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INFORMATION

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SUR LE RESSOURCES  
GÉNÉTIQUES ANIMALES

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DE INFORMACION  
SOBRE RECURSOS  
GENETICOS ANIMALES



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## **ANIMAL GENETIC RESOURCES INFORMATION**

### **BULLETIN D'INFORMATION SUR LES RESSOURCES GÉNÉTIQUES ANIMALES**

### **BOLETÍN DE INFORMACIÓN SOBRE RECURSOS GENÉTICOS ANIMALES**

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## Editorial

# The Global Strategy for the Management of Farm Animal Genetic Resources – an Update

The FAO programme entity Global Strategy for the Management of Farm Animal Genetic Resources is to help tap the significant potential of animal genetic resources to both food security and rural economic diversification and development. To realize this potential, the use and development of animal genetic resources must be effectively planned to achieve the desirable outcomes. Past attempts to increase agricultural production using genetic improvement of domestic animals have not always been well planned and undertaken with all of the important factors to be considered. Locally adapted breeds are often able to survive and produce valuable products in low input and variable environments. A strategy to develop them is likely to be more sustainable over the long-term than reliance external genetic resources.

Animal genetic diversity is rapidly eroding despite the strongly growing demand for livestock products. Conservation and development of animal genetic resources is essential to enable farmers to adapt to changing environmental conditions and consumer demands.

FAO, in using its comparative advantages, is leading efforts to sustainably use, develop, and conserve animal genetic resources, and since 1993 has been engaged in the preparation of the Global Strategy for the Management of Farm Animal Genetic Resources. The Global Strategy is intended to serve as a strategic framework to guide international efforts in the animal genetic resources sector. Preparation of the *First Report on the State of the World's Animal Genetic Resources* will be an essential element of the Global Strategy up to 2004-2005. There is a

specific clear mandate from FAO member countries through the Commission on Genetic Resources for Food and Agriculture to develop the Global Strategy for the Management of Animal Genetic Resources along the lines followed by this entity. Further priority actions for the sustainable use of farm animal genetic diversity will be based on the *First Report*. The proposed Report is a country-driven process, endorsing FAO's guidelines for the preparation of country reports. Furthermore, the FAO Working Group on Animal Genetic Resources requested that countries, donors, stakeholders and FAO increase efforts to mobilize the resources necessary, including financial resources, in order to successfully undertake the preparation of the Report and implement priority follow-up action. FAO stands ready to assist its member nations in the preparation of this landmark document and in implementing country assistance for priority actions in conservation and management of farm animal genetic resources. The country driven State of the World's Animal Genetic Resources process has already been initiated with the FAO Director-General inviting countries to participate in this global effort. To date 103 countries have formally accepted. A set of training and reporting tools has been developed to assist countries in preparing their national reports. A global training effort has been implemented, reaching 123 countries and 224 professionals in 2001, and ending up in May 2002 by reaching 53 additional countries and 120 more professionals. This undertaken is expected to go on to the year 2005 until the technical and analytical work

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related to Report has been completed and will  
expectedly cost US\$ **3 400 000 of**  
**extra-budgetary funds.**

This activity will contribute to the  
integration of the management of animal  
genetic resources into other agricultural  
activities and will lead to the enhancement of  
capacities of communities to utilize local

animal genetic resources for sustainable rural  
livelihoods, as it will address more equitable  
access to resources and helps develop  
international instruments to regulate global  
animal genetic resources. The activity also  
relates to other activities of concern to FAO  
like Biological Diversity, Biotechnology,  
Ethics and Sustainable Livelihoods.

The Editors

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## Editorial

### Stratégie Mondiale pour la Gestion des Ressources Génétiques des Animaux Domestiques - Mise à Jour

Le programme de la FAO pour la Stratégie mondiale pour la gestion des ressources génétiques des animaux domestiques vise à exploiter l'important potentiel de ressources génétiques animales tant pour atteindre la sécurité alimentaire que pour la diversification et développement de l'économie rurale. Pour atteindre ce but, l'utilisation et le développement des ressources génétiques animales doivent être planifiés de façon effective. Les actions entreprises par le passé pour augmenter la production agricole au moyen de l'amélioration génétique des animaux domestiques n'ont pas toujours été bien planifiées ni réalisées en tenant compte de tous les facteurs nécessaires. Les races locales adaptées sont souvent capables de survivre et de fournir des productions valables avec un minimum d'intrants et dans des conditions environnementales variables. Une stratégie orientée vers le développement de ces races serait plus durable à long terme plutôt que de recourir à des ressources génétiques externes.

La diversité génétique animale subit une érosion rapide malgré la forte demande croissante de produits animaux. La conservation et le développement des ressources génétiques animales sont essentiels pour permettre aux éleveurs de s'adapter aux changements des conditions de milieu et de la demande des consommateurs.

La FAO, grâce aux avantages dont elle dispose, dirige les efforts pour une utilisation, un développement et une conservation des ressources génétiques animales durables. Pour cela, depuis 1993, la FAO a entrepris la préparation de la Stratégie mondiale pour la gestion des ressources des animaux

domestiques qui doit servir comme cadre stratégique d'orientation des efforts internationaux dans le secteur des ressources génétiques animales. La préparation du Premier rapport sur la Situation mondiale des ressources génétiques animale sera un des éléments essentiels de la Stratégie mondiale pour la période 2004-2005. Il existe un mandat spécifique des pays membres de la FAO à la Commission pour les ressources génétiques pour l'alimentation et l'agriculture afin de développer la Stratégie mondiale pour la gestion des ressources génétiques des animaux domestiques suivant les lignes préconisées par cette entité. Les actions ultérieures pour l'utilisation durable de la diversité génétique des animaux domestiques feront référence à ce Premier rapport. Ce Rapport doit être le résultat d'une procédure nationale de démarrage qui accepte les normes de la FAO pour la préparation du rapport national. En outre, le Groupe de travail de la FAO pour les Ressources génétiques animales a demandé aux pays, aux donateurs, aux parties prenantes et à la FAO d'augmenter leurs efforts pour mobiliser les ressources nécessaires, y compris des ressources financières, afin de pouvoir commencer avec succès la préparation du Rapport et mener à terme les actions de suivi prioritaires. La FAO est prête à donner son assistance aux pays membres pour la préparation de ce document général et pour la réalisation des actions prioritaires nécessaires à la conservation et la gestion des ressources génétiques des animaux domestiques. La procédure nationale sur la Situation mondiale des ressources génétiques animales a déjà été lancée avec l'invitation du Directeur général aux pays membres pour qu'ils prennent part

à cet effort global. Jusqu'à présent 103 pays ont confirmé officiellement leur adhésion. Une série d'outils pour la formation et la préparation du rapport ont été développées pour aider les pays dans la préparation de leur rapport national. Un effort global pour la formation a été réalisé et a bénéficié à 123 pays et 224 professionnels en 2001, et 53 pays et 120 professionnels jusqu'en mai 2002. Cet effort devrait continuer jusqu'en 2005, jusqu'à la finalisation du travail technique et analytique du Rapport, et ceci avec un coût prévu de **US\$ 3 400 000 en provenance des fonds extra budgétaires.**

Cette activité contribuera à l'intégration de la gestion des ressources génétiques animales dans d'autres activités agricoles et renforcera les capacités des communautés rurales à

utiliser les ressources génétiques animales locales pour subvenir durablement à leurs besoins, étant donné qu'elle permettra un accès plus équitable aux ressources et aidera le développement des moyens internationaux pour réglementer les ressources génétiques animales mondialement. Cette activité a aussi des liens avec d'autres activités qui concernent la FAO, telles que la diversité biologique, la biotechnologie, l'éthique et les moyens d'existence durables.

Les Editeurs

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## Editorial

### Estrategia Mundial para la Gestión de los Recursos Zoogenéticos - Actualización

El programa de la FAO para la Estrategia mundial para la gestión de los recursos zoogenéticos fomenta en un primer momento la importancia del potencial de los recursos zoogenéticos con el fin de alcanzar la seguridad alimentaria y mantener la diversificación y el desarrollo de la economía rural. Para alcanzar este objetivo, la utilización y el desarrollo de los recursos zoogenéticos deben ser planificados de forma efectiva. Las acciones llevadas a cabo en el pasado para aumentar la producción agrícola a través el uso de la mejora genética de los animales domésticos no siempre fueron planificadas correctamente ni llevadas a cabo teniendo en cuenta todos los factores implicados. Las razas locales adaptadas son a menudo capaces de sobrevivir y proporcionar productos válidos con un mínimo de aportes y en condiciones ambientales variables. Una estrategia orientada hacia el desarrollo de estas razas sería más sostenible a largo plazo en vez de cubrir simplemente las necesidades nacionales con recursos genéticos externos.

La diversidad genética animal presenta una erosión rápida a pesar de la fuerte demanda creciente de productos animales. La conservación y el desarrollo de los recursos genéticos animales son esenciales para permitir a los agricultores adaptarse a los cambios de condiciones del ambiente y de la demanda de los consumidores.

La FAO, gracias a las ventajas de que dispone, dirige sus esfuerzos hacia una utilización, un desarrollo y una conservación sostenible de los recursos zoogenéticos . Para ello, y desde 1993, la FAO ha dado inicio a la preparación de la Estrategia mundial para la gestión de los recursos zoogenéticos de los animales domésticos que deberá servir de

marco estratégico de orientación a los esfuerzos internacionales dentro del sector de los recursos zoogenéticos . La preparación del Primer informe sobre la Situación mundial de los recursos genéticos animales será uno de los elementos esenciales de la Estrategia mundial para el período 2004-2005. Existe un mandato específico de los países miembros de la FAO a la Comisión para los recursos genéticos para la alimentación y la agricultura, para que desarrolle la Estrategia mundial para la gestión de los recursos genéticos de los animales domésticos en base a las normas establecidas por esta entidad. Las acciones posteriores para el uso sostenible de la diversidad genética de los animales domésticos harán referencia a este Primer informe. Este Informe debe ser el resultado de un acuerdo nacional inicial que acepte las normas de la FAO para la preparación del informe nacional. En un segundo momento, el Grupo de trabajo de la FAO para los Recursos zoogenéticos solicitará a estos países, a los donantes, a los agricultores, a los ganaderos y a la FAO, que aumenten sus esfuerzos para movilizar los recursos necesarios, incluidos los financieros, para poder iniciar con éxito la preparación del Informe y llevar a cabo las actividades prioritarias de seguimiento. La FAO está dispuesta a aportar su asistencia a los países miembros en la preparación de este documento general y en la realización de las actividades prioritarias necesarias para la conservación y la gestión de los recursos zoogenéticos . El informe nacional sobre la Situación mundial de los recursos genéticos animales ha iniciado ya con la invitación del Director general a los países miembros para que tomen parte en este esfuerzo global.

Hasta hoy, 103 países han confirmado oficialmente su adhesión. Se ha puesto a punto una metodología para la formación y la preparación del informe, y ayudar a los países en la preparación del informe nacional. También se ha realizado un esfuerzo global de formación que ha beneficiado en 2001 a 123 países y 224 profesionales, y 53 países y 120 profesionales hasta mayo 2002. Esta situación debería seguir hasta el 2005, es decir, hasta la finalización del trabajo técnico y analítico del Informe, y esto con un costo previsto de **\$EE.UU. 3 400 000 con cargo a los fondos provenientes de los presupuestos extraordinarios.**

Esta actividad contribuirá en la integración de la gestión de los recursos genéticos animales con otras actividades agrícolas y

llevará a fomentar las capacidades de las comunidades en la utilización de los recursos genéticos de animales locales a través de medios de existencia rurales sostenibles, dado que permitirá un acceso más equitativo a los recursos y ayudará al desarrollo de los medios internacionales para normalizar los recursos zoogenéticos globalmente. El informe se refiere también a otras actividades que conciernen a la FAO, tales como la biodiversidad biológica, la biotecnología, la ética y los medios de subsistencia sostenibles.

Los Editores

# Conservation of farm animal biodiversity: history and prospects<sup>a</sup>

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## Summary

The conservation and sustainable use of animal genetic resources (AGR) is now recognized as a legitimate activity of public concern in which inter-governmental, governmental, non-governmental and private sectors are involved. Livestock breeds became threatened on a large scale only in the second half of the 20<sup>th</sup> century. They are now recognized as a significant human heritage resulting from domestication whose loss would deplete the quality of human life. Conservation as a conscious and organized activity is therefore a new item on the public agenda. This paper traces the origin of livestock conservation from the Vision in the 1950s and 1960s through the awakening of the environmental movement with the creation of UNEP in 1972, followed by the development of a Joint Conservation Infrastructure and Programme for animal genetic resources in the 1980s by FAO and UNEP.

The paper describes the context, participants, constraints, opposition and activities of building the AGR Conservation Infrastructure and Programme. Although the concept of conservation was opposed by some and there were both financial and political difficulties, an effective institutional infrastructure for conservation was built by FAO by 1990 using UNEP funds. In 1992, the advent of the Convention on BioDiversity offered substantial funding for project activities for the first time through the Global Environmental Facility (GEF). At that point it was desirable to move activities from central planning to the design, funding and operation of local or national conservation

projects. "Top-down" institutional control should have been replaced by "Bottom-up" conservation activities. Regrettably this did not happen during the 1990s and, as shown by successive editions of the World Watch List, the number of endangered livestock breeds has continued to increase. Now that the conservation vision is accepted and the institutional infrastructures are in place it is time for a new dynamic by creating and funding specific conservation projects which harness the local human resources of knowledge and enthusiasm.

## Resumen

La conservación y utilización sostenible de los recursos genéticos animales (ANGR) ha sido ahora reconocida como actividad legítima de beneficio público en cuanto se refiere a los sectores interesados a nivel intergubernamental, gubernamental, no gubernamental y privados. Sólo a partir de la segunda mitad del siglo XX las razas domésticas empezaron a estar en peligro de

<sup>a</sup> Paper presented at the joint RBI/EAAP International Symposium on "Conservation, management and use of rare livestock genetic resources", held in Budapest on 23<sup>rd</sup> August 2001

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manera importante. Actualmente estas razas están reconocidas como parte importante de la herencia de la humanidad y una pérdida supondría una disminución en la calidad de la vida. La conservación, como actividad consciente y organizada, es por lo tanto un tema nuevo en la agenda pública. Este artículo presenta el origen de la conservación animal desde su visión en los años 50 y 60 y posteriormente a través del despertar del movimiento ambiental con la creación del UNPE en 1972, seguida del establecimiento de la Infraestructura y Programa Conjunto de Conservación para los recursos genéticos animales en los años 80 por la FAO y el UNEP.

El artículo describe el contexto, los participantes, los límites, la oposición y las actividades en la creación del Programa e Infraestructura de Conservación de los recursos genéticos animales. A pesar de que el concepto de conservación encontrase una cierta oposición y, por consiguiente, dificultades tanto financieras como económicas, la FAO durante los '90 con la ayuda de los fondos del UNEP, consiguió crear una infraestructura institucional efectiva. En 1992, el avenimiento de la Convención sobre Biodiversidad ofreció un financiamiento substancial para las actividades del proyecto por primera vez a través del GEF (Global Environmental Facility). En aquel momento era preferible transferir las actividades desde la planificación central hacia un diseño, financiamiento y operación de proyectos de conservación local o nacional. El control institucional debería haber sido substituido por las actividades de conservación, pero desgraciadamente no fue así en los años 90 y, como se observa en las ediciones sucesivas de la World Watch List, el número de razas de animales domésticos en peligro ha seguido aumentando. Ahora que la visión de conservación ha sido aceptada y que las infraestructuras institucionales han sido establecidas, ha llegado el momento de una nueva dinámica a través de la creación y fundación de proyectos de conservación específicos que fomenten los conocimientos y el entusiasmo en los recursos humanos.

**Keywords:** *Strategy for conservation, Technical and financial infrastructures, Policy decision, Convention on Biological Diversity*

## Introduction

Entry into a new century and a new millennium is an appropriate time to stand back and review the Conservation of Animal Genetic Resources. The domestication and use of animals by humans dates back about 12 thousand years. Despite the small number of mammalian species which mankind chose to domesticate in the few primary and secondary (or copy-cat) Centres of Origin (Payne and Hodges, 1997) several thousand distinct breeds or races have spread across the earth. This bio-diversity results both from natural selection for adaptation as people emigrated with their animals over the surface of the earth and also from human choices for use or aesthetic appearance. The preferential selection of distinct genetic traits is reflected in the breeds, types or races that are adapted to specific uses or environments and that are often named after the language, people or locality where they are dominant. This vast array of thousands of breeds is a human heritage worthy of conservation.

In the twentieth century, humanity which shaped animal bio-diversity over the millennia suddenly became the destroyer of those same domestic animal breeds. This aggression is driven by intensification of food production which favours only a few breeds. Biodiversity accumulated over thousands of generations is today challenged by an accelerating process of extinction. While mankind behaved wisely, though almost unconsciously, in building-up bio-wealth we are now foolishly squandering animal-capital for short-term gains. And we are aware of what we are doing.

## The Three Stages of Human Endeavour

Fortunately, the twentieth century also produced some people of wisdom and vision who saw the danger and several decades ago called for a new movement for the Conservation and Improved Use of Animal Genetic Resources. The idea of conserving endangered farm animals was an innovative idea in the 1960s. Like all novel and important ideas, it had opponents. The new vision called for global action involving cooperation at local, national and international levels. During the decades since the 1960s the Farm Animal Conservation Movement has passed through the predictable phases of most human innovations (Table 1). They are: Vision, Programme Infrastructures; and Projects.

In small projects at one location the three phases may all be carried out by a small team working together. When a new endeavour calls for change on a large or global scale, the three phases of human endeavours must be separated. Each phase needs special skills, resources and people. Visionaries are rarely able to build effective infrastructure; institutions are rarely skilled at hands-on project operations. The vision for Animal Genetic Conservation calls for change globally and needs co-operation and division of labour at local, national and international levels. It is part of the thesis of this paper that the distinction between Programme Infrastructures and Project Activities in the Conservation of Animal Genetic Resources has not yet been recognized.

## Top-Down and Bottom-Up Approaches to Animal Conservation

New human enterprises can also be viewed as “Top-Down” and “Bottom-Up” models. These two terms can be illustrated by applying them to the three phases of human endeavour. Offering a new vision is very unusual work and nearly always flows from individuals who rarely have the skills for implementation. It is the essential first step. We may paraphrase the biblical observation (Bible, Proverbs, 29, 18): “Where there is no vision, the people perish” by saying “Where there is no vision for conservation the animals will perish”. The Vision may come from Top-Down or Bottom-Up. A visionary may be a scholarly, academic thinker or a practical hands-on activist at a local level. Visionaries rarely become the operators of successful large-scale operations.

By contrast, Creation of Infrastructures is usually a Top-Down task requiring centralized planning, analysis, budgeting, and thinking on the grand scale. The global Vision has to be clothed with reality so that Infrastructures are created which will truly support field projects. Programme Infrastructures must be neither so large, nor expensive nor cumbersome that they stand in the way of local action; but they must be authentically related to reality, strong and flexible enough to encourage local projects. The great danger, which regrettably has recently happened in Animal Genetic Conservation, is to try and use Technical Infrastructure from the centre to control local

*Table 1. Three typical stages of new human endeavours.*

- 
- **Vision** originating from individuals - thinkers and activists.
  - **Creation of Programme Infrastructures** – institutions.
  - **Project Activities** in the field – local people.
-

Project Activity. Such a model may be suitable for deployment of nuclear arms around the world by a super-power where all local actions are controlled by a Commander-in-Chief. It does not work in Domestic Animal Conservation where each local project has unique characteristics, specific breeds and environments, indigenous knowledge and cultures. The danger of creating Infrastructure is that the people in charge are tempted to see themselves as responsible for organizing the whole global activity. In other words they have a Top-Down approach in which they think it is possible for the centre to decide how the projects will operate on the ground. This is clearly nonsense on a world scale with animals. Individual conservation projects must germinate in the local seedbed in a Bottom-Up model using local knowledge and resources which are linked into national and global infrastructures that provides technical information, publications, training and support.

The parties to the farm animal conservation movement are the following: governments, UN inter-governmental agencies, and local people often grouped as non-governmental organizations (NGOs). Effective action requires the parties to co-operate. The Intergovernmental UN agencies can create the technical and financial infrastructures; governments can provide an integrated national approach to conservation and supply local resources and support to projects; and local people as NGOs can run Project Activities to save the animals that are so often in remote locations. Thus competent Programme Infrastructures empower local people with training, technical knowledge and funds (Top-Down) while the conservation projects on the ground are implemented by committed local people, often livestock owners with long-term interests in the animals (Bottom-Up). Further discussion of the role of the parties is given in Hodges, 1997.

The great danger, which leads to waste of funding, confusion, rivalry and minimum conservation is to imagine that animal

projects can be organized centrally by officials in governments or in the UN agencies (Top-Down). Live animal conservation is a daily, hands-on job, perhaps with semen and embryos stored nearby. The idea of a Command Centre at FAO in Rome for operating farm animal conservation projects throughout the world is totally inappropriate. It may work with plant genetic conservation where some seeds can be stored centrally *ex situ*. On the other hand, FAO is indispensable to provide Top-Down Programme Infrastructures, the types of which are listed later in this paper.

## Structure of This Paper

This paper now examines the history and prospects of farm animal conservation within the framework of the three normative stages of developing human projects described above and the Top-Down / Bottom-Up approaches. The paper follows this pattern.

### The origin of the vision for farm animal conservation

A historic account of the origin of the Vision is given. It is assumed here that the Vision is accepted and needs no further justification. The role of NGOs as the first organizations to catch the vision is summarized.

### Building technical and financial infrastructure for the farm animal conservation programme

The paper shows how the UN later caught the vision and moved into farm animal conservation. Actions by UNEP and FAO then rapidly built up a Technical Infrastructure. The list of the many FAO/UNEP publications which provide this Technical Infrastructure is given in FAO, 1990. The inability of FAO to provide a Financial Infrastructure for project implementation is noted. The impact of the

Convention on Biological Diversity upon funding local conservation projects is examined.

### **Farm animal conservation project implementation at the local level**

The roles of FAO and national governments in empowering local people and NGOs in conserving farm animal bio-diversity is outlined showing that successful action still awaits international co-operation between the various parties.

### **Origin of the vision for farm animal conservation**

The vision for farm animal conservation arose among thinking people who saw the coming monoculture of animal production. A very early visionary was the UK animal geneticist Ian Mason who began in the 1940s and 1950s to collect data on individual breeds in developing countries, also showing population statistics. Mason was, at that time, a solitary visionary who authored the first World Dictionary of Livestock Breeds, Types and Varieties in 1951 (latest 4<sup>th</sup> edition, 1996).

I recall hearing Mason speak in 1961 at a UK cattle breeders' conference about the threat to biodiversity of breeds in developing countries. Live animal conservation was initiated in the UK in 1964 by another academic, Dr. I. Rowlands, who gathered small groups of domestic breeds in a zoo. In 1968 the first NGO for farm animal conservation was formed, also in the UK, the Rare Breeds Survival Trust, which started farm parks and conservation on individual farms. Much credit for this NGO initiative goes to Lawrence Alderson and his associates. He was also a leader in later forming Rare Breeds International (RBI) the International NGO that coordinates and supports national NGOs in their conservation activities. In the early 1960s also, the Milk Marketing Board of England and Wales, a farmers' co-operative body, noted that some traditional breeds of British cattle were declining rapidly in

numbers as the Holstein-Friesian grew to dominance. Cryo-conservation was used to save semen from threatened British breeds.

Thus, the vision came from individual thinkers, visionaries and people of action close to the ground in agriculture. Early pioneers also existed in some Developing Regions. The vision of farm animal conservation did NOT originate within the ranks of mainstream animal scientists; nor did it arise within the international development agencies like FAO who joined the conservation scene much later in the 1980s; nor did it arise primarily in national governments. Like so many creative ideas, the vision came from individuals. There was resistance. In the 1960s and 1970s, most animal scientists were locked into the paradigm of economic progress as the only value. Conservation of biodiversity was seen as uneconomic. The old-fashioned breeds of previous centuries were regarded as obsolete and many scientists argued that, in the name of progress, these breeds should be allowed to disappear.

FAO did not start a programme for animal genetic conservation until 1980. This is extraordinary as FAO had been advised by its expert consultations in the 1960s of the need to study adaptation and the relative merits of exotic and indigenous breeds in the tropics (see Payne and Hodges, 1997). The prevailing animal production policy within FAO throughout the 1960s and 1970s was to try to introduce temperate breeds with high genetic merit to the tropics. This philosophy is well illustrated by the FAO scheme, started in the 1970s, to donate Holstein-Friesian semen from the West to developing countries. The philosophy of increasing animal production in the tropics with temperate genes not only failed but also damaged indigenous breed resources (Payne and Hodges, 1997). On the other hand, the vision of conservation crept unnoticed into FAO in the 1970s when Ian Mason was appointed in FAO Rome in charge of animal breeding projects. In addition to his duties, he continued to build-up data on tropical breeds which, much

later, contributed substantially to the first edition of the World Watch List (Loftus and Scherf, 1<sup>st</sup> Edition, 1993).

### **Building technical and financial infrastructure for the farm animal conservation programme**

The conservation vision for farm animals, born in the 1960s, first moved onto the international stage at the UN Conference on the Environment in 1972 in Stockholm following which the United Nations Environment Programme (UNEP) was created. Some thought that UNEP was the appropriate UN organization to establish the farm animal conservation programme within its broad mandate for the environment. However, it was recognized that within the UN system FAO is the Specialized Agency with a technical brief for agriculture, especially to assist Governments of developing countries. Therefore UNEP and FAO started working together in the newly identified field of conserving agro-biodiversity. Their first joint activity was in 1980 when they held the FAO/UNEP Joint Inter-Governmental Consultation on Animal Genetic Resources in Rome (FAO, 1981) at which I was privileged to represent Canada. That 1980 Consultation moved the rationale for conservation from being a fringe topic onto the international agenda and recognition within animal science.

The Consultation recommended actions to Governments, to FAO and UNEP, to the private sector and to NGOs. Governments were asked to initiate and facilitate conservation programmes themselves and to encourage NGOs and others in the private sector. The Consultation called upon FAO and UNEP to provide Technical Infrastructures. These included scientifically sound techniques for identifying and conserving threatened breeds; training courses; collection of accurate information on breed characterizations; documentation of distribution of farm animal diversity

throughout the world etc. Financial support for building this new Infrastructure was provided by UNEP. Thus, Phase Two of the Farm Animal Conservation Movement started in 1982.

FAO added the new Farm Animal Conservation Programme to the HQ Group of staff responsible for existing animal breeding development projects. I was privileged to lead this group in FAO Rome from 1982 to 1990. Our conservation activities were funded by UNEP while animal breeding activities continued within the FAO/UNDP funded programme. We were supported scientifically by the newly established worldwide FAO/UNEP Joint Expert Panel on Animal Genetic Resources which brought the enthusiasm and expertise of about 35 eminent scientists from developing and developed countries chaired by the sheep geneticist, the late Dr. Helen Newton-Turner from Australia.

### **Institutional environment within FAO in the 1980s**

Although the mandate for farm animal conservation was given by the 1980 FAO/UNEP Consultation, actual progress is always influenced by the prevailing internal institutional environment. Thus, the first task was to explain the new ideas within FAO. The concept of “sustainable development” was not current in the early 1980s in development agriculture. We had to define the terms “preservation” and “conservation” for the first time in terms of domestic breeds. We had to explain that conservation and use are two sides of the same coin. These were new concepts. UN Specialized Agencies are slow-moving bodies. Policy-makers and Budget Directors within FAO had for years felt that the only legitimate business of FAO was to increase animal production. The funding from UNEP was the key to change as these funds were designated for animal conservation. A further stimulus was the fear within FAO that UNEP might take over FAO’s traditional role in agriculture through its environmental mandate within the UN.

The 1980s saw four specific issues arise within FAO which deeply affected the animal genetic conservation programme. They were sufficiently important to be mentioned briefly here relative to their impact upon the new programme for conservation of farm animal genetic resources.

1. Policy decision on animal genetic data and gene banks;
2. Controversy on plant genetic resources;
3. Conflict over FAO's regular programme budget;
4. Convention on Biological Diversity.

### **Policy decision on animal genetic data and gene banks**

A high level policy decision was made when I first arrived in FAO in 1982 not to establish a single global data centre nor a single cryogenic storage bank at FAO in Rome. Rather it was decided to provide the Technical Infrastructure as guidelines, training and scientific support for the establishment of regional and national data centres and gene banks in Africa, Asia, and Latin America. This policy decision was in line with our view that the role of FAO was to build infrastructure to support activities close to where conservation will occur.

### **Controversy on plant genetic resources**

The development of FAO's Infrastructure Programme for farm animal conservation was complicated in the 1980s by the global plant genetic resource programme. The plant programme had been in operation for some years and the key body at that time was the International Bureau of Plant Genetic Resources (IBPGR) which was located within the FAO Plant Production and Protection Division in Rome. The FAO/UNEP 1980 Animal Consultation had proposed a comparable body within FAO to be called the International Bureau of Animal Genetic Resources. However, in the 1980s a political ferment erupted within the FAO Governing

Bodies about plant breeders' rights, farmers' rights, ownership of seed banks and access to conserved stocks. Consequently, the Director-General of FAO decided that it was essential to consolidate the plant situation before starting any such comparable body for animals. That commotion on plants resulted in the formation in the 1980s of the FAO Commission and Undertaking on Plant Genetic Resources. Only recently has that body been reshaped to include Animal Genetic Diversity along with Plants.

### **Conflict over FAO's regular programme budget**

In the 1980s the USA, which contributed nearly 25% of the FAO Regular Programme Budget, withheld its contributions for some years as a protest against the FAO management style. Within FAO it was impossible to gain new funds at that time and so we managed to continue our conservation mandate with the UNEP funds and by liaison with UNDP and bi-lateral donors. However our small staff resources were cut as these were supported from the FAO Regular Programme.

