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BOLETIN DE INFORMACION SOBRE RECURSOS GENETICOS ANIMALES

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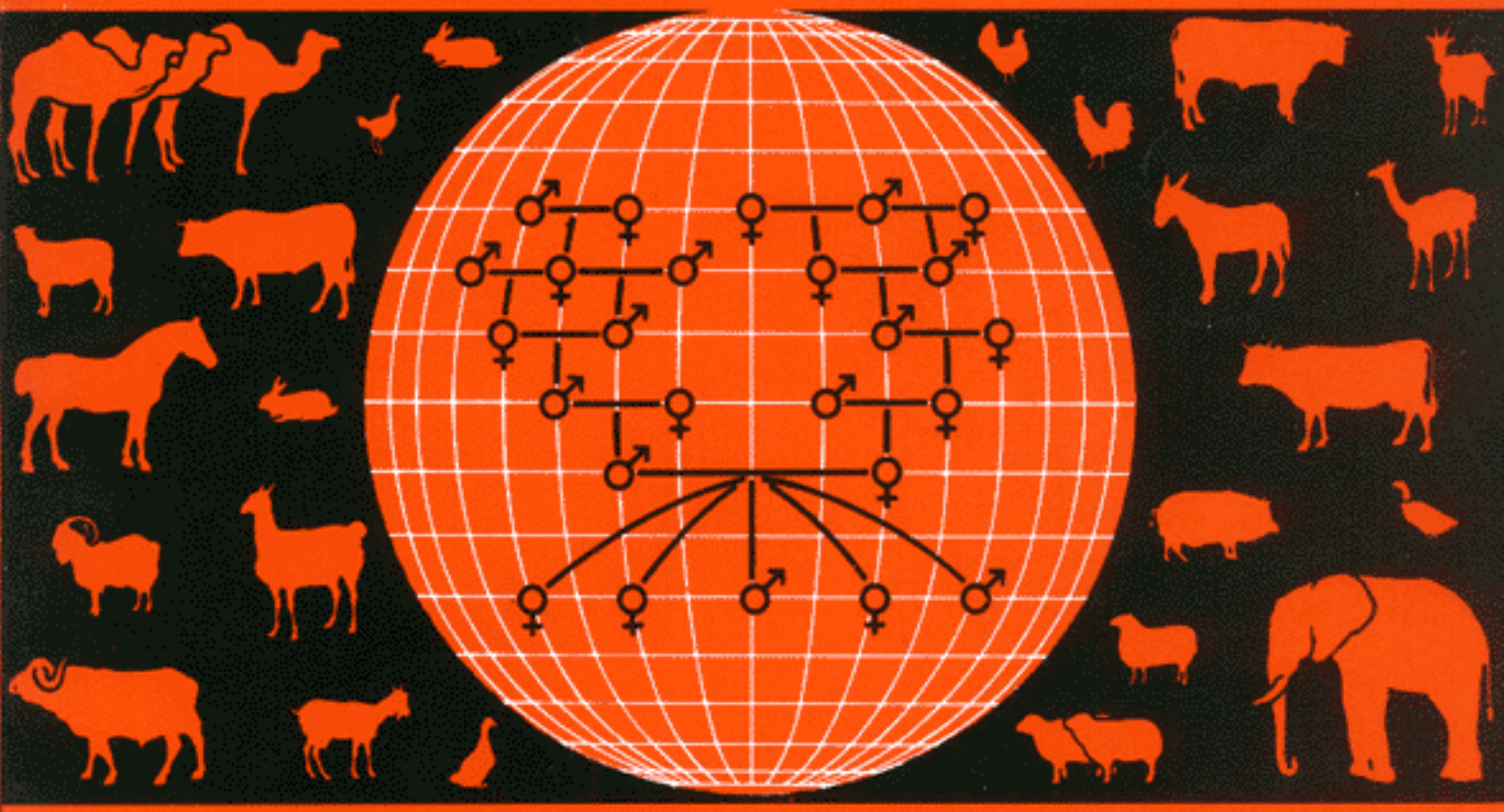

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Organisation des Nations Unies pour l'alimentation et l'agriculture

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CONTENTS

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Editors: J. Boyazoglu, FAO (REUS) and S. Gala1 (AGA)
Viale delle Terme di Caracalla
I - 00100 Rome, Italy

ANIMAL GENETIC RESOURCES INFORMATION will be sent free of charge to those concerned with the conservation, management or utilization of domestic livestock. Anyone wishing to receive it regularly should send their name and address to the Editors, at the address on page iii

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El Editor, AGRI, AGAP, FAO,
Via delle Terme di Caracalla,
00100 Roma, Italia

Animal Genetic Resources Information

J. Boyazoglu and S. Galal (Editors)
FAO, Animal Production and Health Division
Via delle Terme di Caracalla, 00100 Rome, Italy
Room C-579; tel.: +39-6-52256139; fax.: +39-6-52253927; Email: <Salah.Galal@fao.org>

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EDITORIAL

The Convention on Biological Diversity clearly accepts each country's sovereignty over its genetic resources, and this alone means that the structure for a global programme of management must focus at the country level. The need for such a focus is further underscored by the fact that countries possess different subsets of the global total of breeds forming each domestic animal species. Additionally, although production environments vary greatly even for the pigs and poultry, countries are becoming increasingly interdependent in seeking to access unique animal genetic resources from elsewhere. Hence, effective utilisation of animal genetic resources by nations must provide the foundation for a successful global programme of management for each species. The FAO Global Programme for the Management of Farm Animal Genetic Resources (AnGR) provides the structure for achieving country-based emphasis combined with the necessary regional and global co-ordination of policy and effort. This primary level in the global infrastructure will provide for the early implementation of the necessary within-country management networks and enable countries to design, implement and maintain comprehensive national strategies for the management of their aniznal genetic resources. At present, priority is set on initiating the key infrastructure required. The main features of this infrastructure can be summarised as follows:

National Focal Point for each country, comprising a co-ordinating institution and a country technical co-ordinator nominated by, and strongly linked to, the government and to the regional focal point. The government must be responsible for the within-cou.ntry component and can contribute internationally through the intergovernmental mechanism for AnGR which is also being developed as a component of the Global Strategy for the Programme. This co-ordinator will be the point of contact for the country's involvement in the FAO AnGR Programme and will assist in establishing and maintaining the essential incountry network.

