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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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CONTENTS

	Page
Editorial	I
Realising added-value in native British breeds of beef cattle <i>G.L.H. Alderson</i>	1
Adding value to South African landrace breeds conservation through utilisation <i>K. Ramsay, M. Smuts & H. C. Els</i>	9
Introduction de la race bovine N'Dama à la Ferme Elevage de l'Okpara au Bénin. Quelques performances zootechniques <i>A.K.I. Youssao, A. Ahissou & Z. Toure</i>	17
The Sambucana sheep: a project to save a valley <i>S. Luparia</i>	27
The productivity of Polish Wrzosówka sheep in conditions of preservation <i>W. Kiec</i>	35
Characterisation of Jamunapari goats in their home tract <i>P.K. Rout, V.K. Saxena, B.U. Khan, R. Roy, A. Mandal, S.K. Singh & L.B. Singh</i>	43
The Majorcan Black pig <i>J. Jaume & L. Alfonso</i>	53
Turkey conservation in the United States <i>D.P. Sponenberg, R.O. Hawes, P. Johnson & C.J. Christman</i>	59
Recent publications	67
Editorial policies and procedures	77

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE
ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION**

**UNITED NATIONS ENVIRONMENT PROGRAMME
PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT
PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE**

**27
2000**

Editorial

Domestic animal biodiversity developed over the millennia through natural and man-made selection from the hunting-and-gathering period to agrarian eras. Species and populations within species developed to suit different environments and different human needs. However, it is not until the industrial revolution in the 18th century that this valuable biodiversity started to decline in an ever-accelerating manner. For example from the over a hundred animal species that man extracted utility from in the past he now depends on less than 15. The situation of the erosion of diversity among breeds within populations is even worst. This entails a great risk particularly in regard to low-input production systems and to the probable occurrence of changes in environments that require adaptable genotypes. Advances in biotechnology will unlikely make up for this erosion in diversity by enabling the production-on-demand of genotypes for products needed by different societies, for these differ greatly with physical societal needs as well culture- the human heritage- let alone the expense incurred in acquiring and utilising such technologies.

However, the efficient maintenance and development of animal domestic biodiversity requires sound foundations for the conservation and utilisation of these animal genetic resources. Conservation can be passive in the form of genome banks, i.e. keeping frozen gametes and embryos, but with progress in biotechnology there is the prospect of being able to regenerate the individual from stored DNA material. These genome banks can serve well the urgent need for conserving populations at risk. Active conservation is where populations are actually reproducing. There is more awareness now of the need of both types of conservation and many countries and regions are establishing genome banks. For the more expensive endeavour of active conservation countries are innovating in partially covering the expense as in maintaining such

endangered breeds and species in parks engaged in agri-tourism activities or creating niche markets for products where the breeds excel.

An important form of active conservation is the conservation through utilisation. Some breeds that were judged as uneconomical under some production environments are being 'rediscovered' for their superiority in certain aspects of the production system, i.e. heterosis or maternal effect, or in certain products or product quality, i.e. leanness, leather or flavour. Coincidentally this issue of AGRI gives such examples across different species, cattle, sheep, goats and pigs in the UK, Poland and South Africa. Conservation through utilisation requires adequate characterisation of the genetic resource and its adaptability and productivity under different production environments and in different mating systems. *The Production Environment Approach to Breed Development* recognizes that animal genetic resources are an element in complex production systems and their management should be dealt with in that context. FAO has done well by taking stock and publishing of the world breeds of major farm animal and avian species in its successive versions of the World Watch List, the Domestic Animal Diversity Information System (DAD-IS), both on line and on CD. A great effort is still needed in developing environment descriptors and applying such descriptors to breeds accordingly. This will represent a major step towards the utilization of the breed in its home or other tracts and the conservation of a breed through utilization.

The Editors

Editorial

La biodiversité des animaux domestiques s'est développée au long des siècles à travers la sélection naturelle et celle appliquée par l'homme, ceci depuis l'époque préhistorique jusqu'à l'établissement sédentaire de l'ère agricole. Les espèces et les différentes populations à l'intérieur des espèces se sont développées pour s'adapter aux multiples environnements ainsi qu'aux besoins des hommes. Cependant, ce n'est qu'à partir de la révolution industrielle (XVIIIème siècle) que cette importante biodiversité a commencé à décliner de façon accélérée et continue. Ainsi, sur une centaine d'espèces animales que l'homme utilisait dans le passé il ne dispose maintenant que de l'utilisation de moins de 15. La situation de l'érosion de la diversité parmi les races à l'intérieur des populations est encore plus grave. Ceci entraîne un gros risque, surtout par rapport aux systèmes de production dans le contexte de l'économie de marché et tenant compte des changements probables des milieux qui nécessiteraient des génotypes adaptés. Les progrès en biotechnologie permettraient peut-être de rattraper cette érosion de la diversité à travers une production "sur demande" de génotypes selon les produits nécessaires aux différentes sociétés; cependant, ces besoins seront très différents selon les sociétés et leur héritage culturel, sans compter les dépenses qu'entraîne l'achat et mise en valeur de ces technologies.

Cependant, la conservation efficace et le développement de la biodiversité des animaux domestiques requièrent de bases solides pour leur conservation et utilisation. La conservation peut être passive en forme de banques de gènes, par exemple avec la congélation de gamètes et d'embryons. Avec le progrès de la biotechnologie on se trouve aussi face à la prospective de pouvoir peut-être "régénérer l'individu" en partant du matériel ADN stocké. Ces banques de génomes peuvent aussi bien résoudre le besoin urgent de conservation des populations à risque. Il existe actuellement une reconnaissance de la nécessité d'avoir les deux types de conservation en parallèle, et beaucoup de pays et régions sont en train

d'établir des banques de génomes. En ce qui concerne la partie plus chère de la conservation active, certains pays, pour couvrir partiellement les dépenses, ont mis en place des parcs de réserve pour les races et les espèces en danger, liés aux activités d'agri-tourisme ou ont créé des niches de marché pour des produits régionaux de qualité.

Une forme importante de conservation active est la conservation à travers l'utilisation. Certaines races qui étaient considérées peu intéressantes du point de vue économique sous certaines conditions de production et de milieu, ont été "redécouvertes" grâce à leur supériorité dans certains aspects des systèmes de production, par exemple l'effet d'hétérosis ou maternel, ou dans le cas de l'utilité vis-à-vis de certains produits, même de qualité, comme les fromages, les viandes spécifiques, le cuir ou le goût particulier d'un produit. Par conséquent ce numéro d'AGRI présente tous ces cas pour différentes espèces, bovins, ovins, caprins et porcins en Angleterre, Pologne et l'Afrique du Sud. La conservation à travers l'utilisation demande une caractérisation adéquate des ressources génétiques et de leur adaptation et productivité en différents milieux et sous différents systèmes de production. *L'approche de la production-milieu pour le développement des races* établit que les ressources génétiques animales sont un élément important dans les systèmes de production complexes et leur gestion devrait donc tenir compte de ce contexte. La FAO a d'ailleurs bien fait de rassembler et publier les listes des races animalières et avicoles les plus importantes dans le monde dans ses différentes versions de la Liste Mondiale de Surveillance du Système d'Information sur la Diversité des Animaux Domestiques (DAD-IS), aussi bien *on line* que sur CD. Il est nécessaire de faire encore un grand effort pour développer les descripteurs de milieu et pouvoir appliquer ces descripteurs correctement aux races. Ceci représente un pas important dans l'utilisation des races dans leur environnement ou dans d'autres milieux, ainsi que dans la conservation des races à travers l'utilisation.

Les Editeurs.

Editorial

La biodiversidad en los animales domésticos se ha ido desarrollando a lo largo de los siglos a través de la selección natural y la selección realizada por el hombre, y esto desde la época prehistórica hasta los asentamientos sedentarios de la era agrícola. Las especies, así como las diversas poblaciones dentro de las especies, se han desarrollado para adaptarse a los múltiples ambientes y a las necesidades de los hombres. Sin embargo, fue sólo a partir de la revolución industrial (siglo XVIII) que esta importante biodiversidad empezó a declinar de forma acelerada y constante. Por tanto, sobre un centenar de especies animales que el hombre venía utilizando en el pasado no dispone hoy en día más que de unas 15. Más grave todavía es la situación de la erosión de la diversidad entre las razas dentro de las poblaciones. Todo esto conlleva un riesgo importante, sobre todo en relación con los sistemas de producción dentro del contexto de la economía de mercado y teniendo en cuenta además los cambios probables del ambiente que exigirían genotipos más adaptados. Los progresos obtenidos con la biotecnología permitirían quizás frenar esta erosión de la diversidad con una producción “a medida” de genotipos según la demanda de productos en las distintas sociedades; sin embargo, estas necesidades podrán ser muy distintas y dependerán de cada tradición cultural, sin contar los gastos que conlleva la compra e implementación de estas tecnologías.

Por otra parte, la conservación eficaz y el desarrollo de la biodiversidad de los animales domésticos requieren bases sólidas para su conservación y utilización. La conservación puede ser pasiva, bajo forma de bancos de genes, como por ejemplo la congelación de gametos y de embriones. Con los progresos de la biotecnología nos encontramos también frente a la posibilidad de poder quizás “regenerar un individuo” a partir del material de ADN almacenado. Estos bancos de genomas pueden también resolver la necesidad urgente de conservación de las poblaciones en peligro. Existe actualmente el reconocimiento de la necesidad de mantener los dos tipos de conservación de forma paralela, y muchos países y regiones están ya estableciendo bancos de genomas. En cuanto

a la parte más cara de la conservación activa, algunos países, para cubrir parcialmente los gastos, han instalado parques de reservas para las razas y las especies en peligro, en conexión con las actividades de turismo rural, o se han orientado hacia los productos regionales de calidad para un sector determinado de consumo.

Una forma importante de conservación activa es la conservación mediante la utilización. Algunas razas consideradas poco interesantes hasta hoy desde el punto de vista económico bajo ciertas condiciones de producción y ambiente, han sido “descubiertas de nuevo” gracias a su superioridad en según que aspectos de los sistemas de producción, por ejemplo el efecto de heterosis o materno, o en los casos de utilización para la obtención de ciertos productos, incluso de calidad, como pueden ser quesos, carnes particulares, cuero o también por el sabor típico de un producto. Por tanto, este número de AGRI presenta todos estos casos para las distintas especies de bovinos, ovinos, caprinos y porcinos en Reino Unido, Polonia y Africa del Sur. La conservación a través de la utilización necesita de una caracterización adecuada de los recursos genéticos y de su adaptación y productividad en distintos ambientes y bajo diversos sistemas de producción. *El enfoque de producción-ambiente para el desarrollo de las razas* establece que los recursos genéticos animales son un elemento importante dentro de los sistemas de producción complejos y su gestión debería por lo tanto tener en cuenta este contexto. La FAO, de hecho, hizo muy bien recogiendo y publicando las listas con las razas animales y avícolas más importantes en el mundo en sus distintas versiones de la Lista Mundial de Vigilancia del Sistema de Información para la Diversidad de los Animales Domésticos (DAD-IS), disponible tanto *on line* como en CD. Todavía es necesario llevar a cabo un esfuerzo importante para desarrollar los descriptores de ambiente y poder aplicar dichos descriptores correctamente según las razas. Esto representa un paso importante dentro de la utilización de las razas en su propio ambiente o en otros diferentes, así como para la conservación de las razas a través de la utilización.

Los Editores

Realising added-value in native British breeds of beef cattle*

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Summary

Native breeds of beef cattle in Britain have been superseded by imported breeds since the 1960s, but a changing market in the 1990s has begun to restore traditional values. The distinctive qualities of native breeds are becoming more relevant, and the White Park is a prime example of their importance. This paper makes a critical evaluation of several studies of White Park cattle that have been carried out, namely productivity in non-intensive systems of management, assessment of type and function by linear measurements, quality of product (meat), and value in crossing programmes. It concludes that breeds such as the White Park derive significant added value as a result of their native adaptability and the high quality of their beef, and that they benefit from a market driven by consumers rather than supermarkets. The use of different linear measurements is proposed, and the effective use of White Park bulls in crossing programmes is demonstrated.

Resumen

Las razas bovinas nativas en Gran Bretaña han sido sustituidas por razas importadas desde los años sesenta, pero un mercado cambiante en los noventa ha empezado a restaurar los valores tradicionales. Las cualidades distintivas de las razas nativas se están convirtiendo en mas relevantes, y el White Park es un primer ejemplo de su importancia. Este trabajo hace una evaluación crítica de varios estudios sobre el bovino

White Park que han sido llevados a cabo, a saber: productividad en sistemas de manejo no intensivos, evaluación del tipo y función por mediciones lineales, calidad de productos (carne), y valor en programas de cruzamiento. Se concluye que razas tales como el bovino White Park derivan un valor añadido adicional como resultado de su adaptabilidad natural y la alta calidad de su carne, y que ellos son beneficiarios de un mercado conducido por los consumidores y no por los supermercados. El uso de diferentes medidas lineales se propone, y el uso efectivo de los toros White Park en programas de cruzamiento es demostrado.

Key words: Beef cattle, White Park cattle, Non-intensive production, Linear measurements.

Introduction

Trends in the beef cattle industry in Britain during the period 1965 to 1995 increasingly favoured imported breeds and discriminated against native breeds. Controlled environment conditions and intensive systems of production were an integral part of performance recording assessments promoted by the Meat and Livestock Commission, and were responsible for the domination of the British beef industry by

*Paper presented at the Rare Breeds International Mini Symposium "Characterisation of small populations of farm animal genetic resources with special initiatives and value added traits" held in Zurich, Switzerland, 20 August 1999

large animals from the mainland of Europe, distinguished by high yield of lean meat. These methods of evaluation did not recognise the distinctive qualities of most native British breeds of beef cattle. Characteristics such as native adaptability and product quality are not easily measured and have been disregarded by official bodies. However, changing market forces in the late 1990s have caused the resurgence of more traditional criteria, and programmes of characterisation within policies of genetic conservation have demonstrated the value of the special qualities of native breeds. The White Park is the most distinctive British breed, and it demonstrates most effectively the potential value of these breeds (Alderson, 1997). Comparative crossing trials from the 1970s onwards showed its superiority over several more popular commercial breeds, while analyses of type, conformation and systems of management in the 1990s have confirmed opportunities for the breed in the wider livestock industry by utilising its particular qualities to achieve added value.

Since the 1960s the market for beef cattle has been driven by two main factors. The combined force of supermarkets and partial scientific advice, one demanding product uniformity and the other condemning dietary animal fat, brought the market to almost total dependence on intensively-reared lean beef. This development was underpinned by programmes of the Meat and Livestock Commission which evolved selection criteria calculated to cater for this market, and which neglected the interests of other breeds with different qualities. Weight gain and withers height became standard measures of performance, both associated with large body size. Performance testing stations identified potential breeding animals that excelled in intensive systems. Intensively-reared beef animals, often entire bulls slaughtered at a young age, became the norm. As a result, large late-maturing breeds were given the opportunity to increase their popularity in Britain; first Charolais, followed by Limousin and finally Belgian Blue. At a later stage BLUP programmes were applied to permit further dominance in the industry by these

breeds. Virtually all native beef breeds became marginalised, and their particular qualities were neglected in the mainstream marketplace.

A change occurred during the 1990s. It may have been triggered by the BSE crisis, but it had its roots in the increasing awareness of consumers. Their demands began to assume a greater importance than the dictates of supermarkets. Eating quality of meat played a significant role in this process, but factors associated with animal welfare, protection of the environment and human health also assumed a high priority. While the BSE crisis caused the collapse of mainstream beef sales in Britain during the following year, sales of beef from native rare breeds doubled during the same period. Consumers became aware of the close relationship between native breeds and non-intensive systems of production. The conservation of British breeds, reared in natural systems, was a strong promotional line for beef marketing.

The development and promotion of native breeds have been inhibited by lack of characterisation that stemmed from the focus of attention on popular imported breeds. Programmes of characterisation were necessary to realise the potential of native breeds in commercial systems, and this study has evaluated the progress that has been achieved with White Park cattle particularly with regard to defining performance in non-intensive production, developing a system of linear measurements, evaluating the quality of products, and demonstrating its value as a crossing breed.

Methods

Efficiency of production was calculated in a recorded pedigree herd of White Park cattle on upland pasture (Figures 1 and 2) during a four-year period (1995-1998 inclusive). Fertility, ease of parturition, longevity and growth rate were examined, and related to the system of management. In addition, other data were analysed and evaluated. Results from records of White Park cows included in a system of linear measurements for beef



Figure 1. Breeding cows in an upland herd which remains outdoors throughout the year on rough grassland.

cattle were related to production and performance. Quality of meat was evaluated by butcher and consumer assessments in the Traditional Breeds Meat Marketing scheme of the Rare Breeds Survival Trust (Lloyd-James, 1999). Data of comparative breed trials were evaluated to determine the value of White Park bulls as crossing sires.

Non-Intensive System of Production

White Park cattle are adapted to a wide variety of conditions, ranging from lowland meadows and parkland to mountain pasture (Alderson, 1997). Performance records from an upland herd in central England have been analysed for four years (1995-1998 inclusive).

The herd was kept on exposed permanent pasture of coarse herbage 250 m above sea level. The breeding herd remained outdoors

throughout the year with no housing, and received no extra feed at any time, in contrast to neighbouring herds of commercial crossbred cows. All cows were mated to a White Park bull, and all heifer replacements were homebred. Selection criteria, in order of priority, were:

1. Average weight of calf weaned.
2. Maternal breeding records of progeny,
3. Type (linear assessment).

The average herd size was 26-27 breeding cows.

A satisfactory level of fertility was achieved from a 75-day exposure to the bull. A calving rate of 93.2% (123 calvings) was realised from 132 calving opportunities. During the five-year period 21 cows left the herd, giving an average breeding life in the herd of 6.3 years. This did not provide an accurate assessment of longevity as 17 cows (average age 5.18 years) were sold for breeding. Only four animals were culled; two were barren (12 and 8 years of age) and two

were aged (both 16 years of age). The age structure of the herd in 1999 was 5 cows (20%) 12-16 years of age, 5 cows (20%) 7-11 years, and 15 cows (60%) 3-6 years. The high proportion of young cows was due to the policy of selling proven breeding cows rather than first-calving heifers.

Calves and young stock were weighed at approximately 180, 500 and 900 days of age. Weights were adjusted for age, and corrected for sex, age of dam, and inbreeding. Average weight at 180 days of age was 199.04 kg (SD 17.4 kg) from a daily live weight gain of 0.91 kg. Comparative results for a small sector of the herd on lowland grazing showed a daily live weight gain of 1.195 kg. Weights at 500 and 900 days of age (circa 400-420 kg and 630-650 kg respectively) were more variable and susceptible to changes in climatic conditions and grass quality (Figure 3). White Park steers finished under intensive conditions averaged a daily live weight gain of 1.02 kg to give an average carcass weight of 277 kg at 496 days of age, with good commercial carcass grades ranging from O+3

to R4L. Grades are defined on a scale of E (best) through U, R, O and P (worst) for conformation, and 1 (leanest) to 5 (fattest) for fatness.

Linear Measurements

A study was carried out on White Park cattle in Britain (1994–1998) to explore the relationship between various linear measurements and ratios and production characteristics, and to establish norms of type and conformation for the breed (Alderson, 1999). A total of 315 female records were included, and the process was repeated on some animals after an interval of 2 to 3 years to study patterns of growth. The measurements showed a medium-sized animal, with a long body in relation to height and depth, and relatively short legs.

The study questioned the value of established criteria. It demonstrated that withers height was a poor indicator of weight or quality, and proposed instead the use of

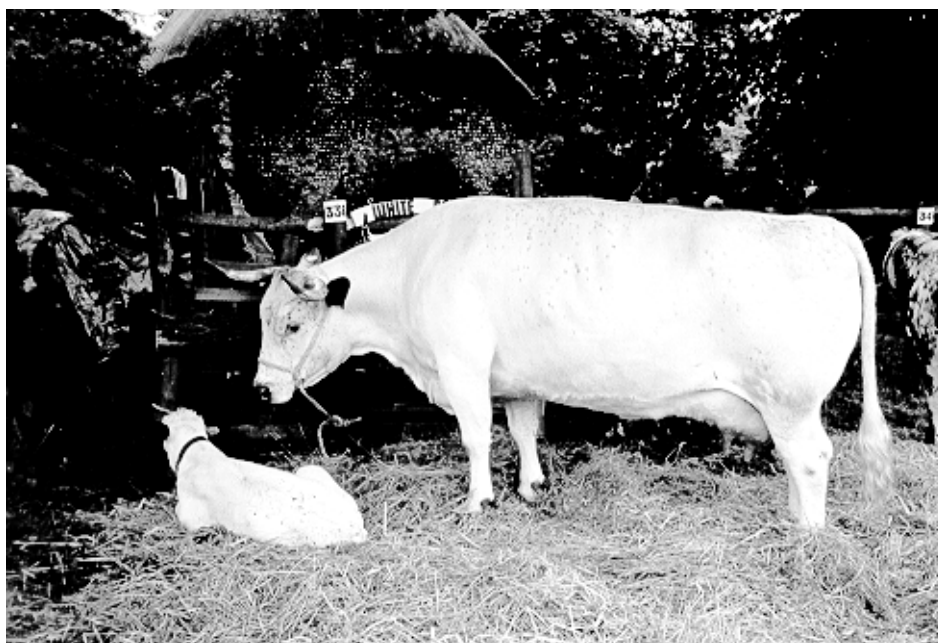


Figure 2. This White Park cow shows the typical beef characteristics of the breed.