### **Convention on Biological Diversity**

In 1988 a new feature appeared on the international landscape which affected the possibilities of funding for animal conservation projects. This was the proposal to bring the Convention on Biological Diversity (CBD) to the planned UN Conference on Environment and Development, UNCED, to be held in Rio de Janeiro in 1992 as the successor to the Stockholm Conference. This proposal had a large impact within FAO itself, one might even call it a conversion, to accept that conservation and improved use of animal genetic diversity are complementary. FAO was invited to the negotiating sessions in Geneva for the Convention on Biological Diversity and I was privileged to lead the FAO delegation. Conservation and sustainable development entered the FAO

*Table 2. Components of Technical Infrastructure created by FAO from 1982-1990.*

- 
- Scientific criteria for defining breeds at risk;
  - Sampling techniques;
  - Conservation standards for declining populations;
  - Cryogenic and live animal conservation methodologies;
  - Regional networks of concerned scientists;
  - Training programmes for developing country scientists;
  - Collection, analysis, and publication of surveys of breeds in developing countries;
  - Publication of the first comprehensive books on farm animal diversity of the USSR and China in UN languages;
  - Design of animal genetic descriptors;
  - Pilot national data banks and later regional data banks;
  - Technical support and training to regional cryogenic gene banks;
  - Provision of pilot funding and technical support to governments for national and regional conservation programmes;
  - Publication of operating manuals;
  - Guidelines for setting up live animal conservation projects;
  - Promotion of study of biotechnology as a potential new tool for production and conservation;
  - Establishment of contacts with the national and international organizations with interests, concerns and activities in conservation of agro-biodiversity and wild relatives of farm animals;
  - Provision of technical support to Governments and NGOs wishing to start national or local conservation programmes;
  - Publication of technical bulletins and launch of the new periodical Animal Genetic Resources Information;
  - Regular consultation with the joint UNEP/FAO Expert Panel.
- 

project vocabulary. As a result, in 1989, one of the FAO Governing Bodies, the FAO Committee on Agriculture (COAG), spent a day considering the conservation and improved use of farm animals. They enthusiastically approved our Technical Infrastructure Programme and proposed seeking funds for Project Activity from the forthcoming Convention on Biological Diversity. One might say that animal genetic resources conservation had, at last, become respectable although Financial Infrastructure for the large-scale development of Projects would have to wait for the Convention (CBD) in 1992.

### **Creation of the technical infrastructure**

During the 1980s the appropriate new Technical Infrastructure was created. Much of the technical work was done by consultant specialists on contract. The Technical Infrastructure and outline Global Programme was created as a knowledge base, discussed with leaders in developing countries, published, given to governments and used in many training courses for developing country leaders. The Technical Infrastructure was monitored by the FAO/UNEP Joint Expert Panel and components are shown in Table 2.

Table 3. Specification by Convention on Biological Diversity for Project Funding.

- 
- Conservation of threatened indigenous breeds;
  - Improved and sustainable food production;
  - Enhancement of the quality of rural life;
  - Conservation of the natural environment and resources used by farm animals;
  - Recognition of the traditional life-styles and ownership rights of the indigenous people whose animals are to be conserved;
  - Approval by the government as a part of a national strategy.
- 

The creation of this FAO/UNEP Newsletter, Animal Genetic Resources Information (AGRI) opened a new communication channel between all engaged in animal conservation. It is amazing that only 20 years ago in 1982 all FAO communication to and from developing countries was by diplomatic mailbags with letters prepared on electric typewriters plus carbon copies. Urgent messages were sent and received by telex. In 1982 in FAO, there were no fax machines, no desk-top computers, no courier services, no email and of course no internet.

Important conservation activities in Europe, for which FAO has no mandate, were undertaken by the European Association for Animal Production (EAAP), an international NGO, which carried out and then repeating a European breed survey (Maijala *et al.*, 1984). Then in 1988, EAAP established the European Animal Genetic Data Bank at Hannover, Germany. FAO cooperated with this European Data Bank Centre by sending developing country scientists there for training. EAAP subsequently published the information from the European Data Bank (Simon and Buchenauer, 1993). Later in the 1990s new leadership at FAO decided to establish a Global Data Bank for Animal Genetic Resources at Rome. The transfer of the European data to FAO Rome from the EAAP Data Bank in Hannover provided a good foundation together with the data from the regional data banks.

### **Farm animal conservation project implementation at the local level**

By 1990 therefore, FAO had successfully built a Technical Infrastructure on farm animal conservation, had established working relationships with the existing national programmes and had trained leaders in many developing countries. The missing factor was a Financial Infrastructure to fund national and local projects. All hopes were fixed upon obtaining finance from the Convention on Biological Diversity which was approved at Rio in 1992 and subsequently ratified by a significant number of governments who held their First Meeting of the Parties to the Convention in 1994 in The Bahamas (Hodges, 1995). This marked a new political and financial statement by governments which placed six billion US dollars for bioconservation. This fund offered – and still offers - a remarkable new possibility for financing the third and operational phase of the Conservation of Farm Animal Biodiversity to be undertaken as projects by national governments and by NGOs. The key features defined by the CBD to approve financial support for conservation projects in developing countries and in transition countries of Central and Eastern Europe are shown in Table 3.

The way was at last open for credible farm animal conservation projects to be funded. The intended route was for FAO, as the UN Specialized Agency, to provide national governments and NGOs with Technical Information and assistance in the design and

format of project proposals for submission by governments to the Global Environmental Facility (GEF) which was established to administer the six billion US dollars funding. Governments clearly need help in preparing their project proposals as they are approved only when the project is well defined, technically competent and integrated into national and local needs. A major role of FAO is to help to prepare these project proposals. FAO has decades of experience in this task and has almost turned it into an art form in development programmes generally. Given approval, the project is then operated by the government or national NGO. GEF also earmarked a substantial amount of the funding for projects specifically designed and operated by NGOs with national government approval.

Regrettably, an alternative route was apparently followed. When the funding became available in 1994, FAO sought large funding directly from the GEF to support its own newly-created Global Programme of Animal Genetic Conservation (DADIS). This approach for funding was unsuccessful and the rejection can be well understood in the light of the historic developments described in this paper. The GEF and the governments providing the funds prefer to put their funds directly into projects rather than into the hands of an agency. There is always the problem of enthusiastic individuals within an Inter-Governmental Agency wanting to build an empire. But, the conservation of endangered farm animal diversity is essentially a field task to be carried out by those who live, work and use the farm animal diversity. The role of the UN Inter-Governmental Agencies like FAO is to provide technical infrastructures and to support projects submitted by governments for financial assistance. FAO had followed this pattern with projects funded by UNDP for decades. By contrast, no GEF funds had been awarded by 2000 for farm animal conservation projects, although about one billion US dollars remained available from this first CBD tranche (Personal communication, 2001).

This tragedy is recorded by FAO's own documentation of erosion of biodiversity in farm animals. The World Watch List (Loftus and Scherf, 1<sup>st</sup> Edition, 1993), (Scherf, 2<sup>nd</sup> Edition, 1995, and 3<sup>rd</sup> Edition, 2000), which is a valuable publication, shows that between 1993 and 2000 the number of breeds at risk has increased. The vision for conservation has not been matched by action on the ground. FAO's other technical publications show that, during the 1990s, attention within FAO was directed to further development of the scientific aspects of its own Global Programme for Domestic Animal Diversity rather than upon enabling and facilitating governments and NGOs to submit projects to GEF for funding.

### **Prospects for the future: Where is the cutting edge of animal conservation?**

Conservation activities are well established in the developed regions where national NGOs and most governments have made excellent progress. Rare Breeds International (RBI) with its limited budget has successfully started some grass roots projects, as have creative private sources. Some larger developing countries for example, Brazil, China and India accepted the FAO Technical Infrastructure during the 1980s and, with their own funds, established national conservation projects.

Farm animal biodiversity now most at risk is in the poorer and least developed countries and in the newly Independent States (NIS) of the former Soviet Union. These countries are struggling with poverty and are most in need of external funding to start projects. The conservation needs of these countries can be addressed with funds from GEF and from international and bi-lateral donors provided the Governments and NGOs submit valid proposals. The current FAO project State of the World - Animal Genetic Resources (SoW-AnGR) is another move to document where there is most urgent need for project activity. However, the SoW-AnGR alone will not initiate conservation activities for it is basically another Top-Down approach. Unless FAO with its technical and project

formulation expertise moves alongside the governments and NGOs able to operate projects, the new information on declining biodiversity will simply remain as documentation. Meanwhile, farm animal biodiversity will be further depleted.

FAO, like all UN bodies, frequently loses its institutional memory by relatively frequent changes in staff. One of the purposes of this paper is to restore some of FAO's lost institutional memory on the Conservation of Farm Animal Diversity. An effective future must be built upon knowledge of the past. Otherwise the same mistakes are repeated and work already done is duplicated.

We know there is a large fund of enthusiastic knowledge at the grass roots level. Live animal conservation can often be combined into integrated community projects, sustainable development programmes, quality food product systems, organic farming or agrotourism - and at less cost than high technology proposals. The urgent need is to equip and empower local people to gain funding for their animal conservation projects for animal genetic conservation through national or local NGOs working together with Governments. FAO alone, as the UN Specialized Agency, has the unique mandate to provide technical help in the design of conservation project proposals.

In summary, the view expressed in this paper is simple. The vision for conservation is clear. The technical knowledge on how to do it is available and there is minimum need to spend more time and resources on refining scientific techniques of conservation. We are in Phase Three of this great endeavour. The need is for Project Activities to be initiated, funded and supported. That is a Bottom-Up activity. It has been well demonstrated that such conservation projects cannot be implemented by a Top-Down approach.

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## Development of a Regional Focal Point for animal genetic resources: the European example<sup>a</sup>

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### Summary

This paper describes the process that led to the creation of the European Regional Focal Point (ERFP). The action was suggested by the FAO Global Strategy (1995) aimed to assist countries to stop animal diversity erosion by helping them with a better use and preservation of their livestock resources.

In 1997, France accepted the responsibility of developing an ERFP through its Bureau des Ressources Génétiques (BRG). During the first year, the ERFP held meaningful discussions with the different European countries with the objective of finding a general agreement for an organisational structure as well as a medium-term work programme. The following step was settled during the Annual Meeting of the European Association for Animal Production (EAAP) in Warsaw where it was agreed that the new body had to have a light structure and respect national sovereignty regarding the AnGR.

In February 2000, following a difficult internal debate involving the establishment of a basic strategy and further steps, an enquiry was launched among the National Coordinators in order to have an overall picture and to evaluate the usefulness of the proposed organisation to be established. In 2000 during the 6<sup>th</sup> Workshop of the European NCs, the ERFP was created.

The new structure is based on

- a) an Annual Meeting of National Focal Points;
- b) a Steering Committee; and
- c) a Secretariat to be elected among the National Focal Points to serve for a limited period.

### Résumé

Cet article présente le processus qui a porté à la création des Points focaux régionaux européens (ERFP). L'action a été suggérée par la Stratégie mondiale de la FAO (1995) qui prévoit l'assistance aux pays pour empêcher l'érosion de la diversité animale en les aidant à mieux utiliser et préserver leurs ressources animales.

En 1997 la France a accepté la responsabilité de développer le ERFP à travers son Bureau des Ressources Génétiques (BRG). Pendant la première année le ERFP a maintenu d'importantes discussions avec les différents pays européens dans le but d'établir un accord général pour le développement d'une structure d'organisation ainsi que d'un programme à moyen terme. Le passage suivant a été réalisé pendant la Réunion annuelle de la Fédération européenne de zootechnie (FEZ) qui s'est tenue à Varsovie et où il a été accordé que cette nouvelle structure devait être flexible et dans le respect des AnGR existant dans chaque pays.

En février 2000, après un débat difficile au sujet de la stratégie de base et le futur immédiat, une enquête a été lancée auprès des Coordinateurs nationaux dans le but d'obtenir une vision globale et d'évaluer l'intérêt réel pour établir une organisation de ce genre.

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En 2000 encore, pendant le 6ème Atelier européen des Coordinateurs nationaux, le ERF a été créé.

La nouvelle structure se base sur:

- a) Une Réunion annuelle des Points focaux nationaux.
- b) Un Comité directeur
- c) Un Secrétariat élu parmi les Points focaux nationaux pour une période limitée.

**Keywords:** *Global Strategy, Conservation, Europe.*

## Introduction

Since 1995, the FAO Global Strategy was developed to assist countries to halt erosion of animal diversity by helping the countries to use better and preserve their priceless resources. The setting up of the components of the Global Strategy is in hand. It remains still perfectly flexible.

The Global Strategy's framework consists of four fundamental components with set of elements. Whilst elements may be reconfigured, the Strategy is designed to be comprehensive to emphasise the balance approach required to cost-effectively better understand, utilise and maintain animal genetic resources over time.

The Global Strategy's four fundamental components are:

- a. An intergovernmental mechanism involving the direct countries participation through centres and networks to assist countries design, implement and maintain comprehensive strategies for the management of their animal genetic resources. The need has been clearly demonstrated to distribute the focal points to at least three levels - country, regional and global.
- b. A technical program of activity aimed at supporting effective management action at the country level, in harmony with the Convention on Biological Diversity (CBD).

It includes a set of six elements:

- characterization, encompassing demographic and environmental factors, phenotypic and genetic indicators and assessment;
  - *in-situ* utilization and conservation;
  - *ex-situ* conservation;
  - communication and information system development, including the development of Domestic Animal Diversity Information System (DAD-IS) and training;
  - guidelines development and action planning;
  - collaboration, coordination and policy instrument development.
- c. Cadres of experts to guide development of the Strategy and maximise its cost-effectiveness.
  - d. An intergovernmental mechanism for direct government involvement, policy development and support and to maintain a national strategy adapted of the management of its own resources. This is provided by the Commission on Genetic Resources for Food and Agriculture (CGRFA).

For the implementation of the Global Strategy for Europe, FAO has closely collaborated with the EAAP (European Association for Animal Production). Created since a long time by EAAP, the existing networks were used by FAO. The relational aspects between the researchers, the various national and international organizations and all the animal genetic resources management actors were implied. In the field of the exchanges, many aspects were also implied mainly in the data processing from various countries. Collaboration between FAO and EAAP has been remarkable. It constitutes a fundamental difference between the Global Strategy set up in Europe and those carried out in other parts of the world.

## History

In 1995, 37 European countries have responded to an invitation by FAO, nominated an institution as National Focal Point (NFP) and identified a national technical coordinator (NC). The NC serves as the point of contact for the country's involvement in the Global Strategy and will assist in organising the essential in-country networking, facilitating and coordinating activity. This aspect is regarded as essential for a good coordination of the national activities. To ensure the country level has access to the necessary level of assistance and to best utilise the limited resources of the Global Focus, the planned coordination structure provides for decentralisation to the region level - Regional Focal Point (RFP) - is being implemented in each major genetic storehouse region of the world.

In 1997, France has kindly agreed to accept the responsibility of developing a Regional Focal Point for Europe through its Bureau des Ressources Génétiques (BRG). This would initially occur on an interim basis and for a period of one renewable year. During this period the RFP-Europe would have in depth discussions with the different European countries with the objectives to come to a consensus for an organisational structure together with medium-term work programme. The financial implications for an operational RFP-Europe as for the other technical activities were to be clearly identified and some proposals for the funding were to be made. In this work, the BRG received the strong assistance from the NFP of Poland which was a true relay for the various exchanges between the Eastern European countries.

In 1998, in order to continue this set-up, a strong option was taken during the Warsaw meeting. First, only one RFP for Europe must be able to meet the various countries needs, but this solution must take care not to stop during the following evolutions. This RFP should have a light organisational structure taking into account the relatively weak means, which could be devoted by a majority

of the countries. During this first period, which could last 3 or 4 years, wisely, the majority of the countries did not want to give to the RFP a fundamental role in the decision-making processes. In the field of the farm animals genetic resources management, the decisions aiming at the conservation or the use of these resources must a national responsibility. However, this solution does not exclude a strong need for an international co-operation at the political and technical level.

Keeping in mind, these two basic considerations:

- set up a light structure in order to support important and future evolution,
- respect of national sovereignty in the farm animals genetic resources management and the free adhesion of the countries at this co-ordinating structure ;

It should be possible to create a RFP ensuring a platform to exchange experiments and information in the field of the farm animals genetic resources management. Having a regard for the national differences, it is necessary, for economic reasons, this RFP can provide technical councils or supports in common fields. All countries should participate in these exchanges where totality of the actors who act at the local level, regional or international and from governmental or non-governmental organizations, is requested.

France was asked to continue to act as the temporary RFP Europe for one more year. During the 5th workshop for the European National Co-ordinators (NCs) for the management of Farm Animal Genetic Resources (FAnGR) in Zurich (1999), an agreement could not be made between the different European countries to allow the European Regional Focal Point (ERFP) creation. However, a new step was reached: the European countries recognized that it was not possible to establish an ERFP by a time-limited project. No formal or informal structure could continue the required work at European level. France did not have any mandate to act as the temporary ERFP.

However, it was difficult to conclude with a failure for this Zurich Workshop and the end of the ERFPP set up to stimulate exchanges and dialogue between countries in the field of Farm Animal Genetic Resources (FAnGR). That is why, a small group of countries under the sponsorship of EAAP and FAO wished to carry on this work. They asked the French national coordinator to organize a vote among all the NCs in order to have an overall picture and to evaluate the usefulness of the proposed organisation with sufficient precision.

During this new process, the first objective was to set a voting to know the countries position concerning the ERFPP creation. The first circular was sent on September 27, 1999. It proposed a vote on an “idea” or on a starting point for next fruitful discussions.

There were four main points in this proposal.

- General objectives of a European Co-ordination and benefits to be expected.
- Co-ordination ensured by one NC, based on a light structure.
- Funding provided by a dedicated trust fund financially managed and fully edited by EAAP (Rome).
- The French NFP offers to take this co-ordination in charge for a period of 4 years renewable – under the control of the annual NCs workshop

The results were published in February 2000.

- Thirty-seven contacted countries.
- Twenty-three answers.
- One country was against this proposal.
- Two countries require more time for governmental discussions.
- One country accepts partially.
- Nineteen countries accepted this proposal.

In addition, four countries (U.K., Switzerland, Italy, France) were ready to finance a part of ERFPP actions if ten countries joined this international will for collaborating.

In 2000, during the 6<sup>th</sup> Workshop for the European NCs, the ERFPP was created. After three years discussions, it appeared that a

light organisational structure and a simple and country driven functional structure could ensure the sustainability of a ERFPP.

## Terms of Reference for the ERFPP

ERFPP is to be established in the framework of FAO's Global Strategy on Animal Genetic Resources to serve the following needs:

- To assist and enhance the AnGR activities of National Focal Points (NFPs) at the European level and to assist in co-ordinating those activities within and between other European organisations such as the EU and the CEE.
- To develop and maintain regular contact and exchange of relevant information on AnGR horizontally among European NFPs and vertically with the Global Focal Point in Rome within FAO's agreed global structure.
- To stimulate the funding and organisation of regional projects, workshops and national programmes on AnGR within the European Region.
- To stimulate and co-ordinate the maintenance and further development of national databases within the European Region and encourage European information networking on AnGR.

Its structure is based on:

- 1) Annual Meeting of National Focal Points
  - to bring together all NCs of FAO's European Region annually and normally chaired by the host country;
  - to exchange information on relevant national and sub-regional activities;
  - to decide on the ERFPP budget, the general rules of the annual meeting, ERFPP Steering Committee and Secretariat and the future activities of the ERFPP;
  - to elect the Secretariat NFP and the Steering Committee;
  - to be advised by technical (e.g. EAAP) political (e.g. EU Commission) and organisational (e.g. FAO Global Focal Point) experts as appropriate.

## 2) Steering Committee

- to consist of members elected from among the NCs (initially 5 members including representatives of each of the European sub-regions). The preliminary Steering Committee will consist of the NCs of France Greece, the Netherlands, Poland and the UK (Chair) for one year from August 2000;
- to plan or execute activities of the ERFP as decided upon by the Annual Meeting of NFPs;
- to represent the ERFP in contact with other institutions under the mandate of the Annual Meeting;
- to ensure that decisions with financial implications are not taken against the majority of countries that regularly fund the ERFP.

## 3) Secretariat

- to be elected from among the NFPs to serve for a limited period. France has agreed to serve for the first 4 years;
- to be headed by an executive officer of the elected NFP (usually the NC);
- to organise the Annual Meeting of the NFPs;
- to give secretarial support to the Steering Committee of the ERFP;
- to execute decisions or support projects decided on by the Annual Meeting or Steering Committee;
- to distribute relevant information on AnGR to and from NFPs and pass on information from within the FAO global network using newsletters/email/internet homepage etc.

The ERFP is funded through financial contributions made by donor countries placed in a Trust Fund administered by the Steering Committee through the Secretariat but held by and fully audited by the European Association of Animal Production (EAAP). These funds cover basic additional costs of the Secretariat (time, communications, travel) when engaged on ERFP business, the Steering Committee and any costs for specific activities approved by the Annual Meeting.

Donors for specific programmes or projects co-ordinated by the ERFP may also make voluntary additional financial contributions.

The hosting country of the ERFP Secretariat will be expected to cover the overhead costs of office accommodation, administrative and clerical staff and communications equipment.

For the ERFP to be created, at least 10 donor European Countries must contribute to the Trust Fund a maximum of Euro 10 000 per annum each for the first 4 years to meet the budgeted costs.

## Conclusion

The ERFP is now operational. To date, 10 countries decided to support the ERFP (Czech Republic, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Switzerland, United Kingdom). Now, many countries are convinced that the ERFP is important for the reliable management of AnGR in Europe. Important problems start to come up. With the ERFP, the countries can be better armed for them.

## Establishing a National Focal Point for farm animal genetic resources in South Africa

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### Summary

The recent call from FAO to take part in the process of preparing the First Report on the State of the World Animal Genetic Resources (SoW) stressed the need to develop management capacity at country level to facilitate the preparation of country reports (CRs). A key role is played by the National Focal Points (NFPs) and the National Coordinators (NCs).

A national workshop was held in South Africa in 1998 and a National Committee for Farm Animal Genetic Resources (FanGR) was established. The existing Indigenous Livestock Committee was reviewed and adapted to make it more focused on the management of FAnGR. At the same time a National Coordinator was also identified and the Animal Improvement Institute was nominated as national coordinating institute for FAnGR.

The collaboration with some NGOs was strongly suggested, particularly with:

- a) the Farm Animal Conservation Trust (FACT), to assist with the conservation of farm animal genetic resources. This NGO was modelled on the Rare Breeds Survival Trust (RBST) in the United Kingdom and on Rare Breeds International (RBI)
- b) The South African Stud Book and Livestock Improvement Association (SASB) and
- c) many Rural Communities and National and Provincial animal genetic resource centres

The institutional frame for AnGR conservation in South Africa is briefly described, together with the aims of the South African conservation activities.

### Résumé

Le récent appel lancé par la FAO pour prendre part au proces de préparation du Premier Rapport sur la Situation mondiale des ressources génétiques animales (SoW) a souligné la nécessité de développer les capacités de gestion au niveau national pour faciliter la préparation du rapport national (RN). Les Points focaux nationaux et les Coordinateurs nationaux jouent un rôle important dans proces.

Un atelier national a été tenu en Afrique du Sud en 1998 suit auquel un Comité national pour les ressources génétiques animales (FanGR) a été établi. Le Comité pour les races indigènes a été revu et adapté afin de l'orienter vers la gestion des FanGR. Au même moment, un Coordinateur national a été nommé et le Animal Imporvement Institute est devenu l'institut de coordination pour les FanGR.

On suggère vivement la collaboration avec certaines ONG, en particulier:

- a) le Fonds pour la conservation des animaux d'élevages (FACT), pour aider à la conservation des ressources génétiques

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<sup>a</sup> Paper presented at the joint RBI/EAAP International Symposium on "Conservation, management and use of rare livestock genetic resources", held in Budapest on 23<sup>rd</sup> August 2001

animales. Cette ONG s'est inspirée au Rare Breeds Survival Trust (RBST) au Royaume Uni et au Rare Breeds International (RBI).

- b) Le South Africa Studbook et le Livestock Improvement Association (SASB).
- c) Plusieurs centres de ressources génétiques animales au niveau des Communautés rurales, nationales et de province.

Le cadre institutionnel pour la conservation des Ressources génétiques animales (AnGR) en Afrique du Sud est présenté brièvement dans cet article ainsi que les objectifs principaux des activités de conservation en Afrique du Sud.

**Keywords:** *National Advisory Committee, Stakeholders, NGO, Rural communities.*

## Introduction

Recent global concerns on the loss of diversity of farm animal genetic resources have led to renewed initiatives to identify, characterize and conserve animals that were once considered inferior to more conventional international breeds.

The future of these breeds is often dependent on their economic value, either as pure breeds or as a source of genetic material with traits such as disease and parasite tolerance and general hardiness.

Characterizing breeds, investigating value added traits and developing products and markets all contribute towards the value adding and information process.

To be effective, information must flow to all levels and genetic material must be available to all levels as well.

Where a breed has no immediate economic value, it needs to be conserved for possible later use and where a breed is endangered, all efforts should be made to preserve it and increase numbers.

These actions are often key elements of breed conservation initiatives, the success of which is largely dependent on effective coordination and public sector support. Past

failures have often been due to fragmentation and a lack of focus, hence the need to have a focal point at National and regional level.

The recent invitation from FAO to all countries to participate in the process of preparing the first report on the State of the Worlds Animal Genetic Resources (SoW) highlighted the need to develop management capacity at country level to facilitate the drafting of Country Reports. Those countries with established structures for the management of Farm Animal Genetic Resources (FAnGR) have been in the fortunate position of having the basic framework needed for this process and central to this has been the existence of National Focal Points (NFP's)

Initial FAO communications on the management of FAnGR often included the following statements:

*“Successful global management must be country-led and sound programmes of management must involve all stakeholders”*

*“To take full advantage of FAO's Global Strategy, countries must appoint an institution as a National Focal Point and identify a technical coordinator”*

While a number of effective National Focal Points (NFP's) have been established, the general principles and procedures could be useful for the many countries in the process of developing local capacity to manage FAnGR and could also be useful in setting up the structures needed to draft country reports as part of the SOW process.

The Global strategy for the Management of FAnGR listed the following key objectives:

- Establish a national focal point (NFP) and a National Coordinator (NC).
- Train and support these coordinators.
- Establish regional focal points to work closely with national focal points.
- Develop basic guidelines, protocols and tool kits to assist countries to establish their own cost-effective management strategies.
- Conduct sub-regional missions to facilitate collaborative action.

- Conduct donors meetings to facilitate funding.
- Preparation of intergovernmental mechanisms for AnGR.
- Develop the Domestic Animal Diversity Information System (DAD-IS).
- Promote the *in situ* use of adapted genetic resources and *in situ* and *ex situ* conservation of unique resources currently not in demand.
- Coordinate and Facilitate the general and genetic characterization of AnGR.
- Develop a supportive communications network.
- Use technical expertise around the world to maximize cost-effectiveness.
- Report on progress with the implementation of the strategy.
- Assist with policy development for wise use and benefit sharing.

Many of these objectives can be used as guidelines for general terms of reference for National Focal Points (NFP's). They also serve to illustrate the range of activities.

## Developing Management Capacity at Country Level

The initial process of establishing a NFP is fairly straightforward. It includes the following:

- Identifying and enabling a National Coordinator.
- Establishing a National Advisory Committee (NAC) for FAnGR with the necessary technical and practical skills and experience to advise and lead where necessary.

Supportive legislation is of critical importance. This may often determine the degree of acceptance of the NAC at local, provincial and National level.

## Who should serve on a National Advisory Committee?

- Government – AnGR and Animal health.
- Universities with relevant faculties.
- Industry (beef, dairy, mutton, wool, poultry, ostrich etc.).
- National Animal Recording schemes.
- Breed Conservation NGO's.
- Relevant research institutes.
- The traditional livestock sector (Indigenous peoples knowledge).
- The AI and embryo industry.
- The pedigree livestock industry.
- Independent breed conservation and animal breeding specialists.

## Location of a NFP

As policy is involved, it may be advisable to locate the NFP in the relevant Government Department or Government Institute, usually the National Department of Agriculture or research institute. This facilitates two-way communication between the NAC and policy makers.

It is equally important to obtain formal recognition for the NAC to ensure that advice will be accepted and acted upon. This is of particular importance where emergency conservation actions are called for. This would include the conservation of non-infected herds and flocks during outbreaks of diseases such as Foot and Mouth Disease (FMD).

## Reviewing existing structures and supportive legislation: The South African situation

When the initial FAnGR 'challenge' was issued, South Africa had existing structures and support services that included the following:

- Livestock Improvement legislation.
- National animal recording and improvement schemes.

- An indigenous livestock committee that included representatives from the Communal sector, Provinces, Universities and the research sector.
- An advisory board for animal production, established in terms of National legislation.
- An established pedigree livestock industry with a National herd book, SA Stud Book.
- An established conservation NGO.
- An Agricultural research council with a commitment to the conservation of FAnGR.
- Support from the National Department of Agriculture, the National Cultural History Museum and the ARC Animal Improvement Institute.
- Legislation had recently been reviewed to include aspects of FAnGR

Many countries may have similar structures, supportive services and legislation. By reviewing the situation, it may be possible to adapt existing infrastructure

with relatively minimal costs. These structures may also be more acceptable to local stockowners.

### National workshop

A National workshop was held as early as 1998 and a committee for FAnGR was established.

It was therefore not necessary to 'reinvent the wheel' when establishing the basic infrastructure for a National focal point.

The existing indigenous livestock committee was reviewed and adapted to make it more focused on the management of FAnGR.

A National coordinator was also identified and it was decided to split the functions by using the Animal Improvement Institute as the National coordinating institute for FAnGR. Figure 1 illustrates this basic framework

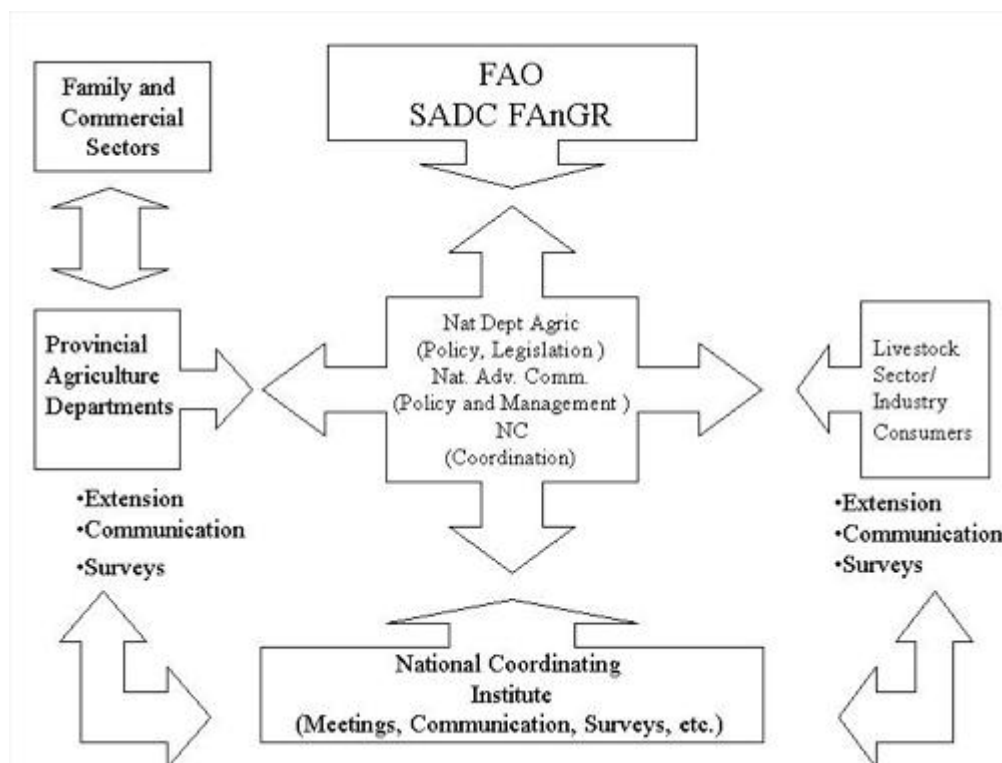


Figure 1. The basic framework of the national focal point in South Africa.

