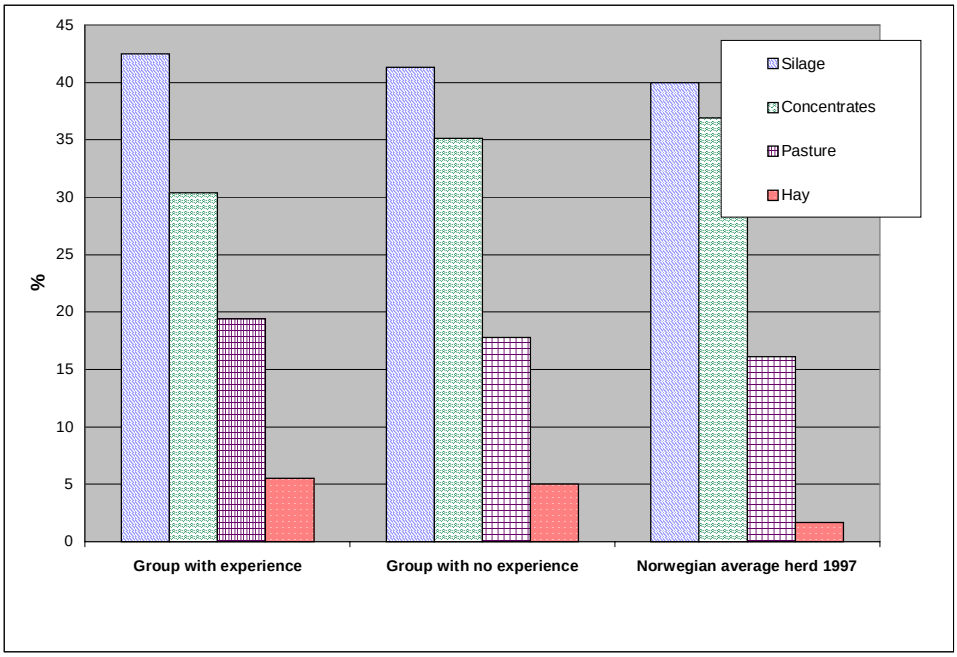

Figure 3. Feed consumption (energy) by type of feed in the survey in Norway 1997.

focus so much on a high milk yield. Most likely the explanation is a combination of these two factors. Both the experienced and the inexperienced group seem to be at a stage where the STN herd was being established. The low STN herd sizes, plus the fact that the experienced group found the culling age a bit lower than they expected, indicate this.

The fat and protein percentage did not differ between these groups of farms and the national average. The average fat and protein percentage in Norway in 1997 was 4.03 and 3.21, respectively (Agricultural Statistics, 1997).

Feed consumption (energy) by type of feed showed a different distribution for the farms in the survey compared to the national average (Agricultural Statistics, 1997). The concentrate percentage is a bit lower for the farms in the survey, while the pasture and silage percentages are higher (Figure 3). Even if there is a tendency in the direction of extensive production, only 13 percent of the farmers considered their production to be organic.

Differences in opinions on STN and NRF

Table 1 shows the results of the questionnaire regarding the different production and performance traits. STN is different from NRF in 13 out of 22 traits listed in the survey. Farmers ranked the STN breed as having lower liveweight, more polled animals and nicer colour patterns. They also ranked the breed as a lower milk producer, but with higher fat and protein content. Among the health traits, they thought the breed has easier heat detection and higher longevity. They also thought the breed fits better into ecological production systems than the NRF breed because, among other reasons, there is less damage to pasture caused by hooves, better grazing behaviour on extensive pasture and more qualities as better leading cows. They also considered the STN cow to be more favourable for tourist purposes.

It was expected that the STN cows would be associated both with extensive production systems and with organic farming. The answers from the survey do not support this

Table 1. Results of the farmers` opinion on traits in which the STN breed differs from the predominant NRF breed and in which direction they differ.