Regional Focus in each major genetic storehouse region of the world, to help develop effective national co-ordinators, design and implement effective regional networks as integral components of the global structure, help achieve early and wide introduction of national strategies, and trigger a range of most effective projects covering the conservation complex for domestic animals. Regional focal points are implemented for Asia and the Pacific; being planned for Europe; the Americas; Africa; and, the Near East and Mediterranean.

Global Focus for the Programme is being established at FAO headquarters to lead facilitate, communicate and co-ordinate the global effort; as FAO's 170 + member governments resolved. This includes developing the necessary modalities for countries and assisting them in establishing their management strategies for AnGR; developing, implementing and maintaining the Domestic Animal Diversity Information System (DADIS); communicating the issues globally; maintaining the Early Warning System for AnGR; involving the range of governmental, non-governmental and intergovernmental parties essential for the Programme's success; servicing the intergovernmental mechanism; and seeking the essential extra-budgetary fiznding for the Programme.

Some aspects of the Programme are already being implemented. Although complete implementation of the Programme will take some years and will depend on strong collaborative support for its activities, significant progress has been made. To date, 50 countries have established focal points: 38 in Europe and 12 in Asia. The regional focal point for Asia and the Pacific has

now been initiated in Bangkok. Planning for the Regional Focus for Europe has commenced and a preliminary workshop of the National Co-ordinators of most countries was held in the autumn of 1995. A third workshop is being held for the National Co-ordinators in the Asia Region, where an evaluation mission recently strongly recommended the country-based and regional structure and reported that it was operating very successfully. In the Americas a group has been formed to establish the country and sub-regional focal points and 11 countries in three sutb-regions were identified to be invited, through official channels, to nominate national coordinators. A training course on DAD-IS was organised in Brasilia in May 1996. FAO professional staff travelled to Africa to assess the needs for AnGR m nagement programme and to enlist the help of national, regional and international organisations related to this field. It is intended to organise, on a pilot sub-regional basis with 12 Southern-African countries, a workshop and field a project identification mission.

Another important achievement in the implementation of the AnGR Management Frogramme was the launching of DAD-IS on the INTERNET which can now be accessed at the site http://www.fao.org/dad-is/

The Editors

BIBLIOGRAPHY NOTES

The Yak by Cai Li and Gerald Wiener.
FAO, Bangkok, Thailand. ISSN 974-974-89351-0-8.

This is an interesting book containing much new information - at least in the English language. As one of the authors (G. Wiener) points out, the book uses much of the work of Prof. Cai Li in Sichuan province of China. This province has about one quarter of the Yak population of China which itself possesses over 90% of the world population oi 14 million.

The book, while not attempting to be a comprehensive review of all known work on this, rather special, species covers all aspects of the yak, its environment, management, performance and social function.

The main author points out that there was a serious time limitation in producing this bookthis is perhaps of minor consequence because, while a complete picture from other countries would be better, it is still true that almost 95% of all yak are in China. Even with the "time" problem, the book gives a most valuable cover of other populations with clear evidence of some excellent co-operation from contributors.

The book uses the technique of providing an "overview" at the start of each chapter - useful for reviewers and those who do not have a specific interest in the yak - but repetitive for those who want to find out more about this unique beast and its adaptation to one of the most harsh global environments - that on "the roof of the world".

The book starts with background history and has a most useful table of breeds, followed by a chapter covering breeding and crossbreeding results, conservation needs and interspecies crosses. The authors then provide a useful review of the effect of various environmental factors, and the adaptive characteristics of the yak - providing evidence in the range of temperatures in which the yak survives but not fully explaining how, for example, a reasonably sized population thrives in the UK. Chapters provide readers with ample information on the reproduction and performance of yak and its crosses with *Bos taurus* and *Bos indicus.* There follows an interesting section on the menagement aspects including the use of different grasses to assist worming, stimulate oestrous, increase milk yield and turn the raw butter to the desired orange colou ! Interesting examples of daily schedules are included and well illustrate the busy life of the yak herder. There follows a brief chapter on health, one on yak products and their utilisation and a good review of yak husbandry in countries other than China. The book concludes with a section provided mainly by one author (G. Wiener) on the present position and state of knowledge, some comments on some of the limitations of research and some gaps in knowledge, finishing with some conjecture as to the future.

The book lives up to the authors' claims and is well worthy of a place ou tne shelf of anyone interested in a wider knowledge of the yak whether as a scientist involved in its utilisation or simply as some one interested to "learn and appreciate the contribution the yak makes both to human survival in an inhospitable environment and to biological diversity" (to quote Obaidullah Khan, the Assistant Director General and Regional Representative of FAO for Asia and the Pacific) in his Foreword to the book.

D. Steane

La zootechnie et son enseignement. Ethnozootechnie No. 54, 169 pp. Societe d'Ethnozootechnie, 25 Bd. Arago, F-75013 Paris (France).

Ce numero de la revue de la Societe Française d'Ethnozootechnie rassemble les textes des exposes presentes lors d'une reunion qui s'est tenue le 30 novembre 1994 a 1'Institut national agronomique de Paris et qui etait consacree a une analyse de 1'enseignement de la zootechnie et a son evolution au cours du dernier siecle.

Cette journee rassemblait les principaux enseignants de cette discipline dans les grandes ecoles agronomiques et veterinaires françaises, ainsi que quelques chercheurs de 1'INRA. Plusieurs communications analysent les traites de zootechnie et livres scolaires s'y rapportant publies depuis un siecle et mettent en lumiere, a partir de leur contenu, outre le role majeur de quelques grandes figures,1'evolution de cette discipline et de la fonction meme du zootechnicien. Une etude parallele de 1'evolution des recherches sur les productions animales depuis le dixhuitieme siecle et, pour les cinquante dernieres annees, au sein de 1'INRA, renforce cette analyse, en montrant 1'evolution des thematiques en reponse a la modernisation des elevages et a 1'evolution des besoins de la societe.