## **The importance of effective communication as a first step**

The development of an effective communication network – both locally, regionally and internationally is a critical success factor that must run parallel with the other initiatives. It is essential to have established communication links with all the major stakeholder groups. This should include electronic communication between NAC members. A link to DAD-is should be established in the NC office and links to International bodies such as RBI, SAVE, ALBC etc. are highly recommended.

## **Some Key Stakeholders**

### **Breed Conservation NGO's**

South Africa has used a NGO, the Farm Animal Conservation Trust (FACT) - to assist with the conservation of farm animal genetic resources for the past six years. This NGO was modeled on the Rare Breeds Survival Trust (RBST) in the United Kingdom and on Rare Breeds International (RBI).

RBST and RBI structures and objectives were adapted for local use, without compromising the basic principle of conservation through sustainable use.

Guidelines for establishing breed conservation NGO's are available from RBI.

FACT is an active partner in a National initiative to create awareness and markets and to add value to endangered and indigenous breeds. This partnership includes the National Department of Agriculture, the Agricultural Research Council, the National Cultural History Museum and Universities.

FACT activities include the preparation and distribution of farmer friendly information on lesser known and endangered farm animals and facilitating conservation through the sustainable use of these breeds in commercial farming systems.

## **National registration/herd book organizations**

The South African Stud Book and Livestock Improvement Association (SASB) is an Association of 60 livestock- and animal breeders' societies and their members. In terms of its constitution the aims of the organization are, amongst other things, to:

- Encourage and promote the breeding, conservation and genetic improvement of the production potential of animals under its jurisdiction.
- Keep records of the pedigrees, production and performance of animals and issue certificates of registration and recording for such animals.
- Safeguard and advance the collective interests of stud breeders and their breeders' societies and act as a mouthpiece for the stud breeding industry.
- Represent the collective interest of animal breeders and their societies on various national and international bodies and forums.
- Render technical and advisory services to breeders' societies, their members and participants in the Integrated Registration and Genetic Information System (INTERGIS).
- Promote the export of animals with pedigrees registered or recorded with the Association, and of semen, ova or embryos from animals thus registered or recorded

## **Rural communities: Indigenous peoples knowledge**

Many rural communities still have large areas under communal land tenure.

In the past, reasons for keeping animals, along with the intricacies of communal land tenure and traditional herd structures were often seen as barriers hampering progress. Many efforts were made to 'improve' animals that were, in fact better suited to the total production environment than exotic alternatives, often introduced at the expense of local breeds. Failure to understand and

appreciate the complexity of livestock ownership and to incorporate traditional knowledge and experience in animal production systems in rural areas almost led to the disappearance of a number of economically important breeds and those involved in the promotion of sustainable farm systems in developing areas are now faced with the challenge of reversing years of negative extension.

Despite this, however, it is this sector that often has the biggest potential to conserve through sustainable use.

### **National and provincial animal genetic resource centers**

An awareness of the value of indigenous cattle, sheep and goats led to the establishment of a number of National facilities to multiply and improve specific breeds and ecotypes. At the facilities serving the commercial sector, more attention was given to the improvement of breeds such as the Boer goat, Afrikaner sheep and Afrikaner cattle and the development of product-orientated composites.

The facilities serving the developing sector concentrated on Nguni cattle ecotypes, Pedi sheep and local unimproved goats. Some of these facilities face closure due to financial constraints and it is here that the NAC could play a major role in convincing the authorities to maintain these centers as a matter of National importance

### **National agricultural research institutes**

Some research institutes may have mandates to investigate and develop the genetic potential of breeds and to conserve less useful breeds. As such, they are key stakeholders with the potential to serve as Focal points or Coordinating institutes. Close ties should be established and maintained.

### **National museums**

Some Institutions have a mandate to establish and maintain living museums. In South Africa's case, the National Cultural History Museum had the necessary infrastructure at an Agricultural Museum close to Pretoria. The Museum played a major role in the establishment of the local breed conservation NGO, FACT and remains a major supporter.

Facilities at the Museum were also used for a number of meetings and workshops, including the initial workshop to establish a NAC for FAnGR.

### **Making the best of existing institutional support for the management of FAnGR**

Institutional support for the conservation and sustainable use of FAnGR in South Africa includes the following:

- Legislation to facilitate and support the identification and improvement of animals (The Livestock Brands Act, 1987 (Act 62 of 1987); The Livestock Improvement Act, 1977 (Act 25 of 1977) The Animal Improvement Act, 1998 (Act 62 of 1998).
- The establishment of breeding and improvement schemes.
- Supportive research at research and development centres in the main production areas.
- The establishment of animal recording and evaluation schemes.
- Information / Extension on all aspects of animal husbandry.
- Regulations to monitor/control the importation and exportation of genetic material.
- Support to establish and maintain a central integrated registration and genetic information system.

By focussing and co-ordinating activities, the following actions were initiated. This serves to illustrate the way in which a NFP

could assist with the facilitation of breed conservation initiatives and policy formulation.

- Early breed surveys
- Establishing breeding units for indigenous breeds
- Support for the establishment of a conservation NGO, linked to international conservation bodies
- Liaison with the FAO and links to the FAO initiative on Domestic animal Diversity
- Revised legislation to control the exportation genetic material from indigenous and locally developed breeds.
- The implementation of biological impact studies to evaluate any proposed introductions of new breeds.
- New legislation to align South Africa with regional and international breed conservation and improvement initiatives.

## Concluding Remarks

While this paper may appear to be fragmented, as far as some of the discussions are concerned, the purpose was to illustrate the range of activities in the management of FAnGR and the subsequent need for a focussed and co-ordinated approach.

Establishing a NFP is fairly straightforward and many countries already have the basic ingredients in the form of legislation, national facilities and a wide range of stakeholders.

While each individual situation will differ, the following basic procedures can be used to establish an effective NFP:

1. Review all existing structures for the management of FAnGR – and identify (where possible) the most suitable to be the NFP. Take issues such as policy and legislation into account.
2. Identify existing and potential role players and stakeholders and hold a National workshop to establish both a NAC and a system of communication

3. Identify a suitable NC – and ratify this appointment
4. Establish a NFP – with the full support of National and local government
5. Develop and establish a communication network
6. Consider establishing a breed conservation NGO where no such structure exists
7. Review existing and relevant legislation (A task that could be given to the NAC)

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## Ongole cattle status in India

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### Summary

The Ongole cattle breed, also known as *Nellore*, is the native of the coastal districts Guntur, Prakasham and Nellore of Andhra Pradesh. This is a dual-purpose breed. Bullocks are very powerful and suitable for ploughing and cart pulling. These animals are resistant to various insect-borne diseases. The coat colour of Ongoles is glossy white but some males have grey markings on their hump and grey markings on the back quarters have also been noticed. The animals of this breed are heavy having long / large ears, dewlap, hump, limbs and barrel. The size of a tail, neck and horns is in general short. Ears are alert with a moderately short black tip. Horns are short and stumpy. The dewlap is large, fan shaped, fleshy and slightly pendulous. The udder is well formed with well-placed and developed teats. A survey was conducted in 60 villages in the breeding tract and 7 341 cattle true to the breed (Ongole) type were found. A genetic improvement / conservation programme for Ongoles is being executed by the Indian Council of Agricultural Research in collaboration with Acharya N G Ranga Agricultural University, Hyderabad (Andhra Pradesh). The progress of the programme was presented.

### Resumen

La raza vacuna Ongole, también conocida como *Nellore*, es nativa de la zona de la costa de los distritos de Guntur, Prakasham y Nellore en la región de Andhra Pradesh. Se trata de una raza a doble propósito. Los

machos castrados son poderosos y apropiados para el arado y la tracción. Estos animales son resistentes a varias enfermedades transmitidas por insectos. El manto de la raza Ongole es mayormente blanco pero en algunos machos se observan manchas grises en la parte superior y en ocasiones se han observado también dichas manchas en el cuarto trasero. Son animales de peso elevado con largas y anchas orejas, papada, joroba, y extremidades. El rabo, el cuello y los cuernos son en general cortos. Las orejas se presentan erectas con las puntas ligeramente negras. La papada se presenta amplia, flaccida y ligeramente colgante. Las ubres están bien formadas y colocadas. Una encuesta fue llevada a cabo en 60 poblados en la zona originaria y se encontraron 7 341 animales puros pertenecientes a la raza Ongole. El Indian Council of Agricultural Research está realizando un programa de mejora / conservación de la raza en colaboración con Acharya N.G. Ranga Agricultural University en Hyderabad (región de Andhra Pradesh). En este artículo se presentan los progresos alcanzados hasta la fecha por el programa.

**Keywords:** *Physical and genetic characteristics, Conformation traits, Statistics, Production and reproduction performance.*

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Figure 1. Digital map of Ongole cattle breeding tract.

## Introduction

The Ongole cattle breed, also known as *Nellore*, is the native of the coastal districts Guntur, Prakasam and Nellore of Andhra Pradesh (Figure 1). The districts of Kurnool, Cuddapah and part of Mahabubnagar form the rearing tracts where bull calves after weaning are taken and reared till maturity and trained for farm work. The breed has been developed in the deltas of the rivers Penna, Krishna and Godavari, on the east coast of the Peninsular under the selection and patronage of farmers in these areas.

The best draught animals of this breed were developed between the south of the river Krishna and north of river Penna (Arora and Garg, 1997). The best milk-producing animals were developed in the deltas of the river Godavari. The animals of this breed have also been transported to many tropical countries of America, West Indies, South East Asia and Australia and have earned international recognition for its better survival and performance on tropical pastures.

## Physical Characteristics

The coat colour of Ongoles is glossy white (Figure 2 and 3) but some males with grey markings on the hump and back quarters have also been noticed. Calves are generally white but sometimes are born with reddish brown patches (Figure 4). The Muzzle is black with wide nostrils. The animals of this breed are heavy having long / large ears, dewlap, hump, limbs and barrel. The size of tail, neck and horns is in general short. Ears are alert with a moderately short black tip. Horns are short and stumpy. The dewlap is large, fan shaped, fleshy and

slightly pendulous. The udder is well formed with well-placed and developed teats. These animals are famous for adaptability to heat stress due to development of large dewlap forming folds and skin with sweat spores covered by short shining and smooth hairs. This is a dual-purpose breed. Bullocks are very powerful and suitable for the ploughing and cart pulling. These animals are also resistant to various insect-born diseases.

## Population Statistics

India possesses about 200 million cattle out of which 12 million are crossbreds (Dairy India, 1997). Cattle population of Andhra Pradesh is about 12.5 million including 0.4 million crossbreds. A breed-wise census has not been conducted in India to date. However, the Livestock Research Station, Lam, Guntur (Andhra Pradesh) has recently conducted a survey under the Network Project of the National Bureau of Animal Genetic Resources, Karnal (Indian Council of Agricultural Research). A survey was conducted in 60 villages in the breeding tract and 7 341 cattle true to the breed (Ongole) type were found (Annual Report of National Bureau of Animal Genetic Resources, 1998-99). The average number of cattle reared

*Table 1. Statistics and performance of Ongole cows under network project.*

| S. N. | Characteristic                     | Estimate                        |
|-------|------------------------------------|---------------------------------|
| 1.    | Female population                  | 789                             |
| 2.    | Breedable females                  | 475                             |
| 3.    | Bulls (breeding $\pm$ young)       | 15 (15+0)                       |
| 4.    | Mortality                          | 3.8%                            |
| 5.    | Highest mortality                  | Due to Pneumo- Enteritis<br>21% |
| 6.    | Calving abnormality                | 7.6%                            |
| 7.    | Chief cause of calving abnormality | Retention of placenta<br>55%    |
| 8.    | Conception rate (%)                | Heifers 46<br>Cows 54           |
| 9.    | No. of insemination /conception    | 1.9                             |

by each farmer was 4.7. Table 1 summarises statistics and performance of Ongole cows under network project

## Topography and Management

The Ongole breed is found within 14°.27' to 16°.8' N latitude and 80°.02' to 80°.29' E longitude at an average height of 600 feet

above sea level. The average annual rainfall in the breeding tract varies from 40 to 100 cm in different seasons and temperature reaches 45°C in summer. Ongole cattle are mainly reared by farmers of a higher income group. The majority of the animals are reared under open type housing at night and put out to graze for the entire day. Natural mating is



*Figure 2. An Ongole cow.*



*Figure 3. An Ongole bull.*

used in the whole breeding tract of the breed except at the University / State Government farms and their surrounding areas.

## Research and Development

The Project Directorate on Cattle, Meerut, Uttar Pradesh, India (Indian Council of Agricultural Research) initiated a Genetic Improvement Programme in Ongoles in collaboration with the Livestock Research Station, Lam, Guntur, Andhra Pradesh (Acharya N G Ranga Agricultural University, Hyderabad) during 1987. The programme aims at associating the existing organized farms maintaining the Ongole breed under State / Central Government, ICAR Institutes and State Agricultural Universities into a network programme for undertaking progeny testing of bulls, their selection on the basis of progeny performance for milk and draught and production of superior germplasm for utilization in cattle development programmes.

## Statistics, Mortality and Calving Abnormality

Female herd (Figure 5) strength in the network project was 789 at the end of the year as a result of 138 normal calvings and 289 disposals (153 surplus, 20 auction, 59 reproductive disorders, 28 weak and 29 deaths). Population of breeding females at the end of the year was 475. A total of 15 breeding bulls was also available on the closing date. Overall mortality at the Ongole unit was very low (3.8 percent). Highest mortality was reported due to Pneumo-Enteritis (21 percent) among all the major diseases. The lowest mortality on the farm revealed that the animals of this breed are very resistant to various diseases. A few cases of calving abnormality were also observed at different centres (7.6 percent). The main cause of calving abnormality was retention of placenta (55 percent).

Table 2. Conformation characters in Ongoles under network project.

| Character                     | Sex    | Estimate  |
|-------------------------------|--------|-----------|
| Body weight at birth (kg)     | Male   | 27.1±0.2  |
|                               | Female | 25.3±0.3  |
|                               | Both   | 26.2±0.7  |
| Body weight at 24 months (kg) | Male   | 302.0±9.8 |
|                               | Female | 223.9±3.6 |
|                               | Both   | 237.2±6.4 |
| Body height at birth (cm)     | Male   | 72.8±0.6  |
|                               | Female | 71.6±0.6  |
|                               | Both   | 72.2±0.9  |
| Body height at 24 months (cm) | Male   | 135.2±1.4 |
|                               | Female | 126.8±0.9 |
|                               | Both   | 128.3±0.5 |
| Heart girth at birth (cm)     | Male   | 68.6±0.4  |
|                               | Female | 67.0±0.7  |
|                               | Both   | 67.8±0.7  |
| Heart girth at 24 months (cm) | Male   | 155.1±1.9 |
|                               | Female | 141.1±1.2 |
|                               | Both   | 143.7±0.7 |
| Body length at birth (cm)     | Male   | 60.7±0.7  |
|                               | Female | 60.6±0.3  |
|                               | Both   | 60.67±0.9 |
| Body length at 24 months (cm) | Male   | 130.2±2.1 |
|                               | Female | 122.0±1.1 |
|                               | Both   | 123.5±1.2 |

## Fertility Status

The overall conception rate in heifers and cows was low (46 and 54 percent). The average number of inseminations / conception was 1.86. Twenty-four bulls were inducted under the test mating in three sets of eight each. Nine hundred and thirty nine daughters have so far been produced from the three sets. Daughters of the first set will complete their first lactation which will be the source for evaluation of genetic worth of the bulls. More than 66 000 doses of semen of test bulls were available on the closing date.

## Conformation Traits

Weight at birth and at 24 months averaged 26 and 237 kg, respectively. Males were heavier than females (Table 2). Birth weight in the present study was similar to that reported by Krishna *et al.* (1970). However, body weight at two years of age was lower than that reported in literature (Joshi and Phillips, 1953). This reveals that adult body weight has been declining in the last decades and needs special attention. Average body height at birth and at 24 months was 72 and 128 cm, respectively. Males had higher body height as compared to females. Heart girth averaged 68 cm at birth and 144 cm at 24 months of age. It was also higher in males than females. Average body length at birth and 24 months was 61 and 124 cm, respectively.

Table 3. Production and reproduction characters in Ongoles under network project.

| S.N. | Character                               | Estimate |
|------|-----------------------------------------|----------|
| 1.   | Cows (%) in milk                        | 41.6     |
| 2.   | Wet average (kg)                        | 2.8±0.0  |
| 3.   | Herd average (kg)                       | 1.2±0.0  |
| 4.   | Age at 1 <sup>st</sup> calving (months) | 52.7±5.9 |
| 5.   | First lactation yield (kg)              | 584±30.4 |
| 6.   | 300 days lactation yield (kg)           | 675±35.2 |
| 7.   | Lactation length (days)                 | 231±15.9 |
| 8.   | Dry period (days)                       | 289±22.2 |
| 9.   | Service period (days)                   | 203±12.2 |
| 10.  | Calving interval (days)                 | 502±18.2 |
| 11.  | Peak yield (kg / day)                   | 3.8±0.1  |
| 12.  | Fat %                                   | 4.4±0.4  |
| 13.  | Total solids %                          | 12.9±0.6 |
| 14.  | Solids-not-fat %                        | 8.5±0.5  |



Figure 4. A group of Ongole calves.

## Production and Reproduction Performance

Forty-two percent of cows was in milk throughout the year and yielded 2.8 kg wet and 1.2 kg herd average. Table 3 show that the proportion of milk and dry cows is lower

than the optimum (70:30). This needs to be improved. Furthermore, the effective selection programme has not been implemented on the farms to increase the milk yield. Average age at first calving was 53 months. Age at first calving was reported between 39 and 42 months in the previous literature (Rao, 1966; Acharya and Bhat, 1984; Bhat and



Figure 5. Ongole cows in a herd.

Taneja, 1989). This further revealed the poor growth of the heifers and as a result increases in age at first calving. This suggests that management practices need to be improved in order to reduce age at first calving.

First lactation milk yield averaged 584 kg. Per lactation yield in 300 days was 675 kg. Average lactation length and peak yield were 231 days and 3.8 kg, respectively. Average lactation yield and length were similar to those reported by Bhat (1977) and Katpatal (1979). Dry period, service period and calving interval averaged 289, 203 and 502 days, respectively. Rao (1966) also reported the service period in Ongole cows as 210 days, which is almost similar to the present study. Average fat, total solids and solids-not-fat percentage was 4.4, 12.9 and 8.5, respectively. These values corroborated with the findings of Katpatal (1979).

## Genetic Parameters

Heritability of lactation length, 305 days milk yield and service period were high and ranged between  $0.43 \pm 0.24$  to  $0.51 \pm 0.25$

revealing relatively high genetic variation in the traits. Peak yield ( $0.48 \pm 0.23$ ), days taken to peak ( $0.43 \pm 0.23$ ) and age at first calving ( $0.58 \pm 0.25$ ) also had high heritability estimates. These results suggest that selection with optimum intensity might bring reasonable genetic improvement in the performance traits.

Age at first calving had high negative genetic correlation with 305 days milk yield ( $-0.73 \pm 0.02$ ), medium negative with peak yield ( $-0.48 \pm 0.17$ ) and medium positive with lactation length ( $0.41 \pm 0.15$ ). Genetic correlation of the service period was negatively high with 305 days milk yield ( $-0.63 \pm 0.07$ ) and medium positive with a dry period ( $0.42 \pm 0.23$ ) and lactation length ( $0.43 \pm 0.21$ ). High negative genetic correlation between age at first calving and 305 days milk yield suggest that efforts should be made to reduce age at first calving to optimum level.

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# Deoni cattle breed of India. A study on population dynamics and morphometric characteristics

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## Summary

Deoni is an important dual-purpose breed of cattle in Maharashtra. These animals are mainly found in the Latur district and the adjoining area of Prabhani, Nanded and Osmanabad districts of the Marathwada region of Maharashtra. From 1996 to 1999, a systematic survey was conducted in 13 strata involving 69 villages to determine geographic distribution, establish breed characteristics, determine socioeconomic status and existing management practices as well as to estimate the approximate population of Deoni cattle in its breeding tract. The total number of households enumerated was 9 132. The average herd size was 2.5 animals with a range of 1 to 16. About 30 percent of farmers were found rearing Deoni cattle. The total population of the Deoni in the entire breeding tract was estimated at 118 945. A decrease in Deoni cattle population (8.78 percent) was also noticed from August 1996 to August 1998.

Deoni is a medium heavy animal. It is found in three-colour variations viz. Wannera, Balankya and Shevera. The body is moderately developed and symmetrical with distinct muscles. Horn length, ear length, head length, chest girth, body length and height averaged 17.61, 26.18, 49.82, 151.82, 120.11 and 122.22 cm in adult cows and 19.97, 26.67, 53.68, 163.55, 129.59 and 134.36 cm in bullocks. Lactation milk yield averaged 868 litres. The average fat content in the milk of Deoni cows was 4.3 percent. Cows showed

their first estrus at the average age of 36 months. Average age at first calving was 46 months. Service period and inter-calving period averaged 170 and 447 days. The selected bulls started breeding at the age of 30 months. Calf and adult mortality was found to be negligible and the breed was found to be hardy and well adapted to tropical draught prone areas. The declining trend of the Deoni cattle breed calls for immediate steps to control the reasons. Regarding conservation and improvement, both models need to be implemented effectively to make the programme successful.

## Resumen

La Deoni es una raza vacuna de doble propósito originaria de Maharashtra. Estos animales se encuentran principalmente en el distrito de Latur y las zonas vecinas de Praghani, Nanded y Osmanabad, en el distrito Marathwada de en la región de Maharashtra. Entre 1996 y 1999 se llevó a cabo una encuesta sistemática en 13 zonas que comprendían 69 poblados con el fin de determinar la distribución geográfica, establecer las características de la raza, determinar el estatus socioeconómico y las prácticas de conducta existentes, así como hacer una estimación de la población aproximada existente de la raza Deoni en su habitat. El total de familias propietarias fue de 9 132, y la media de animales por familia de 2,5, con un espectro de 1 a 16. Alrededor del



Figure 1. A Deoni cow.

30% de los agricultores resultó ser criados de la raza Deoni. La población total de Deoni en la zona originaria fue establecida en 118 945, y se observó una disminución de la raza del 8,78% entre agosto 1996 y agosto 1998.

Se trata de una raza de peso medio que se subdivide según una variación de tres colores: Wannera, Balankya y Shevera. El cuerpo se presenta bastante desarrollado y simétrico con músculos visibles. La longitud de los cuernos, orejas, cabeza, circunferencia torácica, longitud del cuerpo y altura media son respectivamente de 17,61; 26,18; 49,82; 151,82; 120,11; y 122,22 cm en los animales adultos y de 19,97; 26,67; 53,68; 163,55; 129,59; y 134,36 cm en los novillos. El rendimiento medio por lactación es de 868 litros. El contenido medio en grasa en la leche de la raza Deoni es de 4,3%. Las hembras presentan el primer estro hacia la edad de 36 meses, y la media de edad al primer parto es de 46 meses. El periodo de monta y el intervalo entre partos es de 170 y 447 días. Los machos seleccionados se utilizan en reproducción a partir de los 30 meses. Se consideró que la mortalidad de crías y adultos no representaban un dato importante ya que la

raza se presenta fuerte y bien adaptada a las zonas secas tropicales. El declive de la raza Deoni ha provocado una serie de medidas inmediatas para averiguar los motivos. En cuanto a la conservación y la mejora ambos modelos necesitan ser mejorados para conseguir un programa de éxito.

**Keywords:** *Distribution, Characteristics, Population dynamics, Management practices.*

## Introduction

Deoni is an important dual-purpose cattle breed of Maharashtra. These animals are mainly found in the Latur district and the adjoining area of Parbhani, Nanded and Osmanabad districts of the Marathwada region of Maharashtra. The name of the breed is derived from Deoni Taluk of the Latur district. The breed is also known as Surti, Dongarpati and Dongri. It is found in three colour variations viz. Wannera (clear white with black colour at the sides of the face), Balankya (clear white with black spots on the lower side of the body) and Shevera (white

body with irregular black spots). Deoni cattle are hardy and well adapted to their breeding tract constituting an important cattle genetic resource of Maharashtra.

Present status of a livestock breed in terms of population size and the breed characteristics is essential to formulate the conservation and improvement strategies for the breed. A systematic survey was, therefore, undertaken to determine geographic distribution, establish breed characteristics, determine socioeconomic status and existing management practices and to estimate the approximate population of Deoni cattle in its breeding tract during the period 1996 to 1999.

## Materials and methods

The Deoni breeding tract with a total area of about 11 240 km<sup>2</sup> is located approximately between 17° 35' and 20° 05' N and between 75° 16' and 78° 15' E. The elevation of the breeding tract ranges from 409 to 455 m above mean sea level. The climate of the Deoni breeding tract is generally hot throughout the

year except for some winter months. The average temperature varies from 9 to 44°C and the average relative humidity from 40 to 54 percent. The tract receives maximum rains during June to September. The mean annual rainfall varies from 750 to 990 mm.

A total of 10 strata from the Latur district and one stratum each from the Parbhani, Nanded and Osmanabad districts of Maharashtra State (India) were selected for the survey of Deoni cattle. From each stratum five to six villages were further randomly selected. Thus, the total survey was conducted in 13 strata involving 69 villages. Information on geographical distribution of breed, socioeconomic status of the farmers, category wise enumeration of the population (calves, young stock, milking females, dry females, working males and bulls), feeding and management practices followed and disease aspects were collected.

Morphological, conformational as well as production and reproduction characteristics of Deoni cattle were recorded for phenotypic characterization of Deoni breed.



Figure 2. A Deoni bull.

Table 1. Body measurements  $\pm$  SE of different category of Deoni cattle.

| S. N. | Category                 | Records | Horn length<br>(cm) | Ear length<br>(cm) | Head length<br>(cm) | Chest girth<br>(cm) | Body length<br>(cm) | Height at<br>withers (cm) |
|-------|--------------------------|---------|---------------------|--------------------|---------------------|---------------------|---------------------|---------------------------|
| 1.    | Calves<br>(0-3 months)   | 188     | --                  | 17.34 $\pm$ 0.52   | 27.22 $\pm$ 0.83    | 78.82 $\pm$ 2.19    | 68.18 $\pm$ 1.43    | 76.42 $\pm$ 1.32          |
| 2.    | Calves<br>(4-6 months)   | 246     | --                  | 19.57 $\pm$ 0.60   | 31.88 $\pm$ 1.20    | 94.56 $\pm$ 3.85    | 78.45 $\pm$ 1.86    | 86.45 $\pm$ 1.87          |
| 3.    | Calves<br>(7-9 months)   | 288     | --                  | 21.54 $\pm$ 0.48   | 36.39 $\pm$ 1.03    | 107.01 $\pm$ 3.26   | 87.93 $\pm$ 1.98    | 93.78 $\pm$ 2.20          |
| 4.    | Calves<br>(10-12 months) | 317     | 0.95 $\pm$ 0.38     | 23.06 $\pm$ 0.46   | 38.86 $\pm$ 1.03    | 114.53 $\pm$ 3.31   | 93.30 $\pm$ 2.34    | 98.51 $\pm$ 3.46          |
| 5.    | Calves<br>(13-18 months) | 373     | 2.39 $\pm$ 0.35     | 24.58 $\pm$ 0.34   | 41.94 $\pm$ 1.09    | 124.97 $\pm$ 2.73   | 101.56 $\pm$ 1.50   | 107.94 $\pm$ 2.32         |
| 6.    | Calves<br>(19-24 months) | 354     | 3.76 $\pm$ 0.46     | 25.39 $\pm$ 0.43   | 44.73 $\pm$ 1.06    | 129.73 $\pm$ 5.31   | 103.52 $\pm$ 2.59   | 112.50 $\pm$ 2.23         |
| 7.    | Calves<br>(> 24 months)  | 368     | 6.16 $\pm$ 0.74     | 27.52 $\pm$ 0.35   | 48.01 $\pm$ 0.93    | 144.83 $\pm$ 2.81   | 116.43 $\pm$ 2.06   | 122.06 $\pm$ 2.39         |
| 8.    | Bulls                    | 52      | 7.19 $\pm$ 1.29     | 25.48 $\pm$ 1.30   | 54.87 $\pm$ 7.10    | 173.61 $\pm$ 6.08   | 135.13 $\pm$ 7.60   | 139.55 $\pm$ 6.25         |
| 9.    | Bullocks                 | 731     | 19.97 $\pm$ 0.92    | 26.67 $\pm$ 0.34   | 53.68 $\pm$ 0.83    | 163.55 $\pm$ 1.55   | 129.59 $\pm$ 2.28   | 134.36 $\pm$ 2.03         |
| 10.   | Cows                     | 1007    | 17.61 $\pm$ 0.74    | 26.18 $\pm$ 0.52   | 49.82 $\pm$ 0.91    | 151.82 $\pm$ 1.92   | 120.11 $\pm$ 2.16   | 122.22 $\pm$ 1.23         |



*Figure 3. A Deoni cow with a calf.*

Seventy animals from each village and 350 from each stratum were taken for the study. Physical measurements of the calves were recorded every month up to one year. Young stock was physically measured once in six months. Measurements on adult animals were taken only once in the three years of study. The feeding and management of all marked animals was recorded once in three months. Milk recording were done once a month from the month of lactation by milking twice. Reproduction and disease aspects of these animals were also noted by observations and on the basis of information provided by the farmers. The total population of the Deoni breed was estimated by superimposing the population obtained by a survey on the Livestock Census Data already available with the State Department of Animal Husbandry. The breed descriptor was developed. The study was completed with the help of enumerators and supervisors.