Trait	Does STN differ from NRF ?	How does STN differ?	Does experience influence the answer?
Liveweight	Yes	Lower liveweight	No
Polled / horned	Yes	More polled animals	Yes, experience favours the opinion that STN has more polled animals
Colour pattern	Yes	Nicer colour pattern	Yes, experience favours STN less
Milk production	Yes	Lower milk production	No
Protein content of milk	Yes	Higher protein content	No
Fat content of milk	Yes	Higher fat content	No
Somatic cell count	No	No	
Mastitis frequency	No	No	
Milk fever	No	No	
Ketosis	No	No	
Heat detection	Yes	Easier heat detection	No
Calving ease	No	No	
Culling age	Yes	Higher culling age	Yes, experience favours equality between breeds
Pasture damage caused by hooves	Yes	Less pasture damage	No
Grazing season, extensive pastures	No	No	
Grazing season, intensive pastures	No	No	
Net income	No	No	
Extensive pasture	Yes	Functioning better	No
Extensive production system	No	No	
Ecological production system	Yes	Functioning better	No
Leader cow	Yes	Better leader cows	No
Tourism	yes	better for tourism	No

assumption completely as the tendency is that the farmers with STN cows ran more extensive farming than the national average but only 13 percent said they farmed organically. Later in the questionnaire, the answers indicated another perspective; the STN cow was seen to be better in organic production systems than the NRF cow, but the two breeds are equal in more traditional extensive production systems.

The general opinion seems to be that the STN cow is a smaller, lower producing and more picturesque cow than the NRF and has higher fat and protein contents in the milk. Most of these statements might well be true but the results from the survey also reveal that the herds with STN cows do not have a higher fat and protein content in milk than the national herd average. Even when examining the twelve herds with only STN cows, the survey revealed estimates no different from the national average. It might seem that the general breeding goal of most cattle breeds, higher protein content, is strongly influencing the farmers breeding STN. The bull mother's protein content in milk is clearly the most sought-after trait (chosen by 45 percent of the farmers) when choosing a breeding bull. However, only 8 percent of the same farmers were concerned about the bull mothers' fat content of the milk.

A common argument for using the old native breeds instead of NRF has been that the old breeds have better health, fertility and longevity than the modern NRF, especially heat detection and udder health. According to the farmers in the survey this is not true. The only health traits that seem to favour STN are heat detection and culling age. The old-fashioned long teats of the STN breed, compared to the small and rather short teats of modern breeds, is expected to cause a higher somatic cell count and mastitis frequency in STN under machine milking conditions. This situation might explain why the survey reports the same udder health in STN and NRF. Some farmers have reported better udder health after having changed from standard milking equipment to special equipment adjusted for udders with long teats.

The STN cow seems to score higher on traits important for grazing and especially for grazing on extensive pastures. The lighter liveweight causes less damage by hooves to the grass and the leader cow trait is assumed to be important when utilizing large pastures in typical extensive grazing fields, as in the mountain areas.

Table 2. Use of specific ordered AI-bulls and degree of natural mating in STN.

	All answers in %	The groups' answers in %	
		Experienced group	Inexperienced group
Have ordered specific AI-bulls from the technician	49*	58	38
Natural mating is used with STN, because of;	11*	20	6
– Just as good breeding bulls as an AI-bull	7	10	4
– Minimizing the increasing of inbreeding in the population	3*	7	1
– Not accepting AI in principal	0	0.5	0
– It is cheap to use natural mating	6	9	4
– Other reasons	11*	18	6

*There was a significant difference between the two groups.

Difference in opinions between experienced and inexperienced

Only in three traits does experience significantly influence the answers on how STN differs from NRF. The experienced group favours STN more highly because they are polled, while they think the different colour pattern is of less importance than the experienced group. The inexperienced group has expectations of older culling age of the STN, while the experienced group is not sure that STN is different from NRF. It can be concluded that in most traits the two groups have similar opinions on STN versus NRF.

Breeding strategies in STN

Table 2 contains the answers on farmers' use of natural mating in contrast to AI. The results show that 49 percent of the farmers have ordered specific AI-bulls from the technicians and that the experienced group is significantly more concerned about which AI bull they want to use on their cows.

Table 2 shows that natural mating was practised in 11 percent of the farms in the survey. Among the experienced group 20 percent use natural mating, a result which is significantly higher than the 6 percent in the inexperienced group. "Other reasons" is the most chosen alternative for using natural mating instead of AI and is mainly explained by the statement "It's more trouble-free and safer than using AI." The other important reasons for using natural mating were that bulls for natural mating might have just as good breeding qualities as an AI bull and that natural mating was considered cheaper.