Figure 3. White Park steers being finished on grassland for a speciality beef market.

rump length or hip width as superior measures. It also recommended the use in breeding cows of a comparative index instead of weight as an indicator of productivity. The comparative index combined values for weight, body length and rump area. Although withers height was the least variable measure and the least affected by environment, it was of limited value. It had a high correlation only with length of leg, but poor correlation with both weight and the comparative index (0.566 and 0.446 respectively). The best measures were hip width (correlation 0.861 and 0.809) and length of rump from hip to pin (correlation 0.745 and 0.781, respectively). The analyses also indicated a negative phenotypic correlation between body weight and measures of productivity such as regularity of breeding, longevity and efficiency of production. For example, 27% of heavy cows (1SD above mean) and 40% of very heavy cows (+ 2SD) were culled for irregular breeding, compared with 18% and 29% for cows with the highest comparative index (+ 1SD and 2SD respectively). The longevity

of heavy cows was shorter, but probably this was related to a poorer breeding record rather than directly to weight. There was a greater negative phenotypic correlation between productivity (total weight of calves weaned / number of years exposed to bull) and body weight (-0.543) than between productivity and comparative index (-0.407) but there was a negative correlation between efficiency of production (productivity / body weight) and comparative index (-0.663).

The study identified useful linear measures for the evaluation of beef cattle, especially in relation to behaviour in non-intensive systems of management as a specialist grazing animal, and to meat yield. A long body gave good capacity for digestion of roughage, and a greater area for high-priced joints of meat. Rump area (hip width x rump length) also was related to production of high-priced joints of meat, and this confirmed the identification of pelvic width in a study of Belgian Blue cattle (Hanset *et al.*, 1995) as the best indicator of muscularity and meat yield. Linear measures did not appear to be

correlated with other selection criteria, such as temperament or meat quality.

Quality of Product

White Park beef enjoys a particularly high reputation among butchers and consumers. Evaluation responses by both butchers and consumers were more positive than for any other breed, and White Park beef has been the preferred meat for speciality banquets. It is distinguished by a light fat covering and good marbling, and is claimed to have a high n-3 polyunsaturated fatty acids content, but measurement of meat quality has not yet been subjected to scientific evaluation.

The special quality of White Park beef has been exploited by the Traditional Breeds Meat Marketing Company, which fills a niche gourmet market in Britain and which demands high standards of taste, texture and traceability. The best quality beef is produced by cattle which are finished off grass at 36 months of age and this can command a price premium of more than 20%, but current legislation requires animals to be slaughtered before 30 months of age at which time White Park steers can achieve a liveweight of up to 650 kg. The beef is sold through a national network of specialist butchers, and is promoted not only for its eating quality, but also for related benefits to animal welfare, protection of the environment and human health. These factors are associated with non-intensive systems of production, for which White Park cattle are well suited by virtue of their medium size, grazing behaviour, good leg structure, efficiency of roughage conversion and body capacity.

Crossing Bull

While purebred White Park cattle have successfully filled a niche market, both as breeding herds in less favoured areas and as finished beef cattle through specialist outlets, their wider use will depend on their value in crossing programmes. Comparative crossing trials with White Park bulls have been carried

out against Hereford and Welsh Black bulls in the 1970s (Ark, 1974), and against Limousin bulls in 1986 (Alderson, 1997). The results indicated that the crossbred progeny of White Park bulls benefit from a high level of hybrid vigour. The growth rate of calves by White Park bulls to circa 200 days of age exceeded that of their contemporaries by Welsh Black (+23.96%) Hereford (+16.67%) and Limousin bulls (+7.26%), indicating a hybrid vigour effect of circa 20%. This was a product of the genetic distance of White Park cattle from other breeds, which has been demonstrated in several studies (Royle, 1983 and Blott, 1997).

Other advantages obtained by the use of White Park bulls were colour marking of progeny, ease of parturition and high fertility. The White Park colour pattern is dominant over any other colour or pattern. Ease of calving is experienced both by White Park cows and by other cows mated to White Park bulls. Scrotal circumference measurements from a small sample of bulls in the linear assessment programme indicated a good testicle size (average scrotal circumference 46.3 cm) in relation to body weight (955 kg). No assessment has been made of meat quality in crossbred progeny of White Park bulls.

Conclusions

The qualities which have caused native breeds to be excluded from the mainstream beef industry in Britain for three decades, are the same qualities which fit them for future markets.

1. Their natural adaptability to local conditions enables them to produce efficiently in non-intensive systems of production. The performance results for grassland systems, both upland and lowland, demonstrate a high level of productivity, but their output in intensive high-input systems can not compare with larger breeds.
2. As a group, they are characterised by ease of parturition, high fertility and longevity, and their behaviour shows grazing preference for coarse herbage and efficient use of extensive pasture.

3. Their conformation is that of a specialist grazing animal – relatively short legs and proportionately large body capacity. Their type is in contrast both to the very compact animals of breeds that were popular in Britain up to the 1960s, and to the tall continental style that superseded the earlier fashion.
4. The merit of their product is based on eating quality, especially flavour and tenderness. The meat quality of native breeds is the combined result of genetic merit and non-intensive systems of production.

Various studies of White Park cattle have confirmed the distinctive characteristics and qualities of the breed, but some results rely too heavily on anecdotal evidence that has not been subjected to scientific analysis. Special qualities, such as adaptation to grazing coarse herbage, are significant and deserve deeper study. Their level of productivity in non-intensive low-input systems offers an increasingly attractive alternative to intensive systems of beef production, and is reinforced by the premium value of the beef. The assessment by linear measurements demonstrated the irrelevance of withers height as an indicator of type, and the danger of using body weight as a priority selection criterion. The value of rump area as a superior indicator was determined, but the proposed comparative index seemed both complex and not closely correlated to some critical factors of production. The distinctiveness of the breed is particularly relevant with regard to genetic distance.

Added value is derived from the efficiency of production of the breed, from the high

quality of the product, from the perception by the consumer of the safety of traditional beef from an historic native breed, and from the use of the breed in crossing programmes for hybrid vigour.

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Adding value to South African landrace breeds conservation through utilisation*

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Summary

The paper analyses the importance of breed conservation in South Africa by means of added value through a number of species. This principle was applied to some of Southern Africa populations: Nguni cattle, indigenous pigs, indigenous sheep landraces including fat-tails (Pedi, Damara, Zulu, Afrikaner) and fat-rumped breeds (Persian) as well as the improved Boer goat. The latter is an example of what can be achieved by selecting an indigenous breed for a specific purpose.

For each breed, possible alternative uses are explained by analysing their characters. For the Nguni cattle (very well adapted to local conditions) a premium is paid for hides with minimal tick damage as these are used for car upholstery, an important added value. Beef quality and easy calving are also relevant factors that are important when crossing the Nguni with European breeds.

Indigenous sheep landraces are often used to develop hardy composites and this helps their conservation, while the Boer goat is in demand in many countries for meat-production and has been exported world-wide; this is probably the only selected meat-goat in the world.

Indigenous pig breeds are capable of generating a good income and are satisfactory alternatives to modern breeds.

través de ejemplos y por medio del valor añadido. Este principio fue aplicado a algunas de las poblaciones existentes en Sudafrica: bovinos Nguni, razas porcinas indígenas, y razas ovinas indígenas, incluidas las de cola grasa (Pedi, Damara, Zulu, Afrikaner) y cadera grasa (Persian), así como la raza caprina mejorada Boer. Esta última es un ejemplo de lo que se puede obtener a través de la selección de una raza indígena para un fin específico.

Para cada una de las razas, se presentan los usos alternativos posibles a través del análisis de sus caracteres. Para la raza Nguni (muy bien adaptada a las condiciones locales), viene pagado un premio por las pieles con un mínimo de daño, ya que vienen utilizadas como tapicería para los coches, lo que representa un importante valor añadido. La calidad de la carne y la facilidad para el parto son otros de los factores importantes considerados en el momento de cruzar la raza Nguni con razas europeas.

Las razas indígenas ovinas vienen utilizadas a menudo para desarrollar los componentes de resistencia, lo que ayuda a su conservación. Mientras que las Boer han sido exportadas ampliamente, ya que vienen solicitadas por su producción de carne; es seguramente la única raza caprina seleccionada en el mundo por su carne.

Resumen

El artículo analiza la importancia de la conservación de las razas en Sudafrica a

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Figure 1. A typical Nguni bull.

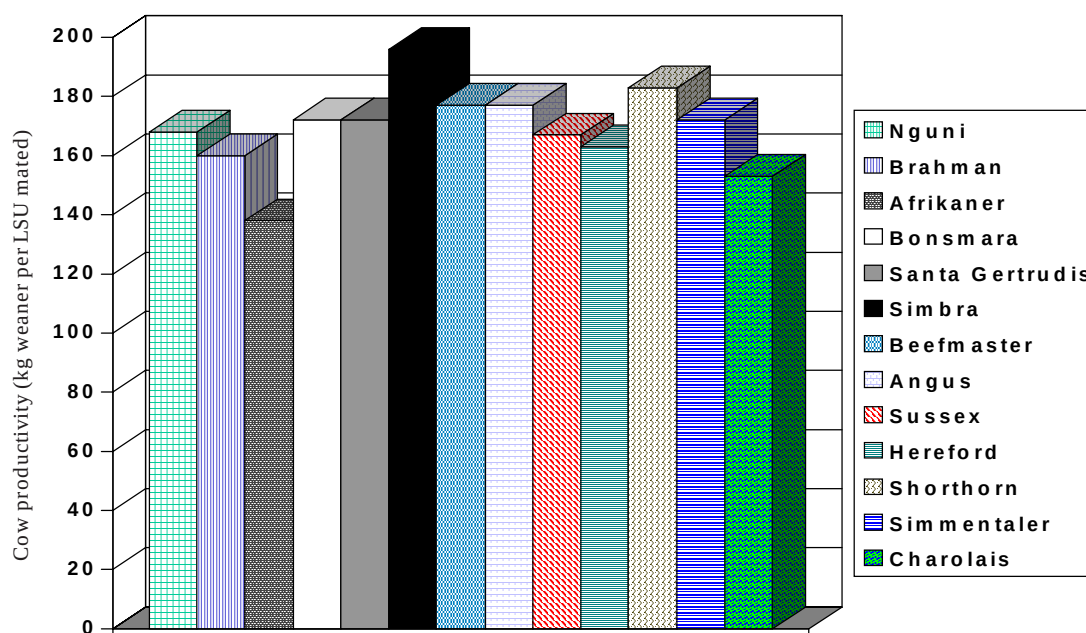


Figure 2. Cow productivity (kg weaner per LSU mated) of breeds participating in the National beef performance testing scheme (Matjuda & Scholtz, 1995).

Las razas indígenas porcinas son capaces de generar un buen ingreso y representan alternativas satisfactorias a las razas modernas.

Key words: Nguni cattle, Tick tolerance, Beef quality, Indigenous sheep and goats, Indigenous pig.

Introduction

The long-term future of any breed of farm animal depends largely on its commercial value - and / or its ability to meet specific needs through sometimes unique traits. This applies particularly to many indigenous

Table 1. Tick infestation and the effect on weaning weight (Scholtz et al., 1991).

	Hereford	Bonsmara	Nguni
Number of one-host ticks	3 137	2 030	431
Number of multi-host ticks	164	164	82
Difference in weaning weight between dipped and not dipped	29.5 kg	17.6 kg	4.4 kg

landraces that are often perceived as having no real commercial value.

In recent years, global animal agriculture has seen the virtual disappearance of a number of breeds - mainly because they were unable to 'compete' with improved breeds and composites.

These are often conserved by enthusiasts and conservationists - some of whom are aware of the importance of maintaining as much biological diversity as possible - as well as the fact that many have unique traits that are becoming increasingly important in modern animal breeding.

Long - term conservation of farm animal genetic resources will, however, depend largely on the commercial value of the breeds concerned. It is therefore important to capitalise on any traits that will make a breed an economically viable alternative to more modern breeds and composites.

South Africa has a number of landrace breeds that fall in the above categories. Relatively small carcass size, non-uniform colour patterns and a general lack of information on production potential even led to traditional owners changing to often less adapted exotic and composite breeds. These breeds are, however, often-viable alternatives. All that is needed is a value-added approach.

Adding Value to Nguni Cattle

Nguni cattle were perceived to be inferior to other cattle breeds, largely due to their often-smaller size and varied colour patterns

(Figure 1). This situation has changed. Information on the potential of the breed and the establishment of a breed society contributed in a big way - but it will be the unique characteristics and added advantages of this cattle breed that will guarantee its long-term stability and survival.

Indigenous breeds are not always the best option under optimal conditions. This can clearly be seen in Figure 2 where the cow productivity of breeds participating in the National performance testing scheme is compared by measuring kg weaner produced per Livestock Unit mated. (Matjuda & Scholtz, 1995).

In this graph, the Nguni compares fairly well with most breeds - but there are breeds that are more efficient under optimal conditions.

Including other factors such as cost saving with stock remedies, however, changes the situation.

Tick Tolerance

Work done at the Animal Improvement Institute farm, Loskop South clearly showed what effect tick infestation had on weaning weight (Table 1). The potential cost saving should be added to a projected hide value. A premium is paid for hides with minimal tick damage as these are used for car upholstery.

South Africa has a lucrative contract with a German car manufacturer based largely on hide quality.

Hide and Colouring Characteristics

The Nguni has a relatively thin hide and, as already mentioned, minimum tick damage places a premium on the leather.

The colouring characteristics offer wide scope for a range of products - from hair-intact hides for floor and wall covering to handbags, briefcases and even fashion garments (jackets)

The fact that the Nguni often has a symmetrical colour pattern (e.g. red and white Nkone) is an added advantage when it comes to fashion garments, floor coverings and wall hangings. Hides are currently being sold for between US\$200 and US\$300.

Another added advantage of the variety of colour patterns is ecotourism. The Tswaiing project near Onderstepoort has a Nguni herd as part of the tourist attraction. Mkhaya in Swaziland is another example of where the Nguni has added value to an Ecotourism venture - thereby adding value to the Nguni as well as a potential tourist attraction.

This aspect could be put to good use in rural areas with ecotourism potential - it could also be linked to the sale of hides and leather products. This would be an added incentive for stockowners in these areas to retain pure Ngunis.

Quality Beef

Naude (1975) showed that well finished Sanga cattle are capable of fetching top grades. Work done by Swanepoel (1989) and Strauss (1993) came to similar conclusions but included observations on quality and taste as well. The work done by Swanepoel (1989) compared breeds and the Afrikaner and the Nguni fared the best as far as quality and taste was concerned (with the Afrikaner slightly ahead on taste and preference)

Lepen (1993) compared both feedlot and veld production of beef from Drakensberger, Brahman and Nguni cattle and showed that veld-finished Ngunis were capable of fetching top grades.

The value of this work lies in two directions:

- 1) Using the Nguni as a dam line for industrial crossing for feedlot purposes - combining the beef quality potential of the Nguni with the feedlot potential of breeds like the Devon, Simmentaler and Charolais.
- 2) Branded beef finishing under extensive grazing conditions beef with little to no use of chemicals (dip) and stock remedies (largely antibiotics). A quality product for a niche market with export potential.

Table 2. Preweaning and feedlot performance of Nguni-Charolais crosses and pure Nguni, Charolais and Simmentaler breeds (Scholtz, 1992).

Trait	Nguni	Nguni-Char	Char	Simmental
Birth weight (kg)	27	34	47	39
Weaning weight (kg)	186	219	223	221
ADG (kg)	1 121	1 652	1 775	1 655
FCR	7.5	6.4	6.6	7.0
ADG- Average daily gain				
FCR - Feed conversion rate				



Figure 3. A Black Headed Persian ram – typical fat-rumped sheep.

Ease of Calving

Although this characteristic is well documented, the advantages are seldom exploited as well as they could.

Table 2 shows the preweaning and feedlot performance of Nguni - cross Charolais crosses and some other breeds. The Nguni - cross Charolais compares well with the pure Charolais and Simmentaler breeds in the feedlot and has the added advantage of a slightly better feed conversion rate.

The Nguni can be used effectively as a dam line to breed weaners for the feedlot. This can be further exploited to breed 'custom-weaners'.

Table 3. Average market carcass weights (kg) of some South African indigenous and composite landrace sheep breeds (Source: Snyman, 1998).

Breed	Carcass weight
Mutton Merino	22
Namaqua Afrikaner	18
Afrino (Merino x Afrikaner)	20
Persian (Somali)	13
Dorper (Dorset x Persian)	18
Damara	17

Research has shown that the Nguni does not even experience calving difficulties when crossed with the largest beef breed in the World, the Chianina. Any breed can safely be used as a sire line - with the possible exception of the double muscled breeds where additional research may be needed.

Using this, it would be possible to custom-breed a feedlotter using a sire breed that finishes well of a specific ration / feed type and also a breed known for specific characteristics such as marbling and lean beef.

Industrial crossing for finishing under extensive grazing conditions could also be exploited in this way, using the Nguni as a dam line and using a large frame beef breed with specific characteristics.

An example of this could be the Romagnola breed from Italy that is almost as large as the Chianina, but is potentially a better converter of low quality roughage.

These unique characteristics manifest themselves in many ways, but they could be exploited more by concentrating on minimum care and ease of handling.

Adding value to the Nguni will ensure that it can compete. The value is there, it just needs to be exploited effectively.

Table 4. Adding value to indigenous sheep - economically useful characteristics.

Characteristic	Added value
Quality skin	In demand for fashion items and garments
Parasite tolerance	Less damage to skin - lower maintenance costs - stock remedies
Fat tail	Sold as a delicacy - or as an ingredient for locally made meat products (fresh and dried sausage)
Residue-free meat ; quality meat	Capitalise on the market for healthy meat as well as a branded (local sheep) mutton.

Table 5. Adding value to goats - economically useful characteristics.

Characteristic	Value
Resistance to heartwater (Cowdria)	Lower mortalities ; minimal use of stock remedies
Tick tolerance	Less damage to skin ; minimal use of stock remedies
Quality skin	In demand for fashion items and garments
Capacity for crossbreeding - milk	Potential to develop hardy composite milk producers
Capacity for crossbreeding - cashmere	Quality cashmere as an added product
Capacity for crossbreeding - meat	Can be used to breed a more hardy meat producer in areas where pure Boer goats are unable to survive without additional management and remedy inputs

Table 6. Down fibre quality and quantity in South African double coated breeds and types.

	Boer goat	Savannah	Unimproved	Gorno Altai
Down diameter (μ)	16-18.5	16.0-18.5	14.0-16.5	18.5-19.0
Down length (mm)	20-31	20-31	15-30	18.5-19
Down crimp	good	good	good	Poor
Down style	good	good	good	Poor
Down weight (g)	10-50	10-50	5-15	100-500
Down yield (%)	50-70	50-70	60-80	50-70
Down colour	white and white / colour	white	white and white / colour	brown

Source: CSIR Textile Research Institute.



Figure 4. A typical kolbroek pig a lard-type as opposed to the leaner windsnyer breed/type.

Adding Value to Indigenous Sheep

South African indigenous sheep landraces include fat-tailed (Pedi, Damara, Zulu, Afrikaner) and fat-rumped varieties (Persian). In comparison to some of the locally developed composite landraces such as the Dorper (Dorset Horn - Persian) and the Afrino (Afrikaner- Merino), these breeds have a smaller carcass and have also been downgraded in the past as a result of the fat tail - or fat rump.

Although not always seen as a value-added advantage, indigenous landraces are often used to develop hardy composites. This often helps conserve a pure nucleus.

The average market carcass weights of some of the pure and composite sheep landraces in South Africa illustrate this (Table 3).

Farming with pure indigenous sheep breeds can be made more profitable by considering the table 4.