## Results and Discussion

### General observations

The total number of households enumerated was 9 132. The average family size was about seven. The literacy percentage varied from 40 to 75 in the breeding tract. The average land holding was 8.5 acres out of which about 12 percent was irrigated and the remainder rainfed. The average herd size was 2.5 animals with a range of 1 to 16. About 30 percent of farmers were found rearing Deoni cattle.

### Population statistics

Out of the 69 villages surveyed, 49 were in high-density areas whereas 20 others were in low-density areas, which were nearer to the borders of the breeding tract. The population of Deoni breed was 1.35 (Mulaj) to 58.58 percent (Deverjan) of total cattle

population in different strata. A total of 6 244 animals of this breed consisting of 541 calves (0-6 months), 783 calves (6-24 months), 328 calves (above 24 months), 1 212 females in milk, 719 females dry, 2 563 working males and 98 breeding males were found in the strata under survey. The total superimposed population of the Deoni in the entire breeding tract was estimated as 1 18 945 involving 5 014 from Parbhani, 97 002 from Latur, 14 882 from Nanded and 1 947 from the Osmanabad districts. The total superimposed population constituted approximately 39 977 (33.6 percent) breeding females, 1 784 (1.5 percent) breeding bulls and 48 827 (41.1 percent) working bullocks.

The Deoni cattle population enumerated from the villages at the initial stage (August 1996) was also compared to that enumerated after two years (August 1998). It was observed that the Deoni cattle population decreased by 8.78 percent during the period under study. This revealed that the Deoni

cattle population is decreasing continuously in the breeding tract and warrants urgent steps against its further decline.

### Physical characteristics

Deoni is a medium heavy animal. It is found in three colour variations viz. Wannera, Balankya and Shevera. The body is moderately developed and symmetrical with distinct muscles. Males are more developed than females. Body colour is clear white in Wannera and Balankya strain. Irregular black spots are found on the body in Shevera. The head is partially white in Wannera. Head is masculine, alert, broad and slightly convex. The colour of the head is black and white in Wannera and Shevera and completely white in the Balankya strain. The forehead is prominent, broad, slightly bulged and white in all the strains; ears are long and drooping with slightly curved tips; horns are medium, thick, apart and emerge from the sides of the

Table 2. Production and reproduction characteristics in Deoni cattle.

| S. No. | Characteristics                               | Records | Average $\pm$ SE   |
|--------|-----------------------------------------------|---------|--------------------|
| 1.     | Milk yield in 1 <sup>st</sup> month (litres)  | 310     | 106.77 $\pm$ 6.23  |
| 2.     | Milk yield in 2 <sup>nd</sup> month (litres)  | 383     | 107.63 $\pm$ 6.17  |
| 3.     | Milk yield in 3 <sup>rd</sup> month (litres)  | 466     | 106.25 $\pm$ 2.79  |
| 4.     | Milk yield in 4 <sup>th</sup> month (litres)  | 516     | 101.83 $\pm$ 5.76  |
| 5.     | Milk yield in 5 <sup>th</sup> month (litres)  | 531     | 97.95 $\pm$ 6.35   |
| 6.     | Milk yield in 6 <sup>th</sup> month (litres)  | 573     | 88.20 $\pm$ 6.75   |
| 7.     | Milk yield in 7 <sup>th</sup> month (litres)  | 556     | 76.70 $\pm$ 5.93   |
| 8.     | Milk yield in 8 <sup>th</sup> month (litres)  | 523     | 59.27 $\pm$ 6.51   |
| 9.     | Milk yield in 9 <sup>th</sup> month (litres)  | 426     | 46.65 $\pm$ 5.39   |
| 10.    | Milk yield in 10 <sup>th</sup> month (litres) | 329     | 33.23 $\pm$ 5.45   |
| 11.    | Milk yield in 11 <sup>th</sup> month (litres) | 71      | 15.61 $\pm$ 5.77   |
| 12.    | Lactation Yield (litres)                      | 597     | 868.24 $\pm$ 49.56 |
| 13.    | Average fat %                                 | 200     | 4.3 $\pm$ 0.14     |
| 14.    | Age at estrus (months)                        | 1007    | 35.6 $\pm$ 0.53    |
| 15.    | Age at 1 <sup>st</sup> conception (months)    | 1007    | 36.6 $\pm$ 0.54    |
| 16.    | Age at 1 <sup>st</sup> calving (months)       | 1007    | 45.7 $\pm$ 0.52    |
| 17.    | Service period (days)                         | 1007    | 170.0 $\pm$ 7.0    |
| 18.    | Inter-calving period (days)                   | 1007    | 447.0 $\pm$ 8.0    |
| 19.    | Gestation length (days)                       | 1007    | 277.0 $\pm$ 1.0    |



Figure 4. A Deoni calf.

poles; tips of the horns are blunt; and eyes are prominent, bright and alert with black eyebrows.

The hump is massive and well developed in males and small in females. The neck is short, strong and well developed. Dewlap is thick, pendulous, and muscular with folds. It is more pendulous in males than in females. The chest is deep and wide. The skin of these animals is thick and loosely attached to the body. The tail is long reaching below the hock with black and white switch. The udder is well attached and medium in size with squarely placed black teats. Bulls are characterized by blackish scrotums of a good size. The animals are docile and calm.

### Physical measurements

The linear measurements viz. height at withers, body length, chest girth, horn length, ear length and head length of all categories of Deoni cattle were recorded on 3 924 animals (Table 1). It was revealed that measurements increased with increase in age. The ear length in adult animals was similar in both sexes. The chest girth, body length and height at

withers were more in bulls than bullocks and milk / dry cows. Horn length, ear length, head length, chest girth, body length and height averaged 17.61, 26.18, 49.82, 151.82, 120.11 and 122.22 cm in cows and 19.97, 26.67, 53.68, 163.55, 129.59 and 134.36 cm in bullocks. Average chest girth, body length and height at wither in the present study were lower than that reported by Deshpande and Singh (1978). They reported 168.3 cm chest girth, 132.2 cm body length and 126.2 cm height at wither in adult cows in an organized herd.

### Production and reproduction characteristics

The milk recording was carried out at monthly intervals in all the villages included in the project. The recording on 597 cows of different lactations was made. The milk consumed by the calf at the initial and last stage of milking was not included in the milk yield. The production and reproduction characters are shown in Table 2. Lactation milk yield averaged 868 litres. Milk yield was almost similar in first three months of lactation (106 to 107 litres) and declined

thereafter from the fourth month (102 litres) to the tenth month (33 litres). The average fat content in the milk of Deoni cows was 4.3 percent with a range of 2.5 to 5.3 percent. Cows showed their first oestrus at the average age of 36 months. Average age at first calving was 46 months. The service period and inter-calving period averaged 170 and 447 days. The average number of calvings per cow was six to seven. The selected bulls start breeding at the age of 30 months.

The production and reproduction performance of Deoni cattle in the present investigation was similar to that reported in the literature. Deshpande and Singh (1977A) observed lactation milk yield in Deoni herds ranging from 800 to 1 000 kg. Kakde *et al.* (1976) reported age at first calving in Deoni cows as 47 months. A service period of 184 days and calving interval of 466 days was reported in Deoni cows by Deshpande and Singh (1977B). Sontakke *et al.* (1978) reported average fat percent of 4.29 in 100 samples of Deoni cow milk.

### **Draught capacity**

The observations were recorded on 25 pairs of bullocks at different locations. A bullock pair was able to pull the load of 10-11 quintals using wooden heavy cart with wooden wheels on katcha (muddy) road. They are able to pull a maximum of 28-30 quintals of load using a light steel bullock cart with tyre wheels on the tar roads for about 10-15 km. One pair of bullocks can pull the medium plough for about seven to eight hours a day and can plough about half an acre of land. The bullocks show their maximum potential at five to six years of age and maintain it up to 10-12 years of age.

### **Management practices**

Deoni cattle are maintained under a semi-intensive system of management. They are traditionally reared on grazing in fallow lands, dry lands or bunds of the farms. The animals are allowed to graze from 8.00 a.m. to

5.00 p.m. The breeding bulls are usually stall fed. Only 12.7 percent of farmers grow green fodder (maize and sorghum). The animals are also provided with maize / sorghum stovers, paddy straw, wheat straw and sugarcane tops as well as groundnut, urd (*Vigna mungo*) and arhar (*Cajanus cajan*) haulms. The cows suckle their dams before and after milking. Quantity of the dry fodder mainly depends on availability of green fodder in the grazing areas. Some amount of concentrate is also given to the milking cows and working bullocks.

The animals are housed in either separate houses or part of the owner's residence during the night. About 50 percent of owners house their animals in open area, 3 percent keep their animals in *pucca* (cemented) houses and the remaining house their animals in *katcha* (muddy) house thatched with dry grass or sugarcane dry leaves. No weaning is practised in the breeding tract. The males are separated after 20 months of age and trained for agriculture operations. They are usually castrated at 30 months of age and used for transportation at three years of age.

### **Disease prevalence**

The occurrence of foot-and-mouth disease was reported even after regular vaccination. Incidence of the other diseases like Rinderpest, Black Quarter, Coccidiosis, Mastitis and Pneumonia were also recorded. The calf and adult mortality was found to be negligible and the breed was found to be hardy and well adapted to tropical draught prone areas. Some cases of mastitis have also been reported by Deshmukh *et al.* (1995). Norladkar *et al.* (1994) reported occurrence of reproductive disorders in Deoni cows ranging from 2 to 4 percent.

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# Leadersheep: the unique strain of Iceland sheep<sup>a</sup>

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## Summary

A unique strain of sheep, known to lead the flock, has evolved within the short-tailed, native breed of Iceland sheep. Leadersheep, known for centuries, walk or run in front of the flock, even in bad weather conditions, they may foresee climatic events and are generally very alert and attentive. The high level of intelligence expressed by these sheep is known to be strongly inherited, without being linked to sex, age, colour and other external traits. However, little is known about the genetics of leadersheep *per se*. Most of them are non-white and horned with a slender body conformation. Since they are endangered with a breeding population of only some 1 000 purebred animals, mostly ewes, conservation measures are in progress, mainly through AI and individual recording. To strengthen these efforts enthusiastic breeders and scientists founded the Leadersheep Society of Iceland in the spring of 2000. While the main aim is to conserve and maintain leadersheep, future possibilities of utilizing their unique characteristics are being considered.

## Résumé

Une seule lignée ovine, reconnue comme leader de troupeau, a évolué vers la race native à courte queue en Islande. La race Leadersheep, connue depuis des siècles, marche ou cours devant le troupeau même dans des conditions de mauvais temps, et est capable de prévoir les événements climatiques, se qui les rend extrêmement attentives. Le haut niveau d'intelligence de cette race semble être de forte héritabilité, sans qu'il y ait un lien avec le sexe, l'âge, la

couleur ou d'autres caractéristiques externes. Cependant, très peu est connu de la génétique de cette race de *per se*. La plupart ne sont pas blanche, portent des cornes et possèdent un corps de conformation élancée. Etant donné la situation de danger de disparition, seulement 1 000 animaux purs la plupart des brebis, des mesures de conservation ont été mis en place surtout à travers l'insémination artificielle (AI) et le contrôle individuel. Pour renforcer ces efforts enthousiasmants, les éleveurs et les chercheurs ont fondé la Leadersheep Society of Iceland au printemps 2000. Bien que l'objectif principal soit de conserver et maintenir la race, on a pris aussi en considération la possibilité d'utiliser leurs caractéristiques uniques.

**Keywords:** *Characteristics, Conservation, Leadersheep Society.*

## Introduction

The only breed of sheep in Iceland is the native North-European short-tailed sheep brought to the country by the settlers, the Vikings, 1 100-1 200 years ago. Without their sheep the Icelanders would not have survived throughout centuries of hardship on an isolated island just south of the Arctic Circle. Even grazing in winter had to be utilized to the utmost. Somehow, a unique small population of sheep evolved, probably through selection in certain flocks, which

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Figure 1. A leadersheep (wether) coming first across a bridge.

displayed outstanding behavioural abilities to aid the management of the flock at extensive range pastures, namely leadersheep (Adalsteinsson, 1981; Jónmundsson *et al.*, 1994).

## Characteristics

The main characteristics of sheep of the leadersheep strain are to walk or run in front of the flock, even in very bad weather conditions. Moreover, they seem to be able to foresee or predict climatic events such as snowstorms. They are generally very alert and attentive and a large number of records of individual leadersheep show that they differ considerably from other sheep in many aspects of intelligence (Jónsson, 1953). Although individual sheep of this strain differ to the extent to which the traits are expressed, there is clearly a strong hereditary base present (Jónmundsson *et al.*, 1994). Leading characteristics are not linked to sex, age, colour and other external traits. However, most of the leadersheep are non-white with a range of colours. Most of them are horned, even four-horned in a few cases, they have a slender body conformation, long legs and bones, in general, and are of lighter weight than other sheep in the flock as they have been selected for intelligence, not for meat characteristics. The ewes are excellent mothers, reproductive performance is similar as in ordinary Icelandic sheep but longevity may be higher.

## Distribution



Figure 2. A leadersheep leading a flock from pasture after a heavy snowfall (below)

It is generally assumed that the cradle of leadersheep breeding was in Northeast-Iceland. Around the middle of the 20<sup>th</sup> century there was a substantial decline in the population of leadersheep due to a widespread slaughter policy and restocking which resulted in the eradication of the lung diseases Jaagziekte and Maedi. Moreover, hayfield cultivation and increased hay and silage production reduced the need for winter grazing and thus the role

of leadersheep diminished in most flocks. Fortunately, steps were taken in the 1950s to conserve leadersheep and for over 40 years

farmers have been able to obtain semen from rams of the leadersheep strain kept at AI centres. The stronghold of leadersheep is still in NE-Iceland where most of the AI rams have been obtained. Those who breed leadersheep, normally a few in each flock, keep ewes and to a lesser extent rams, but contrary to ancient practices only small numbers of leadersheep are now kept as wethers. The breeding population of leadersheep in Iceland is hardly over 1 000 purebreds with perhaps some 500 crossbred individuals. The total population of breeding sheep in Iceland is 460 000 at present. A few crossbred Icelandic leadersheep are now found in Canada and the USA due to semen exports from 1998 onwards. The AI work in such a small population has been facilitated by oestrus synchronization since the mid

1970s and the Farmers' Association will continue to support the conservation of this unique strain of sheep.

## Leadersheep society

Enthusiastic sheep breeders, sheep scientists and others interested in leadersheep, founded the Leadersheep Society of Iceland on 18 April 2000. The main aims of the society, stated in its by-law, are to support the maintenance and conservation of leadersheep, improve individual recording, gather past and present information about such sheep and disseminate educational material about them. The Society cooperates with the Farmers' Association and other relevant bodies, for example, on the selection of promising leaderrams for the AI services operated from two centres in the country. As



Figure 3. A Leadersheep ram.

I am the chairman of this newly founded society, already with a membership of 140, with a few in North-America, I will do my best to provide further information on request.

## Conclusions

The leading instinct and other peculiarities of Icelandic leadership are examples of genetically based rare characteristics which due to changes in management practices have lost much of their former economic importance. However, I am one of those who believe that such unique characteristics should be conserved, not only for cultural reasons or as a means of maintaining biodiversity, but also with future practical possibilities in mind. For example, do leadership still have a role in facilitating flock management under extensive pastoral

conditions? Can their alertness help to protect flocks against predators? One wonders how better use could be made of such genes in the future.

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# La chèvre Draa. Potentiel de production et caractéristiques d'adaptation aux contraintes de l'environnement aride

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## Résumé

La chèvre Draa est la seule des populations caprines marocaines qui peut être considérée comme une race bien distincte. C'est une sorte d'isolat génétique qui est localisée et élevée principalement dans les oasis de la vallée du Draa à un climat aride. Il ressort des études réalisées que le potentiel laitier de la chèvre Draa est satisfaisant (142 litres sur 150j de lactation). De même, l'évaluation des ses performances de reproduction en station a montré une prolificité de 158 % avec une aptitude à réaliser deux mises bas par an.

De plus, la chèvre Draa présente quelques capacités adaptatives pour produire et survivre dans les conditions arides. En effet, son turnover de l'eau corporelle est relativement faible comparativement aux races caprines européennes étudiées dans les mêmes conditions expérimentales. Enfin, la chèvre Draa présente une bonne capacité à préserver l'appétit en cas de privation d'eau. Ces caractéristiques de production et d'adaptation, prises ensemble, font d'elle un bon candidat pour le développement d'une race caprine laitière marocaine et pour continuer les efforts pour sa préservation, son amélioration et la connaissance de ses caractéristiques physiologiques.

## Summary

The Draa goat can be considered as a distinct breed among various goat populations in Morocco. It is considered as a genetic isolate reared in the oasis, along the Draa valley in southern Morocco, which is characterised by

an arid climate conditions. The results of previous investigations showed that the Draa goat has a good potential for milk production (142 litres during 150 day lactation). The evaluation of its reproductive performances under station conditions indicated a prolificacy of 158% and an ability to produce 2 crops per year. Moreover, the Draa goat showed some adaptive characteristics to produce and survive in arid conditions. Its water turnover is low compared to European goat breeds studied in similar environment conditions. The Draa goat also has the ability to maintain food intake unchanged during period of water deprivation. Taken together, these results indicate that the Draa goat could be a good candidate for developing a Moroccan goat breed for milk production. Thus, effort to preserve, improve and to study the Draa goat should be continued.

**Mots clefs:** Chèvre Draa, Maroc, Caractéristiques d'adaptation, Production laitière, Fertilité.

## Introduction

L'élevage caprin au Maroc constitue une richesse potentielle pour l'amélioration du revenu des agriculteurs dans les zones défavorisées et marginalisées. Les effectifs sont relativement importants (5,1 millions de têtes en 1999). Du point de vue génétique, le cheptel caprin marocain se caractérise par son hétérogénéité due au brassage incontrôlé entre les différentes populations. Il est donc difficile de distinguer des entités génétiques bien définies (races) à l'instar des races ovines

locales qui sont bien standardisées. Néanmoins on peut distinguer trois populations caprines marocaines (Bourfia, 1989).

La population caprine du Nord ou population Fnideq; elle résulte d'un métissage entre la population locale et certaines races espagnoles (Murciana, Granadina, Andalousia) et de ce fait présente des caractéristiques laitières apparentes comme la finesse de la peau et un bon développement de la mamelle.

La population caprine des montagnes de l'Atlas ou chèvre noire marocaine: elle possède des caractéristiques d'adaptation aux conditions arides fort intéressantes à savoir un faible turnover de l'eau corporelle ainsi qu'une bonne capacité à préserver le poids corporel lors des privations complètes d'eau

ou d'aliments (Hossaini-Hilali *et al.*, 1993; Hossaini-Hilali *et al.*, 1994). La chèvre noire marocaine se caractérise aussi par son tempérament. C'est un animal habile, marcheur et un bon grimpeur. Son défaut réside dans son potentiel laitier limité (Hossaini-Hilali et Benlamlih, 1995). Elle est typiquement non prolifique avec une taille moyenne de portée de 1,03 (Bourfia, 1989).

La population D'man ou Draa: elle est localisée et élevée principalement dans les oasis de la vallée du Draa dans le Sud du Maroc. Il s'agit d'une sorte d'isolat génétique. C'est la seule des populations caprines marocaines qui peut être considérée comme une race bien distincte. L'effectif total dans la vallée du Draa était de 20 000 têtes dans les années 80 et s'est réduit actuellement à 10 000 têtes. Jusqu'à présent, la chèvre Draa

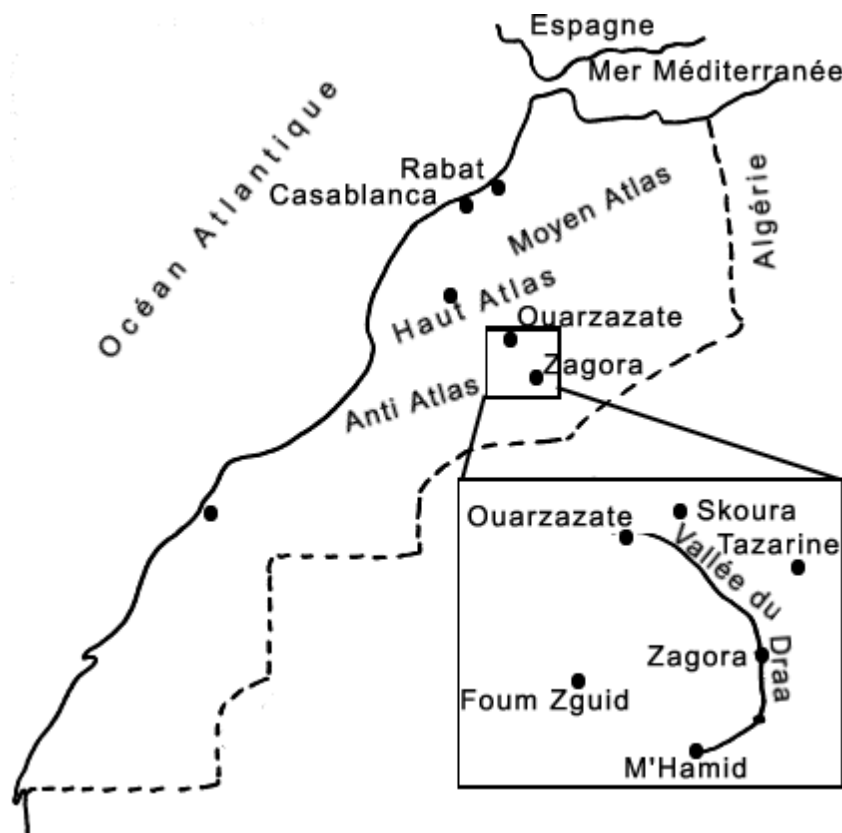


Figure 1. Carte du Maroc avec la localisation et le détail de la vallée du Draa qui est le berceau principal de la chèvre Draa.

n'a pas encore été utilisée dans un programme de croisement ni avec d'autres populations locales marocaines ni avec des races européennes.

Le présent article a pour objectif de présenter la chèvre Draa tout en mettant l'accent sur son potentiel de production ainsi que sur ses capacités d'adaptations aux conditions arides d'élevage.

## Données Générales

### Berceau de race

La chèvre Draa est élevée principalement dans les oasis de la vallée de l'oued Draa. Celui-ci s'étend sur 200 km dans le Sud marocain entre Ouarzazate et Zagora. Cependant, on peut trouver la chèvre Draa dans d'autres oasis situées en dehors de la vallée du Draa tout en étant proche comme les oasis de Tazarine, Skoura et Foum-Zguid (Figure 1). Le climat qui règne dans le bassin versant du Draa est un climat sec à tendance continentale. Ce bassin est ouvert vers le sud-est et le Sahara et subit par conséquent l'influence du climat désertique. Les températures sont très élevées avec une saison chaude de 7 mois présentant des moyennes mensuelles de maxima supérieures à 30 °C. Les précipitations moyennes décroissent du nord vers le sud de la vallée du Draa et sont comprises entre 150 et 50 mm.

### Appellation et origine

Localement la chèvre Draa est appelée «Horra» ce qui signifie «pure». Ceci laisse penser que les éleveurs se sont aperçus depuis longtemps que cette population représente une race bien identifiée malgré l'hétérogénéité des robes qu'elle présente. Elle est aussi appelée «Beldia» qui signifie «locale». Dans les années 80 et lors de la première description de la race, Ezzahiri et Benlakhal (1985) ont décidé de l'appeler la

chèvre D'man. Cette appellation a été motivée par deux éléments. Le premier est que le berceau d'élevage de la chèvre Draa est globalement identique à celui de la brebis D'man. Le deuxième élément est que les premières études sur l'activité sexuelle de la chèvre Draa ont montré que cette race est désaisonnée et possède un anoestrus post-partum court à l'instar de la brebis D'man (Ezzahiri et Benlakhal, 1985, Lahlou-Kassi *et al.*, 1989). Cette situation n'a pas trop duré puisque l'Office de Mise en Valeur Agricole de Ouarzazate (ORMVAO) a jugé plus opportun d'appeler cette race la chèvre Draa et de garder l'appellation D'man pour la brebis évitant ainsi toute confusion. L'origine de la chèvre Draa n'est pas bien connue. On a émis l'hypothèse que cette chèvre a été introduite dans les oasis du Sud marocain à partir des îles Canaries. Cette hypothèse est loin d'être plausible. Il existe une nette différence entre la chèvre Draa et celle originaire des îles Canaries. En effet, la chèvre des Canaries se caractérise par sa relative grande taille. En plus, elle porte des cornes et possède une robe à poil long (Ezzahiri et Benlakhal, 1985).

### Description morphologique

La première description morphologique de la chèvre Draa a été faite par Ezzahiri et Benlakhal (1985). C'est un animal de format moyen avec un poids moyen de 32 kg. La hauteur au garrot et la longueur du corps sont respectivement de 66 et 62 cm. L'encolure est mince, bien dégagée et porte souvent deux pendeloques. La tête est fine, triangulaire et souvent dépourvue de cornes chez la femelle. La peau est fine, souple et porte des poils ras. On note une très grande hétérogénéité des robes et les plus répandus sont le brun, le marron avec souvent des plages blanches au niveau du thorax ou de la tête. Certaines chèvres présentent les 3 couleurs à la fois (Figure 2 et 3).



Figure 2. Chèvre Draa dans l'oasis de Skoura près de Ouarzazate présentant une robe à prédominance blanche avec des taches brune et marron.

## Mode d'élevage

La chèvre Draa est une chèvre qui ne se déplace pas dans les pâturages. Elle est plutôt maintenue dans les habitations. Il n'existe pas de chèvres bien individualisées. Les animaux sont maintenus avec d'autres espèces (ovins et rarement bovins) dans des locaux situés dans le rez-de-chaussée des habitations. De mars à septembre, l'alimentation est constituée principalement de luzerne, de paille, de quelques sous-produits de maraîchage et très peu de déchets de dattes. D'octobre à février, la ration est constituée principalement du foin de luzerne et les déchets de dattes. Cette ration est complétée accessoirement par l'orge, le son et la pulpe sèche de betterave selon les disponibilités en trésorerie (Ezzahiri et Benlakhal, 1988).

## Potentiel de Production

### Performances de reproduction

L'évaluation des performances de reproduction d'un troupeau de chèvres élevées en station et observées pendant 6 ans (1982-1988) a montré que la fertilité des luites d'hiver, du printemps et d'été est supérieure à 80%. L'intervalle entre deux mise bas est en moyenne de 9 mois, cependant 20 % des intervalles sont de 6 mois (Ezzahiri et Benlakhal, 1988). Ces observations indiquent que la chèvre Draa est une race désaisonnée comme la race ovine D'man (Lahlou-Kassi *et al.*, 1989). Cette caractéristique est un avantage pour l'établissement d'un programme de reproduction accélérée visant à l'augmentation de la productivité du troupeau. Concernant la prolificité, sur l'ensemble des naissances enregistrées pendant 6 ans en station, le pourcentage des naissances simple, double et triple a été

respectivement de 36, 57 et 7 %. Soit un taux moyen de prolificité de 158% (Ezzahiri et Benlakhal, 1988).

### Production laitière

Un troupeau conduit en station (de 1982 à 1988) et formé de 14 à 39 chèvres selon les années a été suivi afin de quantifier avec plus de précision le potentiel laitier de la chèvre Draa. Les résultats du contrôle laitier de ce troupeau indiquent que la durée moyenne de lactation chez la chèvre Draa est de 150 j; mais elle varie de 90 à 150 j. La production laitière moyenne est de 142 litres et le maximum obtenu est de 219 litres. L'évolution de la production laitière journalière au cours de la lactation est consignée dans le Tableau 1.

Les performances laitières d'une race sont déterminées par la génétique, certes, mais aussi par les facteurs liés à l'environnement de production (contraintes environnementales, pression pathogène et alimentation). Ainsi, pour mieux juger des potentialités d'une race, il est préférable de la comparer par rapport à une autre maintenue dans le même milieu de production. Dans ce sens, Ezzahiri et Benlakhal. (1985) ont mené une étude qui consistait en la comparaison de la production laitière de la race Draa par rapport à une race étrangère (la race espagnole Murciana) et la population caprine

du Nord du Maroc (population Fnideq). Les résultats ont montré que sur une période de lactation de 150 j, la production laitière de la chèvre Draa a été de 142 Litres. Cette valeur est comparable à celle enregistrée chez la race Murciana (142 litres) et légèrement supérieure aux performances de la race Fnideq (125 litres). Ces résultats montrent que dans des conditions similaires la chèvre Draa présente des capacités de production comparables à d'autres races laitières bien connues (race Murciana en l'occurrence).

### Adaptation aux contraintes de l'environnement aride

Les performances de production prometteuses affichées par la chèvre Draa indiquent que cette chèvre peut être un substrat génétique pour la création d'une chèvre laitière marocaine. Cette éventualité serait encore plus attractive s'il s'avérait que cette chèvre possède des caractéristiques d'adaptation et de survie dans des conditions difficiles. Cette possibilité nous a interpellé pour réaliser, dans des conditions contrôlées, des expérimentations afin de mettre en évidence les potentialités d'adaptation éventuelles de la chèvre Draa aux conditions difficiles du milieu aride à savoir la rareté de l'eau et des aliments. Les principaux résultats sont comme suit.

Tableau 1. Production laitière journalière chez la chèvre Draa élevée en station (D'après Ezzahiri et Benlakhal, 1988).

|                              | Quinzaine de lactation |      |      |      |      |      |      |      |      |      |
|------------------------------|------------------------|------|------|------|------|------|------|------|------|------|
|                              | 1                      | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
| Production laitière (l/j)    |                        |      |      |      |      |      |      |      |      |      |
| Moyenne                      | 1,30                   | 1,08 | 1,01 | 1,00 | 0,95 | 1,0  | 0,95 | 0,80 | 0,75 | 0,65 |
| Minimum                      | 0,70                   | 0,65 | 0,40 | 0,50 | 0,45 | 0,40 | 0,35 | 0,30 | 0,30 | 0,30 |
| Maximum                      | 2,30                   | 2,00 | 2,10 | 1,55 | 1,40 | 1,45 | 1,30 | 0,90 | 0,80 | 0,80 |
| Coefficient de persistance % | -                      | 83   | 94   | 99   | 95   | -    | 95   | 84   | 94   | 87   |



Figure 3. Chèvre Draa en fin de gestation à l'I.A.V. Hassan II à Rabat présentant une robe marron avec une petite tache blanche au front.