An increased number of males in the breeding programme is a rather important issue in reducing the risk of increased inbreeding in such a small population. Gjerstad (1999) showed that in small populations of old cattle breeds, avoiding inbreeding might be the best criterion for increased milk production. The National Genetic Resource Committee on Farm Animals has sent out several recommendations on using more natural mating in the small native populations.

The results from the survey showing that 20 percent of the experienced farmers and 6 percent of the inexperienced farmers use natural mating, indicate that breeders are quite aware of the importance of using natural mating. Still, within the experienced group there should be potential for using it even more than by the reported 20 percent. Within the inexperienced group it must be considered satisfactory that six percent is

Table 3. Traits of importance when choosing STN breeding bull.

	All answers in %	The groups' answers in %	
		Experienced group	Inexperienced group
The bull mother's protein content of milk	45*	57	36
The bull's relationship to the cow	41*	63	25
The bull mother's annual milk yield	38*	50	29
The bull mother's udder	23*	30	18
The bull's colour pattern	20	29	15
The bull's muscle score	13	14	12
The bull mother's liveweight	11	16	7
The bull's stance	8	9	5
The bull mother's fat content of milk	8	9.5	7.5
The bull mother's colour pattern	8*	12	5
The bull mother's stance	7	7	6

*There was a significant difference between the two groups.

making use of natural mating, bearing in mind that this group on average only had 1.6 STN cows in their herd.

Important traits when breeding STN

Table 3 shows that the three clearly most important traits to consider were protein yield, milk yield and awareness of inbreeding. The next two important traits are the bull mother's udder and the bull's colour pattern. Meat production concerned only 13 percent of the breeders and 11 percent were concerned about the cow's liveweight. The bull mother's colour pattern is significantly more important to the experienced group than to the group without experience, although it is one of the least important traits in the table, as only 8 percent said it was a trait of concern when choosing a breeding bull.

Since the lower liveweight seems to be both an important and a characteristic trait for the breed, it is remarkable that Table 3 shows that the bull mother's liveweight is of so little importance to the farmers when choosing a bull.

Finally, the survey seems to reveal that the STN farmers are aware of the correlation between udder health and udder conformation, since the bull mother's udder is the fourth most important trait the farmers were concerned about when choosing semen from STN.

Motives for breeding STN

The ranking of the more idealistic motives for breeding STN is shown in figure 4 and is based on the answers from all the farmers. "Conserving an alternative dairy breed" scored highest. Several other motives are linked to the genetic resources aspect. Within the category "other motives", the farmers were focused on "a nice, small cow with good temperament, easy to handle".

It was concluded that the farmers who have chosen the STN breed were aware of the breed's lower production, however, they chose this breed from both idealistic motives and from a belief in biological efficiency; i.e. other traits than milk production also influence the total economic situation of the farm.