Adding Value to Indigenous Goats

The South African Improved Boer goat is an example of what can be achieved by

improving an indigenous breed for a specific purpose. The Boer goat is in demand in a number of countries for use as a meat-producing goat and genetic material has been exported to Canada, the USA, Australia and New Zealand.

The wide variety of unimproved goats are generally regarded as having little to no economic value, and some ecotypes could become endangered fairly shortly as a result of this perception.

Value can be added to these goats by capitalising on one or more of the traits shown in table 5.

Cashmere could become a useful value-added product and initial trials have shown that South African indigenous goats produce good quality cashmere. Selection for higher production could lead to the development of a multi-purpose goat - meat, milk and cashmere (Table 6).

Adding Value to Indigenous Pigs

South Africa has two basic indigenous pig breeds - a short-snouted 'kolbroek' and a longer snouted 'windsnyer'. Both are often seen as less efficient than the more modern

pig breeds and their tendency to put on excess fat is also seen as a disadvantage.

Despite these perceptions, these breeds are capable of generating a good income and are, in fact, viable alternatives to more modern breeds under certain circumstances.

Concluding Remarks

The survival of a breed lies in numbers and diversity. Adding value will ensure that landrace breeds can compete with other breeds as viable alternatives to certain farming systems.

Many stock owners are, however, unaware of the potential these breeds have for adding value. It is therefore important to have as much information available at all farm systems levels to enable stock owners to make an informed choice.

More attention should therefore be given to conservation through utilisation and the economic potential of breeds should be included in any characterisation studies.

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Introduction de la race bovine N'Dama à la Ferme Elevage de l'Okpara au Bénin. Quelques performances zootechniques

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Résumé

Les performances zootechniques de la race N'Dama ont été déterminées de 1994 à 1997 à partir du noyau reconstitué en 1993 dans le cadre de l'amélioration génétique des races locales à la Ferme Elevage de l'Okpara au Bénin. Les poids moyens à la naissance, à 6, 12 et 24 mois sont respectivement 17.4, 55.6, 95.9 et 158 kg. La vitesse de croissance de la naissance à 12 mois est de 215 g/j. Excepté le poids à la naissance, le poids et les mensurations corporelles sont largement en dessous de ceux obtenus chez la race dans son berceau. L'intervalle de vêlage a été de 413±54 jours, l'âge moyen au premier vêlage a été situé à 48 mois ± 33 jours, et le taux moyen de fécondité à 84.3%. Les naissances s'observent d'octobre à janvier avec une mortalité variant selon les années de 0 à 8.1% chez les jeunes. Aucun cas de mortalité n'a été enregistré chez les adultes. En somme, il est remarqué que l'expression phénotypique des caractères de productions de la N'Dama est limitée dans le ranch de l'Okpara.

Summary

The zootechnical performances of the N'dama breed were measured from 1994 to 1997, in the breed nucleus formed in 1993 with the purpose of genetically improving the local breed at Okpara breeding farm in Benin. The average weights at birth, 6, 12 and 24 months were respectively 17.4, 55.6, 95.9, and 155 kg.

The average daily gain from birth to 12 month is 215 g/d. Except for the weight at birth, the weight and body measurements are largely below those reported in its origin. The calving interval was estimated in 413 days and the mean age at first calving was 48 months ± 33 days, the average fertility was 84.3%. The births were observed from October to January, with a calf mortality of 8.19%. No case of mortality was recorded in adults. All things considered, it is noticed that the phenotypic expression of production traits in N'dama is modest in the ranch of Okpara.

Mots-clés: N'Dama, Poids, Mensurations, Reproduction, Mortalité, Bénin

Introduction

La trypanotolérance de la race N'Dama est un facteur favorable à son développement dans les régions tropicales chaudes et humides infestées par la glossine. De part sa vitesse de croissance, sa conformation et son aptitude bouchère, la N'dama est la plus importante des races trypanotolérantes. Elle se rencontre en Afrique occidentale, notamment en Guinée, au Sénégal, en Sierra Leone, au Mali et en Côte d'Ivoire, puis dans certains pays de l'Afrique centrale (Congo et République démocratique du Congo). Tenant compte de ses performances, elle a été l'objet des programmes d'amélioration génétique des Centres de recherche zootechnique dans la

plupart des pays d'Afrique occidentale comme le Mali, la Côte d'Ivoire et le Sénégal (Pagot, 1985 ; Hoste, 1983 ; Planchnault, 1984). Au Bénin, la race N'Dama a été introduite vers 1952 à la Ferme expérimentale de l'Okpara dans le but d'améliorer les races bovines locales (Borgou, Somba et Pabli) par croisement avec la N'Dama importée de la Guinée, du Sénégal et de la Côte d'Ivoire. Cet essai d'amélioration s'est soldé par un échec par manque de suivi après la phase du projet (Sanoussi, 1993).

Financée à nouveau en 1990 par la Banque Africaine de Développement (BAD) dans le cadre du Projet pour le Développement de la Production Animale (PDPA) phase II, actuellement Projet pour le Développement de l'Élevage (PDE), le noyau de N'Dama a été reconstitué en 1993 suite à l'introduction de 22 nouvelles têtes dans le troupeau initial en dégénérescence.

Le but de ce travail est de déterminer quelques caractéristiques zootechniques de la race bovine N'Dama dans un biotope autre que son aire de distribution géographique afin d'étudier la possibilité d'un croisement avec les races autochtones aussi bien dans les fermes d'Etat qu'en élevage traditionnel. Le seul autre exemple comparable est celui du Ranch d'Okouma (OGAPROV), à Franceville, Gabon ; des N'Dama d'origine du Sénégal et du Congo (Kinshasa) ont été introduites avec succès dans le début des années 70 (Boyazoglu, 1984).

Matériel et Methode

Le cheptel bovin N'Dama à la Ferme Elevage de l'Okpara a été estimé à 32 têtes avant le repeuplement en 1993. Il était composé de 11 vaches, 7 génisses, 5 velles, 2 taureaux, 2 taurillons et 5 veaux. Courant cette année, 20 génisses, 1 taureau et 1 taurillon ont été introduit à l'effectif initial. Le suivi des animaux s'est déroulé de 1994 à 1997.

Milieu d'étude

Créée depuis 1952, la ferme Elevage de l'Okpara couvre 33 000 hectares dont à peine

5 000 hectares sont exploités. Elle est implantée au Bénin dans le Département du Borgou, Sous- Préfecture de Kika et située à 15 km à l'Est de la ville de Parakou, chef lieu du Département du Borgou. Elle est comprise entre 2°39 et 2°53 de longitude Est et 9°6 à 9°21 de latitude Nord.

Le climat est de type soudanien avec une alternance d'une saison pluvieuse (mai à octobre) et une saison sèche (novembre à avril) marquée par l'harmattan (décembre à février). La pluviométrie est de 1 200 mm environ.

Le relief est constitué d'une pénéplaine cristalline comportant des collines à roches dures. De grandes dépressions s'observent, permettant ainsi la mobilisation des eaux de pluie vers le fleuve Okpara et son affluent la Dama, principale source d'approvisionnement en eau de boisson pour le bétail.

Le sol de texture sableuse, sablo-argileuse ou limoneuse par endroit supporte une végétation de savane. Celle-ci est affectée chaque année par les feux de brousse.

Mode d'élevage

Le mode d'élevage est de type semi-amélioré. Les animaux passent la journée au pâturage et la nuit dans un parc (figure 1) muni d'abreuvoirs et mangeoires. L'alimentation est basée sur l'exploitation du pâturage naturel et les prairies artificielles. Ce pâturage finit par brûler et les parcours naturels restent nus pendant les quatre premiers mois de l'année. Seuls les bas-fonds et les abords des cours d'eaux de l'Okpara et de ses affluents offrent un fourrage vert très peu abondant. Les animaux bénéficient également des résidus de récoltes issus des champs de cultures. La complémentation en ensilage (*Brachiaria ruziziensis* et *Stylosanthes* sp), foin (*Brachiaria ruziziensis*), et graines de coton a eu lieu pendant la période de soudure de janvier à avril, et les animaux les plus nécessiteux, ont été les vaches allaitantes, veaux avant et pendant le sevrage.

Pendant la saison pluvieuse, c'est-à-dire de mai à octobre, les parcours naturels



Figure 1. Parc de nuit du troupeau N'dama à la Ferme Elevage de l'Okpara au Bénin.

repoussent et le pâturage est abondant. Les graminées sont rabougries sur les parcours surpâturés pendant la saison sèche tandis que sur les zones non exploitées elles sont de grande taille, et transformées en paille. De manière générale, les herbes se transforment en paille en novembre et en décembre.

Le système de reproduction est la monte libre et le suivi sanitaire est basé sur la prévention : déparasitage interne, vitamines, oligo-éléments, trypanoprévention, et vaccinations contre la Pasteurellose, la Peste bovine et le charbon bactérien. A tout cela s'ajoutent les traitements spécifiques.

Méthodologie

Les animaux utilisés sont issus du noyau reconstitué de race N'Dama (figure 2) dont l'effectif a été de 58 en 1994, 71 en 1995, 74 en 1996 et 90 en 1997. Le matériel de travail utilisé est constitué de couloir de contention, d'un pulvérisateur pour le déparasitage des

animaux, d'une bascule pèse bétail, du matériel de clinique et d'une fiche de suivi comportant les renseignements suivants :

- numéro de l'animal ;
- numéro de la mère;
- mois de naissance;
- année de naissance;
- âge de sa mère au vêlage;
- rang de vêlage occupé par l'animal;
- sexe;
- intervalle de vêlage;
- poids à la naissance;
- poids mensuel de 1 à 24 mois.

Tous les veaux ont été pesés à la naissance et à la fin de chaque mois jusqu'à l'âge de 24 mois. Les poids à âge type sont enregistrés dans la fiche de suivi, ainsi que les données contenues dans celle-ci.

Concernant les mesurent corporelles, l'instrument de mesure utilisé pour le périmètre thoracique et la longueur scapulo-ischiale a été le mètre ruban gradué en

Tableau 1. Evolution pondérale et vitesse de croissance de la N'Dama à la Ferme de l'Okpara.

Paramètres	Sexe	Effectif	Moyenne (kg)	Ecartype	Paramètre	Sexe	Effectif	Moyenne (g/j)	Ecartype
Poids à la naissance	M	11	17.63	1.22	GQM ₀₋₆	M	11	190.9	66.15
	F	21	17.23	1.67		F	21	223.2	56.4
	M et F	32	17.37	1.52		M et F	32	212.1	61.68
Poids à six mois	M	11	52	12.51	GQM ₆₋₁₂	M	9	243.15	62.33
	F	21	57.41	11.22		F	16	205.24*	59.32
	M et F	32	55.55	11.76		M et F	25	229.51*	62.82
Poids à 12 mois	M	9	100.31**	9.05	GQM ₀₋₁₂	M et F	9	215.26	46.56
	F	16	88.16**	18.15					
	M et F	25	95.94	14.49					
Poids à 24 mois	M et F	9	158	17.24					

GQM₀₋₆ : Gain quotidien moyen de la naissance à 6 mois

M : mâle

GQM₆₋₁₂ : Gain quotidien moyen de 6 à 12 mois

F : femelle

GQM₀₋₁₂ : Gain quotidien moyen de la naissance à 12 mois

* différence significative entre le mâle et la femelle (p<0.01)

** différence significative entre le mâle et la femelle (p<0.001)

centimètre. Le périmètre thoracique a été pris en arrière des épaules et juste derrière la pointe du coude sur l'animal en expiration tout en veillant à ce que le ruban ne présente pas de torsion. Quant à la longueur scapulo-ischiale, la mesure a été faite de la pointe de l'épaule à la tubérosité ischiale lorsque l'animal est immobilisé.

La hauteur au garrot a été mesurée par une canne - toise tenue verticalement à côté d'une patte antérieure de l'animal. Le tube à niveau associé à la canne - toise a été posé sur le garrot de l'animal juste en arrière de la bosse. La hauteur est notée au lieu d'application du tube sur la canne dès que l'angle droit a été obtenu entre la canne et le tube à niveau.

Toutes ces mesures ont été enregistrées sur une fiche comportant le numéro, le sexe, l'âge et le poids réel de l'animal, ainsi que son périmètre thoracique, sa longueur scapulo-ischiale et sa hauteur au garrot.

Les analyses statistiques ont été faites à l'aide des logiciels SAS (Statistical Analysis System) et Excel 97.

Résultats et Discussion

Croissance pondérale

Le tableau 1 récapitule le poids à la naissance, à 6, à 12 et à 24 mois, ainsi que les différents gains moyens quotidiens de la N'Dama. Le poids moyen à la naissance a été estimé à 17.4 kg, et les mâles ont été plus lourds que les femelles. Cette tendance s'inverse à six mois avec un poids moyen pour tous sexes confondus de 55.5 kg. Ainsi, le gain quotidien moyen entre la naissance et six mois a été de 212.1 g/j. En côte d'Ivoire, le poids à la naissance du veau N'Dama est de 17.6 kg chez le veau et 16.6 kg chez la femelle (FAO, 1995). Ces poids sont très proches de ceux obtenus à la Ferme de l'Okpara. Chez la N'Dama de grande taille au Sénégal, les mâles et les femelles ont eu respectivement 18 et



Figure 2. Troupeau N'dama à la Ferme Elevage de l'Okpara au Bénin.

17 kg de poids à la naissance (FAO, 1995). Par contre, en élevage extensif au Mali, les mâles ont un poids de 15.4 kg et les femelles, 14.8 kg (Planchnault, 1984). A 6 mois, le poids moyen du veau est beaucoup plus important chez la N'Dama en élevage semi-intensif au Centre de recherche zootechnique de Minankro Bouaké en Côte d'Ivoire ; il est égal à 89.8 kg chez le mâle et 84.3 kg chez la femelle (Pagot, 1985).

Le poids moyen des jeunes a été estimé à 95.9 kg à 12 mois et 158 kg à 24 mois. La vitesse de croissance pondérale entre 6 et 12 mois a été de 229.5 g/j et 215.3 g/j de la naissance à 12 mois. Ces différents poids sont beaucoup moins importants que ceux obtenus par Coulomb en 1976 au Mali et en Côte d'Ivoire où les jeunes bovins N'Dama ont eu un poids de 129.7 kg pour le mâle et 120.7 kg pour la femelle à 12 mois. De même, à 24 mois, les mâles ont pesé 227.4 kg et les femelles 190.9 kg. La N'Dama accuse un retard de croissance très important à la Ferme Elevage de l'Okpara que dans son berceau en Côte d'Ivoire ou au Mali. Ce retard s'exprime par une vitesse de croissance assez faible (212.1 g/j) pendant les six premiers mois qui suivent la naissance contre 375 g/j pour le sixième mois (Coulomb, 1976).

Mensurations corporelles

Les mensurations corporelles à 6, 12 et 24 mois sont indiquées dans le tableau 2. Les variables prises en compte ont été: le périmètre thoracique, la hauteur au garrot et la longueur scapulo-ischiale. Tout comme le poids et la vitesse de croissance, les mensurations obtenues sont inférieures à celles de la même race en Côte d'Ivoire et au Mali (Coulomb, 1976; Planchnault, 1984).

Reproduction

Dans les conditions d'élevage semi-améliorée pratiquée à la Ferme d'Elevage de l'Okpara, les vaches et les génisses ont été laissées en permanence en présence des taureaux. Ainsi, le tableau 3 regroupe le résultat de quelques performances de reproduction de la race

N'Dama dans le ranch de l'Okpara.

L'intervalle de vêlage a été de 413.4 jours. L'âge moyen au premier vêlage a été situé à 48 mois $\pm$ 10 jours. Le taux de fécondité a varié de 69.2 à 96% de 1994 à 1997 avec une moyenne de 84.3%. Le taux le plus bas a été observé en 1997 à cause des épizooties de la fièvre aphteuse et de la dermatose nodulaire qu'a connu le troupeau pendant la période de saillies en 1996. En 1994, 50% des naissances ont eu lieu en novembre et en 1995, 76.5% des naissances ont été enregistrées d'octobre à décembre. Quant aux années 1996 et 1997, les pics de naissances ont été enregistrées en janvier, novembre et décembre pour le premier (61.90%) et juillet août et septembre pour le second (50%). Le regroupement des naissances s'observe pendant les mois secs (octobre à janvier), correspondant ainsi à une saillie fécondante de février à mai. Toutefois, les mise-bas ont été enregistrées vers la fin de la saison des pluies en 1997. La durée de la gestation n'a pas été déterminée parce que la monte n'a pas été dirigée; enfin, aucune difficulté de vêlage n'a été observée.

Au Centre de recherche zootechnique de Minankro en Côte d'Ivoire, selon Coulomb (1976), l'âge au premier vêlage se situait à 35 mois 17 jours $\pm$ 29 jours. Cet âge a été précoce par rapport à celui observé à la Ferme Elevage de l'Okpara. Aussi, le taux de fécondité oscillait, selon les années, entre 82 et 95% avec une moyenne sur 14 années consécutives (1956-1969) de 88.5 $\pm$ 3.2%, et la période la plus favorable pour les naissances est d'octobre à janvier dans les conditions climatiques de la Côte d'Ivoire. Enfin, l'intervalle de vêlage a été de 420 $\pm$ 9 jours selon le même auteur.

Mortalité et taux d'exploitation

Aucune mortalité n'a été enregistrée chez les veaux en 1995 et en 1997, puis chez les adultes durant toute la période de suivi (1994-1997). En 1994, le taux de mortalité des jeunes a été de 8%, et 8.1% en 1996. Ces mortalités sont dues aux épizooties de la fièvre aphteuse et de la dermatose nodulaire bovine qui ont sévi pendant ces périodes.

Tableau 2. Mensurations des jeunes N'Dama.

Paramètres	Age (mois)	Ferme de l'Okpara			Mensurations des mâles en Côte d'Ivoire*			Mensuration de femelles en Côte d'Ivoire*		
		Efectif	Moyenne (cm)	Ecartype	Efectif	Moyenne (cm)	Ecartype	Efectif	Moyenne (cm)	Ecartype
PT	6	30	87,8	2,9	190	103,3	1,1	189	101,4	1
	12	20	108,5	3,1	155	117,3	1,2	154	114,7	1,2
	24	9	125	2,2	108	143,4	1,5	120	135,4	1,4
HG	6	30	75,8	4,2	190	85,2	0,7	189	83,6	0,7
	12	20	85,2	3,7	154	94,4	0,8	154	92,2	0,7
	24	9	98,48	3,8	108	108	0,8	120	104	0,8
LSI	6	30	82,1	2,9	190	95,3	1,1	189	93,2	1
	12	20	98,3	1,1	155	107,6	1,1	154	105,3	1
	24	9	112,6	1,5	108	128,6	1,2	120	121,9	1,3

PT: Périmètre thoracique.

HG: Hauteur au garrot.

LSI: Longueur scapulo-ischiale.

*Source: Coulomb, 1976.

Tableau 3. Quelques paramètres de reproduction de la race N'Dama.

Paramètres		Effectif	Moyenne
Fécondité (%)	1994	13	96
	1995	24	89,47
	1996	27	82,35
	1997	25	69,23
Age au premier vêlage (mois)		19	48,13 $\pm$ 0.33
Intervalle de vêlage (jours)		13	416,38 $\pm$ 54,48

Le taux d'exploitation concerne les animaux vendus, sortis ou ayant fait l'objet de don. Il s'agit des vaches en fin de carrière de reproduction, des taurillons surnuméraires et autres en cas de nécessité. Ces taux sont de 7.7, 5, 16.3 et 2.0% respectivement pour les années 1994, 1995, 1996 et 1997. Le taux d'exploitation est plus important en 1996 à cause des sorties effectuées lors de l'épidémie de la dermatose nodulaire.

Taux de croît

Le taux de croît dénote la croissance du troupeau par rapport à l'effectif du début de l'année. La croissance la plus spectaculaire a été observée en 1995 soit 89.5%, contre 21.6% en 1997 et 4.2% en 1996.

Conclusion

Les performances pondérales et corporelles de la race N'Dama à la Ferme Elevage de l'Okpara sont largement en dessous des résultats escomptés. De même, l'âge au premier vêlage est beaucoup plus important que celui observé dans le berceau de la race. L'adaptation de ces animaux doit se poursuivre pendant quelques années afin de pouvoir dégager des résultats plus concluants et définitifs. La race Borgou sélectionnée à la Ferme Elevage de l'Okpara, présente des performances pondérales et une trypanotolérance presque analogues à celles

de la race N'Dama dans son berceau. Le Bénin a des effectifs très importants de quatre races bovines (Zébu, Borgou, Somba et Lagunaire) dont chacune occupe un biotope déterminé, et par conséquent, il y a une grande possibilité et facilité d'adaptation dans l'aire de distribution géographique de la race voisine. Dans les zones de contact entre différentes races, s'observent des croisements anarchiques qui devraient être contrôlés et suivis selon un programme local, régional ou national d'amélioration génétique.