Les participants se sont egalement interesses au contenu de 1'enseignement de la zootechnie de nos jours et tout particulierement aux inter-relations entre recherche et enseignement, qui sont une des forces de 1'enseignement de cette discipline en France. L'attention ne se limite pas au cas de la France et le probleme est egalement analyse en ce qui concerne le Bassin mediterraneen a partir de 1'exemple de trois grands professeurs qui sont indissociables du developpement de la zootechnie en Espagne, en Italie et en Grece.

Enfin, ce compte rendu se termine par une analyse prospective des besoins futurs compte tenu des evolutions previsibles de la place de 1'elevage dans la production agricole et alimentaire, sans negliger les impacts tant positifs que negatifs que les animaux domestiques peuvent avoir sur 1'environnement.

D. Chupin

La transhumance bovine. Ethnozootechnie No. 55,169 pp. Societe d'Ethnozootechnie, 25 Bd. Arago, F-75013 Paris (France).

Il s'agit la du compte rendu d'une journee d'etude de la Societe d'Ethnozootechnie qui a eu lieu le 19 mai 1995 a Saint Martin d'Herès, dans 1'Isere, et qui etait consacree au probleme de transhumance, centre sur le cas particulier de la transhumance bovine dans les principaux massifs montagneux français. Basees sur un melange harmonieux d'histoire, de citations de textes anciens et d'analyses scientifiques, les diverses contributions s'attachent a montrer I'importance de la transhumance non seulement en tant que systeme d'elevage mais aussi comme element fondateur de societes et de cultures.

Douze contributions montrent successivement le role de la transhumance dans 1'emergence des systemes modernes d'elevage, dans la mise au point de procedes de fabrication, fromagere notamment, dans 1'evolution des systemes de commercialisation des productions comme des animaux, mais aussi dans 1'evolution, la regeneration ou le maintien des ecosystemes des etages successifs rencontres dans les vallees, sans toutefois occulter le role negatif dans la propagation des maladies du betail lie a ces concentrations saisonnieres d'animaux de provenance variee.

Bien qu'il se degage de certaines de ces contributions un parfum un peu nostalgique de regret du "bon vieux temps",1'ensemble de ces apports donne sans aucun doute un aperçu complet et raisonnablement critique de 1'importance passee et presente de la transhumance et du role qu'elle pourrait encore etre amenee a jouer dans la gestion des montagnes desertees par 1'homme.

D. Chupin

The Indigenous sheep and goat breeds of South Africa. Q. Campbell.1995. Quentin Peter Campbell,14 Dersley Street, Bayswater, Bloemfontein 9301, South Africa. 44pp.

South Africa is characterised with widely divergent environmental and climatic conditions: from desert to subtropical rain forests and from classical African bushveld to temperate zones and it is home to a large number of indigenous animal populations, both wild and domesticated.

Quentin Campbell is one of this region's best experts of the local small ruminant populations and the existing systems of production. This booklet, publishes at the author's expense, is an indepth and passionate description of the indigenous sheep and goat breeds, their origin, numbers, characteristics and productivity. While some of them such as the famous Boer Goat - the only true meat goat in the world - number several million head (2 500 000), others such as the Red and Roan "Persian" sheep are practically extinct (100 animals). At least five indigenous sheep breeds number less than 3 000 animals: the Zulu Nguni sheep, the Bezuidenhout and Namaqua, and both the Speckled and Redhead Persians.

These forty four pages are truly easy and pleasant reading; for those who do not know Southern Africa, it is a discovery of the small ruminant genetic variability and for those who know it, an interesting interpretation of valuable historical, cultural and biological facts.

The author differentiates clearly between the fat-rumped breeds of sheep, the ancestors of which arrived by chance in South Africa sometime during the mid l9th century, i.e. the so-called "Persian" populations which probably originated from the Arab peninsula (the Blackhead Redhead and Speckled "Persians"), from the indigenous fat-tail sheep: the Damara, Round.rib, Steekhaar and Namaqua Afrikaner sheep; the Bezuidenhout, Pedi, Van Rooy and Zululand Nguni sheep. These are all breeds vary adaptable to the·diffiicult environments and marginal production systems of the region. An interesting case is the so-called Russian Red Woolled Persian which is the said to be well adapted in the cold mountainous areas of the Cape Province; their distribution is limited and their origin unknown.

A valuable part of the booklet is the one describing the subdivision of the Boer goat population: Rona, Briekwa, Short-eared, Red-headed, Jas and Polled goats.

The last part describes the remaining local goat types which are mostly linked to or located in specific parts of the region: the Speckled goats, first described in 1801; the Khosa goats of the Ciskei of which a small population was saved in the late 1980's and brought to the Losko-South Research Station; the Nguni goats of Kwa-Zulu; the Pedi goats which originated north of the Tropic of Capricorn and of which a small number is now kept in the Delftzijl area; the Damara goats of Namibia, as well as the Savannal White Goats more recently developed at Olierivier, bred from a cross of the local coloured goats with a white ram.

This illustrated booklet is an example of what can be done to collect and record information through the eyes of those that have the true knowledge, passion and experience of indigenous animal populations as compared to the cold and impersonal in/output of a personal computer!

J. Boyazoglu

O resgate do curraleiro. Suplemento do Campo, O Popular - Jornal de Brasilia, 20 September 1995.

The paper describes the attempts carried out by the Centro Agropecuaria do Meio-Norte (CPAMN) and the Centro Nacional de Recursos Geneticos e Biotecnologia for the preservation of the Pe-Duro or Curraleiro cattle. Through CPAMN, farmers will raise again the breed that will be subsequently commercialised by Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA).

In the meanwhile, a new farmer association has been founded on September 3,1995, aiming at the conservation of the breed. The name and address of this association is: Associaçao Brasileira dos Criadores de Gado Curraleiro -ABCG- President: Mrs. Marli Calil, C.P. O1 Mara Rosa, GO - Brazil, 76490-000.

The origin of the name Curraleiro comes from the river Dos Currais; the animals are characterised by high adaptability to severe environmental conditions, they are reddish colour, and have a short body, and a weight of 380 kg for the sires and 240-260 for the cows. Other important characteristic is their docility; the cows are known as good mothers and the sires are well adapted to draught power.