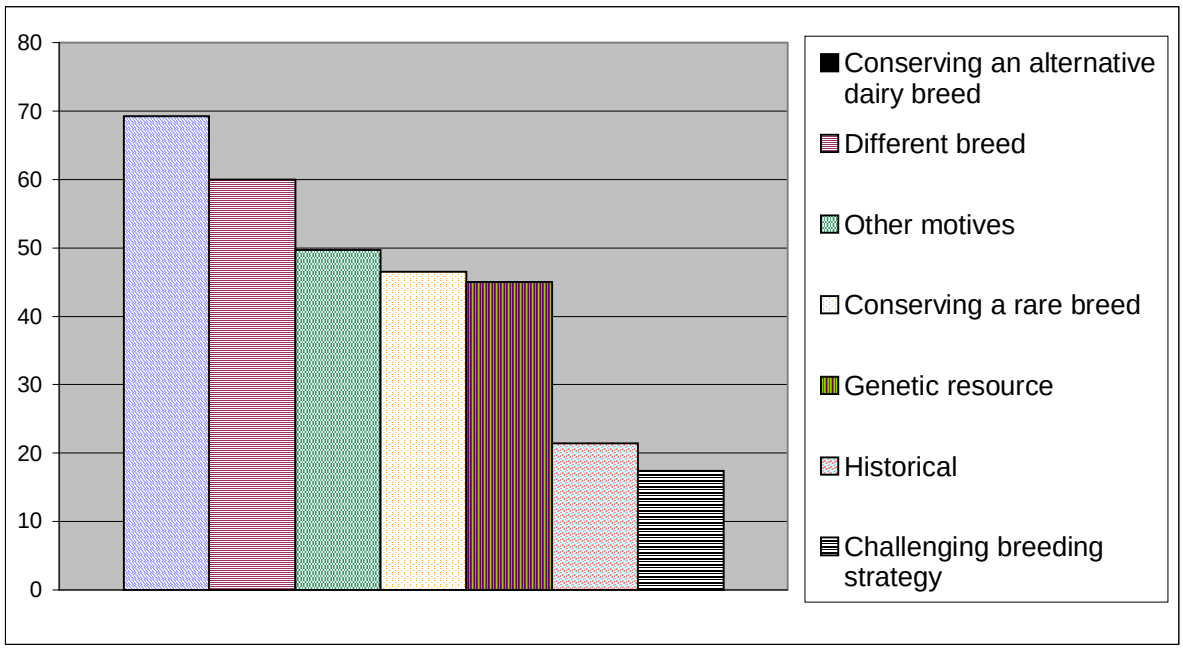

Figure 4. Motives for breeding STN.

Concluding Remarks

An investigation of the type presented in this study raises several questions. What is the value of "opinions" on a breed when it should be possible to produce more objective information on production and other traits? Firstly, the questionnaire gives indications to several of the motives farmers have for choosing a lower producing, smaller framed type of milking cow. It is obvious from the answers that a substantial proportion of farmers are aware of the need for maintaining domestic animal diversity. As stated by several authors (Vangen and Mukherjee, 1994; Olesen *et al*., 1998) there is a need for the development of alternative breeding goals and sustainable breeding programmes in several of the smaller populations of farm animals. In order to develop such breeding goals, it is necessary to know the opinions and interests of the breeders. Only with the interest of and enthusiasm by the breeders will these alternative breeds survive in the future. Secondly, several programmes have been developed in the Nordic countries to conserve domestic animal diversity (Vangen *et al*., 1994; Danell *et al*., 1998). The next step in the conservation programmes will be to stimulate the development of active breeding populations for some of these breeds. Objective information and scientific help with breeding objectives and breeding strategies are important factors in this next step.

The results of the questionnaire convey the message that farmers believe in traits not focused on in modern breeding programmes, even in other traits than the traditional secondary or functional traits. Especially in

Figure 5. A herd of Blacksided Trønder and Nordland Cattle (STN) grazing in the birch forest of the mountain areas of Southern Norway. The variety in colour patterns is quite characteristic for the breed (Photo by Halvard Blegen).

Figure 6. A herd of Blacksided Trønder and Nordland Cattle (STN) grazing outside the summer farm in the high mountain areas of Southern Norway (Photo by Kjell Wickstrøm).

extensive, less industrialized farming, these traits play an important role. Several farmers are of the opinion that these traits do not receive the attention they deserve in modern breeding programmes.

Finally, several of the farmers point to the positive aspects of smaller framed animals for biological efficiency reasons. They expect a net income on the same level as the intensive dairy breed when all traits are included in the economic evaluation. Obviously the answers given are influenced by production regulatory factors like milk quotas and subsidies per head of cattle. Under such production assumptions, a lower producing animal could have some advantages. However, the results of the questionnaire indicate an increasing interest in biological efficiency rather than in breeding only for production records.

The survey revealed an obvious need for more research and objective information about this old native breed. Therefore, a research programme was launched on the STN. Studies of biological efficiency in relation to specific production environments would be an important consideration.

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The Muturu: A rare sacred breed of cattle in Nigeria

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Summary

The Muturu, a trypanotolerant cattle breed is probably one of the least known breed of cattle in West Africa. Little has been published on its distribution, management, morphological characteristics or biological performance.