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The Sambucana sheep: a project to save a valley

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Summary

At the beginning of the 1980's, Sambucana sheep, which have inhabited a valley in the northern Italian region of Cuneo since the Eighteenth century, were on the verge of extinction. In an effort to safeguard the breed, the 'Comunità Montana' and local institutes set up a consortium which includes approximately eighty breeders and has entrusted the recovery of the breed's genetic heritage, threatened by repeated cross-breeding with Biellese sheep, to a ram centre. The sales of Sambucana lamb, which is a highly prized meat guaranteed by a specific brand, have increased at the shops in the province served by the consortium, and moreover the economy of mountain communities has benefited from the protection program. A pack of wolves endangering the summer grazing of the sheep at high altitudes could in the future have a negative effect on the purity of the breed and the characteristics of the meat.

Résumé

Les brebis "Sambucane", qui peuplent depuis la fin du dix-huitième siècle l'une des vallées de la région de Cuneo dans le nord de l'Italie, ont risqué de disparaître à la fin des années '80. Grâce à la "Comunità Montana" et aux institutions locales, la sauvegarde de cette race et de son patrimoine génétique, menacé par de nombreux croisement avec des brebis de race "Biellese", a été confiée à un syndicat et aux quelque quatre-vingts éleveurs qui y adhèrent; pour rejoindre leur but, ces derniers ont mis en place un centre de sélection et d'élevage de béliers "Sambucani". Les ventes de viande d'agneau "Sambucano", dont la

qualité garantie par un label n'est plus à prouver, sont en plein essor dans toute la province, grâce à l'assidu travail du syndicat. Cet accroissement des ventes et ce programme de sauvegarde de la race font sentir leurs bienfaits sur l'économie rurale des villages de montagne. Seul la présence d'une bande de loups met en danger l'élevage en état de semi-liberté, qui a lieu en été sur des pâturages de montagne. Ce problème pourrait cependant avoir des effets négatifs sur la pureté future de la race et sur les caractéristiques de grande valeur de sa chair.

Key words: *Sambucana sheep, Conservation, Satura Valley.*

Introduction

The Stura valley (in the province of Cuneo, Piedmont, Italy) extends over 60 km, running East-West between the Maritime and Cottian Alps from Borgo San Dalmazzo (a small town near Cuneo) to the Colle della Maddalena on the French border (Figure 1). There are extensive pasture lands on the alpine plains; 94% of agricultural land in the valleys, that is 52% of the total area, is given over to fields and pastures which are used in the main for rearing sheep (Programma di filiera, 1996). The autochthonous breed is the Sambucana, which is thought to have been introduced into the valley in the Eighteenth century and which quickly became adapted to the high grazing grounds. Also known as 'Demontina' and classified by some authors among Apennine breeds that are crossed with French breeds, it is one of the most important of the so-called 'minor' breeds. (Tables 1, 2 and 3).

Twenty years ago the FAO was alerted to the fact that the number of Sambucana sheep

Table 1. Body characteristics.

Size	Average-Large
Head	without horns or wool, slightly ram-like profile
Ears	average size, pointing out sideways, horizontally
Neck	on average short and muscular
Body	long and cylindrical, straight back-lumbar line, ample diameters
Rump	wide, muscular
Abdomen	rounded, developed on the average
Thighs	well-developed
Limbs	fine, slim, solid, adapted to the environment, correct perpendicularity
Tail	fine, hanging to hocks, covered in wool
Fleece	pale yellow-white, half-closed; some black examples with stars on foreheads
Wool	fine, shiny, fiber 3-5 cm, diameter 30-40 micron
Tongue, palate	rosy color
Orifices	rosy color
Hooves	yellow-ivory color, compact, very tough
Birth wieight	5 kg only child, 4 kg twins

Source: Massimino & Brignone, 1993.



Figure 1. The Stura Valley in the province of Cuneo, Piedmont.

was diminishing. It acted by declaring the breed as 'vulnerable'. In 1981 research by the *Consiglio Nazionale delle Ricerche* revealed that there were only 1 000 animals of the breed in existence, divided among about one hundred farms located at that time (as indeed today), in the mid and high valley (Brignone *et al.*, 1998). In 1984 the number had risen to approximately 4 900 sheep, but of these only 40% were pure Sambucana, with the remaining 60% cross-breeds (Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998). In order to increase birth weight and the rate of growth, breeders had cross-bred the race with Biella rams, to the detriment not only of the adaptability of the sheep to the difficult mountainous terrain and the climate, with its cold, snow-bound winters and hot, windy summers, but also, and most notably, of the quality and yield of meat and wool.

The cross-bred lambs were indeed larger, yet the increase in weight was due to their larger bone structure and thicker skin rather than to any increase in the quantity of meat (Brignone *et al.*, 1998).

In the meantime it became evident in Stura valley that the disappearance of Sambucana sheep would harm not only the land (abandoned pastures would be overtaken by impenetrable vegetation covering the centuries' old paths within a few seasons), but also the local economy. Only a strong breed (in summer they climb to pastures above 2 000 meters and in winter they make do with hay and makeshift sheepfolds) (Figure 2) could adapt to the limited resources of a valley in which 7 of the 11 communes are highly marginal, where the breeders are also farmers who in summer cannot tend to their animals when there is hay making and other farm work to be done and who therefore only



Figure 2. Sambucana sheeps in summer pastures above 2 000 meters.

Table 2. Biometric measurements (cm) and slaughter characteristics of male Sambucana lambs (n=6).

	Height at withers	Cross height	Rump length	Rump width	Trunk length	Chest height	Chest width	Chest girth	Carcass length	Thigh length
	61	67	24	18	61	24	15	83	70	54
	60	62	25	18	76	23	15	78	69	53
	64	66	26	18.50	69	26	18	80	70	57.50
	65	67	26	21	78	25	17	78	68	60
	71	73	26	18.50	68.50	29	18	87	73	59
	62	63	26	19	74	25	15	79	69	56
Average	63.83	66.33	25.50	18.83	71.08	25.67	16.33	80.83	69.83	56.58

Source: Massimino & Brignone, 1993.

Table 3. Live weights and biometric measurements of adult Sambucana sheep.

	Rams	Ewes
Height at withers (cm)	80-86	76-80
Trunk length (cm)	85-89	77-81
Chest girth (cm)	94-106	84-104
Weight (kg)	86-94	64-78

Source: Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998

Table 4. Slaughterhouse measurements (kg) of male Sambucana lambs (n=6).

	Live weight	Carcass weight	Blood weight	Intestines stomachs	Empty intestines	Skin and fleece	Empty stomach	Intestinal contents
	39.70	23.40	1.60	10.20	4.20	4.20	0.99	6.00
	36.60	21.20	1.62	9.50	3.20	4.00	0.87	6.30
	41	25.20	1.87	8.70	3.50	4.70	0.96	5.20
	42.20	24.20	1.50	9.60	3.70	4.80	1.04	5.90
	47	26.80	1.70	10.80	3.67	5.80	1.04	7.13
	38	22.50	2.10	9	3.53	3.70	1.03	5.47
Average	40.75	23.88	1.73	9.63	3.63	4.53	0.99	6.00

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rarely visit their flocks (Brignone, Martini & Musso, 1998).

The Protection Program

In 1985 the Stura valley “*Comunità Montana*”, the Piedmont Region’s “*Servizio Decentrato per l’Agricoltura*” and a group of breeders set up a project to safeguard the Sambucana breed. Three years later two associate organizations, the *L’Escaroun consortium* (in Langue d’Oc, an integral part of the local dialect, the term means ‘a group of sheep that leave the main flock to find better grazing’) and the ‘*Lou Barmaset*’ farming cooperative were set up. Experts from the “*Comunità Montana*” and “*Regione*” work with the organizations. At present the consortium numbers around eighty livestock farms, the majority of which are small, family-run concerns with no more than 30-40 sheep.

The most pressing of the project’s objectives was, however, the recovery of the Sambucana sheep’s genetic heritage. This task was entrusted to the ram center in Pietraporzio, the penultimate commune in the valley before reaching the border. Each year the center buys 80 male lambs aged 3-4 months from the member breeders, following careful examination and ensuring that they were bred from pedigreed ewes and rams. Employees at the center check weight gains and hearth girth in the younger lambs by means of repeated periodic measurements. They also carry out food hygiene checks (including testing blood samples). Once they have reached sexual maturity, the animals are lent to the breeders free of charge during the breeding season which begins in May-June. In late autumn they return to the center for the winter, during which their growth is



Figure 3. A Sambucana ewe with two lambs.

monitored and they are appraised genetically by means of examining their descendants. The rams which have succeeded in passing on hereditary characteristics remain at the center and are redistributed during the following mating season to members, in rotation, to avoid inbreeding (Programma di filiera, 1996; Massimino & Brignone, 1993). Since 1996 a group of Sambucana hoggets has been sent to the Regional Ram Center in Sauze d'Oulx (Province of Turin) where they are performance tested before being returned.

A Register, managed in collaboration with the Breeders' Association of the Province of Cuneo, has been set up to fill the gap before the breed's Genealogical Book is drawn up. In 1997, the register recorded 3 200 Sambucana specimens (100 rams and 3 100 ewes) not only from the Stura valley but also from nearby Grana and Gesso, and from the Maira valley (Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998).

Another important step in the promotion campaign was the creation (1992) of the 'Agnello Sambucano garantito' brand, which was recognized by the Italian Industry Ministry in 1996. The brand certifies the origin of the lamb and guarantees the quality and authenticity of the meat. (Figure 3). It also extends to assistance in butchering, the organization of distribution and the provision of marketing checks so that lambs that are not of the Sambucana breed are not marketed with the brand in the selected distribution outlets, particularly in peak periods (Easter and Christmas). In the Stura valley, however, lamb is traditionally eaten before Christmas, from the end of October onwards, when butchers sell hoggets (*tardoun*) (Table 4). This is also the period when the *Fiera dei Santi* (Feast of Saints), attended by all breeders, is held in Vinadio. In the past, breeders would



Figure 4. A shelter with the enclosure in an alpine pasture.

arrive in the village on foot, after walking through the night with their flocks which they collected from their high pastures. During the fair, the show of reproductive ewes, although not an official review of the breed, brings together at least 300 animals each year which are judged by a jury.

Characteristics of the Meat

Sambucana sheep, with their light bone framework and fine skin, boast yields of meat at slaughter varying between 55 and 65% (Table 4). The compact meat is an attractive, bright red color, has a low fat content (5.4% in dried meat) and a high protein content (84% in dried meat), according to analyses carried out by the Agricultural Faculty at the University of Turin (Massimino & Brignone, 1993). These results, coupled with the breed's high prolificacy, which varies between 135 and 150%, with an average of three deliveries every two years, 51% of twin births, and first delivery at the age of 12-13 months, make the Sambucana one of the most interesting sheep breeds for meat (Massimino and Brignone, 1993; Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998).

To enjoy Sambucana meat to the full, the consortium experts recommend lambs which weigh over 20 kilos as well as older animals, whose meat must be carefully cut by expert butchers (Luparia, 1999).

A New Threat

For some years breeders have been reporting attacks on their flocks by wild dogs and wolves. Attacks have become so frequent that the feasibility of raising sheep in the semi-wild, so important for the quality of the meat and the protection of the land, has been brought into question. Breeders have been forced to organize rotas for staying with their flocks in alpine pastures, to protect them using sheep dogs and to construct enclosures in which to keep the sheep, at least at night (Figure 4). Since 1996 the raids of at least 12 wolves, which have been counted in a

census, have increased. It is uncertain whether the wolves come from the Apennines or whether they crossed the border from the Parc de Mercantour, where they were reintroduced a few years ago (Luparia, 1999).

The Region has already set up a commission to deal with compensation for sheep killed by wolves, but the 'wolf problem' must be tackled at its roots. Why should sheep, which have always grazed freely in the valleys, plains and grassy ridges, be forced into enclosed areas? Putting them in pens would be a little like losing the breed a second time, precisely at the time when their numbers have risen, the results of the protection and promotion campaign have started to be seen and the Stura valley has made a step forward in safeguarding biodiversity.

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The productivity of Polish Wrzosówka sheep in conditions of preservation*

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Summary

The Polish Wrzosówka is an old breed of sheep native to Poland. The Wrzosówka sheep restoration programme was begun in Poland in the 1970s. A total of 160 ewes and 27 rams, characterised by great variation, formed the foundation stock. Currently, a total of 1 400 sheep are bred in 8 flocks. The Polish Wrzosówka is an aseasonal breed (3 lambings per year are possible) and is characterised by very high prolificacy of 175-180%. It is a furcoat sheep and its high-quality pelts are mainly used for velour production. The breed has very well developed maternal ability and is well adjusted to harsh environments conditions

bien adaptée aussi aux environnements à conditions difficiles.

Key words: Wrzosowka sheep, Poland, Conservation, Pelt, Skin, Nucleus

Origins

Polish Wrzosówka sheep descended from northern short-tailed sheep (*Ovis brachyura borealis*). They are native to the north-eastern borderlands of Poland. The breed enjoyed considerable popularity during the Second World War. With 120 000 head, Wrzosówka constituted three percent of the sheep population in 1955 (Jelowicki, 1960).

Breeding Programme

The breeding programmes introduced during that period did not promote small-sized coloured-coat sheep. As a result the population of Wrzosowka sheep became dramatically reduced. When the breed became threatened with extinction, the National Research Institute of Animal Production purchased 130 ewes and ten rams in north-eastern Poland in 1972-1973. These were supplemented with 30 ewes and 17 rams from the Zootechnical Experimental Station of

Résumé

La brebis Wrzosówka est une vieille race de brebis native de la Pologne. Le programme pour la récupération de cette race a commencé en Pologne dans les années 70. Le stock de départ, caractérisé par une grande variation, était formé par 160 brebis et 27 mâles. Actuellement un total de 1 400 brebis sont élevées dans huit troupeaux. La race Wrzosówka est une race non saisonnière (il est possible d'avoir trois mises-bas par an) et se caractérise par sa haute prolificité, environ 175-180%. C'est une brebis à poils et la haute qualité de sa fourrure fait qu'elle soit souvent utilisée dans la production de velour. La race a très bien développé la capacité maternelle et est très

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the National Research Institute of Animal Production in Balice. The foundation stock, located at the Zootechnical Experimental Station of the National Research Institute of Animal Production in Czechnica near Wrocław, thus consisted of a total of 160 ewes and 27 rams (Zalewska & A. Folta, 1982). The breeding material showed great variation with regard to the appearance, prolificacy, hair coat and coat colour. The main goal accomplished within the first few years of the recreation programme was to increase the population despite its low reproductive performance (flock prolificacy ranging from 135 to 150 percent).

Characteristics

According to data collected before the Second World War (Czaja, 1937), Wrzosówka was an aseasonal breed, with most of the sheep lambing twice a year giving 70 percent of twins and six percent of triplets and quadruplets. These data were confirmed on a small private farm located in north-eastern Poland (Krupiński *et al.*, 1988). However, the breeding material of the National Research Institute of Animal Production in Balice was very diversified and partly mixed with the other breeds, which had a clear effect on decreased prolificacy.

In order to increase the population size, three lambings were carried out at a Wrzosówka farm belonging to the National Research Institute of Animal Production, with

the last two being performed within one year (Zalewska & Folta, 1982) (Table 1).

Analysis of the last two lambings showed that on average a ewe produced 2.86 lambs and reared 2.62. Average fertility of the flock was 74 percent, which in terms of one ewe in the flock was 2.13 lambs born and 1.95 lambs reared within a year. The results clearly indicate that selection should be carried out for at least twin births and for aseasuality of oestrus.

The Wrzosówka breed standard was elaborated in 1982 (Zalewska, 1982), largely on the basis of a breed description provided by Czaja (1937). Principles of the breeding work were also defined (Radomska, 1982). This programme, with slight changes, is still implemented to date. Currently the nucleus flock, located in north-eastern Poland (Zootechnical Experimental Station of the National Research Institute of Animal Production in Siejnik) produces rams for eight filial flocks. Filial (cooperating) and nucleus flocks produce ewes for replacements in the nucleus flock.

Due to the rapid development of the Wrzosówka population in the late 1990s, one of the cooperating flocks (Prof. Adam Skoczylas Experimental Sheep Farm in Żelazna, belonging to the Warsaw Agricultural University) also initiated the production of rams. These were intended mainly for cooperating and commercial flocks and to a small extent for the nucleus flock. Consistent implementation of the Wrzosówka

Table 1. Reproductive indices in a flock of Wrzosówka sheep during two lambings in one year.

Lambing	Date of mating	Fertility (%)	Prolificacy (%)	Type of birth (%)		
				Single	Twins	Triplets
I	22.6 - 7.8.76	87.9	121.2	80.1	19.5	0.4
II	14.2 - 28.3.77	67.4	132.1	64.7	34.5	0.8
III	15.10 - 20.11.77	80.3	154.0	45.3	53.0	1.7

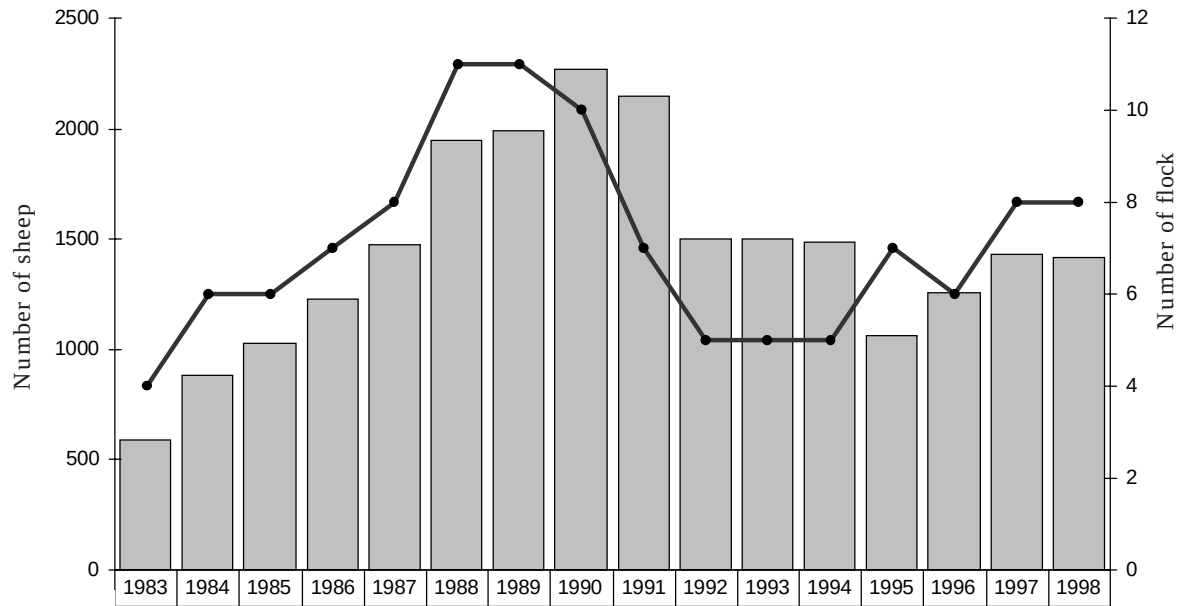


Figure 1. Number of flock and sheep recorded to the flock book entered in the years 1983-1998

Table 2. The analysis of colour distribution of ewes from nucleus flock in Siejnik.