## Le turnover de l'eau corporelle

Un des mécanismes adaptatifs développés par les animaux vivants dans les milieux arides est le fait d'avoir des besoins en eau assez faibles. Ceci n'est possible que grâce à l'intervention de différents mécanismes physiologiques et comportementaux. Ainsi, Mouslih (1999) a rapporté que la prise d'eau journalière chez la chèvre Draa a été de 47 ml/kg PV. Ces valeurs sont comparables à celle rapportée par Hossaini-Hilali *et al.* (1993) chez la chèvre noire marocaine étudiée dans les mêmes conditions d'ambiance et recevant une ration alimentaire similaire (36 ml/kg PV). En revanche, les races caprines européennes montrent des niveaux de prises d'eau 3-4 fois supérieurs (Chaiyabutr *et al.*, 1988; Dahlborn et Karlberg, 1986). La prise d'eau a été accompagnée par des pertes hydriques urinaires assez faible, soit 7 ml/kg P.V.. La faible excrétion urinaire chez la chèvre Draa a été accompagnée par

une osmolalité urinaire en conditions de normohydratation modérément élevée (1 500-2 000 mosm/kg). Ce qui laisse penser que la capacité rénale à concentrer l'urine contribue au faible turnover de l'eau corporelle chez la chèvre Draa.

## Effet de la privation d'eau

D'après McFarlane (1964) les animaux adaptés à vivre dans des conditions arides ou désertiques présentent une capacité à maintenir l'appétit lorsque l'eau manque. Chez la chèvre Draa, la privation d'eau pendant 48 heures a entraîné une baisse de 21% de la matière sèche ingérée. Cette réduction de la prise alimentaire concerne uniquement l'aliment grossier (Mouslih 1999). Cette diminution de la consommation alimentaire est comparable à celle observée chez la chèvre noire marocaine (24%, Hossaini-Hilali *et al.*, 1994). En revanche, les races caprines européennes arrêtent de

manger (90% de diminution) après 48 heures de privation d'eau (Dahlborn, 1987). Ceci montre que la chèvre Draa présente également une bonne capacité du maintien de la consommation alimentaire en période de privation d'eau. Cette ressemblance comportementale de la chèvre Draa avec la chèvre noire marocaine a été corroborée par l'étude du polymorphisme biochimique. En effet, le calcul des distances génétiques, en utilisant les variants électrophorétiques des systèmes transferrine (TF), post-albumine (GC) et hémoglobine (HBB), a indiqué l'existence d'un rapprochement entre la race Draa et la chèvre noire marocaine (Touzami, 1998)

### Capacité de stockage d'un excès d'eau

La chèvre Draa n'a pas de capacité extraordinaire à stocker un surplus d'eau (Mouslih, 1999). Pour vérifier cette hypothèse six chèvres Draa vides et sèches ont été hyperhydratées à l'aide d'une sonde oesophagienne. La quantité d'eau administrée était équivalente à 10% du poids corporel. Le volume d'eau éliminé par voie urinaire a été mesuré au cours des 6 heures post-hyperhydratation. Les performances de rétention d'une charge hydrique équivalente à 10% de poids corporel chez la chèvre Draa se situent entre celle de la chèvre suédoise et celle de la chèvre noire marocaine (Tableau 2). La chèvre Draa ne présente pas de capacité

extraordinaire à stocker l'eau dans le compartiment ruminal comme cela a été démontré pour la chèvre Bédouine (Choshniak et Shkolnik, 1977)

### Conclusion

Au Maroc, le cheptel caprin était de 8 millions de têtes en 1960. Cet effectif s'est réduit à 5,1 millions en 1999. La chèvre Draa n'a pas échappé à cette tendance. Au début des années 80, l'effectif total de cette race était de 20 000 têtes. Actuellement, il est de 10 000 têtes soit une réduction de 50%. Or, il s'est avéré, d'après les recherches réalisées jusqu'à présent, que la chèvre Draa présente des potentialités de production laitière et de fertilité fort intéressantes tout en gardant des caractéristiques d'adaptation aux conditions difficiles de l'environnement aride. Ces éléments, pris ensemble, font d'elle un bon candidat pour la création d'une race caprine laitière marocaine. Aussi, les efforts de préservation, d'amélioration et d'étude de la chèvre Draa doivent être maintenus et soutenus pour une meilleure valorisation des zones arides et semi-arides du Maroc.

### Remerciements

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*Tableau 2. La proportion d'eau excrétée par voie urinaire pendant 6 heures après administration par voie intraruminale d'une charge hydrique équivalente à 10% du poids vif chez différentes races caprines.*

| Race                      | %  | Auteur                        |
|---------------------------|----|-------------------------------|
| La chèvre suédoise        | 60 | Olsson et al. (1982)          |
| La chèvre Draa            | 51 | Mouslih (1999)                |
| La chèvre noire Marocaine | 46 | Hossaini-Hilali et al. (1994) |

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## Four Southern African Horse Breeds

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### Summary

The history and development of the four Southern African horse breeds, i.e. Basutho Pony, Nooitgedacht, South African (SA) Boerperd and Cape Boerperd, are traced from their common ancestor, the Cape Horse, to the present day. Recent blood-typing studies of the first three have shown them to be closer related to each other than to any other world breed. At the beginning of the twentieth century the Southern African horse industry was devastated after the Anglo Boer War (1899-1902). Indiscriminate crossbreeding and intentional importation of other specialized breeds led to the near extinction of the descendants of the Cape Horse in South Africa. Fortunately, the efforts of the Government Department of Agriculture and a number of private breeders to identify, conserve and develop the then existing genetic material over the past half century, resulted in the existence today of three small, but viable, registered breeds of locally adapted and versatile horses viz. Nooitgedacht, SA Boerperd and Cape Boerperd. The recent history and apparent present situation of the Basutho Pony in the neighbouring country of Lesotho was also described.

### Résumé

L'histoire et développement de quatre races d'Afrique Australe, c'est-à-dire Basutho Pony, Nooitgedacht, SA Boerperd et Boerperd du Cap, sont établis à partir de leurs ancêtres en commun jusqu'à présent. L'étude ressenties sur l'examen du sang (étiquetage)

ont montré que les trois premières races sont plus étroitement consanguines que n'importe quelle autre race mondiale. Au début du vingtième siècle l'industrie chevaline sudafricaine avait été dévastée après la guerre Boer (1899-1902). L'élevage en croisement peu judicieux et l'importation délibérée d'autres races spécialisées ont failli l'extinction de la progéniture du Cap Horse en Afrique du Sud. Heureusement l'eclipse a été sauvé par l'effort du Ministère de l'agriculture et un nombre d'éleveurs privés qui avaient identifié, conservé et amélioré le pool génique existant pendant le dernier demi siècle, se terminant par l'existence aujourd'hui de deux petits mais viables races inscrites de trois chevaux versatiles adaptés au pays, c'est-à-dire Nooitgedacht, Cape Boerperd et SA Boerperd. On a fait la description de l'histoire récente et situation présente du Basutho Pony du pays voisin, le Royaume du Lesotho.

**Keywords:** *Basutho Pony, Boerperd, Lesotho, Nooitgedacht, South Africa.*

### Origin of the Southern African Horse Breeds

There are no indigenous horses in Africa south of the equator. The first horses imported into Southern Africa were brought to the Cape of Good Hope in 1652 from Java in a Netherlands East India Company vessel returning to Holland via the newly established halfway station at the foot of Table Mountain. They were called Javanese ponies. Despite some accounts that the Javanese pony was a mixture of Barb and Arab, authorities in that country are now of

the opinion that the Java horses descended directly from Mongolian stock and later crossed to oriental horses from Persia (Hendricks, 1995). It is therefore significant to note that the next recorded importation of horses to the Cape was of Persian origin in 1689. After that, for a period of almost 150 years the descendants of Javanese ponies and Persians formed the foundation stock for large herds of small, but exceptionally hardy farm- and general purpose riding horses in the Dutch colony at the Cape.

In 1778 a shipment of South American horses, highly esteemed for their gentleness, beauty and good service, landed at the Cape. Another introduction of horses of Spanish origin followed in 1807 when, during the Napoleonic wars, two vessels carrying Andalusian horses to Buenos Aires were captured and brought to the Cape. They were eagerly taken up by the local breeders and it can be assumed that the Barb ancestry of the South American and Spanish horses were responsible for the unmistakable traces of Barb conformation that are today still to be seen in the Nootgedacht and SA Boerperd.

In 1782 the first English National Horses (later called Thoroughbred) were introduced. Under British rule, Lord Charles Somerset, English Governor in the Cape (1814 to 1827) did more than any other individual to promote the horse industry in the South Africa of that time. Through his endeavours the export trade to India and other parts of the British Empire was greatly increased. It was then that the Cape Horse gained world renown as a cavalry horse, being reported by the Indian army officers and those who later fought in the Crimean War, to have no equal. It was able to stand the extremities of climate and terrain from the arid, dusty heat of India to the bitter cold of the Crimea. It was hardy, docile, willing and surefooted, needing no special care and able to forage for itself on the scantiest of food.

As early as 1826 Cape Horses were taken into Basutholand as war booty and as trade goods. In that mountain kingdom, with its extremely harsh climate, sheep and rocky mountain foot paths and scantiest of food,

especially in winter, the famous Basutho Pony developed virtually through natural selection as a descendant of the Cape Horse.

From 1835 onwards Cape Horses, in large numbers, went along on the Great Trek, the mass emigration of farmers with their families and livestock from the Cape districts to the lands north of the Orange and Vaal rivers and east of the Drakensberg. Eventually the horses taken from the Cape colony laid the foundation for large breeding enterprises, some of them with hundreds of mares kept virtually free-roaming on new farms in what later became the republics of the Orange Free State, the Transvaal and the British colony of Natal.

## **Decline and Recent History of the Cape Horse and his Descendants**

Horse breeding in the two vanquished republics of Transvaal and Free State as well as in the Basutholand Protectorate was dealt a devastating blow by the Anglo Boer War (1899–1902), which led to the dispersal and even extermination of entire breeding herds during the scorched earth campaign waged by the imperial forces against the two republics and their sympathizers in the colonies of Cape and Natal. Fortunately, some of the most tenacious commando horses as well as small remnants of breeding herds survived in remote areas where they were hidden from the armies.

After the war, English Thoroughbred stallions were generally used in the two new colonies in an attempt to re-establish breeding herds and upgrade the depleted stock.

However, it was in the Cape Colony, especially in the southern districts and later in the Karoo, where major changes in breeding policies and fashions dealt the final blow to the erstwhile Cape Horse. Starting in about 1880, horse breeders and their government advisers in the southern districts embarked on a deliberate policy of introducing Hackney, Cleveland Bay and after the turn of the century, Dutch Friesian and even

Oldenburger into the Cape Horse stock in an attempt to increase size and utility for carriage and general farm work. This resulted in the development of what Schreuder and Wright (1948) called Boland Waperd (literally Western Cape Wagon Horse), which held sway until World War II after which it was finally displaced by mechanized farm implements and transport vehicles. The important point is that after the Anglo Boer War some of these crossbred, carriage type horses inevitably found their way to the northern regions where they further contributed to the dilution of the gene pools of what was left of the erstwhile Boer horses.

From the late 1930s and especially after the wool boom of the 1950s with resulting affluence of Karoo sheep farmers, the American five gaited Saddle from Kentucky took over on the farms, especially in the show ring. Boerperd mares were crossbred to American Saddle stallions.

## The Nooitgedacht Horse

The name of this SA Stud Book registered breed derives from the experiment farm Nooitgedacht in the Ermelo district of the former Transvaal province. In 1952, on this research station, the Department of Agriculture of the then Union of South Africa initiated a project for "the preservation of the Basutho Pony and the development of a South African utility riding horse". Over the previous two years a special committee made extensive journeys into Lesotho and farming districts surrounding that country, in search of suitable breeding material. After due consideration a nucleus of 11 mares and two stallions were purchased from Cloete in the Molteno district and Williams in Memel. Both breeders, situated in districts close to Lesotho, had sufficient records to show that their original breeding material were of Basutho Pony origin of pre-Anglo Boer War stock. The committee found them to be phenotypically superior to the horses they inspected in Lesotho.

According to Joubert and Bosman (1971) the ultimate object of the Nooitgedacht project was to stimulate the establishment of private studs elsewhere in the country with a vision of reviving the breed to its former status and usefulness. Although they recognized the keen demand for horses of this type in and around the bigger urban communities of South Africa, those officials responsible for the project nevertheless firmly adhered to the policy that the ponies bred at Nooitgedacht should retain their pre-eminence primarily as work horses on livestock farms. In the selection of breeding stock, special care was given to the tractable disposition and docile temperament which were such treasured characteristics of the Basutho Pony.

Initially culled males were given out as castrates to other experiment farms for testing. Most of these proved to be excellent hacks and a ready demand became apparent. In 1967, therefore, eight daughter studs were established as part of the breeding project. Only the applications of *bona fide* farmers, anxious to breed Basutho type ponies, were accepted, following approval, by a panel of judges, of their farming operations and ability to handle horses. At the outset cooperators were provided with one stallion and two mares, the latter being added to as they became available. This was done to strengthen the breeding nuclei of the daughter studs. It was also accepted that daughter studs would broaden the genetic base and size of their operations by bringing in suitable mares for crossbreeding and upgrading with the stallion obtained from Nooitgedacht.

At a meeting of the cooperators in 1969 a breed society was founded as a preliminary to ultimately obtaining recognition of the breed in terms of the Registration of Pedigree Livestock Act (Act 28 of 1957). A preliminary Standard of Excellence was adopted by the departmental officials and the members of the new society for the guidance of breeders and judges at shows. It was decided to strive for:

- a strongly built pony (later called horse) with emphasis on riding qualities and stamina;

- a docile temperament and high degree of human affinity;
- limbs with dense, flat bone, strong joints and high quality hooves. It was envisaged that the ponies should preferably not be shod;
- hardiness and the ability to carry a person weighing up to 80 kg for some considerable time;
- preference to all shades of grey, but deviations permitted provided the hides are clearly pigmented;
- ideal height for a stallion 14.0-14.2 hands (140-145 cm) and for mares 14 hands, but in ponies qualifying for registration a

range of 13.2-15.0 hands is allowed.

Mature stallions should weigh 440 kg and mares 340 kg (Joubert and Bosman, 1971).

The question of a name caused some concern. Though the parent material came from acknowledged Basutho Pony herds, there was no doubt about small percentages of Boer Horse and Arab blood in the basic stock. It was therefore decided to call the breed Nooitgedacht instead of Basutho.

In 1976 a milestone was reached when the South African Stud Book Association affiliated the Nooitgedacht Pony Breeders' Association and recognized the Nooitgedacht



*Figure 1 The stallion Mac, born at Nooitgedacht Experiment Farm in 1958, had a significant influence on the development of the breed. and can be considered the ideal type of general purpose animal envisaged by the managers of the project. The good shoulder, short, well-muscled back and loins, rounded hips and slightly sloping croup, strong legs with flat bone and round, hard hooves are evident. The small pointed ears, heavy brows and straight to slightly concave profile are characteristics of the Nooitgedacht (Photo: Landbouweekblad).*

as its first “indigenous” horse breed. In that same year the Department of Agriculture decided that the project had run its course and that future development of the Nooitgedacht could be left in the hands of the breeders’ society and the two universities, Stellenbosch and Pretoria. They received a stallion and four mares each, while the rest of the parent stock at Nooitgedacht was sold at public auction.

The name Nooitgedacht pony (after Basutho pony) was soon changed to Nooitgedacht horse when it was realized that in the minds of South African people, pony was associated with small children’s ponies such as Shetland and Welsh Section A to which the Nooitgedacht had no relation.

With only limited numbers of recorded and registered breeding animals and a narrow

genetic base to start from, the stud book was kept open for the foundation to be broadened with suitable females which were accorded  $F_1$  status after phenotypic inspection by a panel of judges. All recorded animals were identified with the breeders’ registration letters and a unique identification number branded on the left side of the neck or tattooed on the inner lip. Recently, microchips have been accepted as a third option for individual identification. Many of the selected  $F_1$  females were of small Boerperd, Arabian or part-bred Arabian stock. No British pony breeds were allowed and only inspected and approved individuals conforming to the Nooitgedachter standards of excellence, as laid down by the breeders’ association, were accepted. Figures 1 and 2 show some examples of the breed.



*Figure 2. Game warden and tourist mounted on Nooitgedacht horses, approach a female rhinoceros with calf in the background. The South African breeds have shown themselves to be exceptionally suitable for transporting inexperienced riders on game safaris (Photo. F.J. van der Merwe)*

## The SA Boerperd

The present SA Boerperd, registered as a breed with the South African Stud Book and Livestock Improvement Association, is, like the Nooitgedacht, assumed to be a distant descendant of the Cape Horse.

The name derives from *boer* (= farmers) and *perd* (= horse). However, this is not any non-descript farm horse. The present name, which has some historical and cultural connotations, must be seen in the context of the British officers before and during the Anglo Boer War (1899-1902) referring to *boer horses*, or more often in a derogatory manner to *boer ponies*, these being the hardy little local horses on which their enemy in the former republics and the colonies in South Africa were mounted. As shown above, they were descendants of the Cape Horse of the 18<sup>th</sup> and 19<sup>th</sup> centuries. During the war the previously

despised *boer ponies* turned the tables on their detractors and proved themselves superior in the harsh local conditions to most of the hundreds of thousands of remounts imported for the British army (Smith, 1914).

The presently registered SA Boerperd is purported to be a direct descendant of remnants of breeding herds that survived the ravages of the 1899-1902 war and which were maintained as fairly isolated nuclei in the northern provinces. Six northern foundation blood lines were eventually recognized by the breeders' association formed at Memel in 1973. These lines were the Van Niekerk's A2 horses; Cloete's Eggo; Odendaal's; Middleton's; Hancke's; and Steenkamp's. The newly formed breeders' association distanced themselves from the older SA Boerperd Breeders' Association, which was based in the central and southern Cape Province and whose members had by then clearly

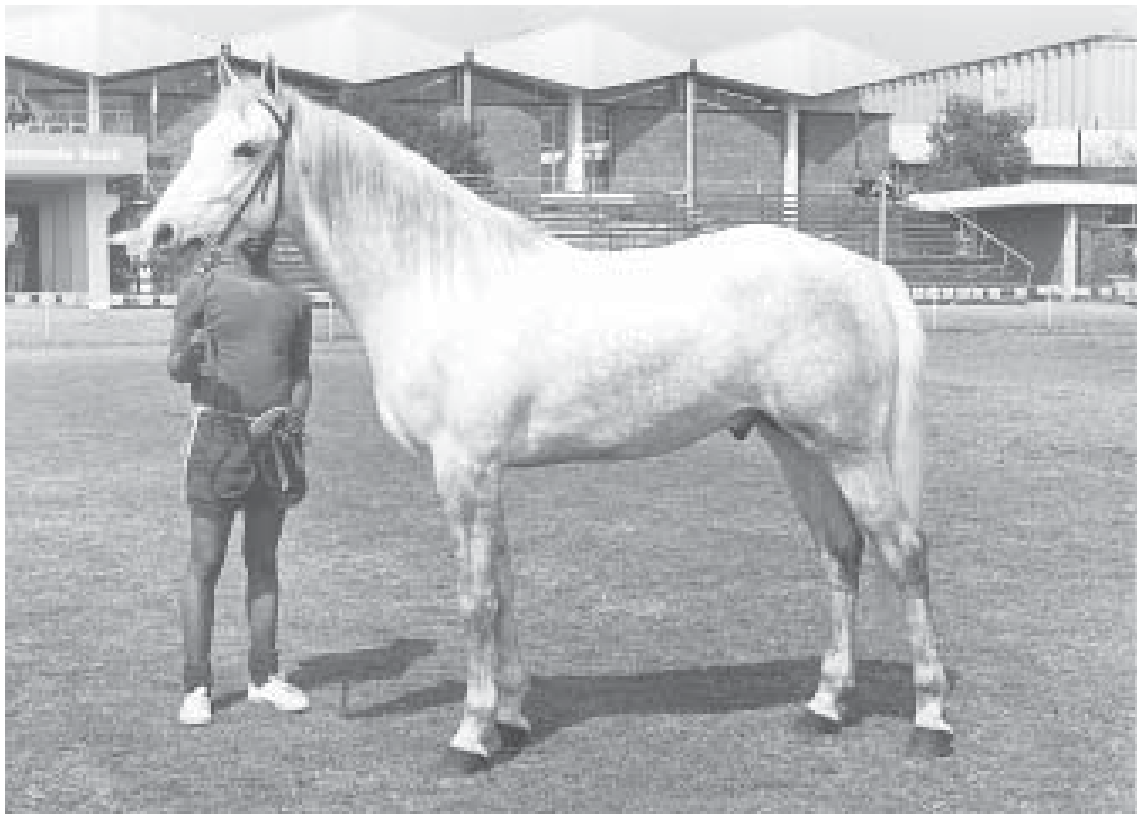


Figure 3. Young SA Boerperd stallion, Carel Hancke Yster, exhibiting the typical features of the breed and the clear resemblance to the other breeds described in this paper. (Photo: Landbouweekblad).

demonstrated that they were intentionally using American Saddle as a breed improver. In contrast the objectives of the Historic Boerperd Breeders' Association, so named from 1977 onwards, was to close ranks and conserve what they believed to have been recovered of the pre-Anglo Boer War genetic material. They preferred to call them blood lines.

The Historic Boerperd Breeders' Association was recognized by the Department of Agriculture and affiliated to the South African Stud Book and Livestock Improvement Association in 1980. They therefore became the second "indigenous" horse breed to be accepted as such. In 1998 the Association decided to discard the historic part of the name and changed to SA Boerperd.

The SA Boerperd is a comfortable riding horse (Figures 3 and 4). A high percentage of the individuals are natural pacers and trippers as were the Cape Horses of the 18<sup>th</sup> and 19<sup>th</sup> centuries. Whether these traits were derived from recent unacknowledged American Saddle infusions rather than from the distant Spanish ancestors which, on another continent, gave rise to breeds like the Paso Fino and Peruvian Paso with their characteristic lateral gaits, is open to discussion. Apart from the similarity in gaits there is, the view of the authors, a distinctive resemblance in general appearance between the South African and South American breeds, with their reputed common Spanish and, further in the past, Barb ancestors.

On paper, the Standards of Excellence, adopted for selection and judging, are very much the same for all the different riding



*Figure 4. SA Boerperd brood mare with two young charges aboard, demonstrates the bright eye and honest dependability of the breed (Photo: Landbouweekblad).*

horse breeds. Height at withers of mature SA Boerperd is stipulated as 14-15.3 hands (142-160 cm). All colours, except piebald and skewbald, are accepted. The most common colours are bay and brown in various shades, with grey and roan, chestnut, dun and palomino occurring less frequently. The Middleton horses used to be distinctively dark brown to black while the Odendaals are frequently dun coloured. In the Cloete horses bays and dark bays, lightly coloured flanks and muscles are characteristic while greys are common in horses of the Hancke blood line.

To qualify for stud book registration, foals have to be individually identified by lip tattoo or microchip before weaning. Inspected and approved individuals are branded with the rather attractive breed emblem, i.e. the letter B framed in a horseshoe.

## The Cape Boerperd

The confusion in names of South African horse breeds is compounded by the fact that a group of breeders, based mainly in the Cape Province, from the 1950s onwards, organized themselves into the SA Riding Horse Breeders' Society and attempted to improve the existing Boerperd stock with American Saddlebred and Morgan stallions (Kaplan, 1974). Over the years they made various attempts to gain recognition from the Department of Agriculture and the South African Stud Book Association. This was eventually granted in May 1984 when the Cape Boerperd Breeders' Association was granted legal status by the Minister for



*Figure 5. Champion Cape Boerperd stallion under saddle, clearly display American Saddle or Morgan influence on the development of the breed (Photo: Landbouweekblad).*



*Figure 6. Cape Boerperd mares and foals at pasture. On some sheep and cattle ranches, horses are still bred in numbers on free range and used for tending and working livestock (Photo: F.J. van der Merwe).*

Agriculture and a certificate of incorporation with the South African Stud Book Association was issued.

At that time there were 93 breeder members of which 90 percent was in the Cape Province. The estimated 1 000 horses of which farm records existed, were entered into a development register which required six generations of line-breeding to approved stallions for full registration.

Again the Standard of Excellence differed little from the ideal set by riding horse breeders' societies and clubs in general. With the American Saddlebred as the main breed improver, it was inevitable that the saddle seat-riding style and show culture were also adopted, to the extent that it was often difficult for the lay viewer to distinguish between the Saddlebred and Cape Boerperd at rural agricultural shows.

It was stipulated that height at withers for males and females is ideally 147-157 cm and that the acceptable lower and upper limits

were 142 and 162 cm, respectively. Piebalds, skewbalds and cremellos were not accepted. The common coat colours were chestnut, bay and grey.

One of the stated objectives was to breed a dual purpose animal, i.e. for draft and riding purposes. This was entirely in line with the history of horses in South Africa where, before motorized travel and mechanization, oxen were used for heavy transport and horses and mules for mail coaches, carriages and carts. Figures 5 and 6 show some characteristics of the breed.

## **The Basutho Pony**

The Basutho Pony was never and is still not a formally recognized breed in the classic stud breeding mold. In other words, there are no recognized stud books or written pedigrees. Loftus and Scherf (1993) in *World Watch List for Animal Diversity*, cite Turton's definition of

a breed as either a homogenous, 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 as a homogenous group for which geographical separation from phenotypically groups has led to general acceptance of its separate identity. At certain stages of their existence the Basutho Pony complied with both these criteria and especially with the second.

Thornton *et al.* (1936) had no doubt that the Basutho Pony, like the once famous Cape Horse, became a definite and well established type due to its origin and habitat. Its conformation, character, paces, action and high powers of endurance were, according to these writers, typical of the oriental ancestors of the Cape Horse. They believe that, in Lesotho, certain characteristics became accentuated due to the nature of the country and the manner in which the horses were

kept and handled by their owners. Lesotho is the most mountainous and coldest part of the subcontinent. Thornton found the Basutho horsemen to be fast and fearless riders but, in his words, “poor horse masters”. Shelter and food for the horses, other than that supplied by nature, are seldom considered. A Basutho Pony was, and is, galloped up and down precipitous mountains where any other horse and its rider would fear to proceed at a walk. This treatment, together with the climatic and topographical conditions, according to Thornton *et al.* (1936), tended to increase and accentuate the inherited characteristics viz. the small body size, endurance, etc. of these animals which were already fearless and surefooted. According to these observers, they were the most fearless and surefooted of any known type or breed.

Thornton *et al.* (1936) considered the popularity and fame of the horses, combined with a lack of national breeding policy and structures, which led to indiscriminate



Figure 7. Aged Basutho Pony stallion Twist, photographed in 2001 at the Lesotho Government Stud in Thabo Tseka, was extensively used in the Basutho Pony Project. His clean, flat-boned limbs, hard round hooves, prominent sloping shoulder and fine pointed ears, are typical features of the genotype (Photo: J. Martin).

gelding of good males and export of even the best breeding animals, as the first factors that caused a decline in the quality of the Basutho horse stock from 1900 onwards. Another contributing factor was the ever increasing human population and livestock density which led to serious overgrazing problems, especially by sheep and goats. This further diminished the horses' only sustenance viz. the natural grazing which, in the prevailing tribal system, was utilized communally.

After the Anglo Boer War various attempts were made by the Government of the Protectorate to improve the breeding stock by the importation of Arab and Thoroughbred stallions. In order to make use of superior or even just selected stallions in horse breeding, the concept of Mare Camps were established. The intention was to enable community groupings of mare owners to make use of superior imported stallions or stallions bred to be established as national studs. It meant that the local chief had to allocate a specific piece of land to a group of horse breeders to be used exclusively by them for the breeding of horses from Government stallions or stallions leased from other camps. This concept has been used with variable success, in one or another form for the past 100 years in order to circumvent the most basic problem in African agriculture viz. the communal land tenure system.

The Irish Basutho Pony Project (IBPP) was a follow-up to a donor conference in Maseru in 1975. In 1976 the Government of Lesotho requested the Government of Ireland to carry out a feasibility study for the development of the Basutho Pony. As a result the IBPP was started in March 1978 with the establishment of a National Stud at Thaba Tseka in the high mountains 120 km east of the capital, Maseru.

The objectives were to:

- maintain a satisfactory mode of transport for the rural population, particularly for the people who live in the mountain districts where travel on horseback is the only realistic alternative to vehicles;
- upgrade the Basutho Pony breed, a potentially valuable natural resource and thereby provide the farmers with a marketable commodity;
- develop and exploit the domestic and export markets for Basutho Ponies;
- improve efficiency of production by instituting an extension programme of general horse care and management; and
- reduce the overall stocking density of the land by the replacement of large numbers of inferior horses with improved stock which would be more easily sold at a young age.

At the beginning of the project it was decided to use the Connemara Pony in the breeding programme as it was well established as a hardy horse under harsh environmental conditions and was considered to be quite similar to the Basutho in general conformation and stature. Two stallions were imported in 1979. It was decided that any further infusion of Arab blood would not make a significant contribution to the breeding programme. In subsequent years Basutho stallions and even Nooitgedacht from South Africa have been used with good results.

In the IBPP the ultimate objective of the breeding programme was to build up a small stud of elite Basutho stallions and mares which would produce suitable colts for dissemination throughout the country. According to McCann (1986) assessment of the horses was made on the following criteria: hardiness and ability to survive; breed type; conformation; temperament; suitability for riding; endurance; and tripling ability.

Three subsequent developments in the project were the:

- a) initiation of an extension / registration service;
- b) establishment of a marketing centre at Mollie Enthuse in 1983; and
- c) development of Pony Trekking as a tourist facility for the generation of extra income and for performance testing of young horses.

In general, the breeding programme was considered to be developing satisfactorily through the 1980s, but progress was slower than initially envisaged. One of the reasons given, was the slow maturing rate of the Basutho Pony. Whereas in Ireland the Connemara would be expected to have reached full maturity at five years, the Basutho, according to McCann (1986), seemed to mature at around seven years.

The Registration/Extension Unit was set-up as an integral part of the project in conjunction with the National Stud at Thaba Tseka where it is based. One of the main objectives of the Unit was the institution of a National Stud Book which was considered to become increasingly important as the programme progressed and the requirement of a reputable and reliable Breed Record became necessary.

In October 2001 one of the authors (DIM) found the National Stud at Thaba Tseka in operation with six stallions, 32 mares and 53 young stock of which 30 were females and 23 males. The premier Basutho Pony stallion Twist, mentioned in the 1986 report, was still alive and well. No updated information could be obtained by the authors about the present status of the Basutho Pony Project. There are indications that most of the essential elements of the original IBPP are still nominally in existence and the Pony Trekking has gained a certain momentum which is being utilized in furthering the objectives of the project.