Early reports showed that the Muturu cattle were once widely distributed across the continent from Liberia, across the West African subregion, to Ethiopia. However, due to expansion of the Zebu population and rapid urbanization, the small bodied animal came under pressure and was found surviving in pockets of the savannahs and in the humid forest zones where it had the comparative advantage of trypanotolerance. The survival of the cattle in the humid and forest zones of Nigeria stems from the fact that the animal is still sacred in so many communities and its milk is widely used for medicinal purposes. In some states of Nigeria, the semi-feral Muturu are not tended but hunted when required for sacrifice.

From a population size of 0.4 million heads in 1960, Akinwunmi and Ikpi, (1985) reported a decline in the population of the breed to 50-80 thousand in the late 1980s in Nigeria although RIMS (1992), reported a population growth to 115 172 heads. With limited data bank information on their adaptation and productivity, possible identification of genes that confer resistance to or tolerance of environmental stress in these animals will be of global significance.

Resumen

La raza Muturu, raza bovina tripanotolerante, es probablemente una de las menos conocidas del Africa oriental. Se ha publicado muy poco sobre su distribución, gestión, características morfológicas o rendimientos biológicos.

Unos primeros informes mostraban que la raza Muturu antiguamente se hallaba a lo largo de todo el continente, desde Liberia, pasando por las regiones del Africa oriental, hasta Etiopia. Sin embargo, debido a la expansión de la población de Zebu y a la rápida urbanización, los animales de pequeño tamaño se encontraron bajo presión y hallaron la supervivencia sólo en pocas zonas de savana y en los bosques húmedos, donde se encontraba la ventaja comparativa de la tripanotolerancia. La supervivencia de bovinos en zonas húmedas y de bosques de Nigeria se debe a que este animal es considerado sagrado en muchas comunidades y su leche se utiliza mucho en prácticas medicinales. En algunos estados de Nigeria los animales Muturu sólo se cazan cuando se requiere un sacrificio.

Partiendo de una población de 0,4 millones de animales en 1960 (Akinwunmi y Ikpi, 1985), se ha llegado a una población de 50-80 mil animales en Nigeria a finales de los años 80, a pesar de que RIMS (1992) indicaba una población de 115 172 animales. Dada la limitada información sobre su adaptación y productividad, resultaría de gran importancia la identificación de los genes que confieren resistencia o tolerancia a las condiciones de estrés ambiental en estos animales.