In the past, the Piaui Region was a great meat producer for other areas and the Pe-duro was the main breed. For this reason, the Pe-duro has today either an economic or historic value and represents an important genetic resource; it is possible to establish selection criteria for the breeding and genetic improvement and its crossing with foreign breeds.

EMBRAPA's Project for Conservation of the Pe-Duro was initiated in 1983 and, actually, the efforTs are aimed at beginning the selection and studies for its breeding; developing of sire; providing technical assistance to the stockbreeders and collect data for census purposes.

C. Mosconi

GROWING INTEREST IN THE WATER BUFFALO: A SHORT BIBLIOGRAPHIC UPDATE*

J. Boyazoglu

Department of Animal Science, Faculty of Agriculture, Box 257
Aristotle University, 54006 **Tbessalonild**, GREECE

When FAO published a major work in 1974 (Ross Cockrill), reviewing for the first time the then existing information relating to the water buffalo *(Bubalus bubalis),* Sir John Grenfell Crawford, the Vice Chancellor of the Australian National University, introduced it by unr'Erlining that "among all farming livestock which science had neglected, the domestic buffalo served as an outstanding example of genera failure to recognise and exploit its production potential". Since then a world-wide interest has developed in this species, not only as a purveyor of anima protein for human consumption, but also because of a growing interest in the diversification of products of animal origin and the manufacture of typical regiona products as well as a variety of renewed uses of these animals. Furthermore, the strong image linking the buffalo with nature and the environment's ecological equilibrium, particularly in some of the world's more marginal lands, shows this species as one of the most viable alternatives of intensive cattle husbandry systems which are more and more under accusation in an environment-conscious society.

The impressive number of papers presented at the 3rd World Buffalo Congress held in Bulgaria in 1991 (several hundreds of pages and ten volumes of proceedings printed), confirms this growing interest (Vlahov, Alexiev and Konova,1991). The 4th World Buffalo Congress was held in Brazil in 1994 and the 5th World Buffalo Cong$_r$ess will be held in Caserta (Italy) in 1997[1].

The growing awareness of the importance of the water buffalo is also demonstrated by the FAO (AGA) publication of a manual intended as a user's guide for the collection and transfer of buffa.lo embryos (Drost,1991). This manual serves as the "buffalo supplement" to the FAO training manual for cattle embryo transfer, which was published in 1989. A more recent overall review paper on embryo biotechnologies in buffaloes was published *in Bubalus bubalis* 96/I (Singia, Mavik and Madam,1996).

Globally, the world's domesticated buffalo population is classified, rather arbitrarily, into three types (Baruselli P.S.,1995. L'allevamento bufalino in Brasile. *Bubalus bubalis* 95/4):

- The **swamp buffalo** populations, mainly found in the far-eastern part of Asia and Australasia as well as the Chinese subcontinent *(Carabaco),* Uzbekistan and X;azakhstan.
- The **river buffalo** populations *(Murrah* and *Jafarabandi),* mainly found in the Indian subcontinent, Pakistan and Afghanistan.
- The buffalo populations in the Southem American subcontinent are of all three origins above, while the small group found in sulb-Saharan Africa relates to the river type.

Today the domesticated buffalo population of the world is approximately 10% of the total

[1] Attention : Dr. Antonio Borghese ; Istituto Sperimentale per la Zootecnia - Via Salaria 31, I-00016 Monterotondo, Roma (Italy). Tel. +39 6 9065851; Fax +39 6 9061541.

* A variant of this bibligraphic note will be published in L.P.S. EAAP News.

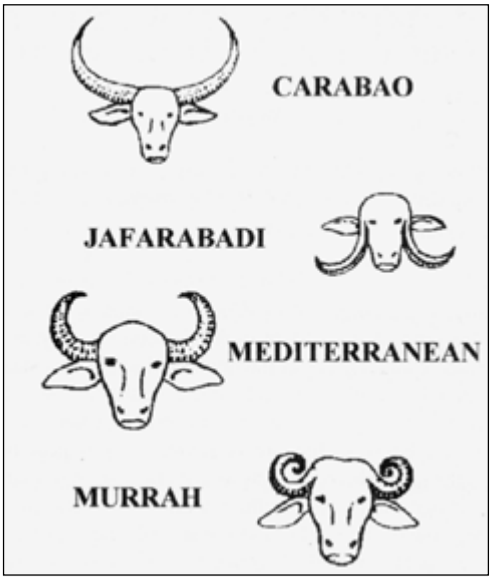

Figure 1
Head conformation of the four main buffalo types
(according to Baruselli, 1995)

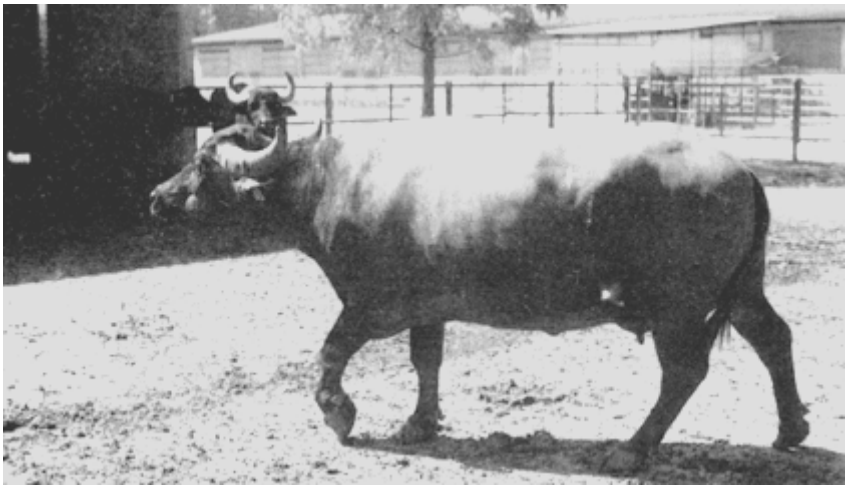

Figure 2
6 years old cow, 4th lactation; 2 523 kg milk in 270 days; 9.77% fat; 5.04% protein.
Animal Production Research Institute, Tor Mancina, Rome (Italy)

number of bovines; it is estiznated at about 150 000 000 heads as compared to some 1300 000 000 cattle. The geographic distribution of the world's actual domesticated buffalo population is estimated to be as follows:

Europe and the Mediterranean basin : 4 000 000
The Americas :1700 000
Southern and Western Asia :102 000 000
Far Eastem Asia and Australasia : 43 000 000

Besides data presented during the 3rd World Buffalo Congress (1991) already mentioned, a valuable document (Chant•,1991) summarised the population status and production practices around the world. This is the proceedings of an FAO sponsored symposium published by the International Buffalo Information Centre in Thailand; it addresses globally the problems and prospects ofthe world's buffalo livestock sector.