An interesting facet of the Extension/Registration element of the project which has developed since 1981, is the popularity gained by organized endurance competitions over 80 km and triple races. The



*Figure 8. Two Basutho horses with their riders in traditional garb, following a foot path in the high mountains of Lesotho. These are working horses on sound limbs and naturally hard hooves, needing no shoe. The dark brown pony in front, showing bright but calm interest in the photographer, is a more typical example of the genotype than the grey (Photo: J. Martin).*

gait known as triple in Southern Africa and which is quite similar to the *tot* of the Icelandic Pony, is a relatively rare trait worldwide. It is a four-beat gait and gives the rider a very smooth ride. As already mentioned, it also occurs naturally in the Boerperd and Nooitgedacht horses. Ridden at this gait, the surefooted Basutho Pony negotiates the steepest of mountain footpaths on the downslide without shoes. Triple races over flat ground are very popular at agricultural shows in Lesotho. Figures 7 and 8 report some characteristics of the breed

## Blood-typing to Establish Relationships

The results of a recent genetic analysis of three of the breeds by Cochran and Van Dyke (1998) is briefly summarized and discussed. This study must be seen in the context of Cochran's comprehensive series of blood-typing studies at the University of Kentucky on some 140 world horse breeds and types.

As a follow-up to Cochran, Van Dyke and Van der Merle's 1996 blood-typing study of a group of Namibia Desert horses (published by Cochran *et al* in 2001), Cochran and Van Dyke (1998) carried out a similar investigation of SA Boerperd, Nooitgedacht and Basutho Pony samples collected by Van Dyke of the Onderstepoort Veterinary Faculty. In collaboration with the Breeders' Association in South Africa and officials in Lesotho, Van Dyk collected samples of SA Boerperd (n=34), Nooitgedacht (n=21) and Basutho Pony (n=34). Standard immunological procedures involving haemagglutination and complement-media haemolysis were used to detect variation of red cell allo-antigens at seven blood group loci. Starch and polyacrylamide gel electrophoresis and iso-electric focusing were used to detect variation at 10 serum rbc lysate protein loci. Values of genetic variation of the South African breeds were compared to those of domestic horse populations that have been tested at the University of Kentucky. They were regarded as international breeds and not country bound.

The results showed the following:

- levels of individual genetic variation within the three South African breeds studied (Cape Boerperd were not included) were intermediate for a domestic horse breed with the highest Ho (observed heterozygosity) in the Boerperd and the lowest in the Basutho Pony;
- the three South African sets of samples show that they are indeed from different breeds;
- the three SA breeds are closer related to each other than to any other horse breed in the world as tested at the University of Kentucky;
- Nooitgedacht and Basutho Pony have the closest relationship to world breeds with a strong English Thoroughbred background while the SA Boerperd falls within the North American gaited breeds cluster;
- significantly none of the SA populations sampled showed a direct close relationship with world Arabian populations sampled nor with the Namib Desert group which was included in another study (*op cit*).

Although there may be questions about the numbers and representivity of the samples, the results of the blood-typing studies tend to support the postulate that the three breeds have a common ancestor.

## Present Status and Use of the Horses in Southern Africa

### Horse numbers and breeding population sizes

In the 1930s the South African horse population was estimated at just under one million. Large-scale mechanization of farming operations after World War II led to a dramatic decline in numbers and to the virtual disappearance of draught horses and mules from commercial farms. In 2000 the total number of horses in South Africa was given as 270 000, which is about 25 percent of the peak numbers recorded before mechanization. In the year 2000 the Lesotho

horse population was indicated as 103 000, which is quite a sizeable number for a small country in the age of mechanization but then it should be remembered that in the mountainous kingdom the horse is still the best and often only mode of transport for rural people in the outlying districts. A further breakdown of the Lesotho horse population shows that 62 percent occurs in the mountain areas, 20 percent in the foothills and 18 percent in the lowlands.

In the Republic of South Africa the situation is quite different from Lesotho. The changed role of horses from work animals to sport and leisure companions is reflected in the dramatic drop in horse numbers over the past half-century. Although horses and mules are still used economically on a limited scale for fence riding and livestock gathering on extensive stock farms and for light draught work by the less well-off rural dwellers, horses have in general disappeared from farms. The highest concentrations of light riding and show horses are to be found in urban and peri-urban areas.

However, in this paper the emphasis is not on total numbers, but on the effective breeding populations, i.e. stud book registered animals, of three South African breeds and the Basutho Pony. The emphasis is placed on recorded and registered breeding stock because with thousands of crossbred and non-descript horses in the country, it is only in the registered breeds where dedicated and disciplined members of breeders' societies can, in the long-term, make contributions firstly to the conservation of valuable and rare genetic material as well as promoting the sustainable use of these animals in a modern economy and in competition with other world breeds.

Numbers of registered animals of six horse breeds in South Africa are reported in Table 1.

For the sake of perspective, the effective breeding populations of the three South African breeds under discussion are compared to that of Thoroughbred, Arab and American Saddle which are the most numerous of some 15 formally registered horse breeds in South Africa.

From the data, it is evident that the active breeding populations of Nooitgedacht and SA Boerperd, which are the two South African descendants of the Cape Horse most deserving of preservation, are quite small and probably fall in the range of rare breeds.

The present-day Basutho Pony in the country of Lesotho falls in a different category. No evidence of an official stud book or registration system could be obtained but, as over the past 175 years, a large practically free-mating population in very harsh climatic and scarce feeding conditions still exists. This is exactly how the Basutho Pony developed in the first instance and, because of its relative isolation of the breeding population, the fixing of a type, if not a breed, is still progressing. Despite many health, husbandry and nutritional problems the almost unique favourable factor in Lesotho is that the horses are used for everyday riding under the most stringent conditions. They are naturally performance tested while in South Africa breeders are trying to find ways of testing that are far removed from the original.

### **Comparative physical appearance and characteristics of the four breeds**

The physical appearance of the breeds is best illustrated in the accompanying photographs. The breeders' societies of the three South African breeds each have a detailed description of the ideal conformation envisaged for their breed and use this as a manual for the mandatory inspection of each horse before it is allowed to be fully registered. It is expected of judges at shows to use the manual as a guideline. Training courses for inspectors and judges are held regularly.

As to be expected, Nooitgedacht and SA Boerperd may share many common physical characteristics and there is a minority of breeders who are of the opinion that the two separate breeders' societies should pool resources and the horses should be combined in one register. Cape Boerperd does not fall in the same category because it shows a strong resemblance to American Saddle.

Table 1. Numbers of registered animals of six horse breeds in South Africa.

|                 | Mares | Stallions | Births | Transfers |
|-----------------|-------|-----------|--------|-----------|
| Thoroughbred    | 5 000 | 200       | 3 500  | 1 800     |
| American Saddle | 2 500 | 1 500     | 439    | 492       |
| Arab            | 1 900 | 830       | 300    | 500       |
| Nooitgedacht    | 850   | 430       | 290    | 100       |
| SA Boerperd     | 846   | 180       | 100    | 103       |
| Cape Boerperd   | 213   | 90        | 8      | 34        |

Information for year 2000 obtained from SA Stud Book and Livestock Improvement Association, Bloemfontein, and Thoroughbred Breeders' Association, Germiston

Explain Transfers

**Note 1:** Only in the case of Thoroughbred can the number of males be taken as representing actively breeding sires. With the other breeds no distinction was made between actively breeding sires and total males registered.

**Note 2:** In the case of Cape Boerperd the figures obtained from the South African Stud Book and Livestock Improvement Association are probably not truly reflecting the numbers unofficially recorded by the Breeders' Society.

Both SA Boerperd and Nooitgedacht societies set their ideal height at 140-160 cm at withers, but in general Nooitgedacht gives the impression of being a slightly smaller animal than SA Boerperd. Liveweights vary between 380-600 kg in the two breeds.

Selection breeders lay much emphasis on temperament. The horses are tractable and docile, but willing to work and easy to train under saddle or in harness.

The horses are generally well proportioned and stylish in conformation with good muscling, clean, flat, dense bone and fine coat. General features are the rounded hips and slightly sloping croup which used to be very pronounced in the old Cape Horse. A straight to slightly concave profile, deep chest, good width between the forelegs, light hindquarters, strait pasterns and high heel bulbs with dense, hard hooves are features of both breeds.

The first of the gaits is a flatfooted, fast walk. With training some individuals are able to go over into a comfortable, shuffling pace which can be maintained for long distances, especially for farm work and on precipitous terrain. A natural progression from the pace is the faster four-beat tripple which is similar to the rack in American gaited horses, but

which was already a feature of the Southern African breeds long before the introduction of American Saddle into the country.

The trot is square and free-moving with good, but not exaggerated, knee and hock action.

The canter is free-flowing, smooth and easy. A much favoured gait in the traditional style is the slow, collected canter with its special variation the amble which can best be described as a combination of the shuffling pace and a slow, swaying canter.

## Present-Day Uses of the Four Breeds in Southern Africa

In the Republic of South Africa horses have a very minor role in the agricultural economy. In rural districts some farm workers and less well-off country dwellers use light horses in harness for transport while stockmen on large livestock enterprises still find horses useful for patrol-riding and stock gathering. Although there is an increase in the request for the partial return of horse power to small farms where draught oxen have been traditionally employed, there is yet no discernible shift in that direction.

In the Kingdom of Lesotho the situation is quite different. In that country riding and pack horses have an essential role in the everyday lives and activities of people in the far-off mountainous areas. The horses are tested under the most stringent conditions and the authors believe that, amongst the majority of non-descript horses in Lesotho there are individuals of excellent merit which could be used in a properly constructed and executed selection programme for the improvement of the Basutho Pony. There seems to be no need for the introduction of any other breed, but there is a crying need for selective breeding and the gelding of the superfluous number of poor quality males.

In modern South Africa the major emphasis in the horse industry falls on the sport and leisure fields. In this market Nooitgedacht and SA Boerperd have to compete with the specialized breeds such as Thoroughbred for flat racing, Arab for endurance racing, Thoroughbred and European Warmbloods for show jumping, dressage and eventing, and the British pony breeds with their crosses for children.

Although the numbers of registered horses are small and saleable, animals are in short supply, both Nooitgedacht and SA Boerperd have a growing market in the show and leisure horse categories. Their even and docile temperament and easy-care characteristics make them eminently suitable in the peri-urban environment for weekend riding as well as in the tourist industry for pony trekking and game viewing. This is also true for the Basutho Pony.

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## On-farm characterization of the indigenous small East African Shorthorn Zebu cattle (SEAZ) in the Southeast rangelands of Kenya

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### Summary

The small East African short horned Zebu (SEAZ) is an important source of animal protein in Kenya. This indigenous genotype is well adapted to environmental stresses including endemic diseases of the tropics. However, literature available on its genetic potential is scarce. The Government of Kenya, in order to study this valuable germplasm in a systematic manner, has recently initiated some research and breed improvement programmes. This paper reports on some of the results of this work. Information was obtained using a structured questionnaire administered to 430 farmers in Makueni, Kitui, Taita Taveta and Kajiado districts, Kenya. A multi-level stratified sampling technique was used to select the farmers to be interviewed. Utilization and reasons for preference of SEAZ cattle differed across and within districts in rankings. Generally, the SEAZ cattle are kept as multi-purpose animals and were mainly preferred to the exotic breeds due to their superior adaptive capacity to the local environmental stresses. Herd structures differed between the agro-pastoral and pastoral herds, but showed a management system that is subsistence oriented with milk production and draught power being the main objectives of herd owners. Breeding bulls were sourced from within or obtained from other herds for pure- or crossbreeding by natural, uncontrolled mating. Natural pastures, under continuous grazing were the main source of livestock feeds. The herds surveyed had advanced ages at first calving and prolonged

calving intervals. The average milk production per day was 1.6 litres with significant differences being observed between districts, and hence Zebu strains, at the start and peak of lactation.

### Résumé

La race de Zébu de petite taille à cornes courtes de l'Est africain (SEAZ) est une importante source de protéines au Kenya. Le génotype indigène est bien adapté aux stress environnemental, y compris les maladies endémiques des tropiques. Cependant, il existe peu de littérature disponible sur son potentiel génétique. Le Gouvernement du Kenya, pour pouvoir étudier ce germoplasme de grande valeur d'une façon systématique, a initié récemment quelques programmes de recherche et d'amélioration. Cet article présente les résultats de ce travail et l'information obtenue à travers un questionnaire soumis à 430 éleveurs dans les zones de Makueni, Kitui, Taita Taveta et Kajiado au Kenya. On a utilisé une technique d'échantillonnage stratifié à différents niveaux pour sélectionner les éleveurs. L'utilisation et les raisons pour la préférence du SEAZ diffèrent à travers les zones et à l'intérieur même de celles-ci. En général, le SEAZ est utilisé à double propos et on les préfère aux races exotiques car plus adaptés aux stress du milieu. La structure des troupeaux aussi diffère entre agro pastorale et pastorale, mais montre de prévalence une conduite de subsistence basé sur la production de lait et la traction. Les mâles reproducteurs sont choisis parmi le troupeau ou obtenu à travers d'autres

troupeaux de race pure ou de croisement naturel non contrôlé. Les pâturages naturels sont la source principale d'alimentation de cet élevage. Les troupeaux contrôlés présentaient un âge avancé à la première mise bas et un interval entre mise bas prolongé. La moyenne de production laitière par jour était de 1,6 litres avec des différences importantes entre les zones observées et les lignées de Zébu, au début et au maximum de la période de lactation.

**Keywords:** *Characterization, Functions, Herd structures, Management, Preferences, Zebu.*

## Introduction

The Small East African shorthorned Zebu (SEAZ) is the main type of cattle in Kenya. This type, represented by several strains (Rege and Tawa, 1999), plays various socio-cultural and economic roles in the livelihoods of a majority of the populace and has successfully adapted itself to almost a large range of vegetation and management systems. These adaptive characteristics are very important for the development of a livestock industry that is suitable for resource poor farmers whose production system is fairly simple and extensive; with a relatively low level of managerial skills.

In spite of their ecological and economic importance, the SEAZ is inadequately characterized. This has indirectly contributed to the lack of sufficient interest to sustainably utilize, improve and conserve these unique genetic resources. Furthermore, literature available relating to the SEAZ has been gathered from unsystematic surveys or anecdotal reports whose reliability is questionable. There is a need for well-designed on-farm and on-station studies to evaluate the SEAZ and to provide an insight into possible areas for interventions. Documentation of the indigenous knowledge applied by farmers to select superior genetic stocks and priorities they attach to each function played by, and the reasons why farmers prefer, the SEAZ over exotic cattle, is also necessary. This study undertook to

address some of these questions by conducting an on-farm survey in four administrative districts of the arid and semi-arid lands (ASAL) of Kenya where these cattle populations predominate.

## Materials and Methods

### Study sites

The survey was conducted in four districts in Kenya, namely Makueni, Kitui, Taita-Taveta and Kajiado. The inhabitants of Makueni and Kitui (Kamba tribe) and Taita-Taveta (Taita tribe) are agro-pastoralists. The Maasai of Kajiado are pastoralists. The climate of the study area has been summarized by Jaetzhold and Schmidt (1983). The study sites are characterized by very low agricultural potential being mainly arid and semi-arid lands where natural conditions favour livestock or game ranching and subsistence farming, given the present level of technology.

### Data collection, classification and analysis

Data were collected in 1992, 1998 and 1999. In 1992, 185 farmers were interviewed in Makueni and Kajiado. The 1998 survey was done in Kitui where 65 farmers were interviewed while in the 1999 survey, which was deliberately designed to cover multiple districts, 180 farmers were interviewed, 60 each from Makueni, Kajiado and Taita-Taveta. Only in the 1998 and 1999 surveys were farmers asked to rank, in order of importance, the functions and reasons why they preferred the SEAZ cattle.

Information was obtained on the functions, preferences, management, adaptive traits, herd structures and production and reproductive attributes of the SEAZ cattle, through formal interviews, using a structured questionnaire administered to cattle-owning households. These households were chosen at random within a structured, stratified framework. That is, in each district, a

multi-level stratified sampling technique was used based on the local administrative boundaries. For example, in Kitui, three locations in each division were chosen at random. In these locations, three sub-locations were chosen and in each sub-location, three farmers were interviewed. For the 1999 survey, only three divisions with the highest population of the SEAZ cattle were sampled and farmers having the highest and lowest numbers of cattle in each of these divisions were included in the survey.

The functions played by, the reasons for preferring, individual cattle types/breeds and age-sex classes were each categorized, classified and coded for analysis. Frequency counts were determined to obtain the number of individuals in each class. Tests of independence were performed by Chi-square to investigate association of responses across and within districts. Milk yield data were collected based on three stages of lactation (start, peak and end). Farmers were asked to indicate average yields at each of these stages. The mean daily milk yield was calculated using the following approach:

$$\text{"Total" milk yield} = x_1y_1 + x_2y_2 + x_3y_3$$

$$\text{Adjusted daily mean milk yield} = \frac{\text{"Total" milk yield}}{(x_1 + x_2 + x_3)}$$

where:

$y_1$  = milk yield at the start of lactation

$y_2$  = milk yield at the peak of lactation

$y_3$  = milk yield towards the end of lactation

$x_1$ ,  $x_2$  and  $x_3$  denote the interval lengths of the different stages of lactation (start, peak and end) and they sum up to lactation length.

Based on farmers' views, within the first 30 days ( $x_1$ ) of lactation, there is a rise in milk production, peaking during the second and third month of lactation (60 days =  $x_2$ ). The end of lactation, a time when milk production is declining, was from the beginning of the fourth month to the end of lactation, varying in length depending on the district surveyed and was  $x_3$  = 204 days for Makueni; 150 days for Kitui; 112 days for Taita Taveta and

115 days for Kajiado. Data were analysed using the GLM procedure of SAS<sup>®</sup> release 6.12 (SAS Institute, 1993).

## Results and Discussions

### Functions played by indigenous breeds

The role of indigenous cattle differed across and within districts in their ranking ( $P < 0.05$ ), (Table 1). Within districts, milk production ranked first in Kitui, Taita-Taveta and Kajiado and second after draught power in Makueni. Slaughter of cattle for home consumption or sale was more common amongst pastoralists than agro-pastoralists. This result indicates milk production as being the principal function of the herd in the study area. Slaughter of cattle either for home consumption or sale is uncommon, as many households either prefer to slaughter sheep and goats or chicken or even purchase meat from butcheries in smaller quantities that can easily be consumed at the household level without the need for preservation. In Kajiado, cattle are slaughtered during socio-cultural ceremonies such as circumcision.

The use of cattle as a source of income (commercial sales) is gaining in importance in the study area compared to the socio-cultural value of cattle (Table 1). Throughout districts, commercial sales were ranked second overall after milk production in Kitui, Taita-Taveta and Kajiado, while in Makueni it was ranked third after draught power and milk production. This implies that commercial sale is gradually replacing the socio-cultural value of cattle as the communities in the study area are being integrated into cash economy.

Throughout and within districts, draught function had higher priority amongst residents of Makueni and Kitui district. The Kamba community have traditionally been known to use cattle for draught while Taitas and Maasais have learnt this technology recently by interacting with the Kamba community. That a few farmers use cattle for draught in Kajiado was not surprising. This is a more arid and predominantly pastoral

[illegible]

| District     | Fertilizer |      | Fuel |       | Building |       |
|--------------|------------|------|------|-------|----------|-------|
|              | Yes        | No   | Yes  | No    | Yes      | No    |
| Makueni      | 96.0       | 4.0  | -    | 100.0 | -        | 100.0 |
| Kitui        | 88.9       | 11.1 | 1.7  | 98.3  | 1.7      | 98.3  |
| Taita-Taveta | 75.0       | 25.0 | 11.8 | 88.2  | 17.7     | 82.3  |
| Kajiado      | 42.2       | 57.8 | 26.3 | 73.7  | 92.5     | 7.5   |

district where extensive cattle grazing is practised. Crop farming is limited to Ngurumani escarpments along the river Ewaso Nyiro South and the Kimana irrigation scheme. Moreover, among the Maasai, the use of cattle for draught is still not acceptable to a large measure: such practice is equated to slavery. In Taita-Taveta, the use of cattle for draught is confined to the lowlands of Mwatate and Taveta Divisions, due to the steep and rugged topography of the remainder of the district.

The majority of the animals used for ploughing and transportation were male Zebu cattle and donkeys (data not shown). This is related to the commonly held belief that female animals should not be overburdened, that is to produce milk, calves and till land. Generally, animals are preferred as a source of draught power due to their easy availability and affordability, in terms of the initial purchasing costs and maintenance requirements compared to tractors.

Animal dung was predominantly used as manure in Makueni, Kitui and Taita-Taveta and for building and partly as a source of energy in Kajiado (Table 2; Figure 1). Agro-pastoralists have long recognized the value of animal dung as manure due to the need to improve soil fertility as chemical (inorganic) fertilizers are unaffordable. The result that only a few farmers in Kajiado used animal dung, as manure was not surprising. It reflects the diversification of the Maasai lifestyle from one traditionally dependent on livestock to that increasingly embracing arable farming. The use of animal dung for building by the Maasai is a long tradition of this community (Figure 2).

### **Preference for the indigenous breeds**

Indigenous cattle were preferred over exotic breeds due to their superior adaptation to local environmental stresses especially extensive droughts and endemic diseases and



*Figure 1. Taita zebu, commonly found in Taita-Taveta District.*

Table 3. Proportion (%) of respondents ranking each preference as 1, 2 or 3 in each district.

| District        | Rank  | Preference               |                                      |                       |                                |                       |                |                |
|-----------------|-------|--------------------------|--------------------------------------|-----------------------|--------------------------------|-----------------------|----------------|----------------|
|                 |       | Survival during droughts | Resistance to diseases and parasites | Better draught animal | Ability to work for long hours | Better milking animal | Highly Fertile | Better carcass |
| Makueni         | 1     | 13.9                     | 8.0                                  | 10.2                  | 1.4                            | -                     | -              | -              |
|                 | 2     | 17.5                     | 6.6                                  | 2.6                   | 5.1                            | 2.2                   | -              | -              |
|                 | 3     | 21.2                     | 7.3                                  | 1.5                   | 2.2                            | -                     | -              | -              |
|                 | Total | 52.6                     | 21.9                                 | 14.3                  | 8.8                            | 2.2                   | -              | -              |
| Kitui           | 1     | 11.8                     | 2.9                                  | 2.1                   | -                              | -                     | 2.6            | -              |
|                 | 2     | 22.8                     | 12.4                                 | 2.6                   | -                              | -                     | 1.3            | -              |
|                 | 3     | 23.4                     | 10.4                                 | 4.6                   | -                              | -                     | -              | -              |
|                 | Total | 58.0                     | 25.7                                 | 9.3                   | -                              | -                     | 3.9            | -              |
| Taita<br>Taveta | 1     | 9.0                      | 12.6                                 | -                     | 0.9                            | 10.8                  | -              | -              |
|                 | 2     | 11.7                     | 12.6                                 | -                     | 1.8                            | 4.5                   | -              | -              |
|                 | 3     | 13.5                     | 9.0                                  | -                     | 2.7                            | 0.9                   | -              | -              |
|                 | Total | 34.2                     | 34.2                                 | -                     | 5.4                            | 16.2                  | -              | -              |
| Kajiado         | 1     | 24.9                     | 3.0                                  | -                     | -                              | 4.2                   | -              | 1.8            |
|                 | 2     | 18.8                     | 6.7                                  | -                     | -                              | 3.0                   | -              | 3.6            |
|                 | 3     | 19.3                     | 8.5                                  | -                     | -                              | 1.2                   | -              | 0.6            |
|                 | Total | 63.0                     | 18.2                                 | -                     | -                              | 8.4                   | -              | 6.0            |
| Total           |       | 33.8                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 34.1                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 32.2                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 100                      | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 21.3                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 39.3                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 39.4                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 100                      | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 35.1                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 35.1                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 29.7                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 100                      | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 35.1                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 33.3                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 31.5                     | -                                    | -                     | -                              | -                     | -              | -              |
| Total           |       | 100.0                    | -                                    | -                     | -                              | -                     | -              | -              |

Note: Others = Better milking animal, better carcass quality, docile, high calf survival, better mothering ability  
 2 .T /Taveta = Better carcass quality, docile, better draught animal, high calf survival, better mothering ability, high fertility rates  
 3. Kajiado = Docile, better draught animal, ability to work for long hours, high calf survival, high fertility rates

parasites (Table 3). These two main reasons given for the preference of indigenous breeds of cattle were not surprising. These are low risk, low investment animals capable of subsisting on poor quality forages without supplementation and minimal levels of veterinary care.

Apart from the adaptive traits, farmers in Makueni and Kitui preferred the SEAZ cattle as better draught animals, pointing out their ability to work for long hours. That, farmers in Makueni, Taita-Taveta and Kajiado preferred the SEAZ cattle to exotic breeds for milk production was interesting, but not totally surprising. This result reflects the ability of Zebu cattle to produce milk in extreme conditions under which their exotic counterparts are totally unproductive or unable to survive.

### **Herd structures**

Two types of sex structures were observed, one in Taita-Taveta and Kajiado and the other in Makueni and Kitui (Table 4). The former showed a male:female ratio of 1:1.8. This type of sex structure is common in most livestock production systems in Africa, where the principal function of the herd is milk production (Pullan, 1979). In Makueni and Kitui, the ratio of males to females was 1:1.1 and 1:1.4, respectively indicating a proportionately larger number of male animals. This is expected in systems where the main function of the herd is to supply milk and draught power (de Leeuw and Wilson, 1987).

The number of adult breeding bulls in each herd gave a mating ratio of one bull to under 10 breeding females: 1:2.1 in Makueni; 1:2.4 in Kitui; 1:4.8 in Taita-Taveta; and 1:7.2 in Kajiado. Similar ratios have also been observed in Ethiopia and Sudan (Wilson and Clarke, 1975; Mukasa-Mugerwa, 1981). The need for draught animals in Makueni, Kitui and Taita-Taveta accounts for this high bull ratio while in Kajiado it may arise from the need to guard against unexpected losses of breeding bulls as a result of prolonged droughts due to the aridity of the district.

Adult animals, over three years of age, formed the highest proportion in the herds surveyed (49.2 percent in Makueni, 66.3 percent in Kitui, 54.3 percent in Taita-Taveta and 56.7 percent in Kajiado), with the majority being mature females (Table 4). This high percentage of mature females is essential where the main objective of the household is to ensure an adequate year-round supply of milk and allow for growth in animal numbers. High mortality rates approaching 20 percent among immature animals in the study area may explain the low proportion of young animals in the herds surveyed.

### **Breeding and nutrition management**

Both straight- and crossbreeding, using natural uncontrolled mating (Table 5), were practised. Farmers sourced breeding bulls from their own or neighbours' herds (Table 5). Under communal grazing, controlled mating is impossible. Crossbreeding is done between SEAZ and Simmental, Freisian, and Sahiwal breeds to improve milk and beef production. However, farmers interviewed indicated that crossbreds did not compare favourably with the SEAZ in fitness traits.

No distinct calving season was observed (Table 5). This was expected under natural uncontrolled mating. The strategy is to encourage non-seasonal calving to ensure year round supply of milk and calves. This is common with most communities found in tropical Africa (Wilson and Clarke, 1975, de Leeuw and Wilson, 1987). However, due to the effect of climate on pastures, there is usually a tendency for more calvings between March to May and November to December.

Inhabitants of the study area generally select animals for breeding. However, there was a preference for the selection of male animals only in Kitui and Kajiado and both males and females in Makueni and Taita Taveta (Table 5). Farmers in the study area do not keep written records but rely on their memory. This is a common situation in developing countries (e.g. Nuru and Dennis',

*Table 4. Age and sex structure of cattle herds in the study area (%).*

| Age – sex structure         | District |       |              |         |
|-----------------------------|----------|-------|--------------|---------|
|                             | Makueni  | Kitui | Taita-Taveta | Kajiado |
| Males                       | 46.9     | 41.8  | 36.0         | 36.1    |
| Adult males (> 3yrs)        | 13.9     | 18.0  | 8.4          | 5.4     |
| Adult castrates (> 3yrs)    | 6.2      | 5.2   | 5.6          | 11.9    |
| Young intact males (1-3yrs) | 9.6      | 8.9   | 11.8         | 5.7     |
| Young castrates (1-3yrs)    | 1.0      | 0.8   | 2.6          | 4.2     |
| Immature (0-1yrs)           | 16.0     | 8.9   | 7.7          | 8.8     |
| Females:                    | 53.1     | 58.2  | 64.0         | 63.9    |
| Mature (> 3yrs)             | 29.0     | 43.1  | 40.3         | 39.3    |
| Young (1-3yrs)              | 12.1     | 8.1   | 14.0         | 12.1    |
| Immature (0-1yrs)           | 12.0     | 7.0   | 9.6          | 12.4    |
| Average herd size (numbers) | 5.2      | 7.9   | 22.3         | 53.9    |

1976). Under on-farm conditions, lack of performance recording is a major handicap to breed improvement.

Qualitative and quantitative traits were used for selecting breeding animals (Table 6). However, selection criteria differed between and within districts in ranking. Milk production, body size and coat colour formed the selection criteria for breeding animals in Makueni, Taita Taveta and Kajiado. In Kitui, milk production, coat colour and horn shape and size were traits of importance. In Taita Taveta, fertility and in Kajiado horn shape and size were additional traits used to select animals for breeding. Farmers favoured high milk producing animals as this ensured self-sufficiency both for the calf and the family, while larger bodied animals fetched better market prices. Brighter coloured coats were preferred as these are considered not to attract tsetse flies and thus act as a natural control against trypanosomosis. The preference for horn shape and size in Kitui and Kajiado was for socio-cultural reasons.

The average age at culling (AAC) breeding animals was 7.2 years and 11.3 years for male and female animals, respectively (Table 7). Significant differences were observed for the

latter ( $P < 0.05$ ) between: Kitui and Makueni, Kitui and Taita Taveta and Kitui and Kajiado. Generally, there was some culling of bulls. However, cows were maintained in the herds up to the end of their reproductive life. This is attributed to the important functions cows play in the households, the low replacement potential due to high calf mortality and the need to reduce risk by holding onto surviving adult female animals.

Livestock production is based on natural pastures under a continuous grazing system (Table 7). Tethering, practised to a small extent in the Kitui District, is done during the planting and harvesting when farming activities are at their peak and herding labour is scarce. Feeds are conserved in the form of crop residues (cereal straws) in Makueni, Kitui and Kajiado and also as hay in the Kitui District (Table 7). Supplementation using concentrates and mineral licks is rare due to the additional cost involved which farmers are either not willing or able to incur (Table 7). However, animals exploit natural salt deposits within the grazing fields or at watering points.