Years	No.	Black		Black greying		Dark-grey		Grey		Light grey	
		No.	%	No.	%	No.	%	No.	%	No.	%
1992	280	4	1.4	8	2.9	120	42.8	138	49.3	10	3.6
1993	173	-	-	7	4.1	72	41.6	91	52.6	3	1.7
1994	173	3	1.7	6	3.5	70	40.5	91	52.6	3	1.7
1995	144	4	2.8	4	2.8	58	40.3	77	53.4	1	0.7
1996	146	6	4.1	2	1.4	45	30.8	92	63.0	1	0.7
1997	146	7	4.8	-	-	31	21.2	104	71.2	4	2.8
1998	156	-	-	8	5.1	27	17.3	105	67.3	16	10.2

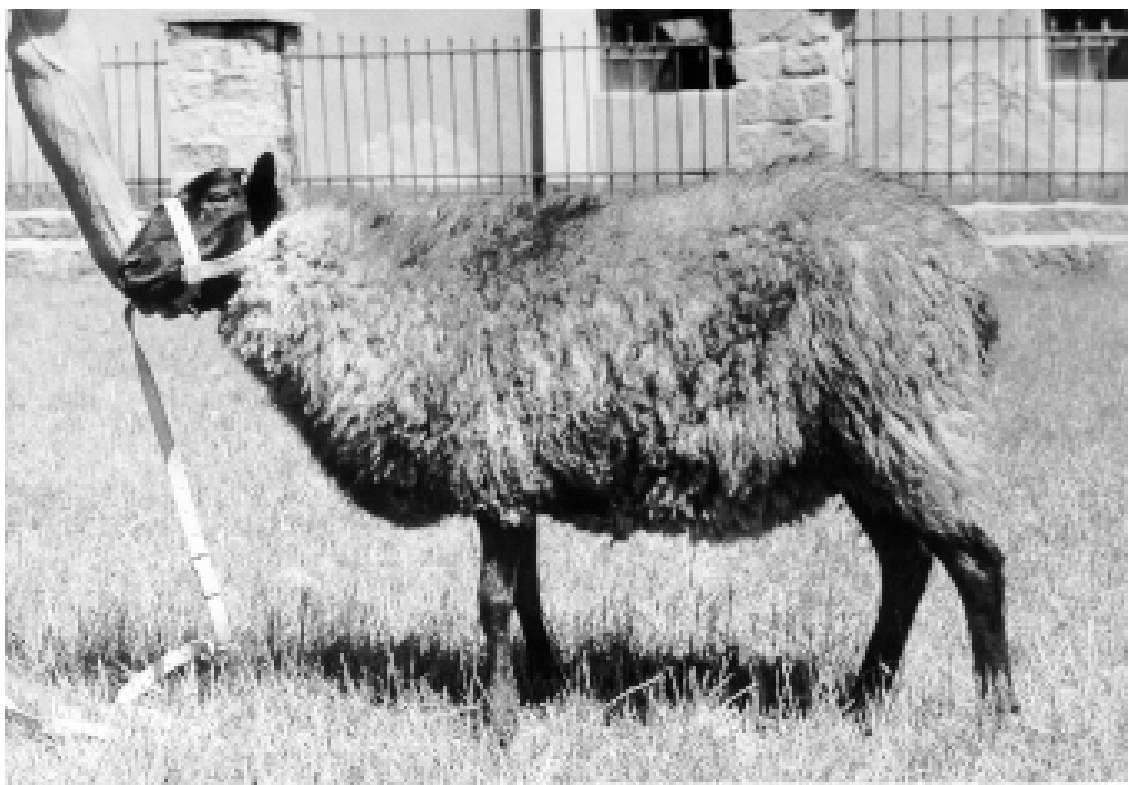


Figure 2. Wrzosówka ewe.

saving programme increased the population considerably to 2 270 sheep. The year 1991 witnessed a clear backward tendency in the breeding of both Wrzosówka sheep and the sheep population as a whole. This resulted from the liquidation of many state farms, reducing the number of cooperating flocks to four and clearly decreasing the population (to below 1 500 head) (figure 1).

A slow increase in the population of breeding sheep has been observed since then. This was accompanied by the establishment of a separate population of commercial sheep of about 600 head.

The breed standard specifies that Polish Wrzosówka sheep should be of small and harmonious build (Figures 2 and 3). The trunk should be short and moderately deep, the rump sloping, the chest fairly well developed, with a forward brisket. A weak conjugation and narrowing behind the shoulders are permissible. The muscles

should be smooth, the tail flattened and covered with hair, just as the head and legs. In rams, the horns should be widely spaced apart, resembling a spiral. Ewes should be preferably hornless, the head black and straight-profiled with short, thin and mobile ears. White colouring in the form of a star or arrow is permissible on the frontal bone of the head. The legs should be black, moderately long, thin boned, with few or no posture defects.

The wool cover should be grey or dark-grey. Black and light-grey cover is permissible in sheep characterised by high lifetime prolificacy if they produce greying progeny (Table 2). The lambs are born black. Their wool cover becomes grey from between two to three to eight to nine months of age (Table 3).

As a result of selection, newly born lambs are slightly heavier than specified by the breed standard (Tables 4 and 5). Wool should

Table 3. Analysis of lambs' coat distribution on the 2nd day after birth in nucleus flock of Siejnik. Lambing 1998.

Ram no.	Coat colour	Proportion of coat colour (%) within different paternal groups						Total	
		Black		Black - grey		Spotted and red-haired		No.	%
		No.	%	No.	%	No.	%		
O565	CS	40	100	-	-	-	-	40	100
2619	CS	48	100	-	-	-	-	48	100
2709	S	37	86	-	-	6	14	43	100
2837	CS	39	100	-	-	-	-	39	100
1112	JS	31	100	-	-	-	-	31	100
1188	CS	33	100	-	-	-	-	33	100
1624	S	50	96.2	-	-	2	3.8	52	100
		$\bar{X}$	97.2%	$\bar{X}$	-	$\bar{X}$	2.8	$\bar{X}$	100
		No.	278	No.	-	No.	8	No.	286

CS - Black grey; S - Grey; JS - Light grey.

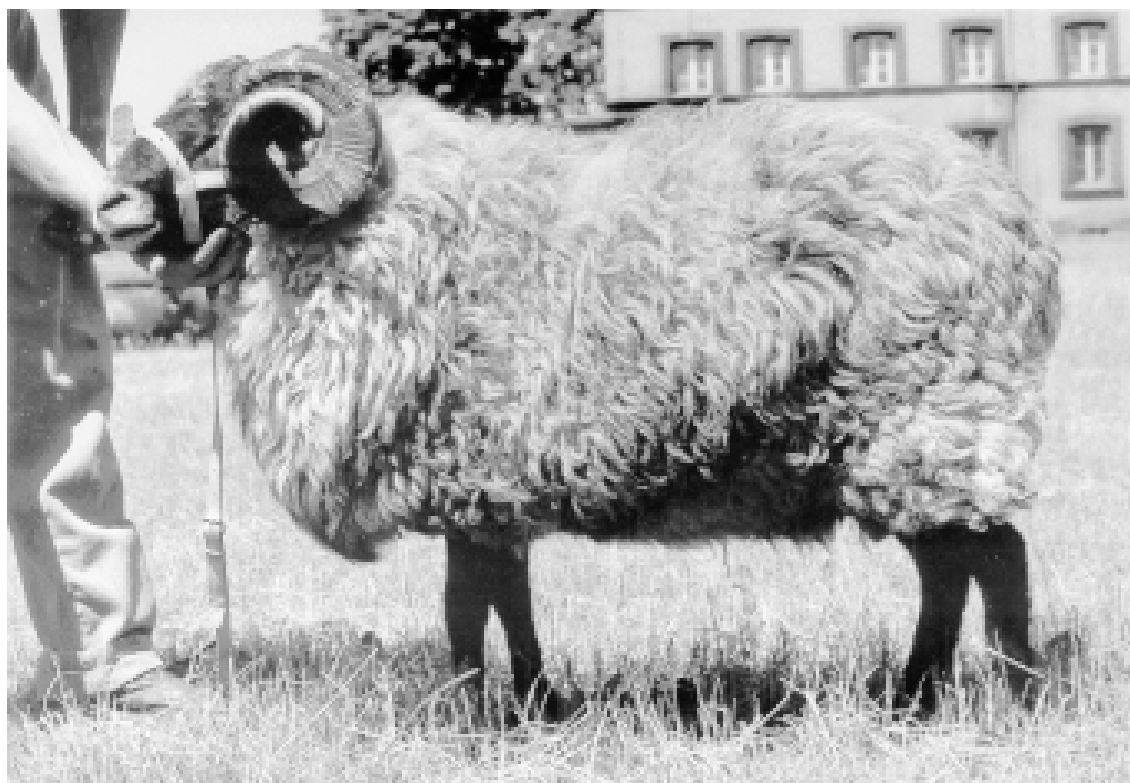


Figure 3. Wrzosówka ram.

Table 4. Average live weight of lambs in nucleus flock in Siejnik on the 2nd day after birth (kg).

		1997		1998	
		Single births	Multiple births	Single births	Multiple births
Males	No.	15	85	22	133
	$\bar{X}$	3.0	2.6	3.7	3.1
	N	22	72	22	109
Females	$\bar{X}$	2.8	2.5	3.4	2.9

		1994		1995		1996		1997		1998	
		Single births	Multiple births	Single births	Multiple births	Single births	Multiple births	Single births	Multiple births	Single births	Multiple births
Males	No.	26	54	23	39	23	54	15	81	22	133
	$\bar{X}$	11.3	11.1	11.7	11.4	9.9	9.1	8.0	6.9	9.0	6.9
	N	40	75	35	35	9	52	22	71	22	109
Females	$\bar{X}$	11.8	10.7	10.6	9.2	9.7	9.3	7.5	6.4	7.9	6.3

be 31-32 μ thick (C). With double-fraction wool, it should be 18-25 μ thick (AA - AB) for down and 45-60 μ thick (E - EE) for medullated hair. Wool curliness at 1/3 the height of lock is a characteristic trait. After a six-month regrowth, staple length should be 8-12 cm for the medullated fraction and 6-9 cm for the downy fraction. Black coarse hair is admissible on the scrag, dewlap and brisket in ewes and on the back in rams. Shearing is twice yearly due to the possibility of wool felting and seasonal hair replacement. Annual greasy wool weight is 3 kg for rams and 2 kg for ewes.

In addition to Romanov pelts, Wrzosówka pelts are ranked among the best in the world, both for the production of velour sheepskins and nappa jackets which are in fashion today. They can also be used for the production of furs and coats of the doubleface type. Skins obtained at the optimum period, i.e. from lambs aged six to eight months, distinguish themselves among other pelts by low total weight (320 g) and low 1 dm² weight (8.9 g), small thickness in the sacral region (1.2 mm) and on the side (0.80 mm), but their area is small (36 dm²). They are exceptionally flexible and have great tensile strength (longitudinal

Table 6. Reproductive performance of dams (O-M) and replacement ewes (P) in nucleus flock in Siejnik.

		1 9 9 3		1 9 9 4		1 9 9 5		1 9 9 6		1 9 9 7		1 9 9 8	
		O-M	P	O-M	P	O-M	P	O-M	P	O-M	P	O-M	P
Total	(No.)	165	20	154	19	102	31	95	50	96	44	149	23
Number of lambing ewes	(No.)	133	14	135	10	84	20	75	35	86	41	140	21
Fertility	(%)	80.6	70.0	87.8	52.6	82.4	64.5	78.9	70.0	89.6	93.2	94.0	91.3
Number of dry ewes	(No.)	32	6	19	9	18	11	20	15	10	3	9	2
Dry ewes percentage	(%)	19.4	30.0	12.3	47.4	17.7	35.5	26.7	42.8	10.4	6.8	6.0	8.7
Number of lambs born	(No.)	181	20	203	15	125	28	122	61	140	59	250	36
Prolificacy percentage	(%)	136.1	142.8	150.4	150.0	148.8	140.0	162.7	174.3	163.0	144.0	178.6	171.4
Number of lambs reared	(No.)	175	18	174	15	104	28	89	53	125	56	245	34
Lambs' rearing percentage	(%)	96.7	90.0	85.4	100.0	83.2	100.0	72.9	86.9	89.3	95.0	98.0	94.4
Reproductive performance ¹	(%)	106.0	90.0	113.0	78.9	102.0	90.3	93.7	106.0	130.2	127.3	164.4	147.8

¹No. of lambs reared per 100 lambs born.

strength 14 MPa, lateral strength 12 MPa) and have normal extensibility of 66 and 75 percent. Their skin is compact and has smooth and homogeneous structure on the rough side.

Mixed hair cover of six to eight months old Wrzosówka lambs has a density of 14 fibres per 1 mm² and average hair cover thickness of 31.5 µ (CV = 40%) (Janik *et al.*, 1994). The characteristics of fleece and the many hues of its natural grey cover make it splendid material for handcrafted and artistic products.

In addition, to the advantages given above, Polish Wrzosówka sheep are, as already mentioned, an aseasonal breed and are characterised by high-quality meat, good health, longevity and the ability to survive in extreme environmental and climatic conditions.

As a result of long and systematic selection, reproductive performance was largely improved. This especially concerns the nucleus flock (Kiec, 1998) (Table 6).

As part of an *ex situ* genetic reserve recreation programme, the National Research Institute of Animal Production in Balice has in its Semen Bank (located at the Zootechnical Experimental Station in Balice near Cracow) 840 semen doses from four Wrzosówka rams.

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Characterisation of Jamunapari goats in their home tract

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Summary

The improvement programme in Jamunapari goats was started with the active participation of farmers in two adopted villages and efforts have been made to characterise the performance of Jamunapari goats in their home tract in relation to production, reproduction performance and field conditions relating to socio-economic status of farmers. The phenotypic measurements are also described in the breed in its habitat. Jamunapari is a tall, white and large size milch goat breed of India and their numbers have been reducing over the years for various reasons. The description in relation to housing, feeding, management, growth parameters, milk yield, parasitic load, blood polymorphism and constraints in field conditions has been made in detail. Body weights at birth, three, six and nine months were 2.75 kg, 12.3 kg, 16 kg and 22 kg, respectively. Milk yield at 90 and 150 days was 102 and 145 litres, respectively. The peak breeding season of this goat in field conditions is in May-June and twinning percentage is about 52 percent. The overall mortality in village conditions is about 3.7 percent and is mostly due to diarrhea and pneumonia. The mortality was 3.7 percent, 1.9 percent, 9.8 percent and 2.0 percent in 0-3, 3-6, and 6-12 months, and adult goats, respectively over the years. The native goat in its home tract is endangered for several reasons and utmost care is needed from all angles to save this germplasm.

Résumé

Le programme d'amélioration de la race caprine Jamunapari a commencé avec la participation active des éleveurs de deux villages désignés et des efforts ont été fait pour caractériser la performance des chèvres Jamunapari dans leur environnement en relation avec la production, la performance de reproduction et les conditions de terrain vis-à-vis du niveau socio-économique des éleveurs. On décrit également les mesures phénotypiques de la race dans son habitat. La chèvre Jamunapari est basse et blanche et c'est la race à lait caprine plus grande aux Indes, bien que son nombre ait été réduit ces dernières années pour différentes raisons. On présente en détail la description de la conduite, l'alimentation, la gestion, les paramètres de croissance, le rendement en lait, la charge parasitaire, le polymorphisme du sang et les contraintes sur le terrain. Le poids corporel respectivement à la naissance, à trois, à six et à neuf mois était de 2,75 kg; 12,3 kg; 16 kg; et 22 kg. Le rendement en lait à 90 et 150 jours était de 102 et 145 litres, respectivement. Le pic saisonnier de mise-bas de cette race caprine dans des conditions de champs se situe entre mai et juin, et le pourcentage de jumeaux est d'environ 52%. La mortalité globale dans les conditions villageoise est d'environ 3,7% et est due principalement à la diarrhée et à la pneumonie. La mortalité pendant l'année était de 3,7%; 1,9%; 9,8% et 2% respectivement pour les âges de 0-3; 3-6 et 6-12 mois, et chez les chèvres adultes. La chèvre native dans son environnement se

trouve en danger pour différentes raisons et il est nécessaire de réaliser un effort supplémentaire de tout côté pour sauver ce germoplasme.

Key words: Jamunapari goat, Conservation, Characterisation, Management, Phenotypic measurements.

Introduction

The Chakarnagar Region of Uttar Pradesh (U.P) is an isolated pocket with a distinct locally adapted breed, the Jamunapari goat, popularly known as Chambal Queen or locally known as Chakarnagar Pari. Chakarnagar is bordered by three rivers, Jamuna, Chambal and Kwari and is a very arid and sandy area where the temperature varies from 2-3°C to 40-50°C in this ravensous

delta. Jamunapari is a majestic, tall, white and large sized breed and is famous for its milk yield all over the country. White in colour, its Roman nose, long ears and short horn characterise this breed. The neck is long, thick and well set. The loin is thick and the tail is short and curved upward. The ear length in 3-6 and 6-12 months, and adult is about 20 cm, 25 cm and 29 cm, respectively. The horn length is about 11.35 cm and 23.75 cm in 6-12 months and adult goats, respectively, and projects backwards. The udder is capacious, extends forwards and is mainly globular and oval shape. Teats are long and measure up to 12-14 cm in length. The survey of the last years revealed that this breed of goat is reducing fast in number as well as declining in breed characters. The population of the Jamunapari goat was 8 040 in 1988 and again decreased to 7 350 in 1991 (survey report of the institute). The goats have now

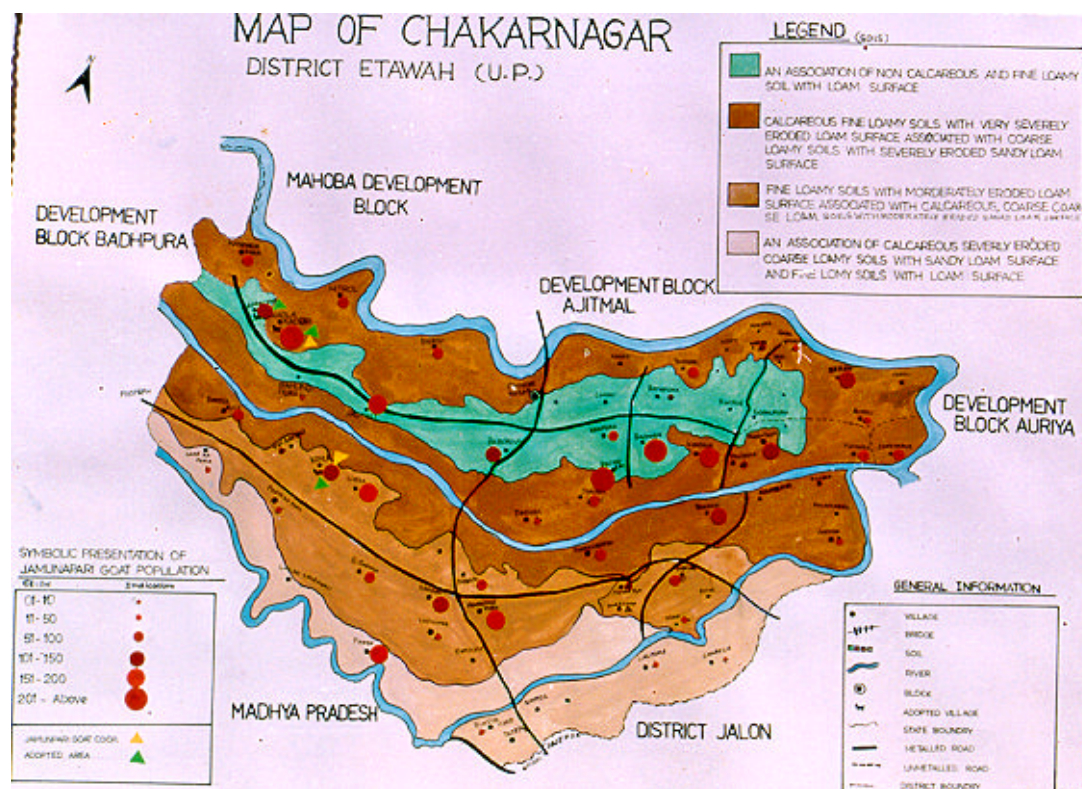


Figure 1. The highly eroded nature of soil in Chakarnagar.



Figure 2. The ravines of Chambal.

reduced in number and size and are mostly off colour, i.e. black with red coloured spots in the region of the shoulder. A research and development programme was started to study the physical characterisation of the breed in its home tract and the production and reproduction traits of this goat in its own habitat. In addition, a full characterisation of the conditions in the field, availability for feed and management would also be made. Finally, the programme would develop an improvement project using the research farm herd as a nucleus and the village herds for test mating and data collection. The Central Institute for Research on Goats has established a research and development herd of Jamunapari goats in two villages in its home tract for conservation and improvement of this breed. The breed improvement programme was launched in 1993 under the All India Coordinated Research Project on goats and the unit started functioning in the villages of Chakarnagar, Jagtoli and Nagla Kadhori (NK), situated about 10 km from Chakarnagar (Bhattacharya, 1990; FAO and UNEP, 1992).