In Asia, buffaloes are an important farm animal genetic resource which, with little input from outside the rural sector, make an important contribution to draught power, milk, meat and mainure. They also play a major socio-economic and cultural role in the rural society. An important symposium on the long-term genetic improvement of the Asian buffalo was organised jointly by FAO and the Asian Buffalo Association in January 1994 in Thailand; it discussed the many long-term buffalo improvement programmes existing in various countries in Asia. The proceedings of this symposium (Bunyavejchewin, Chantalakhana and Sangdid, 1995) represent a very valuable collection of information in 13 countries of the Asian continent. It includes sessions on the Buffalo Sector Development and Genetic Resources, and one on Breeding and Selection. Two short specialised sessions on Cytogenetics of Crossbred Buffaloes and Draught Power and the Environment completed the symposium proceedings.

India is reported to have a buffalo population of nearly 75 000 000 today, followed by Pakistan with just under 18 000 000. A majority of these93 000 000 buffaloes are mainly managed as ,dairy animals. In 1995 McDowell, Wilk, Shah, Balain and Metry developed a collectively produced booklet critically reviewing the research and development programmes existing in various countries on the potential and commercial dairying possibilities of the buffalo. The information relates basically to three countries : India, Pakistan and Egypt. The authors addressed the comparative evaluation of the existing dairy production systems in these countries and tried in particular to establish practical guidelines on feeding and management. Much of the data referred to, concerns the work undertaken during the past decade in relevant institutions of the Indian Council of Agricultural Research, Pakistan's Livestock Production Research Institute and the Animal Production Research Institute of Egypt.

In Pakistan the number of buffaloes per rural household is reported to be 2 to 3 animals and more than two-thirds of the total buffalo population is owned by landless and small farmers. Still, the share of buffaloes in the total animal production of milk and beef is reputed to be more than 70% and 50% respectively. A major publication produced by the Pakistan Agricultural Research Council (Shah, 1991) underlines the important role of this species and discusses in depth the problems of the buffalo sector in Pakistan, such as late maturity, silent heat, long calving intervals and dry periods, calf mortality, nutrition, reproductive imbalances, etc. The author successfully presents the research programmes and results undertaken to address these problems.

The Mediterranean water buffalo occupies a unique place in the farm economies of some countries of the region. While it is the most important milk producing animal in Egypt, it produces distinct dairy products in Italy and plays an environment conservation role in specific parts of countries such as Greece, Romania and Syria. The origin of the buffalo in the Mediterranean and the Middle East is Asia, but farming systems here are very diverse and different from those prevailing in Southwest Asia and the Far East. It is interesting to note that the buffalo has been known to be one of the farm animalss ketit in the Campania and Lazio regions of Italy since the early l6th Century, as shown in paintings of this period. It is thus difficult to know the exact timing of its first introduction to Europe.

The proceedings of an important symposium organised in Cairo in November 1992, co-sponsored by several international organisations interested in the Mediterranean and para-Mediterranean region (FAO, EAAP, CIHEAM, and OIE), presented the state ofthe art ofbuffalo research and development in the region (Shafie, Barkawi, Ibrahim and Sadek,1993). Following an opening plenary session in which the results of a survey on the population, characteristics and systems of production of the Mediterranean buffalo were discussed, over 90 invited papers, short papers and posters were presented in eight specialised sessions (Biotechnology, Breeding and Genetics, Meat Production, Disease Control, Environmental Adaptation, Milk Production and Processing, Nutrition, Reproduction and A.I.).

Succeeding this awakening of interest in the Mediterranean buffalo the FAO Inter-regional (Europe and Near East) Co-operative Research Network on Buffalo was established which has since held two specialised meetings:

a. The International Symposium of Buffalo Products, held in Paestum (Italy) in December 1994; the proceedings (Gigli; Chupin, Galal, Grasso, Boyazoglu and Matassino,1996) are presently in press. Four specialised sessions on Milk and Dairy Products, Meat Products, Genetics and the Environment, Characterisation and Quality of Production were completed by a round-table discussion on the future possibilities of the buffalo sector in Europe and the Mediterranean basin.
b. The International Symposium on Buffalo Reproduction, held in Sofia (Bulgaria) in October 1995; the proceedings were published as a special number of the Bulgarian Journal of Agricultural Science (Kanchev,1996).

A third specialised symposium to be held in Cairo (Egypt) in October, 1996 will address the existing systems ofproduction and available resources.

An important input of the FAO Interregional Network has been the development of a successfizl Buffalo Newsletter for Europe and the Near East since 1993. Four issues were published since November 1993. This valuable and informative newsletter has several sections : short scientific articles, technical information on the Network's past and fiuture activities, technology innovation and bibliographic reviews and updating.

Another important activity of this Network has been the launching of a world-wide survey on the recording of milk performances of dairy buffaloes, in narrow collaboration with the International Committee for Animal Recording. The report was presented at the biennial ICAR meeting held in The Netherlands in June 1996 (Moioli,1996).