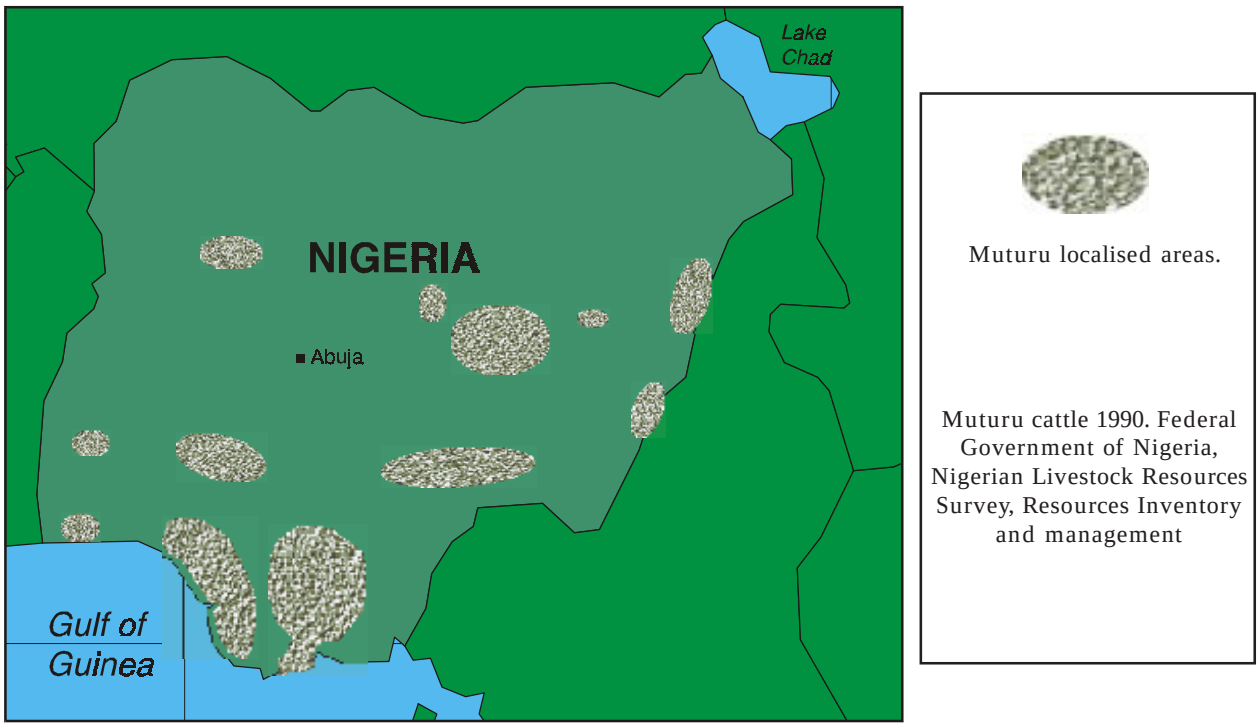

Figure 1. Nigeria's short horn cattle breed - the Muturu distribution (Rim, 1992)

Keywords: *Muturu, Origin and distribution, Trypanotolerant breeds, Characterisation. Productivity.*

Introduction

Nigeria's cattle population

The Federal Office of Statistics gave fluctuating cattle data of 3.45-7.49 million between 1960 and 1986, while FAO gave figures of 10.86-12.30 between 1963 and 1989 with a population growth of 0.6 percent per annum between 1975 and 1987. A recent livestock survey (RIM, 1992) gave a cattle population of 13.89 million out of which 115 172 were Muturu (Table 1) constituing 64 percent of the total trypanotolerant cattle population in the tsetse infested forest zone of Southern Nigeria (Table 2), compared to Akinwumi and Ikpi's 55.7 percent in 1985.

Table 1. 1990 National Cattle Population (Resource Inventory Management Ltd. 1992).

Species	Pastoral	Village	Urban	Total	% SE
All cattle	11 478 145	2 358 078	49 590	13 885 813	1.6
Muturu	-	114 241	931	115 172	19.5
Zebu and others	11 473 800	2 248 182	48 659	13 770 641	1.6

Origin and distribution of Muturu breed

Epstein (1971) reported that the most common type of cattle in Northern Nigeria until the Fulani invasion of 1820 was the West African Shorthorn (WAS). The original breeding area of the WAS stretches on an almost continuous belt from Liberia to Cameroon. They were found in all the coastal countries and also in the Southern part of Upper Volta (Burkina Faso). They derive from the shorthorn humpless (*Brachyceros*) cattle which appeared in ancient Egypt in the middle of the second millennium BC and were first recorded in West Africa during the second half of the first millennium.

Trypanotolerant cattle breeds

The trypanotolerant cattle breeds in Nigeria comprise the N'Dama, Muturu and the Keteku. The Keteku happens to be a cross between Zebu and the Muturu. These three breeds were reported to make up 21.93 percent of the total cattle population of the southern humid/forest zones of Nigeria. Out of this total, the Muturu comprise 55.7 percent, the N'Dama 36.9 percent and the Keteku 7.4 percent (Akinwunmi and Ikpi, 1985).

The Muturu population was 8.3 percent of the total cattle population of Nigeria (RIM, 1992). The total trypanotolerant cattle population which stood at only

Figure 2. Herded Muturu in villages.

Table 2. The Muturu as percent of Trypanotolerant cattle per state (Akinwunmi & Ikpi, 1985).

State	No of heads	% of total trypanotolerant / State
Ogun	536	8.1
Ondo	3 660	56.4
Oyo	8 447	35.1
Lagos	1 217	30.8
Bendel	1 547	75.8
Anambra	11 310	92.4
Imo	7 412	96.1
Rivers	329	84.7
Cross River	2 575	96.9

Figure 3. Mature Muturu compared to mature Bumahi (white).

200 000 declined almost by a third in the 1980s. However, the N'Dama population increased from 15 to 20 thousand heads as opposed to other breeds through a special programme implemented with N'Dama cattle breeds in the 1980s. Five thousand heads of N'Dama were imported from Liberia (Shaw and Hoste, 1987) with the result that six N'Dama cattle multiplication centres currently exist in Southern Nigeria to provide information on the N'Dama and Keteku at the expense of the indigenous Muturu (Table 3).