Habitat

The home tract of Jamunapari goats is in the Chakarnagar Block of the Etawah district of U.P between 26.8°N latitude and 79.3°E longitude. The Chakarnagar Block is situated in the ravenous delta made by rivers Jamuna and Chambal and extends up to ravines of Kwari in the District Bhind of M.P. It lies 40 km southeast from Etawah town across river Yamuna and spreads over an area of 37 725 hectares. Due to the highly eroded nature of soil the ground surface is unevenly undulating forming gullies of 10-150 ft deep (Figure 1). The summers are dry and hot with highest temperatures reaching up to 48°C. During winter the temperature drops to 2-3°C. Annual rainfall is about 70 cm scattered throughout the rainy season. The gullies and ditches are covered with dense vegetation of *P.juliflora* and other drought resistant trees like Plum (*Z. jujuba*), Babool (*A. nilotica*), Chhonkra (*P. spicigera*), Hingota (*B. aegyptica*) etc. The main cereal crops are Arhar (*C. cajan*), Gram (*C. arietinum*) and Bajara (*P. typhoidium*). The main crop is Rabi. There are no proper irrigation facilities in this area.

Management Practices in the Home Tract

Goat rearing is the traditional occupation of the farmers in this area. There are about 49 families in Nagla Kadhori and 35 in Jagtoli villages. Yadavs are a predominant caste in Nagla Kadhori, while Jagtoli has a mixed population. The family size varies from one to 29 with an average of 9.4 and 10.9 in NK and Jagtoli, respectively. In NK about 33 percent of families have land holding of more than five acres and 51 percent in the range of one to five acres. In Jagtoli 60 percent of families have in the range of one to five acres and five percent more than five acres. All are Hindus by caste and no other religions exist in either village.

The Jamunapari goat population in both villages is higher in comparison to other livestock and local goats. In addition to Jamunapari goats, other livestock such as Barbari and local goats, buffaloes, cattle and camels also exist in the villages. About 34 percent of the Jamunapari goats are with

the richer farmers, i.e. farmers having more than five acres of land in NK. In Jagtoli 77 percent of Jamunapari goats are found with medium class farmers (one to five acres of land holding) and no goats are observed with richer farmers, i.e. more than five acres of land holding. The highest population of Jamunapari goats was associated with one to five acres of land farmers in NK and Jagtoli village. The goat keeping has a major contribution for the villagers' livelihood and it represents about half of the income from cropping per annum.

Flock size

Goat keepers prefer to keep small flocks due to less space available to individual farmer. Herds include one to 16 adult females. The small herds are also preferred due to limited feeding resources and for security purposes. The average herd size is 7.0. Goat herds are maintained in an extensive system with eight to 12 hour/day grazing in different seasons in the ravines of Chambal (Figure 2).



Figure 3. Covered accommodation are covered with thorny bushes and used for keeping the goats. Some times this structure may be made of mud or bricks.



Figure 4. A grazing flock.

Housing

In general, covered accommodation of 10-12' x 6-8' area made of wooden poles and thatches and covered with thorny bushes are used for keeping the goats. Some times this structure may be made of mud or bricks depending on the economic status of farmers and modified seasonally to suit prevailing weather (Figure 3). Kids and adults are housed separately. Breeding bucks are kept with special care and reared in brick houses (Figures 4 and 5).

Feeding

The goats are kept on grazing in ravines of river Chambal during day light for a total of eight to 12 hours a day in different seasons. However, pregnant does and goats which are to be used for show purposes are given some special diet comprised of bajra, barley, jowar and wheat as such or in the form of gruel. The concentrate mixture is provided to goats in the morning prior to sending them for grazing. Newly born kids or sucklings below three months of age are allowed to suckle their mother throughout the period. Before suckling or milking each doe is provided with

some boiled bajra or cooked bread. In addition to concentrate mixture, the pods (succulent or dry) of bajra unripe Rajma, Kairi and leaves in abundance are also given to the goats.

Registration of farmer and recording

Initially, the farmers / goat breeders of the two villages of Nagla Kadhori and Jagtoli in Chakarnagar Block were registered. The Jamunapari goat population in these two villages was nearly 500 out of which 350 were adult breedable females (Figure 6). All the goats in the villages were given a number according to owner and numbering was repeated three times in a year. The data recording and registration were maintained by research officers living in that village area. The health coverage for the herds was provided by project workers and veterinary officers in addition to local help. Body weights at different ages (birth, three, six and nine months) were recorded. Milk yield was recorded in two villages in the morning and evening at fortnightly intervals up to 12 fortnights.

Table 1. Production and reproduction traits of Jamunapari goats in field conditions.

Parameter / Number	Mean	±SE	No of observations
<i>Body weight (kg) at</i>			
Birth	2.7	±0.03	240
3 Months	12.3	±0.20	233
6 Months	16	±0.27	127
9 Months	22	±0.52	65
12 Months	28	±0.30	20
<i>Milk production (litre)</i>			
90 days	102	±0.34	197
150 days	146	±0.71	115
<i>Reproduction performance</i>			
Kidding interval (days)	335	±6.1	36
Breeding season	May-June		
Age at 1 st kidding (days)	700	±9.1	26
Service period (days)	187	±8.1	41
Kidding rate	1.61		
Age at first conception (days)	559	±20.1	26

Numbers in the parenthesis indicate the number of observations.



Figure 5. A grazing flock.

Table 2. Means of body measurements $\pm$ SE (cm) of Jamunapari goats at different ages in field conditions.

Trait	2 Teeth		4 Teeth		6 Teeth		Full mouth	
	Male	Female	Male	Female	Male	Female	Male	Female
Body Length	83 $\pm$ 4.0 (2)	71 $\pm$ 0.6 (54)	86 (1)	76 $\pm$ 1.2 (10)	94 (1)	77 $\pm$ 1.2 (25)	96 (1)	79 $\pm$ 1.4 (7)
Body Height	87 $\pm$ 3.0 (2)	75 $\pm$ 0.6 (54)	80 (1)	78 $\pm$ 1.0 (10)	94 (1)	81 $\pm$ 0.9 (25)	98 (1)	80 $\pm$ 1.1 (7)
Body Girth	80 $\pm$ 4.5 (2)	69 $\pm$ 0.6 (54)	84 (1)	74 $\pm$ 1.3 (10)	92 (1)	76 $\pm$ 1.1 (25)	91 (1)	77 $\pm$ 1.3 (7)
Paunch Girth	76 $\pm$ 6.0 (2)	67 $\pm$ 0.7 (54)	84 (1)	74 $\pm$ 1.0 (10)	85 (1)	78 $\pm$ 1.6 (25)	83 (1)	79 $\pm$ 2.7 (7)
Leg Length	54 $\pm$ 0.5 (2)	47 $\pm$ 0.3 (54)	57 (1)	48 $\pm$ 0.8 (10)	58 (1)	50 $\pm$ 0.5 (25)	59 (1)	49 $\pm$ 0.4 (7)
Ear Length	33 $\pm$ 3.0 (2)	25 $\pm$ 3.3 (54)	31 (1)	26 $\pm$ 4.9 (10)	33 (1)	27 $\pm$ 7.0 (25)	32 (1)	28 $\pm$ 1.4 (7)
Ear Width	10 (2)	12 $\pm$ 1.4 (54)	12 (1)	10 $\pm$ 3.4 (10)	12 (1)	10 $\pm$ 3.4 (25)	11 (1)	10 $\pm$ 5.1 (7)

Numbers in the parenthesis indicate the number of observations.



Figure 6. The Jamunapari goat.

Production Performance

Body weight

The overall least-square means for body weight at birth, three months, six months, nine months and 12 months are presented in table 1. The physical measurements of Jamunapari goats in relation to different ages are presented in table 2. Analysis of variance revealed significant effects of sex on body weight at all ages whereas type of birth significantly influenced weights up to six months of age. The location had a significant effect on all body weight groups except birth. The month of kidding also had a significant effect on nine months body weight whereas year of kidding significantly affected body weight at all ages in the present study. Dams with single kids could provide more nutrition to their kids during the prenatal and suckling period as compared to those with multiple births. This would have led to higher weights lasting up to six months only.

Milk yield

The overall mean of milk yield was 0.90 l/day. The milk yield increased up to the fourth fortnight and thereafter starts decreasing. The mean of yield in 90 and 150 days were 102 and 146 litres respectively (Table 1). No difference in milk yield was observed due to the month of kidding from September to November.

Reproductive performance

Conception rate, kidding percentage (number of does kidded / does available for kidding), kidding rate (number of kids born / number of does kidded) and twinning percentage were 88 percent (422), 77.4 percent (369), 1.61 (593) and 52.2 percent (593), respectively, over the years. Male to female ratio was 51:49 among kids born. The age at first, inter-kidding interval, service period and age at first conception was 700 ± 9.1 , 335 ± 6.1 , 187 ± 8.1 and 559 ± 20.1 days, respectively. Most of the kids



Figure 7. Role of women in feeding, milking and reproduction management.

(73 percent) were born in October-November which shows that the peak breeding season of Jamunapari in field conditions is between May-June. However, a few goats were also bred in April, August and September.

Blood protein polymorphism

Haemoglobin polymorphism was conducted in 50 Jamunapari goats using starch gel electrophoresis with Tris-EDTA buffer. Hb-AA frequency was 1.00 and no other phenotype observed in this sample. However three different phenotypes namely AA, AB and BB were observed in this sample and the frequency was 0.09, 0.81 and 0.11, respectively.

Disease Incidence and Health Coverage

Vaccination of the entire animal against FMD was carried out regularly in all the animals. Treatment to all ailing animals was provided free of charge and regularly by project workers. Faecal samples were screened regularly in both the villages by collecting

samples from the field. The overall mortality over the years was 3.7 percent in village conditions. Mortality was 3.7 percent, 1.9 percent, 9.8 percent and 2.0 percent in 0-3 months, 3-6 months, 6-12 months and adult goats, respectively over the years. Diarrhea in kids, pneumonia, abscess and mastitis are the diseases observed in village conditions. The coccidiosis is the major problem in kids and nematode burden is less in adult goats in this area.

Role of Women in Goat Rearing

The women help in goat rearing in every step and they also have adequate knowledge of goat rearing as has been the traditional occupation of people for a long time. However, a particular person in a family is responsible for herd management, grazing and feeding, etc. As it is a heavy breed, so the male members of the family are mainly responsible for their well being. However, the role of women in feeding, milking and reproduction management is observed in a regular manner (Figure 7).

Conclusion

The conservation and improvement programme is facing a lot of problems in the breed home tract. Presently, shortage of grazing land and marketing of goats are of major concern to the farmers. The role of the Government and policy towards animal genetic resources need to be critically evaluated for the conservation of this breed. The admixture of this breed with other goats is a major problem as the breed is losing its genetic architecture. Therefore, it can be concluded that conservation of the Jamunapari goat is of paramount importance and efforts to conserve the breed in an integrated manner should be taken up.

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The Majorcan Black pig

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Summary

The Majorcan Black Pig is the only autochthonous pig breed from the island of Majorca (Spain). It is characterised by a medium size body (160 kg), slate-grey skin colour, and concave profile of the nose, large pendulous ears and tassels on the bottom neck. It is well adapted to the low-level breeding and feeding conditions of the traditional extensive management on the island. It is the base of some traditional high quality products such as the “sobrasada”, sort of red highly seasoned sausage that can be spread over bread, for which there is a good demand in the Spanish market. The Majorcan Black Pig breed played an important social and economic role until the 1960s, which then declined with the introduction of the intensive production systems and foreign breeds. The Majorcan Black Pig Association was founded in the early 1980s by a group of private farmers to recover and conserve the breed. Recently, this association has been officially recognised and the official Majorcan Black Pig Herd Book set up. At present, there are more than 600 animals registered.

Resumen

El Cerdo Negro de Mallorca es la única raza de cerdos autóctona de Mallorca (España). Se caracteriza por ser de tamaño medio (160 kg), color de la piel gris pizarra, perfil cóncavo del hocico, orejas grandes y caídas, y la presencia de mamellas en la base del cuello. Esta raza está bien adaptada a las condiciones pobres de cría y alimentación propias del manejo extensivo tradicional. Por otra parte, es la

base de productos tradicionales de alta calidad como por ejemplo la “sobrasada”, muy apreciada en el mercado español. El Cerdo Negro de Mallorca jugó un importante papel social y económico hasta los años 60. Su declive se inició con la introducción de los sistemas intensivos de producción y las razas extranjeras. Al inicio de los años 80 se fundó la Asociación del Cerdo Negro de Mallorca con los objetivos fundamentales de recuperar y conservar la raza. Recientemente se ha reconocido oficialmente esta asociación y se ha puesto en marcha el Libro Genealógico de la raza. En este momento hay más de 600 animales registrados.

Keywords: *Pig breeds, Majorcan Black pig, Quality pork products.*

Introduction

The Majorcan Black Pig is the only autochthonous pig breed from the island of Majorca (Spain) and one of the few autochthonous pig breeds in Spain. The Majorcan Black Pig breed played an important social and economic role until the 1960s when its decline started with the introduction of the intensive production systems and foreign breeds. The Majorcan Black Pig Association was founded in the early 80s by a group of private farmers. The main Association's objective was the recovery

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and conservation of the breed. Recently this Association has been officially recognised and now is the responsible for the official Majorcan Black Pig Herd Book which was started in 1997. The *Institut de Biologia Animal de Balears, S.A.*, a service of the Balear Government for the conservation of autochthonous breeds, is now the institution responsible for the initiatives needed to preserve the breed.

Origin and Morphological Characteristics

The origin of this breed is uncertain. It seems probable that it came from the Iberian Peninsula with the influence of different pig populations introduced by the several civilisations that have dominated the island of Majorca (Torrens, 1947; Payeras, 1988). The breed has two main characteristics in common with other Western Mediterranean

breeds, black colour of skin and the high production of fat tissue.

The standard morphological characteristics were recently established to set up the herd book. This standard was established as a description of the present morphology of available animals. The main characteristics considered were body size (medium size, 160 kg), the skin colour (slate-grey), the profile of the nose (concave), the ear characteristics (large and pendulous) and the presence of tassels on the bottom of the neck (Figure 1). This latter trait is a characteristic of the Majorcan Black Pig, and found in 96% of the present population.

Population and Distribution

The total number of animals of the Majorcan Black breed is estimated, at present, as approximately 700, and the number officially recognised and registered in the herd book is 610 (554 sows and 56 boars).



Figure 1. Majorcan Black boar.

These 610 animals are distributed in a total of 48 farms. A sample survey was conducted to collect information on population structure, management practices and performances under field conditions for describing the breed. Thirty-nine farms, with 380 sows and 46 boars, were recorded and analysed. The distribution of animals in the recorded farms is shown in table 1.

The theoretical effective population size (N_e) of Majorcan Black Pig derived from figures in table 1 is approximately 200. Following Simon and Buchenauer (1993) this value implies that this breed is only potentially endangered. The real N_e may, however, be lower. First because population is fragmented in very small herds. There is some degree of connection between herds as a result of movement of males between herds, but the number of herds that supply males is small. The second reason why the N_e may be lower than the theoretical value is the accumulated inbreeding. The population size has increased significantly in the last 20 years

after a bottleneck that occurred in the 1960s. There is little information of how this increase occurred, but it is known that a rapid, unbalanced growth occurred in some herds. No pedigree information is available and thus it is difficult to have even an approximate value of the average inbreeding coefficient of the population, but it seems unrealistic to think that it is very small.

Management Systems

The Majorcan Black Pig is well adapted to the traditional extensive management, characterised by low-level breeding and feeding conditions (see Figure 2). Although a lot of present farms have recently introduced animals of this breed, the farms' production and social structures are very old as shown in table 2. Furthermore, the Majorcan Black pig is always managed in an extensive way and a pig enterprise is never the main activity of the farm.

Table 1. Distribution of animals in the farms presently controlled.

Sex		Breeding stock farms (n=12)	Breeding stock farms with growing pigs (n=27)	All
Females	Mean	10.5	9.4	9.7
	Range	3-31	4-29	3-31
	N	126	254	380
Males	Mean	1.3	1.1	1.2
	Range	1-4	1-2	1-4
	N	16	30	46

Table 2. Some characteristics of the structure of the management system.

Characteristic	Percentage of farms
Family farms	83%
Owner of the farm	48%
Farms with new buildings	35%
Farmers older than 40 years	98%
Farms with other activities	100%
Farms with more than 25 ha	85%



Figure 2. Traditional management system of the Majorcan Black pig.

The management of reproduction is very simple and there is no controlled mating with the males and females kept together except during the lactation period. The feeding system was traditionally based on pastures. Only sows and fattening pigs used to receive some supplementary feeding during lactation and final growing period. This supplement was based on household refusals, bran, legume seeds and cereals, and figs. Now the feeding system is still based on pastures but with an important supplement of concentrates. All of the farms feed the sows with commercial diets during lactation, 62% during pregnancy and 21% during the weaning-mating period.

Production Characteristics and Uses

At present the population is being characterised only for reproductive traits. In the near future, traits related to meat and fat production and quality will be also recorded. The only reproductive data available so far

are the number of live (NBA) and weaned (NW) piglets per litter, the number of litters per sow and year (farrowing index) and the number of teats of the sows. Preliminary estimates of the NBA and NW are 6.8 and 5.2 respectively. The number of litters produced per sow per year has not been accurately estimated, but it appears to be less than 2. From these figures it can be deduced that the number of Majorcan Black pigs produced for slaughter is less than 6 000 per year. The number of teats is highly concentrated around a modal value of 10 teats as observed in other pig breeds such the Iberian (Dobao *et al.*, 1988). It is unusual to find sows with less than 10 teats and only 19% have more than 10.

Some traditional high quality products are based on the Majorcan Black pig. The most important of these products is the “sobrasada”, a red, highly seasoned sausage that can be spread over bread (see Figure 3). This “sobrasada” is very popular and highly priced in the Spanish market. It is made of lean meat (50%), fat (50%), and seasoned with paprika, pepper and salt, using all the lean meat and some fat of the slaughter pigs. Pigs



Figure 3. “Sobrasada”, a red sausage highly seasoned with paprika produced from the Majorcan Black Pig.

are slaughtered between 12 and 18 months of age when they weigh between 120 and 140 kg. The killing out percentage is approximately 50%. With heavier pigs, weighing 200 kg or more, the quality of product is maintained but the killing out percentage is reduced to about 40%. Another less important product of the Majorcan system is the “lechona”, piglets of about 8 kg of live weight which are whole roasted, as in other regions of Spain.

Breed Preservation

The starting of the Majorcan Black Pig Herd Book in 1997 was the first initiative to promote the preservation of this domestic pig population. In the Western Europe, as in other developed countries, the conservation of domestic animal genetic resources may be solely for social or cultural reasons. However, in general it is not clear what genetic resources should be preserved. A sustainable

and coherent conservation program must be able to coexist and interact with a program for livestock improvement. This is more viable when the animal population occupies a secure niche in the commercial livestock industry, and when its productive role is widely understood and accepted (Notter *et al.*, 1994).

Arising from these ideas a further initiative to preserve the breed was to promote the traditional products manufactured from it, basically the “sobrasada”. The production of “sobrasada” is an important activity for the meat industry in the Balearic Islands. However, only a small amount, about 50 t, is produced from Majorcan Black pigs (Mora & Palou, 1993), and it was necessary to label the “sobrasada” made from Majorcan Black pigs as such. A registered trademark was created by the Spanish Government in 1994. This defines a role for the Majorcan Black Pig in the livestock industry.

It is clear that these two initiatives, i.e. breed preservation and production of special

products, play an important role but further initiatives are needed. At present, a third initiative has started to improve the veterinary infrastructure and develop a disease control programme. The next initiative will be to set up a management information system. This will permit the improvement of the management of farms, but will also collect more accurate information about the production system. Once the results of this information system and from the herd book are available, it would be interesting to assess the possibilities of starting a programme for the genetic improvement of the breed.

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Turkey conservation in the United States

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Summary

The American Livestock Breeds Conservancy (ALBC) and the Society for the Preservation of Poultry Antiquities (SPPA) completed censuses of domesticated turkeys in 1997. The ALBC census targeted hatcheries and reported census figures for hens, while counting both hens and toms. Toms were about 10% of hen numbers. The ALBC census revealed that only eight seasonal hatcheries out of a total of 25 maintain breeding flocks, including 7 038 Bronze, 4 600 Large Whites, 664 Bourbon Reds, 381 Royal Palms, 62 Black, 60 Slate, 4 White Holland, and 3 Narragansett hens. The SPPA research included hatcheries and also private breeders, included both males and females, and also included anything the breeder deemed a variety. The census figures for the various varieties were: Bourbon Red 931, Royal Palm 717, Bronze 365, Black 211, White Midget 151, Slate 143, Narragansett 87, Buff 62, White Holland 38, Auburn 27, Lilac 24, Silver Auburn 19, Chocolate 12, Royal Nebraskan 8, Wisconsin 6, Spotted Nebraskan 3, 2 each of Dark Brown, Nebraska Royal, Nutmeg, and red, and 1 each of Chestnut, Fawn, and Lavendar. The results of these two approaches generated similar population rankings for these varieties. Both have concluded that the nonindustrial strains of turkeys have perilously low populations.