In the fields of dairy quality products and milk and dairy recording and related reproduction fields, Italy has certainly been in recent years the country where the most important advances in research and application took place. A major research and development programme on the amel-

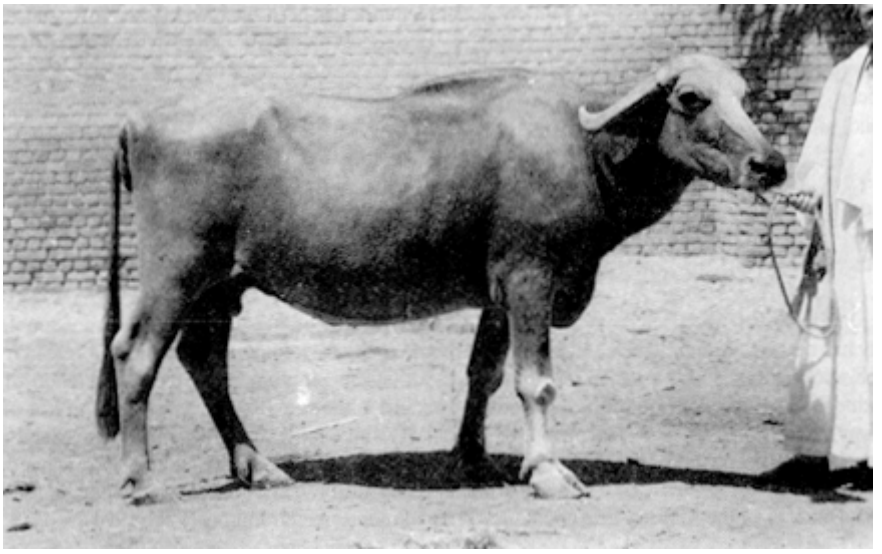

Figure 3
Egyptian mature buffalo cow

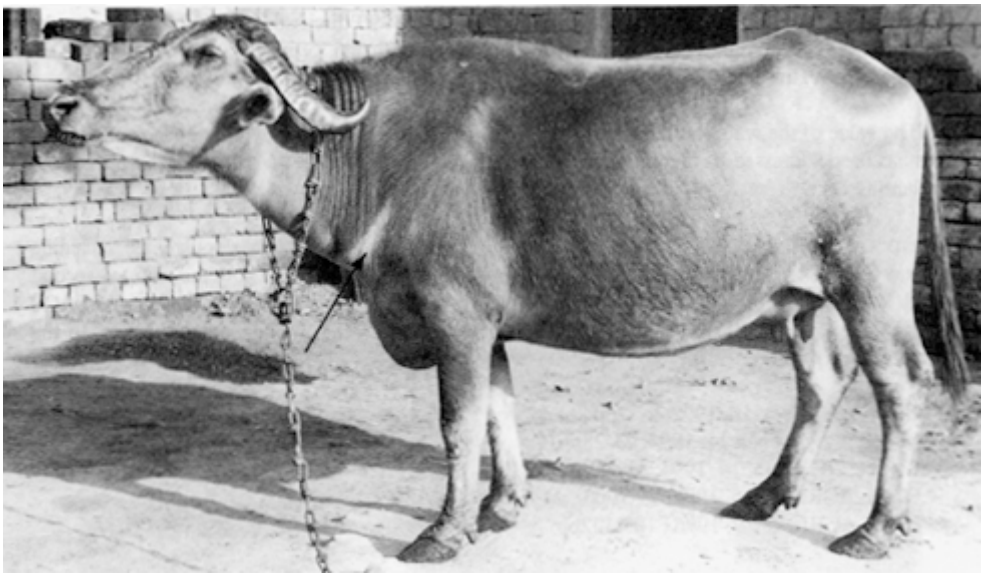

Figure 4
Indian Bhadawari buffalo cow

ioration of the production and reproduction of the buffalo was launched in the late 80's as a specialised project of the Italian Ministry of Agriculture, involving the National Institute for Animal Experimentation, the Italian Association of Animal Producers and any University departments interested, directly or indirectly, in the Buffalo Livestock sector. The results obtained, up to the end of 1993, were summarised in a specia number of the Iinistry of Agriculture's Agricultural Research Journal (Pilla,1994).

The extensive use of the water buffalo in Southwest Asia and the Far East was largely addressed during the Workshop on Draught Animal Power organised during the 6th AAAAP Congress held in Bangkok (Thailand) in November 1992 (Pryor,1992) while two symposia held respectively in Cipanas (Indonesia) in July 1989 and Edinburgh (Scotland) in April 1990 discussed among other themes the role of the buffalo draught power in nural development (Hoffman, Nari and Petheram, 1989; Den Hertog and Van Huis,1990).

The value of the water buffalo and its preservation as an important equilibrium factor in wetland areas has been addressed by Georgoudis (1993) with special reference to the Ramsar wetland sites of Northern Greece.

From a biodiversity point of view the situation of the world's buffalo populations (including numbers, danger of extinction, management and conservation) is presented in both the first and second World Watch Lists for Domestic Animal Diversity (Scherff, 1995). In recent numbers of FAO's Anima Genetic Resources Information Bulletin several articles refer, among other subjects, to the buffalo genetic resources in specific countries:

Brazil; AGRI No.10,1992; 9-32pp
Vietnam; AGRI No.1 l,1993; 23-28pp
Greece; AGRI No.14,1994; 83-96pp
China; AGRI No.15,1995; 83-99pp
India ; AGRI No.17,1996 ;109-122pp

Finally, we should mention the recent creation in 1994 of a specialised review journal on buffalo scientific and technical advances *"Bubalus bubalis"*. This journal of which the third issue has just been published, has a bilingual policy; while the scientific papers are basically in English, the technical notes, news items and general information appear mostly in Italian.

International Contact Points

FAO Interregiona (Europe-Near East) Co-operative Research Network on Buffalo A.M. Pilla and B. Moioli. Istituto Sperimentale'per la Zootecnia, Via Salaria, 31, I-00016 Monterotondo (RM), Italy.

International Buffalo Information Centre C. Chant•. Suwanvajokkasikit Animal Research and Development Institute, Kasetsart University, P.O. Box 1014, Kasetsart Post Office, Chathujakra, TH-10903 Bangkok, Thailand.

International Buffalo Federation G. De Franciscis and A. Borghese, Istituto Sperimentale per la Zootecnia ; Via Salaria 3I, I-00016 Monterotondo, Rome (Italy).