The Muturu Breed

The Muturu breed; a variety of the West African shorthorn is also known as the Nigerian Shorthorn, the Pagan cattle, the Savanna Muturu in the South-West and Forest Muturu in the Middle Belt and Eastern parts of the country (Figure 1).

Its relatives, the Liberian Dwarf found in Liberia and the Bakwiri found at the foot of Mount Cameroon in South West Cameroon, were classified as almost extinct (Mason, 1988). The Muturus are reared for sacrifice at major ceremonies such that ritual restrictions surround their management. As males are slaughtered for ceremonies there is an acute shortage of breeding males. This prevented the Muturus from realizing their breeding potential even under traditional management. One of the assumptions behind the importation of N'Dama is that Zebu cattle cannot sustain comparable productivity as the Muturu in similar conditions and the N'Damas are closer to Muturus than the Zebu breed.

During the Nigerian civil war, 1967-1970, it was recorded that many Muturu cattle were slaughtered to feed the starving human population. They were thus decimated both during and immediately after the civil war. Where some herds survived, owners were known to have preserved their animals by hiding them in caves. From these the Muturus were once again multiplied in Imo and Akwa Ibom States where the Zebu cattle were rejected as hazardous. Muturu populations compared to those of Keteku in some states are shown in Table 4 (Oloruntobi, 1994).

Table 3. Trypanotolerant cattle multiplication herds (after Shaw, 1985).

Name	Location	Responsible organisation	Size (ha)	Breeds	Number
Upper Ogun Ranch	Oyo State	Western Livestock Company	10 522	N'Dama	2 258
Fashola Stock Farm	Oyo State	Ministry of Agriculture	550	N'Dama and Keteku	620
Ogboro Cattle Ranch	Oyo State	Western Livestock Company	1 864	N'Dama	1 646
Akunnu Cattle Ranch	Ondo State	Western Livestock Company	8 094	N'Dama	1 652
Oke Ako Ranch	Ondo State	Western Livestock Company	10 025	N'Dama and Keteku	455
Imeko Ranch	Ogun State	Western Livestock Company	4 000	N'Dama	200

Table 5. N'Dama, Muturu and Zebu production traits.

Trait		Muturu	N'Dama x Zebu	Zebu
Age at 1st calving (days)		635	684	761
Calving interval (days)		350	363	403
Weight at birth.	Males (kg)	13.7	18.1	26.5
	Females (kg)	13.9	15.9	22.7
Weight at 3 months.	Males (kg)	38.9	54.6	78.0
	Females (kg)	37.5	54.3	77.5
Weight at 6 months.	Males (kg)	71.5	-	130.4
	Females (kg)	61.5	92.1	28.6
Weight at 9 months.	Males (kg)	98.1	119.3	178.2
	Female (kg)	82.1	112.4	165.0
Weight at 12 months.	Males (kg)	108.1	137.4	206.7
	Females (kg)	93.5	124.6	193.2
Cow weight 1-2 years (kg)		109	181	242
3-4 years (kg)		167	252	323
5-6 years (kg)		204	275	374

Table 6. Productivity index for Keteku and Muturu under various environments.

	Muturu		
	Village (tsetse)	Station (tsetse free)	Keteku
Cow viability %	95	95	97.8
Calving rate	57	92.4	65
Calf viability to 1 year	85	90	95.8
Calf weight (kg / year)	80	91.5	140
Productivity index per cow pear year (kg)	36.8	72.3	87.2
Cow weight (kg)	150	177	295
Productivity index per 100 kg cow maintained per year (kg)	24.5	40.8	29.6

The Muturus have an important place in traditional culture and this affects their management and marketing. There is a strong spiritual attachment to the animals. To harm a Muturu was considered sacrilegious and would pressage ill for the perpetrator. They must not be roasted whole or in large pieces despite their small carcass yield as this is believed to be a humiliating experience for the spirit of the sacred animal. A farmer who does this angers the gods and may lose all his cattle unless he appeases appropriate deities.

Muturus have special protection and can wander freely in the fields and destroy crops with impunity. Even Christians tend to observe these restrictions in that Muturus are regarded as untouchable animals.