Resumen

El American Livestock Breeds Conservancy (ALBC) y la Society for the Preservation of Poultry Antiquities (SPPA) completaron el censo de los pavos domésticos en 1997. El censo del ALBC estaba centrado en las incubadoras y reportaba también las figuras de censo de hembras y un recuento de ambos, hembras y machos. El número de machos representaba aproximadamente el 10% de las hembras. El censo de ALBC mostró que sólo ocho incubadoras estacionales sobre un total de 25 mantienen grupos de razas, incluidas las siguientes hembras: 7 038 Bronze, 4 600 Large Whites, 664 Bourbon Reds, 381 Royal Palms, 62 Black, 60 Slate, cuatro White Holland, y tres Narragansett. La investigación de SPPA incluyó las incubadoras y también a los privados, en ambos casos machos y hembras, y también consideraron cualquier línea que los ganaderos retuvieran como variedad. Las figuras de censo para las distintas variedades fueron las siguientes: Bourbon Red 931, Royal Palm 717, Bronze 365, Black 211, White Midget 151, Slate 143, Narragansett 87, Buff 62, White Holland 38, Auburn 27, Lilac 24, Silver Auburn 19, Chocolate 12, Royal Nebraskan ocho, Wisconsin seis, Spotted Nebraskan tres, dos de cada para Dark Brown, Nebraska Royal, Nutmeg y Red y uno de cada para Chestnut, Fawn y Lavendar. Los resultados de estos dos estudios han dado lugar a una escala de población similar para estas variedades. Ambas encuestas concluyen

que las razas no industriales de pavos poseen un número de población peligrosamente bajo.

Key words: Turkey, Census, Breed, Conservation.

Introduction

Turkeys are one of very few animals domesticated in the Western Hemisphere. Their early use by Native Americans included cultures in what is now Mexico as well as the southwest of the United States (Christman and Hawes, 1999). Turkeys were used for meat, as well as for the production of feathers for ceremonial and decorative use. By the time of Spanish contact in the 1500s there were several color variants being maintained.

European contact took turkeys to Europe, where they quickly spread throughout many countries to become a component of the array of domesticated birds used for meat and eggs. Domesticated turkeys were brought with northern European settlers back to North America (1600s), which resulted in the curious situation of the domesticates from Europe living in the same range as the eastern wild turkey (*Meleagris gallopavo silvestris*), a subspecies distinct from the Mexican one that was domesticated (*Meleagris gallopavo gallopavo*). Over the ensuing centuries most of the domesticated birds in the United States had genetic contributions from both the original imported domestic as well as the wild turkeys.

From the 1600s to the early 1900s free-range turkey production for both subsistence (local consumption) and commercial systems became widespread throughout North America, and was based on several turkey varieties descended from the original mix of subspecies. Varieties were based on color as well as lineage and were important components of turkey production. Many of the varieties underwent selection for perfection of form, color, and performance. This trend toward selection accelerated early in the 1900s, and competitive exhibitions of turkeys became a widespread and popular passtime. Women were influential in the

development of turkey varieties, and were important throughout the breeding and production phases of turkey production for the first half of the 1900s (Christman and Hawes, 1999).

In 1927 the broad-breasted trait was introduced into Canada from England and underwent further specialized selection in the USA (Crawford, 1990). Broad-breasted birds have a great increase in pectoral muscle mass over the previous standard birds, and the massive white breast meat favored these birds as the type used in industrial production systems. The resulting variety was first the Broad Breasted Bronze (circa 1930), followed quickly by the Broad Breasted White (circa 1950, and now referred to as the Large White). These birds formed the nucleus of the current turkey industry. The present industry is vertically integrated, so that single companies control all breeding, production, processing, and marketing of the birds. This has resulted in highly selected strains that have approached the limit of biologic viability. They require artificial insemination for reproduction. Leg problems stemming from the huge muscular development are relatively common. These broad-breasted varieties are exquisitely adapted to their industrial environment and are incredibly efficient and productive in that environment. The industrialization of turkey production has made turkey meat one of the cheaper meat sources available to North Americans.

As a result of the industrialization of turkey production, many of the older commercial varieties of turkeys fell into disuse. These persisted in the hands of hobbyists, exhibitors, and people interested in range turkey production. Numbers of these varieties declined, and two recent efforts have undertaken a census to determine numbers of traditional farm turkeys in the United States.

Materials and Methods

Two independent censuses of turkey populations have been recently undertaken in the United States. One was by the American Livestock Breeds Conservancy in late 1995

Table 1. Results of ALBC census of traditional turkey varieties.

Variety	Hatcheries selling	Hatcheries breeding	Number of females
Bronze (both broad-breasted and naturally mating)	22	5	7 038
Large White	5	1	4 600
Bourbon Red	10	5	664
Royal Palm	8	4	381
Black	4	3	62
Slate	2	2	60
White Holland	1	1	4
Narragansett	1	1	3

and also in early 1997. The results of the 1997 census are reported here. This census targeted the availability of turkey varieties from hatcheries that sell and ship day-old poults, which makes these sources readily available to the general public. Included were twenty five hatcheries, contacted by telephone with follow-up to clarify any points of confusion. The census survey documented strains, numbers of each strain, and other pertinent details.

The Society for the Preservation of Poultry Antiquities (SPPA) undertook a separate census of traditional turkey varieties in 1997. This census targeted private and hobbyist breeders that tend to sell to one another rather than selling to the general public, and also included seasonal hatcheries. This census assessed the numbers of toms and hens owned by SPPA members, and extended to contacts provided by members. As a consequence it included some but not all of the hatcheries included in the ALBC census, but also included many breeders and sources that the ALBC census did not include.

Results of ALBC census

The ALBC census revealed that of the 25 hatcheries, only eight maintain breeding flocks of turkeys. Fifteen of the hatcheries buy hatching eggs from other hatcheries or from

private breeders, and two hatcheries buy poults for resale. Two of the 25 hatcheries are discontinuing turkeys altogether.

The results of the ALBC census are summarized in table 1. The number of hens was considered as the census of interest, since this number reflected the relative activity of egg and poult production. Bronze birds (both standard and Broad Breasted) included 7 038 hens, Large Whites included 4 600 hens (these exclude the industrially-held breeders), Bourbon Red 664 hens (Figure 1), Royal Palm 381 hens (Figure 2), Black 62 hens, Slate 60 hens, White Holland 4 hens, and Narragansett 3 hens (Figure 3). Around 90% of the Bronze birds were from a single hatchery, and that same hatcher included all of the Large Whites, leaving only 640 females (Bronze and other varieties) among the other 5 hatcheries.

Results of the SPPA census

The SPPA results are substantially different from the ALBC census and include many varieties not accepted by the American Poultry Association. This census was designed to be a complete look at whatever the breeders deem a variety, which includes any reproducible and recognizable color variant within turkeys. Total numbers, both male and female are included. The population

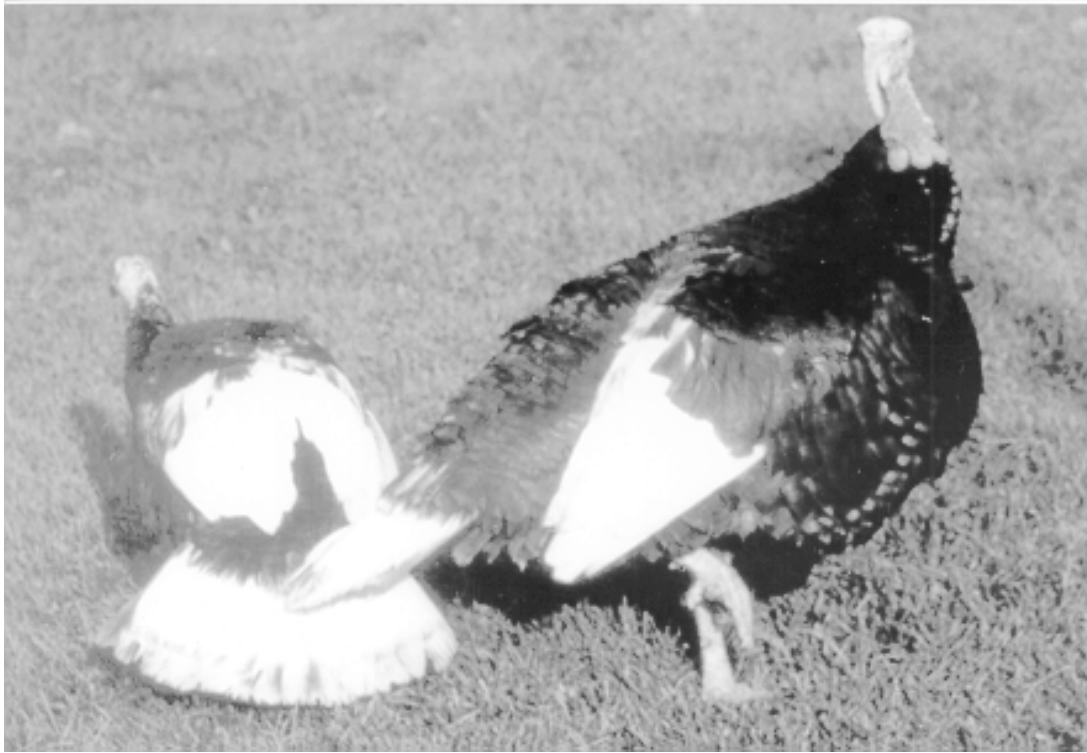


Figure 1. Bourbon Red turkey.



Figure 2. Royal Palm turkey.

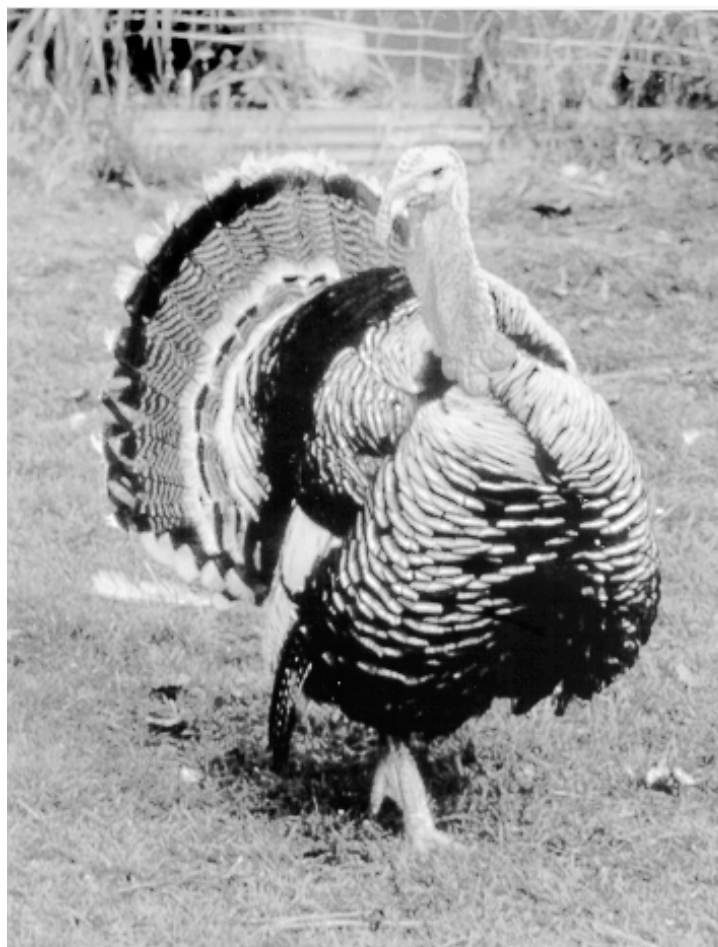


Figure 3. Narragansett turkey.

figures are Bourbon Red 931, Royal Palm 717, Bronze 365, Black 211, White Midget 151, Slate 143, Narragansett 87, Buff 62 (Figure 4), White Holland 38, Auburn 27, Lilac 24, Silver Auburn 19, Chocolate 12, Royal Nebraskan 8, Wisconsin 6, Spotted Nebraskan 3, 2 each of Dark Brown, Nebraska Royal, Nutmeg, and red, and 1 each of Chestnut, Fawn, and Lavendar. Many of these rare varieties are gene combinations that individual breeders have named, rather than long-standing populations with a history of isolated selection and propagation.

Discussion

Some 270 million turkeys were raised commercially in the United States in 1998. These are overwhelmingly a single variety:

Large White. This variety is exquisitely adapted for industrial turkey production which relies on a relatively uniform intensive environment and high levels of feed and health inputs. Genetic selection for industrial turkeys is intense, and only three breeding companies are important internationally. This puts the entire turkey industry on a narrow genetic base.

All turkey varieties outside of the industrial setting are increasingly rare, and only a few now survive in situations where selection still targets production characteristics in low-input systems. The fragmentation of the turkey into different varieties somewhat subdivides the population into subpopulations, some of which are reproductively isolated from the others. The varieties vary in their degree of isolation, with some being completely isolated from other



Figure 4. Buff turkey.

varieties (Royal Palm as an example) and others routinely outcrossing to other varieties and selecting out poults of the appropriate color (Blacks as an example). This tends to keep variation from being lost, although the incredibly low numbers of many of these varieties suggests that much genetic variation has been lost and is no doubt still being lost.

Both censuses point to a perilous state for many varieties. The ALBC census focuses attention on the level of breeding activity in hatcheries, since these are the birds that are readily available to the public. These are in situations where production and shipment provide access to these genetic resources. The Bronze figures reveal numerical strengths, although these are limited to only five breeders, which places large populations in peril of single disasters or dispersal due to management decisions. The Large Whites included in these censuses are small populations whose immediate ancestors come

from industrial breeding programs. The numbers held in these census populations therefore have little impact on the genetic status of this breed as a genetic resource, since they are a small offshoot of a more widespread genetic population. All other varieties can be considered rare in the hatchery setting.

The SPPA census points to similar conclusions, although the census takes a slightly different form. Small private flocks were included in addition to hatchery stocks, and both male and female numbers were reported. The SPPA census reveals that privately held exhibition and hobby flocks of turkeys are imperiled to a similar degree as the more commercial hatchery flocks, and can therefore serve only poorly as a reserve of genetic variation in domesticated turkey germplasm.

The raw numbers do not tell the whole story. Only seven breeders of non-industrial

Table 2. Results of SPPA census of traditional turkey varieties.

Variety name	Breeders	Numbers		
		Male	female	total
Bourbon Red	12	149	782	931
Royal Palm	15	128	589	717
Bronze	8	84	281	365
Black	13	47	164	211
White Midget	4	42	119	151
Slate	8	35	108	143
Narragansett	8	27	60	87
Buff	7	17	45	62
White Holland	5	16	22	38
Auburn	3	10	17	27
Lilac	4	11	13	24
Silver Auburn	3	8	11	19
Chocolate	3	3	9	12
Nebraskan (Royal N)	2	4	4	8
Wisconsin	1	2	4	6
Spotted Nebraskan	1	0	3	3
Dark Brown	1	0	2	2
Nebraska Royal	2	0	2	2
Nutmeg	1	1	1	2
Red	1	1	1	2
Chestnut	1	1	0	1
Fawn	1	0	1	1
Lavender	1	0	1	1
Crimson Dawn	1	few	few	few
Beltsville Small White	0	0	0	0
Mini White	0	0	0	0
Gray	0	0	0	0

turkeys account for 55% of the total number of birds. Populations large enough for significant selection are therefore rare. This is all the more dramatic for some historically important strains. The Buff was the fourth most numerous commercial turkey in 1951-1952 (behind Broad Breasted Bronze, Beltsville Small White, and White Holland), with over 25 000 birds of this variety being raised. They are now down to only 62 birds. In the 1930s the Narragansett was third behind Bronze and White Holland, and is now represented by only 87 birds. The Nebraskan varieties were fifth most popular in 1951 (nearly 17 000 birds) and are now

relegated to relict status of very minimal numbers - 13 birds.

The fate of these traditional varieties is linked to the fate of their production system. Range turkey production is now largely relegated to the past, having been replaced by the modern confinement production systems. In the absence of a commercial niche, the traditional varieties have seen dramatic declines in numbers. A few breeders still produce range-raised turkeys, and some hopeful signs of this increasing in popularity are beginning to appear.

Another positive development is a renewed awareness of the plight of these

varieties through the work of the SPPA and the ALBC. This has resulted in new breeders participating in the maintenance of some of these varieties, although usually as a hobby rather than as a commercial endeavor. This effort is going to be important in maintaining many of these varieties as reserves of naturally-mating turkey genetic resources, which is vitally important to the overall genetic diversity within this agriculturally important species. The increased communication among breeders, especially through the annual SPPA census, has been especially fruitful in tracking down the last remnants of some of these historically important varieties. The future of these

varieties is therefore not as bleak as even a few years ago, but many do remain on the edge of extinction and must be carefully managed to avoid that loss.

References

Christman C.J. & R.O. Hawes. 1999. Birds of a Feather: Saving Rare Breeds from Extinction. American Livestock Breeds Conservancy, Pittsboro, North Carolina, USA, pp. 76.

Crawford R.D. 1990. Poultry Breeding and Genetics Amsterdam, Elsevier, pp. 1123.

ICAR Technical Series no. 2. Proceedings of the Workshop on Developing Breeding Strategies for Lower Input Animal Production Environments

Editors: S. Galal, J. Boyazoglu & K. Hammond
Bella, Italy 22-25, 1999

FAO/ICAR, Villa del Ragno, Via Nomentana 134, 00162 Rome, Italy
Tel.: +39-06-86329141; Fax: +39-06-86329263; E-mail: zoorec@rmnet.it

In English.
ISSN 1563-2504
pp. 570

The Workshop was organised by the Food and Agriculture (FAO) of the United Nations and the International Committee on Animal Recording (ICAR). Thirty seven animal breeding experts from around the world gathered in this Workshop to discuss how to establish and maintain genetic development in the livestock resources used for medium and low-input production systems. The Proceedings include introductory papers, the outcomes of the discussion that took place in the Workshop, 5 seminal paper on Breeding goal definition, Structures and procedures for straight-breeding, Structures and procedures for cross-breeding using local breeds, Structures and procedures for cross-breeding using also exotic breeds, Economic evaluation of breeding programmes; and 27 case studies from lower input production environments covering all continents attempting to identify the key operational and policy issues which have impacted on past attempts to improve livestock for such production systems. Throughout the Proceedings The emphasis was on how to make it happen – both to initiate and sustain desirable genetic change. The Proceedings provide valuable material on the practical, operational aspects of the genetic improvement of farm animals. The case studies are written in plain language and the seminal studies while written in technical language they followed a stepwise approach to introduce the subjects and include many examples and explanation boxes which make them easy to follow. The Proceedings are suggested reading for developers, students and teachers.



Farmers, their animals and the environment

FAO, Via delle Terme di Caracalla 1, 00100 Rome, Italy

For further information contact: www.fao.org/dad-is or iDAD@fao.org

English version stereo

16 minutes video

This video presents a picture, in broadcast quality video, of the invaluable genetic diversity to be found in breeds of some of the most important farm animal species. It illustrates the contribution that diversity makes to the world's food security.

Recorded in four Asian countries -Bhutan, Indonesia, Thailand and Viet-Nam - the video explains the close relationship between farmers and animals and the importance of that relationship in a wide variety of environments.

This video is the beginning of an effort to document on videotape aspects of the management of the genetic resources for important farm animal species and production systems in each region. This information, together with a description of each shooting location, will be archived in a way that will enable low-cost development of a range of videos targeted at different audiences - the general public, technicians, donors and students.

In the future FAO will be able to extract video clips from this archive and add them to the characterization material describing these resources on the Domestic Animal Diversity Information System, online at: <http://www.fao.org/DAD-IS/> and on the DAD-IS-CD-ROM.