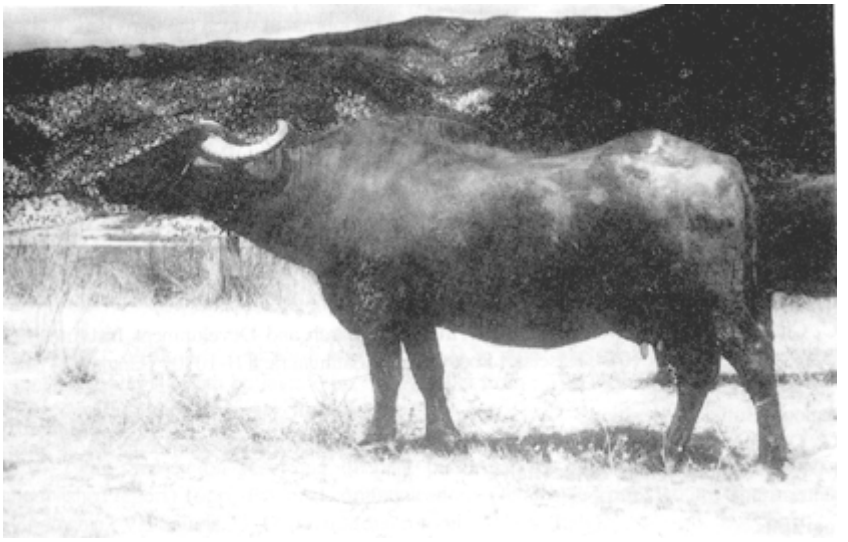

Figure 5
River buffalo at Vistonis lake (Greece)

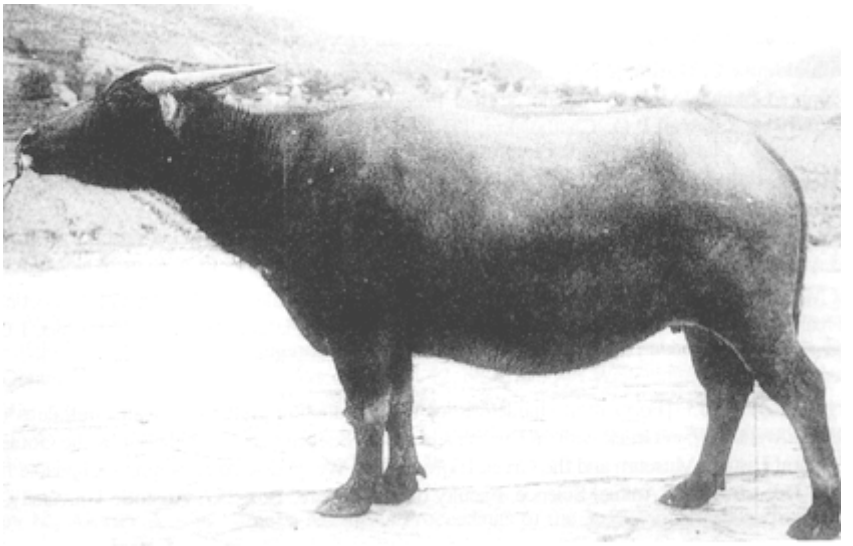

Figure 6
Water buffalo in Sichuan Province (China)

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Bubalus biubalis : A journal on buffalo science and technique ; Viale G. Verdi,12, I-84131 Salerno, Italy.

Figure 7
Italian buffalo in Caserta area

EL CABALLO LOSINO

J.M. Martinez Saiz, M. Valera Cordoba y A. Molina Alcala

Departamento de Genetica. Facultad de Veterinaria. Universidad de Cordoba.
Av. Medina Azahara s/n.14005 - **Cordoba**, SPAIN.

RESUMEN

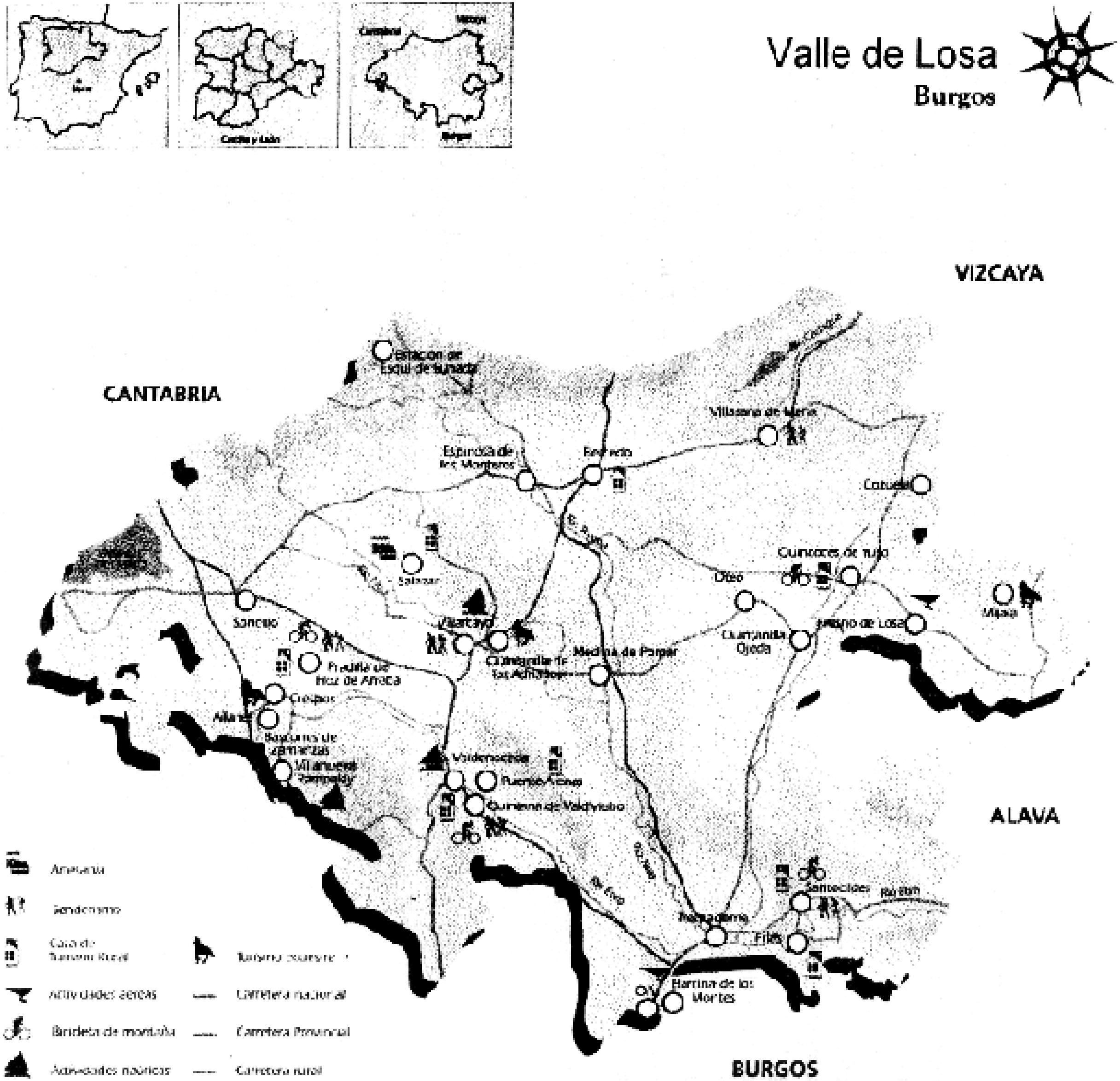
El caballo Losino, Pony sp Losino segun Mason (1960), recibe su denominacion del area oringinal de cria, el Valle de Losa, en el Norte de la provincia de Burgos (España). Se encuentra emparentado con otras razas autoctonas derivadas del tronco Cantabro-Pirenaico: el garrano portugues, el faco gallego, el caballo asturcon, el thieldon, la jaca soriana, el caballo navarro, el pottoka vasco, el caballo de Merens y el extinguido caballo catalan. La Raza Losina mantuvo sus efectivos hasta los anos 50 pero posteriormente, y debido principalmente a la mecanizacion del campo, al cruce con razas de aptitud carnica y con ganado asnal para la produccion mulatera, su poblacion descendio hasta llegar en 1986 a los limites mas criticos de toda su historia. Ese ano, en vista de la alarmante situacion, se inicio el proyecto de recuperacion de la raza creandose posteriormente en Pancorbo (Burgos) el primer Centro de Cria y Seleccion del caballo Losino. En este Centro se viene manteniendo el sistema natural de crianza en libertad. Los animales, una vez que han sido desbravados y domados, vienen utilizados para la equitación infantil juvenil, en enganches y para realizar las rutas ecuestres por zonas rurales y de montaña.