Table 5. Proportion of respondents (%) for each breeding management system.

| Breeding management                      | Districts |       |              |         |
|------------------------------------------|-----------|-------|--------------|---------|
|                                          | Makueni   | Kitui | Taita-Taveta | Kajiado |
| 1. Breeding system                       |           |       |              |         |
| Straightbreeding                         | 77.6      | 79.7  | 55.1         | 26.7    |
| Crossbreeding                            | 10.2      | 15.6  | 26.5         | 58.3    |
| Both straight- and crossbreeding         | 12.2      | 4.7   | 18.3         | 15.0    |
| 2. Mating system                         |           |       |              |         |
| Natural uncontrolled                     | 88.9      | 66.7  | 63.0         | 82.7    |
| Natural controlled                       | 11.1      | 28.6  | 37.0         | 17.3    |
| Artificial insemination (A.I.)           | -         | 4.8   | -            | -       |
| 3. Source of breeding bulls              |           |       |              |         |
| Own herd                                 | 88.9      | 57.1  | 57.7         | 97.7    |
| Neighbours' herd                         | 11.1      | 42.7  | 42.3         | 2.2     |
| 4. Calving season                        |           |       |              |         |
| Wet                                      | 11.4      | 49.2  | 36.5         | 27.4    |
| Dry                                      | 4.2       | 15.9  | 23.1         | 12.9    |
| Year round                               | 84.4      | 34.9  | 40.4         | 59.7    |
| 5. General selection of breeding animals |           |       |              |         |
| Yes                                      | 90.0      | 42.0  | 77.6         | 93.6    |
| No                                       | 10.0      | 58.0  | 22.4         | 6.4     |
| 6. Selection based on sex                |           |       |              |         |
| Male animals only                        | 37.3      | 67.7  | 12.5         | 49.1    |
| Female animals only                      | 2.3       | 6.5   | 20.8         | 25.4    |
| Both sexes                               | 60.4      | 25.8  | 66.7         | 25.9    |

### Age at first parturition and calving interval

The mean age at first calving (AFC) was 4.5 years, but there were substantial differences between districts: Makueni ( $4.3 \pm 0.14$ ) vs Kitui ( $5.3 \pm 0.14$ ) ( $P < 0.001$ ), Makueni vs Kajiado ( $4.4 \pm 0.14$ ) ( $P < 0.001$ ), Taita-Taveta ( $4.0 \pm 0.16$ ) vs Kajiado ( $P < 0.05$ ) and Taita-Taveta vs Kitui ( $P < 0.001$ ). These results show the expected patterns in which conditions in Kitui (nutrition stress) and Kajiado (nutrition stress and trekking long distances in search of pastures and water) are associated with delayed AFC (Ward *et al.*, 1988).

The mean calving interval (CI) was 16 months with significant differences being observed between districts: Makueni ( $14.9 \pm 0.93$ ) vs Taita-Taveta ( $18.5 \pm 0.92$ ) ( $P < 0.01$ ), Kitui ( $16.7 \pm 0.79$ ) vs Kajiado ( $13.9 \pm 0.81$ ) ( $P < 0.05$ ) and Taita-Taveta vs Kajiado ( $P < 0.001$ ). The observed differences in calving intervals between Kajiado and the other districts (e.g. Kitui and Taita Taveta), is in line with short lactation lengths observed among Kajiado herds, a result linked to the fact that Maasai wean their calves early. This facilitates early return to oestrus and thus conception.

Table 6. Proportion of respondents ranking each trait as 1, 2, 3, etc.

| District | Rank  | Body size | Basis of selection of breeding animals |             |            |           |             | Total |
|----------|-------|-----------|----------------------------------------|-------------|------------|-----------|-------------|-------|
|          |       |           | Milk Prodn.                            | Coat colour | Horn shape | Fertility | Other qual. |       |
| Makueni  | 1     | 21.9      | 9.4                                    | 0.6         | -          | -         | 5.9         | 39.0  |
|          | 2     | 5.3       | 4.7                                    | 8.9         | -          | -         | 6.5         | 27.8  |
|          | 3     | 1.8       | 7.7                                    | 3.6         | -          | -         | 2.3         | 19.5  |
|          | 4     | 3.0       | 0.6                                    | 2.3         | -          | -         | -           | 8.9   |
|          | 5     | 0.6       | 0.6                                    | 1.8         | -          | -         | 0.6         | 4.7   |
|          | Total | 32.6      | 23.0                                   | 17.2        | -          | -         | 15.3        | 100   |
| Kitui    | 1     | -         | 6.0                                    | -           | 8.4        | -         | 7.3         | 27.7  |
|          | 2     | -         | 2.4                                    | -           | 4.3        | -         | 2.4         | 10.3  |
|          | 3     | -         | -                                      | 2.4         | -          | -         | -           | 2.4   |
|          | 4     | -         | -                                      | 12.1        | 6.1        | -         | 3.6         | 21.7  |
|          | 5     | -         | 2.4                                    | 19.3        | 9.6        | -         | 3.6         | 37.3  |
|          | Total | -         | 10.9                                   | 33.8        | 28.4       | -         | 16.9        | 100   |
| T/Taveta | 1     | 16.4      | 20.2                                   | 2.2         | -          | 0.8       | -           | 44.0  |
|          | 2     | 10.5      | 9.7                                    | 5.2         | -          | 7.5       | -           | 33.6  |
|          | 3     | 3.7       | 1.5                                    | 3.0         | -          | 7.4       | -           | 16.4  |
|          | 4     | -         | -                                      | 1.5         | -          | 1.5       | -           | 4.4   |
|          | 5     | -         | -                                      | -           | -          | 0.8       | -           | 1.5   |
|          | Total | 30.6      | 31.4                                   | 11.9        | -          | 18.0      | -           | 100   |
| Kajiado  | 1     | 8.2       | 15.2                                   | 2.0         | 2.6        | -         | -           | 31.1  |
|          | 2     | 11.2      | 9.2                                    | 2.6         | -          | -         | -           | 25.3  |
|          | 3     | 3.6       | 1.5                                    | 7.1         | 3.0        | -         | -           | 16.8  |
|          | 4     | 1.0       | -                                      | 3.6         | 11.1       | -         | -           | 16.8  |
|          | 5     | -         | -                                      | 7.1         | 2.1        | -         | -           | 10.1  |
|          | Total | 24.0      | 25.9                                   | 22.4        | 18.8       | -         | -           | 100.0 |

Note: Other qual. = other qualitative traits which include extended dewlap, long neck, long tail, long prepuce, long navel flap

Others = 1. Makueni = Horn shape and size, fertility

2. Kitui = Fertility and body size

3. T/Taveta = Horn shape and size and other qualitative traits

4. Kajiado = Fertility and other qualitative trait



Figure 2. Maasai zebu, commonly found in Kajiado District.

### Average lactation length

The average lactation length (LL) was 235 days (Table 7) with significant differences ( $P < 0.05$ ) observed between the following districts: Makueni ( $9.8 \pm 0.32$  months or 294 days) vs Kitui ( $8.0 \pm 0.41$  months or 240 days); Makueni vs Taita Taveta ( $6.7 \pm 0.47$  months or 202 days); Kitui vs Taita Taveta; Kitui vs Kajiado ( $6.8 \pm 0.32$  months or 205 days) and Makueni vs Kajiado Districts. The short LL observed in Taita Taveta is related to the practice of partial/restricted suckling, as the calf is separated from its dam for part of the day during grazing. This encourages early return to oestrus after parturition. The inhabitants of Makueni, Kitui and Kajiado prolong the lactation lengths by continuously milking the dams and suckling their calves. The SEAZ cattle strains analysed in this study showed short or very short lactation lengths. The SEAZ strains studied are found in the arid and semi arid lands,

areas characterized by nutritional and climatic stress and are kept by resource poor farmers. These factors account for the short lactation lengths of the SEAZ cattle of the study area.

### Milk production

The daily milk yield averaged 1.6 litres with significant differences observed between districts, and hence strains, at the start and peak of lactation (Table 8). For the former, differences were observed between Makueni and Kitui; Makueni and Taita Taveta and between Kajiado and Taita Taveta, and for the latter between Taita Taveta and Kitui and between Taita Taveta and Makueni. The study area is characterized by overgrazed poor quality forage resources, climatic stress and low levels of disease and breeding management. Semenye (1987) observed that the lactation curve of the Maasai Zebu responds to forage availability regardless of the month of lactation. In spite of the low

Table 7. Age at culling of breeding animals (years) and nutrition management<sup>a)</sup>

|                                        | District    |             |              |             |
|----------------------------------------|-------------|-------------|--------------|-------------|
|                                        | Makueni     | Kitui       | Taita-Taveta | Kajiado     |
| <b>Breeding management</b>             |             |             |              |             |
| 1. Age at culling breeding animals     |             |             |              |             |
| Males                                  | 6.7 ± 0.52  | 6.9 ± 0.49  | 7.3 ± 0.53   | 8.0 ± 0.46  |
| Females                                | 11.1 ± 0.55 | 12.6 ± 0.45 | 10.6 ± 0.497 | 10.9 ± 0.44 |
| <b>Nutrition management</b>            |             |             |              |             |
| 1. Type of feeds available on the farm |             |             |              |             |
| Natural pastures                       | 53.1        | 27.7        | -            | 88.5        |
| Sown pastures                          | 6.3         | 3.0         | -            | 11.5        |
| Both natural and sown pastures         | 40.5        | 69.2        | -            | -           |
| 2. The common grazing system           |             |             |              |             |
| Continuous                             | 98.9        | 56.9        | -            | 96.2        |
| Continuous and tethering               | 1.1         | 43.1        | -            | 3.8         |
| 3. Feed conservation                   |             |             |              |             |
| Yes                                    | 100.0       | 85.0        | -            | 100.0       |
| No                                     | 0.0         | 15.0        | -            | 0.0         |
| 4. Type of feeds conserved             |             |             |              |             |
| Hay                                    | -           | 15.0        | -            | -           |
| Crop residues                          | 100.0       | 30.0        | -            | 100.0       |
| Hay and crop residues                  | -           | 55.0        | -            | -           |
| 5. Supplementation of animals          |             |             |              |             |
| Yes                                    | 33.8        | 24.2        |              | 19.0        |
| No                                     | 66.2        | 75.8        |              | 81.0        |

<sup>a)</sup>Figures in the table are percentage of respondents in each district expressing each level of a particular attribute (of nutrition management)

milk production levels in Zebu cattle, high within-breed variation in milk production has been observed with certain strains or individuals within the SEAZ type of cattle having very high milk production levels (Galukande *et al.*, 1962). Farmers interviewed also observed this. In their opinion, Zebu cattle are capable of high milk yields. However, this high level of milk production has declined as a result of inbreeding and poor feeding. It is, however, possible to identify farmers with high milk producing animals. There is a need to identify such animals which can form the basis for breed improvement programmes.

## Research and development

The SEAZ cattle have received limited national attention and no genuine and systematic attempts have been made for their improvement, in spite of its numerical importance and adaptability to stressful environmental conditions including disease

resistance. Considering the importance of using well adapted breeds in the tropics to meet food requirements, a breeding and genetic improvement programme for the SEAZ cattle has recently been established by the Kenya Agricultural Research Institute. A total of 124 SEAZ cattle (eight bulls and 116 heifers) has been procured from Kitui and Kajiado districts with the objective of studying this valuable germplasm and formulating selection criteria for its genetic improvement as a dual purpose breed for milk and beef production in the marginal areas of Kenya.

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Table 8. Average milk yields (litres) for Zebu cattle in the study area.

|                                                                  | Makueni    | Districts surveyed |              |             |
|------------------------------------------------------------------|------------|--------------------|--------------|-------------|
|                                                                  |            | Kitui              | Taita Taveta | Kajiado     |
| 1. Daily milk yields                                             |            |                    |              |             |
| Lactation start                                                  | 2.8 ± 0.23 | 1.9 ± 0.16         | 1.8 ± 0.18   | 2.3 ± 0.23  |
| Lactation peak                                                   | 3.1 ± 0.27 | 3.2 ± 0.23         | 2.4 ± 0.25   | 3.1 ± 0.27  |
| Lactation end                                                    | 1.0 ± 0.11 | 1.0 ± 0.10         | 0.7 ± 0.11   | 0.9 ± 0.10  |
| 2. Adjusted mean daily yields                                    | 1.6        | 1.7                | 1.4          | 1.8         |
| 3. Lactation milk yields                                         | 464.5      | 410.4              | 276.7        | 362.9       |
| 4. Annualized milk yields                                        | 380.1      | 299.0              | 181.6        | 316.4       |
| 5. Amount of milk potentially produced by Zebu cows (annualized) | 83 545 980 | 56 808 100         | 23 698 800   | 239 957 760 |

Annualized milk yield = (actual lactation milk yield \* 365) / calving interval

<sup>5</sup>Based on the proportion (%) of mature (breedable) cows as obtained from the herd structures (Table 4 as follows: Makueni = 29.0; Kitui = 43.1; T/Taveta = 40.3; Kajiado = 39.3. These were used to get the population of adult breedable females in each district). The Zebu cattle population figures Makueni = 219 800; Kitui = 190 000; T/Taveta = 130 500 and Kajiado = 758 400 (MOALD, 1995)

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## Characteristics of indigenous chicken in Iraq

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### Summary

The Iraqi indigenous chickens (I.I.C.) are well adapted to a wide range of ambient temperature ( $-5^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ ). They are found throughout the country and are raised for meat and eggs. The birds are active and independent foragers.

The IPA Agricultural Research Centre played a role in the purification and multiplication of five different genetic lines according to feather colour. These lines are the progeny of segregating populations of the foundation stock which was a specimen collected from all over the country. The plumage colour of the I.I.C. lines varied from white to black. Most of the birds have white skin colour; comb type is single; egg-shell colour varied between white, tinted to brown; age at sexual maturity ranged between 162 to 166 days; body weight at sexual maturity was found to be similar for the different lines (1.4 kg) indicating that I.I.C are small-sized birds and variations among lines of the I.I.C were significant for egg production, egg weight and feed efficiency.

### Resumen

La raza indígena de aves Iraquí (IIC) está bien adaptada a un amplio espectro de temperaturas ambientales que va de  $-5^{\circ}\text{C}$  a  $50^{\circ}\text{C}$ . Esta raza está presente en todo el país y se crían tanta para producción de carne que de huevos. Los animales se crían al suelo y se alimentan de forma independiente. El IPA a jugado un papel esencial en la purificación y multiplicación de cinco líneas genéticas diversas en base al color del plumaje. Estas líneas son la progenie de poblaciones segregadas del stock original formado por

una serie de especímenes recogidos a través del país. El color del plumaje de las líneas IIC va del blanco al negro. La mayoría de los animales poseen la piel blanca, la cresta es única, el color de la cáscara de los huevos varía de blanco, beige a marrón, la madurez sexual se alcanza alrededor de los 162 a 166 días, el peso corporal en el momento de la madurez sexual fue muy similar para las diversas líneas (1,4 kg), lo que indica que la IIC es de pequeño tamaño y las variaciones entre líneas fueron significantes en cuanto a producción de huevos, peso del huevo y eficacia alimentaria.

**Keywords:** *Chicken, Indigenous, Iraq, Practices, Production, Characteristics, Morphological description.*

### Introduction

The Iraqi indigenous chickens (I.I.C.) have the advantage of being well adapted to the local environmental conditions (high temperature, up to  $50^{\circ}\text{C}$  during summer and low temperature, as low as zero centigrade during winter, poor farming hygiene and deficient diet) (Al-Jebouri 1970, Al-Soudi and Sokker 1973, Al-Murrani *et al.*, 1997). Another advantage of the I.I.C. claimed by the consumers is the good taste and flavour of both eggs and meat as compared to commercial chickens. The I.I.C. are spread throughout the country, usually in a limited number of 20-30 birds per family. They are mainly raised in rural areas in a free-range system. Therefore, they are a good source of animal protein and income to most rural populations. Furthermore, I.I.C. are scavengers by nature and as such, provision of feed or supplementary feeding is a rare

Table 1. Morphological characteristics of indigenous Iraqi chicken (prevalence, percent).

|                       | Brown       | Barred      | Black       | White<br>naked | White       | Leghorn     | NH          |
|-----------------------|-------------|-------------|-------------|----------------|-------------|-------------|-------------|
| Plumage pattern       | 98% red     | Barred 100% | 98% black   | 90% white      | 98% white   | 97% white   | 98% red     |
| Skin colour           | 100% white  | 100% white  | 100% yellow | 100% white     | 100% white  | 100% yellow | 100% yellow |
| Shank and foot colour | 90% yellow  | 90% yellow  | 70% black   | 80% yellow     | 90% yellow  | 100% yellow | 100% yellow |
| Comb type             | 100% single | 100% single | 100% single | 90% single     | 100% single | 100% single | 100% single |
| Egg-shell colour      | 100% tinted | 100% tinted | 100% tinted | 100% white     | 90% white   | 100% white  | 100% brown  |

Table 2. Selected traits of indigenous Iraqi chicken.

| Trait                              | BR                 | BA                 | BL                 | WN                 | WT                 | LG                | NH                 |
|------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|--------------------|
| Age at sexual maturity (day)       | 162 a<br>(2.6)     | 165 a<br>(5.2)     | 162 a<br>(3.2)     | 165 a<br>(5.0)     | 163a<br>(3.3)      | 162a<br>(0.4)     | 166 a<br>(3.6)     |
| Body weight at sexual maturity (g) | 1342.8 b<br>(20.1) | 1385.4 b<br>(21.7) | 1457.6 b<br>(19.1) | 1333.4 b<br>(22.0) | 1439.4 b<br>(20.7) | 1400.9b<br>(15.9) | 1685.3 a<br>(22.5) |
| Egg production                     | 175.1 ab<br>(6.2)  | 162.2 bc<br>(8.1)  | 156.5 cd<br>(14.1) | 147.0 d<br>(0.2)   | 156.5 cd<br>(13.3) | 181.5 a<br>(0.7)  | 165.4 bc<br>(10.6) |
| Average egg weight (g)             | 54.1 abc<br>(10.0) | 53.3 bc<br>(10.1)  | 52.5 c<br>(11.5)   | 54.9 ab<br>(10.1)  | 52.9 bc<br>(11.1)  | 55.9 a<br>(9.0)   | 54.3 abc<br>(7.1)  |
| Feed efficiency (g feed / egg)     | 196.2 cd<br>(23.4) | 221.0 ab<br>(29.8) | 209.3 bc<br>(32.0) | 232.2 a<br>(22.0)  | 211.7abc<br>(29.5) | 183.6 d<br>(18.3) | 212.6abc<br>(26.0) |
| Fertility (%)                      | 75.8               | 85.7               | 85.0               | 90.0               | 94.0               | 77.3              | 90.0               |
| Hatchability of fertilized egg (%) | 95.5               | 75.3               | 96.0               | 86.1               | 88.0               | 89.8              | 92.5               |
| Hatchability of egg set (%)        | 75.1               | 87.9               | 82.0               | 70.2               | 83.0               | 69.4              | 82.6               |
| Egg mass (g / hen)                 | 6 088.4 b          | 6 185.0 b          | 5 954.1 bc         | 5 533.0 c          | 5 650.2 c          | 7 414.9 a         | 7 384.9 a          |

Means in same line with different letters differ (P<0.05)

Figures between parentheses are coefficients of variation (%)

practice. The birds scavenge for themselves from morning to evening around backyards and fields feeding mainly on insects, earthworms, green matters and kitchen leftovers. No commercial diets are given to I.I.C. The eggs are naturally incubated under brooder hens. There is virtually no poultry health programme in existence for I.I.C. under the free-range management systems. Little is known about I.I.C. in terms of how many lines (or strain) there are and the degree to which they are genetically adapted to diseases or heat stress and how these chickens have evolved.

The objective of this report is to characterize I.I.C. for egg and meat production

## Materials and Methods

Efforts have been undertaken to preserve and purify the I.I.C. since 1986 (Mohammed *et al.*, 1999). Different genetic lines of I.I.C. were derived according to feather colour and nakedness from indigenous foundation population. A total of five genetic lines of I.I.C. namely, brown (BR) (Figure 1), barred (BA) (Figure 2), black (BL) (Figure 3), white naked (WN) (Figure 4) and white (WT) (Figure 1) were developed. The birds of the different lines represent the eighth generation of the foundation population. Three trials of performance test were carried out during 1993/1994, 1994/1995 and 1995/1996. For each line and within each trial a total of 192 twenty-week old pullets, were housed individually and tested simultaneously for a year. Twenty-four pullets randomly chosen



Figure 1. Iraqi indigenous chicken: brown line.



Figure 2. Iraqi indigenous chicken: barred line.



Figure 3. Iraqi indigenous chicken: black line.



Figure 4. Iraqi indigenous chicken: white naked line.



Figure 5. Iraqi indigenous chicken: white line.

from each of the five I.I.C. lines in addition to two exotic breeds, Leghorn (LG) and New Hampshire (NH) known to be well adapted to the local environment (Al-Jebouri, 1970), were included in a performance test. Performance evaluation involved several functional traits, including weight and age at sexual maturity (as age in days at first egg), egg production, average egg weight, feed efficiency (g feed/egg), feed intake per day, fertility, hatchability of fertilized eggs, hatchability of egg set and egg mass.

## Result and Discussion

The morphological description of I.I.C. is given in Table 1. The plumage pattern was very diverse being white in WN (prevalence,  $P = 90$  percent), LG ( $P = 97$  percent) and WT ( $P = 98$  percent), red in BR ( $P = 98$  percent) and black in BL ( $P = 98$  percent). The skin colour was white in BR, BA, WN and WT and yellow in BL, LG and NH, ( $P = 100$  percent). The shank and foot colour was diverse, being yellow in BR ( $P = 90$  percent), BA ( $P = 90$  percent), WN ( $P = 80$  percent), WT ( $P = 90$  percent) LG and NH ( $P = 100$  percent), whereas, BL was black ( $P = 70$  percent). Comb was of single type in BR, BA, BL, WT, LG and NH ( $P = 100$  percent), and also single with less prevalence ( $P = 90$  percent) in WN. Egg-shell colour varied from white in WN, LG ( $P = 100$  percent) and WT ( $P = 90$  percent), whereas it was tinted in BR, BA and BL ( $P = 100$  percent). However, NH had brown egg-shell colour ( $P = 100$  percent).

There is not much variation in age at sexual maturity among I.I.C. (Table 2). I.I.C. commenced laying eggs (age of sexual maturity) earlier than that reported by Jensen (2000) but similar to the indigenous chickens of Malawi (Safalaoh, 1997). Body weight at sexual maturity seems similar for BR, BA, BL, WN, WT and LG. On the other hand, NH birds significantly showed the heaviest body weight at sexual maturity. This may indicate that the I.I.C. are small-sized birds. Al-Rawi (1969) and Al-Jebouri (1970) reported that indigenous chicken body weight ranged between 1.290-1.391 kg. The heavy weight

attained by birds in this study compared to previous studies may be due to mass selection practised during purification of feather colour of the various lines, where heavier birds were selected for mating. The C.V. of the body weight was high ranging from 15.9 percent (LG) to 22.5 percent (NH).

Wide variation was noticed in egg production. Hens laid between 147 (WN) to 175 (BR) eggs. The BR, BA and BL were as productive as NH. These values are comparable to those found by (Ismail, 1997 and Al-Rawi, 2001). The C.V. of egg production ranged between 0.2 percent for WN to 14.1 percent for BL. Feed efficiency (g feed/egg) was significantly influenced by genetic lines. Egg weights were 54.1, 53.3, 52.5, 54.9, 52.9, 55.9 and 54.3 g for BR, BA, BL, WN, WT, LG and NH, respectively. The LG hens produced the heaviest egg weight among I.I.C. ( $P < 0.05$ ). While BL hens produced the lightest egg weight. The LG birds are more feed efficient (183.6) followed by BR (196.2). The WN birds need 232.2 g feed for production of one egg. The C.V. of feed efficiency is relatively high (18.3-32.0 percent). Genetic improvement of feed efficiency may be possible in view of the high variability that exists. Fertility varied from 75.8 percent (BR) to 94.0 percent (WT). Whereas, hatchability of fertilized eggs ranged ( $\chi^2 = 30.8$ ,  $P < 0.001$ ) from 75.3 percent (BA) and 95.5 percent (BR). Furthermore, hatchability of the egg set was 69.4 percent for LG, increasing ( $\chi^2 = 17.9$ ,  $P < 0.001$ ) to 87.9 for BA line. Fertility and hatchability were average for I.I.C. Egg mass ranged between 5.533 kg for WN to 7.415 kg for LG hens.

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## **Rabbit genetic resources in Mediterranean countries** **Options Méditerranéennes no. 38, series B: Etudes et** **recherches**

**M.H. Khalil & M. Baselga (Eds)**

**Mediterranean Agronomic Institute of Zaragoza,**

**Apdo. 202, 50080 Zaragoza, Spain**

**Published in 2002. ISSN: 1016-1228 ISBN: 2-85352-241-5**

**pp. 262**

The Mediterranean Rabbit Group is a working group created in the eighties, supported by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through its Mediterranean Agronomic Institute of Zaragoza, in coordination with FAO, and whose objectives are the study and characterization of Mediterranean autochthonous populations, the selection and dissemination of selected lines throughout the Mediterranean Region for productivity and adaptation to the environmental conditions of the region, and the identification and solution of problems which are specific to Mediterranean rabbit production, such as the variability of heat tolerance and the selection of productive animals in low-cost production systems.

The exchange of information has been one of the most important activities of this group. Four seminars have been previously organized, whose Acta were published in the same series.

Other activities of this group have been the exchange and common testing of genetic material, the submission of Research Projects to donor bodies, technical stays and training, with two editions of the course on "Production Systems of Rabbit Meat" held in Valencia in 1992 and in Zaragoza in 1997.

Given the limited available evaluation reports on local rabbit breed characterizations, production variables, crossbred performances, and environmental factors, the Mediterranean Rabbit Group has undertaken the task to develop standardized descriptors for breed / strain characterizations of rabbits in Mediterranean countries. This publication

presents the first results obtained, with 24 breeds / strains from seven Mediterranean countries. The content will be included in a web page ([www.iamz.ciheam.org/med-rabbit-genres.htm](http://www.iamz.ciheam.org/med-rabbit-genres.htm)) that will be updated with new information on other Mediterranean breeds.



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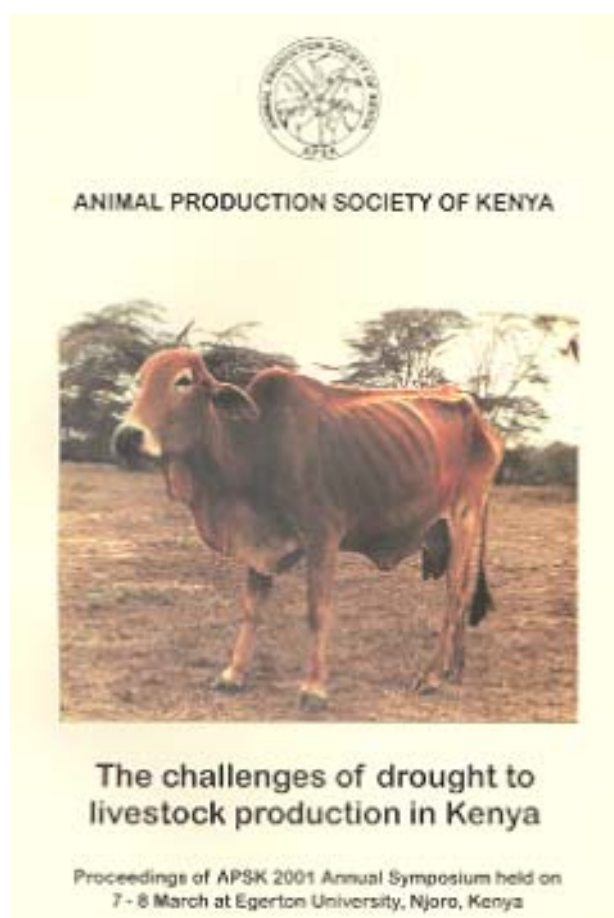
**The challenges of drought to livestock production in Kenya**  
**Proceedings of the Animal Production Society of Kenya (APSK) Annual**  
**Symposium, held in Egerton University, Njoro, Kenya from 7 to 8 March 2001**  
**Animal Production Society of Kenya (APSK), P.O. Box 57811, Nairobi, Kenya**  
**Published in 2002, pp.158**

The Animal Production Society of Kenya (APSK) with the financial support of the European Union under the umbrella of the Agriculture/Livestock Research Support Programme held its Annual Symposium on 7-8 March 2002 at Egerton University, Njoro, Kenya to debate the effect of drought on cattle population in Kenya.

In fact, drought management is a core issue in more than 80% of Kenya's land, which is classified as Arid and Semi-arid Lands (ASAL). These areas are characterised by unpredictable climatic conditions, livestock rustling, food insecurity and low household income. Most of the papers in this symposium have critically attempted to analyse and evaluate different strategies of achieving sustainable livestock production by encouraging wider adoption of technologies and knowledge in the affected area.

One of the major objectives of APSK is to promote interest and to contribute in the development of livestock production in Kenya by, among other things, providing a forum for stakeholders in the sector to exchange ideas, research results and experiences. The society has endeavoured to meet its objectives by organising annual symposium and farmers' field days. The papers in this symposium created stimuli within the stakeholders in formulating and implementing a sustainable policy framework to alleviate poverty and improve food security particularly in ASAL.

From the several papers presented, the issue of technology development and transfer to the target group in the animal agriculture were particularly debated and some suggestions to overcome this bottle necks were presented and discussed.