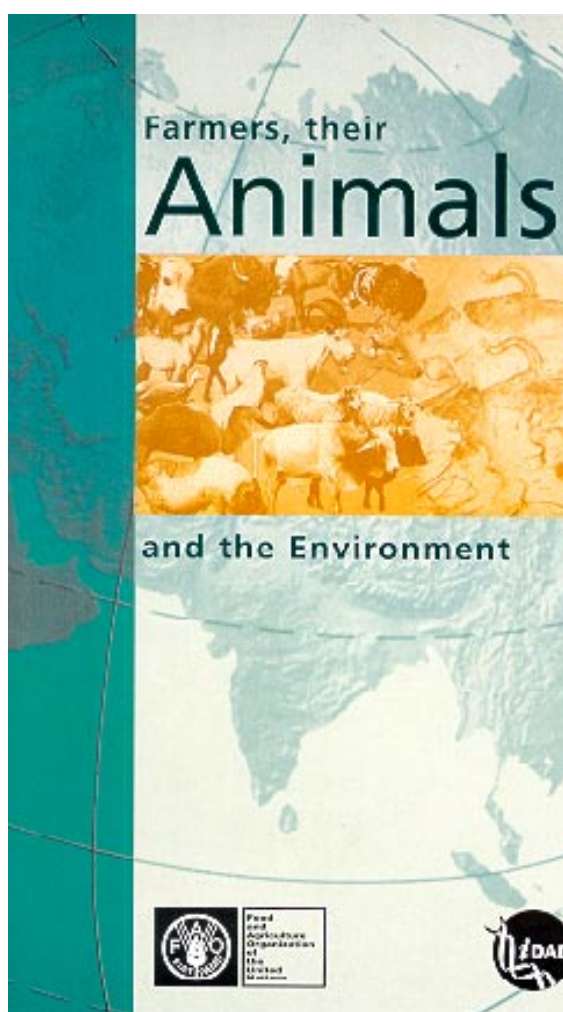
To obtain a copy of the video, please e-mail the DADIS Moderator indicating your mailing address and the type of video required, language, broadcast quality or VHS copy and PAL, SECAM or NTSC. Or write to the DAD-IS Moderator at Animals

Animal Production and Health Division
Food and Agriculture Organization
Via delle Terme di Caracalla
00100 Rome, ITALY"

Tel: +39-06-5705-3540

Fax: +39-06-5705-3927

You can help the countries of your region develop and conserve their Domestic Animal Diversity. Contact your national coordinator (address available from DAD-IS).



Base de données national: situation des ressources génétiques bovins-ovins-caprins-porcins, 1998-1999

Groupes pilotes pour la gestion des ressources génétiques animales

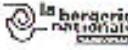
In French. ISBN2-908447-12-6

pp. 240

The Bureau of Genetic Resources who is the French structure for the co-ordination of the conservation of animal, vegetal and microbial genetic resources is the organism who prepared this interesting volume that represents the updated French situation for AGR.

After a brief historical presentation of the national data base for the animal genetic resources, the authors introduce a chapter that analyses the management of the biodiversity in France. After that, they summaries the name of the breeds, their regional localisation, genotypic characteristics, situation, origins and estimations are accounted. Per each breed, phenotypic and physical traits are reported together with a clear information on the number of the heads, subdivided between males and females.

 **BASE DE DONNÉES NATIONALE
FRANCE**

 **la hangerie
nationale**

**SITUATION DES RESSOURCES GÉNÉTIQUES
BOVINS - OVINS - CAPRINS - PORCINS
1998 - 1999**



**GROUPES PILOTES POUR LA GESTION
DES RESSOURCES GÉNÉTIQUES ANIMALES**

Nagori, the famous draught breed of cattle

P.K. Vij, M.S. Tania, R.K. Vijh, B.K. Joshi & A.E. Nivsarkar

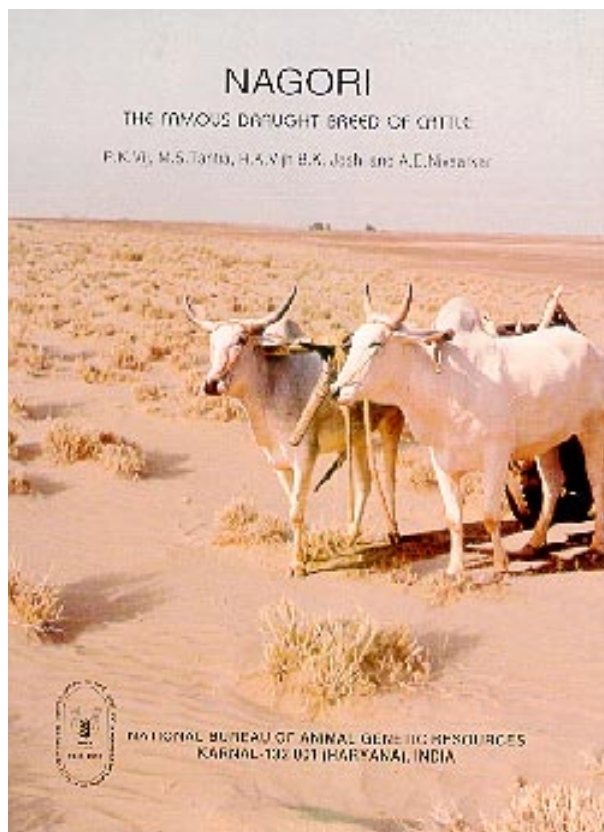
National Bureau of Animal Genetic Resources, Karnal-132 001 (Haryana) India

pp. 30

This booklet, published by the National Bureau of Animal genetic Resources, summarizes the situation of Nagori cattle in India. Nagori is one of the renowned breeds of draught cattle found in Nagaur and Jodhpur districts of Rajasthan. These districts are in arid region and agriculture production here is very low. The economy of this region is mainly dependent on livestock. Nagori cattle are reared mainly for the production of male calves for draught work. Sale of Nagori bullocks is the primary source of income for the farmers.

Management practices, physical characteristics, productive and reproductive performances are clearly reported together with numerous photos of the breed and its environment.

Karyotype of Nagori cattle, with the relative length of the chromosomes are reported and photos illustrate metaphase of the breed.



Razas autoctonas en peligro de extinción de Euska Herria

Gómez Fernández, Mariano Editor
Bilbao, Spain, 8-11 Octubre 1997

Sociedad de Estudios Vascos, Miraconcha 48, 20007 Donostia, Spain

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ISBN 84-89516-92-8

ISSN 1137-8603

pp. 230

Parece que poco a poco en Euskal Herria se va tomando conciencia de la importancia de conservar las razas autóctonas como una parte importante del patrimonio cultural de este pueblo. Nadie niega hoy en día el valor paisajístico y medioambiental de la fauna salvaje y así protegerla de su desaparición, como nadie pone en duda el mantener en pie ermitas, puentes u obras arquitectónicas de tiempos pasados. La ganadería aúna estas dos facetas, estos animales integran el paisaje vasco y por otra son fruto del trabajo de los ganaderos vascos durante siglos.

Por todo esto y para tratar de recoger la situación y los distintos trabajos que se estaban llevando a cabo, la Mesa Técnica de Recursos Genéticos Animales decidió poner en marcha estas jornadas en Octubre de 1997, para así saber lo que se estaba realizando en las diferentes partes de Euskal Herria y así conocer la opinión de otros técnicos que trabajan con razas de aquí.

En el apartado de agradecimientos a los que han hecho posible la celebración de estas jornadas hay que tener en cuenta a los ganaderos de Euskal Herria. Ellos son los que generación a generación han sabido preservar y mantener a sus animales autóctonos como legado de sus antepasados. También, hay que destacar a los compañeros veterinarios de los Departamentos de Agricultura de las Instituciones Vascas ya que gracias a su interés han sabido fomentar animar y estimular la conservación de nuestras razas. Tampoco hay que olvidar a aquellos organismos que han apoyado este evento, como la coordinación por parte de IKT. S.A, (Nekazal Ikerketa ta Teknologia S.A.), el patrocinio del Departamento de

Agricultura y Pesca del Gobierno Vasco, de los Departamentos de Agricultura de las Diputaciones Forales de Aia, Bizkaia y Gipuzkoa, el apoyo del Fondo de Cooperación Euskadi-Aquitania y de la Bilbao Bizkaia Kutxa (BBK).

Fruto de estas jornadas y con el apoyo de la Sección de Ciencias Naturales de Eusko Jaaskuntza recogido en este número de *Naturzale*, surge este trabajo con todas las ponencias que fueron presentadas y que esperamos sirvan para que conozcamos un poco mejor nuestras razas y con ello seamos más sensibles a la importancia de la conservación de las mismas.



**RAZAS AUTÓCTONAS EN PELIGRO
DE EXTINCIÓN DE EUSKAL HERRIA**

Bilbao, 1997



The potential role of rare livestock breeds in UK farming systems

Appleby, Cumbria, UK, 1-2 December 1997

British Society of Animal Science, P.O. Box 3, Penicuik, Midlothian, EH26 ORZ, UK

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ISBN 0-906562-27-9

pp. 70

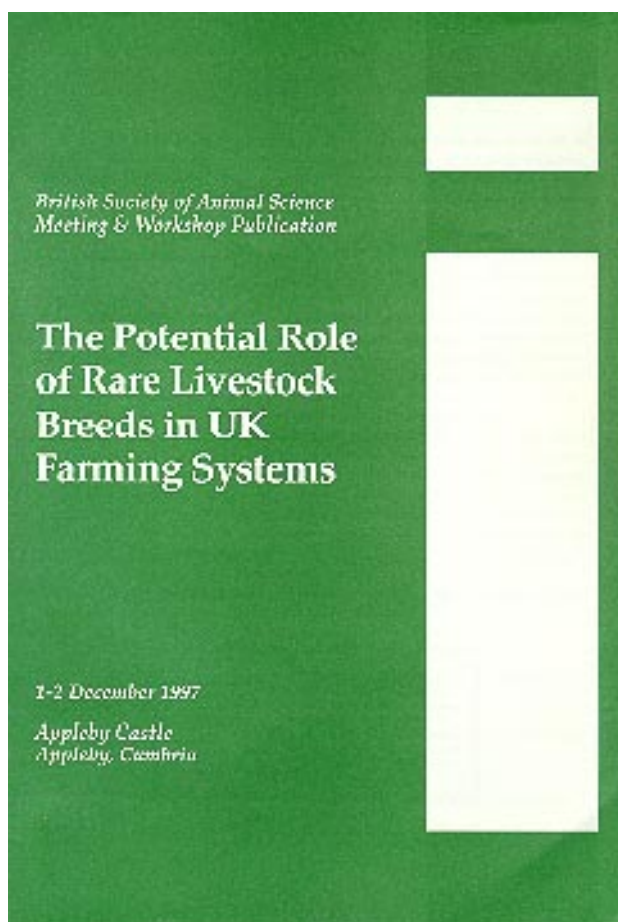
Today 14 breeds of cattle, 28 breeds of sheep, 7 breeds of pigs and 6 to 8 breeds of poultry indigenous to the UK are classified as rare, if not endangered, by the Rare Breeds Survival Trust (RBST). Besides being part of our living heritage, these genetically different breeds may provide flexibility to respond to yet unknown challenges. Among these are changes in the production outputs of farming systems, in the tools and standards used in their production, and in the priorities within society for the use of natural resources.

Early in 1997, in collaboration with the RBST, the Scottish Agricultural College (SAC) won a contract with the Ministry of Agriculture, Fisheries and Food (MAFF) to conduct a literature review of current knowledge about how rare livestock breeds in the UK have evolved in line with their environment, and what this means in terms of their current and future role in farming systems. An important part of this review was to identify what we do not know, and to propose research needed to fill gaps in our knowledge.

At the completion of the review, a Conference and Workshop was held to provide an open forum to discuss the results of the literature review, and to identify areas of research necessary for further integration of rare breeds into farming systems within the UK. The first day of this meeting included an overview of the literature review, and invited speakers dealing in greater depth with specific aspects of that review. The second day consisted of six workshop sessions. These focused on the natural heritage value, conservation and genetic description of rare livestock breeds, and their particular role in land use, and in terms of

their performance and marketing attributes. The goal of each workshop session was to develop a list of ideas for future research in their topical area.

These Proceedings include the Executive Summary of the literature review, the invited papers, summaries of contributed Posters, and a synopsis of each of the discussions of the Workshop sessions.



The adaptation of rare breeds of British livestock to different environments: a review

J.T. Mercer, R.M. Lewis & G.L.H. Alderson (Editors)

Ministry of Agriculture, Fisheries and Food &

British Society of Animal Science, P.O. Box 3, Penicuik, Midlothian, EH26 ORZ, UK

Tel.: +44-131-4454508; fax: +44-131-5352130; e-mail: BSAS@ed.sac.ac.uk

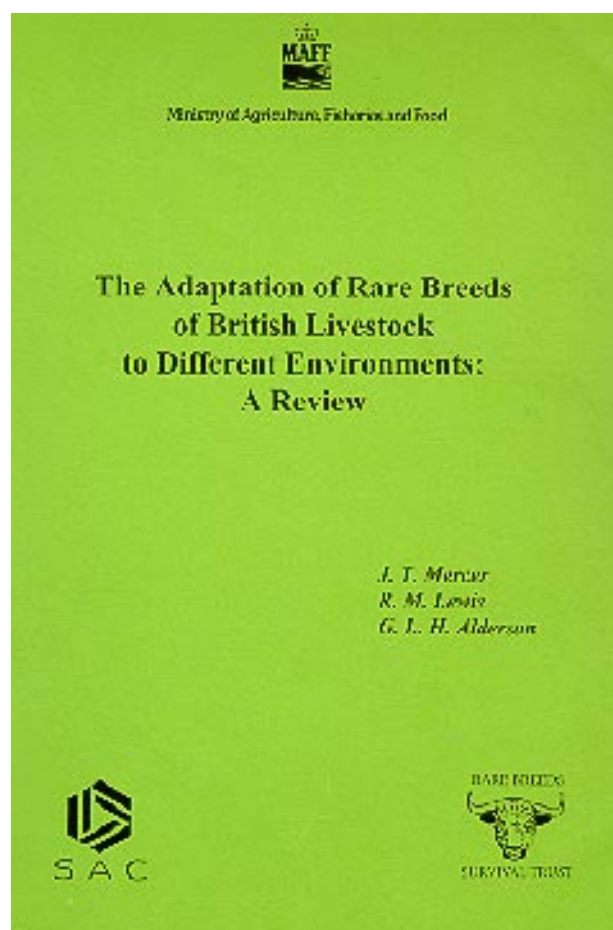
ISBN 0 906562 27 9

pp. 160

Early in 1997 the Scottish Agricultural College (SAC), in collaboration with the Rare Breeds Survival Trust (REST), were contracted by the Ministry of Agriculture, Fisheries and Food (MAFF) to conduct a literature review focused on the adaptation of rare livestock breeds to different environments. Its objective was to critically assess how and whether rare livestock breeds in the UK, and elsewhere, have evolved in line with their environment, and to explore what this means in terms of their current and future role in farming systems. An important part of this review was to identify what we do not know, and to propose research needed to fill gaps in our knowledge.

On 1 and 2 December 1997, at the completion of the review, a Conference and Workshop entitled *The Potential Role of Rare Breeds in UK Farming System* was held at Appleby Castle, Cumbria, England. Its purpose was to provide an open forum to discuss the results of the literature review, and to identify areas of research necessary for further integration of rare breeds into farming systems within the UK. The meeting was organised by the British Society of Animal Science (BSAS) in conjunction with SAC and RBST with sponsorship from Sainsbury Supermarkets Ltd. The first day of this meeting included an overview of the literature review, with invited speakers subsequently dealing with specific aspects of that review in greater depth. The second day consisted of six workshop sessions. These focused on the natural heritage value, conservation and genetic description of rare livestock breeds, and their particular role in land use, and in terms of their performance

and marketing attributes. The goal of the workshop sessions was to develop a list of ideas for future research in each topic area. The Proceedings of this Conference and Workshop are available through BSAS.



Genetic species in danger of extinction, biodiversity, biotechnologies and ethics

**Proceedings of a Conference organised by Slow Food, Via Mendicita Istruita, Brà, Italy
November 5, 1998, Turin, Italy
pp. 130**

Organised by Italian Ministry of Agricultural Policies and Slow Food (an Italian organisation, mainly oriented in the defence of genuine and traditional cuisine) this conference was assisted by relevant Italian personalities belonging to the world of politics, universities and civil society. Among these the Nobel prize Dario Fò assisted the Conference and intervened into the debate with a strong defence of "the natural production systems menaced by the multinationals".

Genetic species
in danger of extinction,
biodiversity,
biotechnologies
and ethics

Conference Proceedings

Turin, november 5 1998


Slow Food


Ministero per le Politiche Agricole



Mendelian inheritance in cattle 2000

P. Millar, J.J. Lauvergne & C. Dolling (Eds)

EAAP publication No. 101

Wageningen Pers, P.O. Box 42, 6700 AA Wageningen, The Netherlands

ISBN 90-74134-75-0

ISSN 0071-2477

pp. 590

Mendelian Inheritance in Cattle 2000 (MIC 2000) is the most comprehensive catalogue to date of those genes in cattle which have identifiable effects on the phenotype. These effects are described.

The locus entries are presented in four categories.

Category 1 Coat Colour;

Category 2 Visible Traits other than Coat Colour;

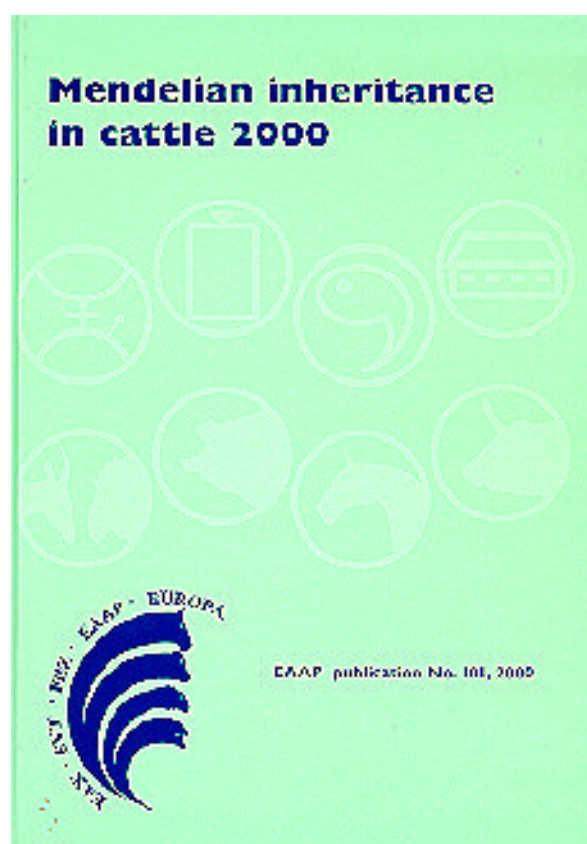
Category 3 Loci controlling Blood and Milk Polymorphisms and

Category 4 Mapped Genes and Loci.

Publications relating to the alleles at the locus are listed in chronological order for each locus entry, and an assessment is made of the reliability of the evidence presented for each allele.

Category 4 relates to mapped loci and other genetic systems in cattle. As the genomic location of a locus is determined, the location is cross-referenced to the appropriate locus entry. As a result, MIC 2000 forms a link between the gene mapper and the cattle breeder. Geneticists, veterinary surgeons, breed societies and commercial breeding companies can consult MIC 2000 to learn what a gene does, and, if its genomic location is known, where to find it.

MIC 2000 is the third catalogue in the COGNOSAG series, following a catalogue of genes with identifiable effect on the phenotypes of goats (COGNOSAG Workshop 1987) and Mendelian Inheritance in Sheep 1996 (MIS 96). Catalogues covering other domestic species are scheduled for the future.



.....

Announcement of a new periodical
Conservation genetics

Editor: A.R. Hoelzel
Biological Sciences, Durham University, UK

Conservation Genetics aims at the promotion of the conservation of genetic diversity by providing a forum where data and ideas can be presented, facilitating the further development of this field of study. Contributions come from researchers in a variety of fields including population genetics, molecular ecology and biology, evolutionary biology, and systematics as well others. The Journal will focus on genetic and evolutionary applications to the problems of conservation, while reflecting the diversity of concerns that are relevant to conservation biology. Papers are accepted in the following categories: full research papers, review papers, short communications, and short methodological notes (including lab methods, computer programs & models, and PCR primers). The first issue of Conservation Genetics is expected to be out late this summer.

More information may obtained at:
<http://www.wkap.nl/journalhome.htm> /
1566-0621

.....

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 indentation. 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

Prof. Galal left FAO on the 1st February 2000 for Cairo (Ain Shams University, Faculty of Agriculture, Animal Production Dept.).
There is no change in the editorial responsibility of AGRI.

For all future manuscript dispatch and correspondence regarding AGRI, please use the following mailbox:

agri.bulletin@fao.org

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:

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

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'écritront 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

Le Prof. Galal a quitté la FAO le 1er février 2000 pour aller au Caire (Ain Shams University, Faculty of Agriculture, Animal Production Dept.). Aucun changement n'a eu lieu en ce qui concerne la responsabilité éditoriale pour AGRI.

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

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

El Prof. Galal dejó la FAO el 1 de febrero del 2000 para ir al Cairo (Ain Shams University, Faculty of Agriculture, Animal Production Dept.).
No ha habido ningún cambio en cuanto a la responsabilidad editorial de AGRI.

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

agri.bulletin@fao.org

Gracias por su colaboración