Figure 4. Coloured variants among Muturu breed.

Productivity

The Muturu traits have been evaluated in a communal management system in some states (Table 4). This system has been largely responsible for the conservation of the Muturu (Robert and Cray, 1973). Under the system, cattle belonging to various owners in a village are herded together. The system was developed to minimize damage to crops by these cattle and prevent conflict between farmers and cattle owners. Whilst the calving rate in this village system is 57 percent, it was as high as 92 percent when tsetse was controlled in the station environment (Table 5). Compared to the Zebu or the Zebu cross, the Muturu calved earlier, 635 days compared to 761 and 684 days of Zebu and Zebu cross, had calving intervals of 350 days compared to 403 and 363 of the others, respectively, though the cows' weight was much lower at maturity (three-four years), 167 kg compared to 323 and 252 kg of the Zebu and the N'Dama x Zebu Cross.

Anatomical differences between male and female Muturu were similarly reported in various field station conditions (Olutogun, 1976, Akinwunmi and Ikpi, 1985). The Muturu cattle are reportedly very fertile with a capacity to produce one viable calf per annum (Oyenuga 1967; ILCA 1979a; Adeniji, 1985). They mature earlier than the Zebu in the region and the intervals between consecutive calvings were shorter. Under improved management it was reported to be between 10-15 months and 18-24 months under the traditional village system.

Table 7. Body measurements of Muturu 4 years old bulls.

	Muturu [a]	N'Dama[b]
Height at wither (cm)	86.43 – 112.63	93 – 120
Heart girth (cm)	103.79 – 118.73	109-162
Rear Flank girth (cm)	106.79 – 120.51	-
Circumference of pouch (cm)	125.55 – 135.62	-
Circumference of canon (cm)	10.53 – 10.85	-
Circumference of neck (cm)	51.91 – 53.90	51 – 54
Circumference of hind legs (cm)	38.05 – 45.55	35 – 43
Body length (cm)	111.76 - 161.56	128 – 172

Source: [a] Oloruntobi, 1994;
[b] Sokefun, 1994.

Milk Production

The Muturus are rarely milked because their milk production is hardly sufficient for their calves. Milking by the Koma people of Gongola State was done for medicinal purposes. However, lactation milk yields of 127-421 kg for lactation length of 120-216 days were reported (Olaloku, 1976; Fricke 1979).

Productivity Index

Productivity indices of the Muturu in different production environments characterized by light and zero tsetse challenge are shown in Table 6. The animals under a tsetse free environment were found to perform better than those in a tsetse infested environment even under improved management. The productivity index varied from 36.8-72.3 under the two systems.

Characterization

Morphometric characterization of the Muturu breed revealed colour shades of ebony black, fawn, black and white, black with white patches, white with brown or black spots of varying frequencies ranging from 39-90 percent, 62 percent of the population studied were predominantly black, which corresponds to ecological adaptation of the animal in the south of the country where it is highly distributed (Oloruntobi, 1994); the lighter shades occurring more among the Northern varieties.

Body measurements as reported by some authors are presented in Table 7. When compared to that of N'Dama, the height at wither ranged from 86-113 cm compared to 93-120 cm of the N'Dama whilst the body length varied from 112–161.6 cm compared to 128-172 cm of the N'Dama, hence, Sokefun (1994), Fall, *et. al*. (1992) showed Muturu as a small bodied compact animal with fine-boned limbs.

Conclusion

The Muturu cattle is the only native shorthorn cattle in Nigeria, the N'Dama having been imported to upgrade Nigerian Zebu for beef production and confirment of trypanotolerance on the trypanosusceptible breed.

Available reports have pointed to the fact that the Muturu is a highly endangered breed as a result of:

1. Civil strife in Nigeria.
2. Reduction in the habitat of tsetse fly through increase cropping hence they are being replaced by the bigger bodied Zebu even in areas where they are considered as sacred.
3. Extensive crossing with the Zebu in tsetse fly areas resulting in its genetic dilution.
4. Urbanization.

Hence survival has been restricted to pockets of savannah and the humid forest zone. With a decline in tradition and destruction of shrines as urbanization continues and the current spread of Christianity, many of the Muturu population will be further drastically reduced if nothing is urgently done about its conservation.

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