**Multipurpose germplasm of fodder shrubs and trees for the rehabilitation of arid and semi-arid land in the Mediterranean isoclimatic zone. A photographic catalogue**

**Options Méditerranéennes no. 37, serie B: Etudes et recherches**

**H. Noël (Ed.)**

**Mediterranean Agronomic Institute of Zaragoza,**

**Apdo. 202, 50080 Zaragoza, Spain**

**Published in 2002. ISSN: 1016-1228 ISBN: 2-85352-240-7**

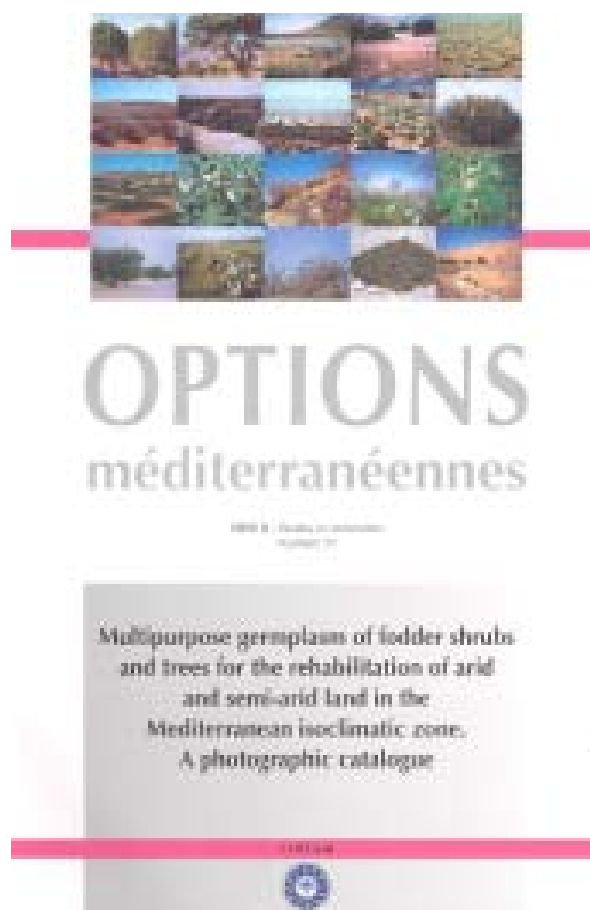
**pp. 118**

This singular publication is aimed at all those interested in the use of multipurpose fodder trees and shrubs (TRUBS) in the Mediterranean region and brings together, through comments and appraisals, the perspective of the scientist and that of the user of these species.

The texts accompanying the photographs are condensed extracts of personal experience of the Author, contrasted with that of scientists, extension workers, project managers and farmers of the Mediterranean countries. The photographs have been selected according to their scientific and technical significance, some of them being genuine historical documents.

The publication is essentially a catalogue of recommended species that contains reflections and recommendations on the strategies of use for soil rehabilitation and animal production, based on the bioclimatic conditions and management requirements. Likewise, it includes, which is not usual, a brief discussion on the economic conditioning factors of their implementation and use, based on practical examples.

This photographic catalogue complements the results of studies hosted by the cooperative research networks coordinated by the Mediterranean Agronomic Institute of Zaragoza, available to the reader in several publications.



## **Development of successful animal recording systems for transition and developing countries**

### **ICAR Technical Series no. 8**

**J. Mäki-Hokkonen, J. Boyazoglu, T. Vares & M. Zjalic (Eds)**

**Proceedings of the FAO/ICAR Seminar held in**

**Interlaken, Switzerland, 27 May 2002**

**ICAR, Villa del Ragno, Via Nomentana 134, 00162 Rome, Italy**

**Published in 2002. ISSN: 1563-2504 ISBN: 92-95014-04-9**

**pp. 195**

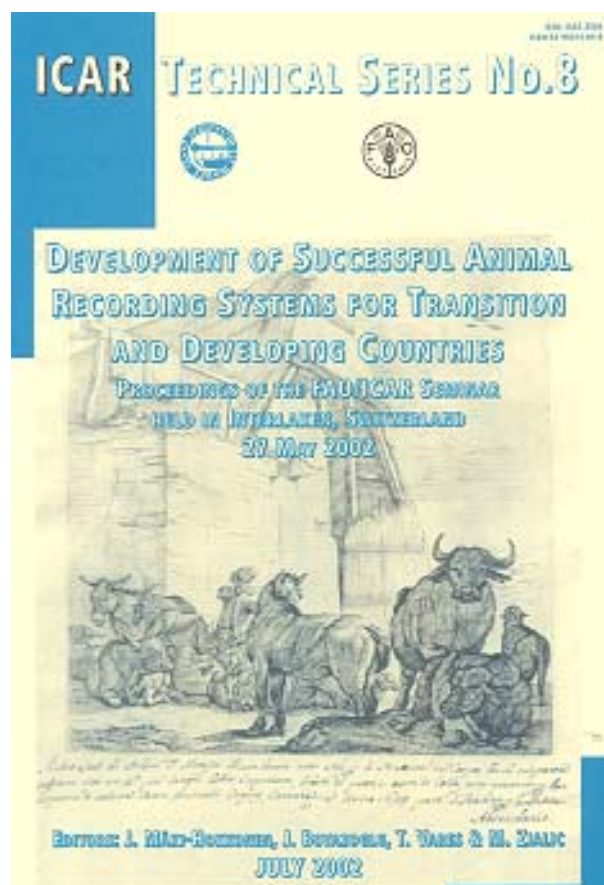
The 33<sup>rd</sup> session of ICAR and Interbull meeting were held in Interlaken, Switzerland from May 26 to 31, 2002. In this context ICAR and FAO organised a joint seminar to discuss how sustainable livestock development can be enhanced in developing and transition countries, through an efficient organisation of animal recording.

Some 75 participants, from 42 countries, focused the discussion on common experiences about the successful development and use of animal recording systems in their countries. The workshop aimed particularly at debating the problems of animal recording organisations in different and changing economic realities.

Several social and economic elements influence the sector and the existing differences among the countries reflect on the distinct systems of animal recording organisations. In particular, the increasing demand for animal products is playing a determinant role in developing and transition countries along with the commercialisation and a more aggressive intensification of animal production. Such process occurs both in the rural family based systems or in private sector industry, be it in dairy, pig or poultry production systems. These basic elements are prevalent factors in many CEE and CIS countries as well as in large areas in the developing world; these problems were debated and analysed as a common economic reality.

This book is particularly addressed to decision-makers, involved in the outlining and managing animal resources and to local

stakeholders, which need to be more informed about the necessary national improvements of recording systems for their optimisation. In order to support, community and national policy-makers on the sustainable use of animal biodiversity, these proceedings will certainly assist them in their job and help them in the monitoring and development process of their activities.



**On-Station characterization of small  
ruminant breeds in Egypt**  
**S. Galal, F. Abdel-Rasoul, M.R. Anous & I. Shaat (Eds)**  
**ICARDA, Aleppo, Syria and**  
**Faculty of Agriculture, Ain Shams University, Egypt**  
**Published in 2002. ISBN 977-298-2510-1**  
**pp. 78**

This report was commissioned by The International Center for Agricultural Research in Dry Areas (ICARDA), Aleppo, Syria, as a part of a regional study on the genetic resources of small ruminants in the countries in the area of interest to ICARDA. The report is structured to elucidate the characteristics of the breeds within the socio-economic context and ecological considerations of the country. A total of 12 sheep breeds and seven goat breeds are included in the report; many of them are reported for the first time. A very extensive review of literature was made to collect information included in the report. Photos are provided for both sexes of most of the breeds. Also reported were the institutions and workers in the country interested in different breeds. Egypt does not have a census of livestock by breed, but the report made an attempt to estimate breed populations roughly extrapolated from the geographical distribution of the breeds. No breed seemed to be in danger of extinction. A comprehensive bibliography on Egyptian small ruminant breeds is included in the report.



## Editorial Policies and Procedures

The mission of the Animal Genetic Resources Information Bulletin (AGRI) is the promotion of information on the better use of animal genetic resources of interest to food and agriculture production, under the Global Strategy for the Management of Farm Animal Genetic Resources. All aspects of the characterization, conservation and utilization of these resources are included, in accordance with the Convention on Biological Diversity. AGRI will highlight information on the genetic, phenotypic and economic surveying and comparative description, use, development and maintenance of animal genetic resources; and on the development of operational strategies and procedures which enable their more cost-effective management. In doing this AGRI will give special attention to contributions dealing with breeds and procedures capable of contributing to the sustainable intensification of the world's medium to low input production environments (agro-ecosystems), which account for the substantial majority of the land area involved in livestock production; the total production of food and agriculture from livestock; and of our remaining farm animal genetic resources.

Views expressed in the paper published in AGRI represent the opinions of the author(s) and do not necessarily reflect those of the institutions which the authors are affiliated, FAO or the Editors.

The suitability of manuscripts for publication in AGRI is judged by the Editors and reviewers.

## Electronic publication

AGRI is available in full electronically on the Internet, in addition to being published in hard copy, at:

<< <http://www.fao.org/dad-is>>>

## Types of Articles

The following types of articles are published in AGRI.

### Research articles

Findings of work on characterization, conservation and utilization of farm animal genetic resources (AnGR) in well described production environments, will be considered for publication in AGRI. Quality photographs of these genetic resources viewed in the primary production environment to which they are adapted, accompanying the manuscripts are encouraged.

### Review articles

Unsolicited articles reviewing agro-ecosystems, country-level, regional or global developments on one or more aspects of the management of animal genetic resources, including state-of-the-art review articles on specific fields in AnGR, will be considered for publication in AGRI.

### Position papers

Solicited papers on topical issues will also be published as deemed required.

### Other published material

This includes book reviews, news and notes covering relevant meetings, training courses and major national, regional and international events and conclusions and recommendations associated with the outcomes of these major events. Readers are encouraged to send such items to the editors.

## Guidelines for Authors

### Manuscript submission

Manuscripts prepared in English, French or Spanish with an English summary and

another summary in either French or Spanish, should be submitted to AGRI Editor, AGAP, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy. Alternatively a manuscript may be sent as a WinWord Electronic Mail attachment to < agri@fao.org >. Photographs, coloured or black and white, and figures must be always sent by mail.

Manuscripts should be typed double-spaced and with lines numbered in the left margin. All pages, including those of references, tables etc., must be consecutively numbered. The corresponding author is notified of the receipt of a manuscript.

For manuscripts that are accepted after revision, authors are encouraged to submit a last version (3½" disc format) in Word 6.0 for Windows of their revised manuscript along with the printed copy.

### *Preparation of the manuscript*

The first page of the manuscript must include the running head (abbreviated title), title, names of authors, institutions, full addresses including postal codes and telephone number and other communication details (fax, e-mail, etc.) of the corresponding author. The running head not exceeding 45 characters plus spaces, should appear at the top of page 1 of the manuscript entirely in capital letters. The title of the manuscript is typed in upper and lower case letters. The title should be as brief as possible not exceeding 150 characters (including spaces) with species names when applicable. Authors, institutions and addresses are in upper and lower case italics. There is one blank line between the title and the authors. Addresses are typed as footnotes to the authors after leaving one blank line. Footnotes are designated numerically. Two lines are left below the footnotes.

### *Headings*

Headings of sections, for example Summary, Introduction, etc., are left-justified. Leave two blank lines between addresses footnotes and Summary and between the heading Summary and its text. Summary should not exceed 200

words. It should be an objective summary briefly describing the procedures and findings and not simply stating that the study was carried on such and such and results are presented, etc. Leave one line between the summary text and Keywords which is written in italics as well as the keywords themselves. All headings of sections (14 regular) and sub-sections (12 regular) are typed bold and preceded and succeeded by one blank line and their text begins with no indention. The heading of a sub-subsection is written in italics, and ends with a dot after which the text follows on the same line. Keywords come immediately after the summaries. They should be no more than six, with no "and" or "&".

### **Tables and figures**

Tables and figures must be enclosed with the paper and attached at the end of the text according their citation in the document. Photos will not be returned

#### *Tables*

Tables, including footnotes, should be preceded and succeeded by 2 blank lines. Table number and caption are written, above the table, in italics (12) followed by a dot, then one blank line. For each column or line title or sub-title, only the 1st letter of the 1st word is capitalized. Tables should be numbered consecutively in Arabic numerals. Tables and captions should be left justified as is the text. Use horizontal or vertical lines only when necessary. Do not use tabs or space-bar to create a table but only the appropriate commands.

#### *Figures*

Figures including titles and legends should be preceded and succeeded by two blank lines. Figure number and title are written, below the figure, in italics (12) and end with a dot. The term figures includes photos, line drawings, maps, diagrams etc.

All the submitted diagrams, must be

accompanied with the original matrix of the data used to create them. It is strongly advised to submit diagrams in Word 6.0 or Excel 5.0. Figures should be numbered consecutively in Arabic numerals.

## References

Every reference cited in the text should be included in the reference list and every reference in the reference list should have been mentioned in the text at least once. References should be ordered firstly alphabetically by the first author's surname and secondly by year.

Example for reference in a periodical is:

Köhler-Rollefson, I., 1992; The camel breeds of India in social and historical perspective. *Animal Genetic Resources Information* 10, 53-64.

When there are more than one author:

Matos, C.A.P., D.L. Thomas, D. Gianola, R.J. Tempelman & L.D. Young, 1997; Genetic analysis of discrete reproductive traits in sheep using linear and nonnlinear models: 1. Estimation of genetic parameters 75, 76-87.

For a book or an ad hoc publication, e.g., reports, theses, etc.:

Cockril, W.R., (Ed), 1994; *The Husbandry and Health of the Domestic Buffalo*. FAO, Rome, Italy, pp 993.

For an article in the proceedings of a meeting:

Hammond, K., 1996; FAO's programme for the management of farm animal genetic resources. In C. Devendra (Ed.) *Proceedings of IGA/FAO Round Table on the Global Management of Small Ruminant Genetic Resources*, Beijing, May 1996, FAO, Bangkok, Thailand, 4-13.

Where information included in the article has been obtained or derived from a World Wide Web site, then quote in the text, e.g. "derived from FAO. 1996" and in the References quote the URL standard form:

FAO, 1996; Domestic Animal Diversity Information System <<http://www.fao.org/dad-is/>>, FAO, Rome

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Thanks for the collaboration

## Normes et règles éditoriales

L'objectif du Bulletin d'Information sur les Ressources Génétiques Animales (AGRI) est la vulgarisation de l'information disponible sur la meilleure gestion des ressources génétiques animales d'intérêt pour la production alimentaire et agricole, d'après les recommandations de la Stratégie Mondiale pour la Gestion des Ressources Génétiques des Animaux Domestiques. Tous les aspects relatifs à la caractérisation, la conservation et l'utilisation de ces ressources seront pris en considération, suivant les normes de la Convention pour la Biodiversité.

AGRI désire diffuser de l'information sur la génétique, les enquêtes phénotypiques et économiques et les descriptions comparatives, l'utilisation et la conservation des ressources génétiques animales, ainsi que toute information sur le développement de stratégies opérationnelles et de normes qui puissent permettre une meilleure gestion de la relation coût/efficacité. C'est pour cela que AGRI prendra spécialement en considération toutes les contributions référées aux races et aux normes capables de permettre une intensification durable des milieux (agroécosystèmes) à revenus moyens et bas dans le monde; qui comprennent la majeure partie des terres consacrées à l'élevage, à la production totale des aliments et l'agriculture provenant de l'élevage; et tout ce qui reste comme ressources génétiques des animaux domestiques.

Les opinions exprimées dans les articles publiés dans AGRI appartiennent seulement aux auteurs et donc ne représentent pas nécessairement l'opinion des instituts pour lesquels ils travaillent, la FAO ou les éditeurs.

L'opportunité ou non de publier un article dans AGRI sera jugée par les éditeurs et les réviseurs.

## Publication électronique

En plus de sa version imprimée, la version totale de AGRI se trouve disponible sur Internet, sur le site:

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## Types d'articles

Les articles suivants pourront être publiés sur AGRI:

### Articles de recherche

Seront prises en considération pour leur publication sur AGRI les études sur la caractérisation, la conservation et l'utilisation des ressources génétiques des animaux domestiques (AnGR) accompagnées d'une bonne description du milieu. On encourage les auteurs à envoyer des photographies de bonne qualité qui montrent les races en question dans leur milieu naturel de production.

### Révisions

Occasionnellement, des articles contenant une révision des agroécosystèmes, au niveau national, régional ou mondial, avec un ou plusieurs aspects se rapportant à la gestion des ressources génétiques animales, y comprises les mises à jour des différentes zones de AnGR, seront pris en considération.

### Articles spécifiques

Ponctuellement, des articles sur des thèmes spécifiques pourront être demandés pour la publication d'éditions spéciales.

### Autre matériel pour publication

Ceci comprend la révision de livres, nouvelles et notes de réunions importantes, cours de formation et principaux événements nationaux, régionaux et internationaux; ainsi que les conclusions et recommandations par rapport aux objectifs de ces principaux événements. Les auteurs sont priés d'envoyer ce genre de matériel aux éditeurs.

## Guide pour les auteurs

### Présentation du manuscrit

Les articles se présenteront en anglais, français ou espagnol, avec un résumé en anglais et sa traduction en français ou en espagnol; et seront envoyés à l'éditeur de AGRI, AGAP, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italie. L'autre possibilité est d'envoyer l'article par courrier électronique avec le document adjoint en version WinWord à <agri@fao.org>. Les photographies, en couleur ou en blanc et noir, seront toujours envoyées par courrier normal.

Les manuscrits se présenteront à double interligne et avec le numéro correspondant à chaque ligne sur la marge gauche. Toutes les pages seront numérotées, y comprises celles avec les références bibliographiques, les tableaux, etc. L'auteur recevra une lettre lui donnant bonne réception de son document.

Lorsqu'un article, après sa révision, sera accepté, on demandera à l'auteur d'envoyer la version finale révisée sur disquette (format 3 1/2") en Word 6.0 x Windows, ainsi qu'une copie sur papier.

### Préparation du manuscrit

Sur la première page du manuscrit on indiquera le titre de l'article en abrégé, le titre et noms des auteurs, des institutions, les adresses complètes (y compris code postal et numéro de téléphone); ainsi que tout autre moyen de contact tel que fax, e-mail, etc. avec l'auteur principal. Le titre abrégé ne devra pas dépasser les 45 caractères, plus les espaces nécessaires, et s'écrit sur la partie supérieure de la page 1 du manuscrit en majuscules. Le titre en entier du manuscrit sera écrit en majuscules et minuscules; il devra être aussi bref que possible, sans dépasser les 150 caractères (y compris les espaces nécessaires), et avec l'indication des noms des espèces. Les noms des auteurs, des institutions et les adresses seront en italique et en lettres majuscules et minuscules. On laissera un espace en blanc entre le titre et les noms des auteurs. Les adresses seront indiquées comme

des notes à pied de page pour chacun des auteurs après avoir laissé un espace en blanc après les noms. Chaque note de pied de page sera numérotée. On laissera deux espaces en blanc après les adresses.

### Titres

Les titres de chaque chapitre, par exemple Résumé, Introduction, etc. seront alignés à gauche. Laisser deux espaces en blanc entre les notes de pied de page avec les adresses et le Résumé, et entre le titre Résumé et le texte qui suit. Le résumé ne devra pas dépasser les 200 mots. Il s'agira d'un résumé objectif qui fasse une brève description des processus utilisés et des résultats obtenus, et non pas une simple présentation du travail réalisé avec une description générale des résultats. Laisser un espace en blanc entre la fin du texte du résumé et les mots-clés, qui seront écrits en italique ainsi que le titre Mots-clés. Les mots-clés seront au maximum six et il ne devra pas y avoir de "et" ou "&". Tous les titres principaux de chapitre (14 regular) et sous-chapitre (12 regular) seront en gras avec un espace en blanc avant et après. Le texte commencera sans retrait. Un titre à l'intérieur d'un sous-chapitre s'écrit en italique, suivi d'un point, avec le texte à continuation.

### Tableaux et figures

Les tableaux et les figures iront à la fin du texte en suivant l'ordre d'apparition dans le texte. Les photographies ne seront pas dévolues aux auteurs.

### Tableaux

Les tableaux, y compris les notes de pied de page, devront avoir un espace en blanc avant et après. Le numéro du tableau et le titre s'écrit sur la partie supérieure en italique (12) avec un point à la fin et un espace en blanc en dessous. Sur chaque colonne, titre d'en-tête ou sous-titre, seulement la première lettre du premier mot sera en majuscule. Les tableaux et leur titre seront alignés à gauche, ainsi que le texte. Les lignes verticales et

horizontales seront utilisées seulement si nécessaires. Ne pas utiliser les tabs ou la barre de séparation pour créer un tableau.

### *Figures*

Les figures, y compris les titres et les légendes, seront précédés et suivis de deux espaces en blanc. Le numéro de la figure et le titre s'écriront sur la partie supérieure en italique (12) avec un point à la fin. Sous la rubrique figure on trouvera les photographies, les graphiques, les cartes, les diagrammes, etc. Dans le cas des diagrammes, la matrice originale avec les données utilisées pour son élaboration devra être envoyée. On recommande l'utilisation de Word 6.0 ou Excel 5.0 pour la présentation des diagrammes.

### **Références**

Toute référence présente dans le texte devra apparaître sur la liste des références, et chaque référence de la liste aura été citée au moins une fois dans le texte. Les références iront en ordre alphabétique du nom de l'auteur, suivi de l'année. Exemple dans le cas d'une référence sur une revue:

Köhler-Rollefson, I., 1992; The camel breeds of India in social and historical perspective. *Animal Genetic Resources Information* 10, 53-64.

Lorsqu'il s'agit de plus d'un auteur:

Matos, C.A.P., D.L. Thomas, D. Gianola, R.J. Tempelman & L.D. Young, 1997; Genetic analysis of discrete reproductive traits in sheep using linear and nonnlinear models: 1. Estimation of genetic parameters 75, 76-87.

Dans le cas d'un livre ou d'une publication ad hoc, par exemple un rapport, une thèse, etc.:

Cockril, W.R., (Ed), 1994; *The Husbandry and Health of the Domestic Buffalo*. FAO, Rome, Italy, pp 993.

S'il s'agit d'un acte d'une réunion:

Hammond, K., 1996; FAO's programme for the management of farm animal genetic resources. In C. Devendra (Ed.) *Proceedings of IGA/FAO Round Table on the Global Management of Small Ruminant Genetic Resources*, Beijing, May 1996, FAO, Bangkok, Thailand, 4-13.

Lorsque l'information contenue dans l'article ait été obtenue ou dérive d'un site World Wide Web, il faudra mettre le texte entre guillemets; par exemple "tiré de la FAO. 1996" et indiquer dans les Références la forme standard URL:

FAO, 1996; Domestic Animal Diversity Information System <<http://www.fao.org/dad-is/>>, FAO, Rome

Pour tout envoi de manuscripts ou correspondance au sujet d'AGRI, vous êtes prié d'utiliser l'adresse suivante:

[agri-bulletin@fao.org](mailto:agri-bulletin@fao.org)

Merci pour votre collaboration

## Reglas y normas editoriales

El objetivo del Boletín de Información sobre Recursos Genéticos Animales (AGRI) es la divulgación de la información sobre una mejor gestión de los recursos genéticos animales de interés para la producción alimentaria y agrícola, siguiendo la Estrategia Mundial para la Gestión de los Recursos Genéticos de los Animales Domésticos. Todos los aspectos referidos a la caracterización, la conservación y el uso de estos recursos serán tomados en consideración, de acuerdo con la Convención sobre la Biodiversidad.

AGRI publicará información sobre genética, encuestas fenotípicas y económicas y descripciones comparativas, uso, desarrollo y conservación de los recursos genéticos animales, así como sobre el desarrollo de estrategias operacionales y normas que permitan una gestión más eficaz de la relación costo / eficacia. Por ello, AGRI prestará especial atención a las contribuciones referidas a razas y normas capaces de contribuir a la intensificación sostenible de los medios (agroecosistemas) con ingresos medio y bajos en el mundo, que comprenden casi la mayor parte de las tierras dedicadas a la producción ganadera; la producción total de alimentos y agricultura provenientes de la ganadería; y el resto de los recursos genéticos de animales domésticos.

Los puntos de vista expresados en los artículos publicados en AGRI son solamente las opiniones de los autores y, por tanto, no reflejan necesariamente la opinión de las instituciones para las cuales trabajan dichos autores, de la FAO o de los editores.

La oportunidad o no de publicar un artículo en AGRI será juzgada por los editores y revisores.

## Publicación electrónica

Además de su publicación impresa, la versión íntegra de AGRI se encuentra disponible electrónicamente sobre Internet, en el sitio: [<<http://www.fao.org/dad-is/>>](http://www.fao.org/dad-is/)

## Tipos de artículos

Serán publicados en AGRI los siguientes tipos de artículos:

### Artículos sobre investigación

Se tomarán en consideración para su publicación en AGRI los estudios sobre la caracterización, conservación y uso de los recursos genéticos de los animales domésticos (AnGR) con una buena descripción del entorno. Se agradecerá el envío de fotografías de calidad que presenten a las razas en cuestión en su ambiente natural de producción.

### Artículos de revisión

Se podrán tener en consideración ocasionalmente aquellos artículos que presenten una revisión de los agroecosistemas, a nivel nacional, regional o mundial, con el desarrollo de uno o más aspectos referidos a la gestión de los recursos genéticos animales, incluidas las revisiones sobre el estado actual de las distintas áreas de AnGR.

### Artículos específicos

Se solicitarán puntualmente artículos sobre temas específicos para ediciones especiales.

### Otro material para publicación

Incluye la revisión de libros, noticias y notas referidas a reuniones importantes, cursos de formación y principales eventos nacionales, regionales e internacionales, así como conclusiones y recomendaciones relacionadas con los objetivos de estos principales eventos. Se invita a los lectores a enviar este tipo de material a los editores.

## Guía para los autores

### Presentación del manuscrito

Los artículos se presentarán en inglés, francés o español, junto con un resumen en inglés y su traducción en francés o español, y se enviarán al editor de AGRI, AGAP, FAO, Viale delle Terme di Caracalla, 00100 Roma, Italia. Otra posibilidad es enviar el artículo por correo electrónico adjuntando el documento en versión WinWord a <agri@fao.org>. Las fotografías, a color o en blanco y negro, se enviarán siempre por correo normal.

Los manuscritos se presentarán con doble espacio y con el número correspondiente a cada línea en el margen izquierdo. Todas las páginas serán numeradas, incluidas las de las referencias bibliográficas, cuadros, etc. El autor recibirá una notificación sobre la recepción de su documento.

En el caso de aceptación de un artículo después de su revisión, se solicitará al autor una versión final de su artículo revisado en disquete (formato 31/2") en Word 6.0 x Windows, así como una copia impresa del mismo.

### Preparación del manuscrito

En la primera página del manuscrito se indicará el título abreviado del artículo, títulos y nombres de los autores, instituciones, direcciones completas (incluido código postal y número de teléfono); así como otros medios de contacto tales como fax, e-mail, etc., del autor principal. El título abreviado no deberá sobrepasar los 45 caracteres más los espacios correspondientes, y aparecerá en la parte superior de la página 1 del manuscrito en mayúsculas. El título entero del manuscrito viene escrito en mayúsculas y minúsculas. Dicho título debe ser lo más breve posible y no sobrepasar los 150 caracteres (incluidos los espacios necesarios), con los nombres de las especies, si necesario. Los nombres de los autores, instituciones y direcciones se escribirán en cursiva y en letras mayúsculas y minúsculas. Se dejará una línea en blanco

entre el título y los nombres de los autores. Las direcciones se escribirán como notas de pie de página de cada autor después de dejar una línea en blanco entre los nombres y éstas. Cada nota de pie de página con la dirección vendrá indicada numéricamente. Se dejarán dos líneas en blanco después de las direcciones.

### Títulos

Los títulos de cada sección, por ejemplo Resumen, Introducción, etc., vienen alineados a la izquierda. Dejar dos líneas en blanco entre las notas de pie de página con las direcciones y el Resumen y entre el título Resumen y el texto que sigue. El resumen no deberá exceder de 200 palabras. Deberá ser un resumen objetivo que describa brevemente los procesos y logros obtenidos, y no una presentación de cómo se ha llevado a cabo el estudio y una descripción genérica de los resultados. Dejar una línea en blanco entre el final del texto del resumen y las palabras clave, que se escribirán en cursiva así como el título Palabras clave. No deberán ser más de seis y no deberán contener "y" o "&". Todos los títulos principales de capítulo (14 regular) y subcapítulo (12 regular) serán en negrita e irán precedidos y seguidos de una línea en blanco. El texto correspondiente empezará sin sangrado. Un título dentro de un subcapítulo se escribirá en cursiva e ira seguido de un punto con a continuación el texto correspondiente.

### Cuadros y figuras

Los cuadros y las figuras se incluirán al final del texto siguiendo el orden de cita dentro del mismo. Las fotografías no serán devueltas a sus autores.

### Cuadros

Los cuadros, incluidas las notas de pie de página, deberán ir precedidos y seguidos por dos líneas en blanco. El número del cuadro y su título se escribirán en la parte superior en cursiva (12) con un punto al final y seguido

de una línea en blanco. En cada columna o título de encabezamiento o subtítulo, sólo la primera letra de la primera palabra irá en mayúscula. Los cuadros irán numerados de forma consecutiva con números árabes. Los cuadros y sus títulos se alinearán a la izquierda, así como el texto. Se utilizarán líneas horizontales o verticales sólo cuando sea necesario. No utilizar tabuladores o la barra espaciadora para crear un cuadro.

### *Figuras*

Las figuras, incluidos los títulos y leyendas, irán precedidas y seguidas de dos líneas en blanco. El número de la figura y el título se escribirán en la parte superior en cursiva (12) con un punto al final. La palabra figura incluye las fotografías, los gráficos, los mapas, los diagramas, etc. En el caso del diagrama se enviará la matriz original con los datos utilizados para crearlo. Se recomienda encarecidamente la utilización de Word 6.0 o Excel 5.0 para la presentación de los diagramas.

### **Referencias**

Toda referencia presente en el texto deberá aparecer en la lista de referencias y, de la misma manera, cada referencia de la lista deberá haber sido citada por lo menos una vez en el texto. Las referencias deben ir en orden alfabético del apellido del autor, seguido por el año.

Ejemplo en el caso de una referencia de una revista:

Köhler-Rollefson, I., 1992; The camel breeds of India in social and historical perspective. *Animal Genetic Resources Information* 10, 53-64.

Cuando se trata de más de un autor:

Matos, C.A.P., D.L. Thomas, D. Gianola, R.J. Tempelman & L.D. Young, 1997; Genetic analysis of discrete reproductive traits in sheep using linear and nonnlinear models: 1. Estimation of genetic parameters 75, 76-87.

En el caso de un libro o de una publicación ad hoc, por ejemplo informes, tesis, etc.:

Cockril, W.R., (Ed), 1994; *The Husbandry and Health of the Domestic Buffalo*. FAO, Rome, Italy, pp 993.

Cuando se trate de un artículo dentro de las actas de una reunión:

Hammond, K., 1996; FAO's programme for the management of farm animal genetic resources. In C. Devendra (Ed.) *Proceedings of IGA/FAO Round Table on the Global Management of Small Ruminant Genetic Resources*, Beijing, May 1996, FAO, Bangkok, Thailand, 4-13.

Cuando la información contenida en el artículo haya sido obtenida o derive de un sitio World Wide Web, poner el texto entre comillas; por ejemplo "sacado de la FAO. 1996" e indicar en las Referencias la forma estándar URL:

FAO, 1996; Domestic Animal Diversity Information System <<http://www.fao.org/dad-is/>>, FAO, Rome

Se ruega enviar los manuscritos o la correspondencia relativa a AGRI a la dirección siguiente:

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Gracias por su colaboración