Palabras clave: España, Recursos geneticos animales, Pony sp. Losino

SUMMARY

The Losino Horse, Pony Losino [sp] according to Mason (1960), receives its denomination from the original area of breeding, the Valley of Losa, in the North of the county of Burgos (Spain). It is related with other autochthonous races derived of Cantabro-Pirenaico trunk: the Portuguese garrano, from the Galician faco, the asturcon horse, the thieldon, the Soriano horse, the Navarrese horse, the Basque pottoka, the horse of Merens and the extinguished Catalan horse. The Losino Horse maintained its population until the 1950-60 decade but later on, and due mainly to the agricultural mechanisation when crossbreeding with the meat breeds and with donkeys for mule production, their population descended until 1986 to the most critical limits of their whole history. That year, in view of the alarming situation, the project to recover of the race began by creating, in Pancorbo (Burgos), the first Centre of Breeding and Selection of the Losino horse. This Centre keeps the natural system of breeding in freedom, using the animalss for the child juvenile horsemanship, horse carriages and to cover the equestrian routes for rural and mountain zones.

Key words: Spain, Animal Genetic Resources, Pony sp. Losino



Valle de Losa
Burgos
VIZCAYA
CANTABRIA
ALAVA
BURGOS
Espinosa de los Monteros
Cotobal
Salazar
Villarcayo
Medina de Pomar
Otero
Crespos
Valdenoceda
Quintana de Valdivielso
Trespaderne
Frías
Casa de Turismo Rural
Actividades aéreas
Carretera nacional
Carretera Provincial
Carretera rural

1.0 APROXIMACION HISTORICA Y ORIGEN DE LA RAZA LOSINA

En la Hispania romana existian tres morfotipos caballares cuya distribucion geografica peninsular estaba suficientemente delimitada por corresponder casi exactamente con la de los pueblos que los trajeron y criaron. En extensas zonas centro-peninsulares se registró la existencia, junto al caballo asturcon e hispano, de un tercer tipo al que los autores dieron el nombre de caldon, celdon, thieldon o fieldon, dicho caballo se origino al fusionarse la poblacion equina ibera con la celtica, momento que estos aprovecharon para mejorar su ganaderia caballar dandole mayor alzada (1,40), intermedia entre las de sus progenitores hispano y asturcon. El cruce resulto frecuentemente calzado y cordon corrido pero de cabeza grande y perfil subconvexo, pecho estrecho, cascos mayores que los del hispano, muy resistente y apto para el tiro y algo inferior al bereber para la silla. Tuvo gran aceptacion en aquellas zonas en que habia menos oportunidades de adquirir caballos hispanos y en ellas se adapto y llego a fijar caracteres que aun conservan sus descendientes. Fue en las zonas gallegas, asturianas, santanderinas, vascas y especialmente en el Valle de Losa (Burgos) donde llego a ser el mejor caballo para carreras de carros como lo demuestra el hecho de que, como tal, fuese exportado a Italia (Cuadrado E., 1968). Alli desplazaron a los caballos celticos cisalpinos, llegando a figurar un tronco de caballos celtiberos entre los premios mas cotizados en las competiciones circenses de Roma (S. Italico, XVI).

Entre las cualidades del caballo celdon, una de las mas llamativas para los italicos era la de practicar el paso poxtante, de andadura o ambladura, paso no conocido en Roma hasta entonces, y muy corriente en los caballos de Asia. Asi Plinio (CXXIII), que habia sido oficial de caballeria, describia el paso portante del celdon como "paso no habitual, sino mas bien como un trote suave que logra alargando las piernas alternativamente".

Sin embargo para Castejon (1953), el caballo Losino es uno de los tres tipos caballares indigenas de la Peninsula Iberica, diferenciandolo de las razas Cantabricas y las del sur de la Peninsula, entroncado genotipicamente con el Tarpan, y descendiente igualmente de especies que han poblado la Peninsula Iberica desde los tiempos del Terciario y Cuaternario (Hipparion Gracile).

La primera cita bibliografica que se hace sobre los caballos criados en la provincia de Burgos corresponde a la referencia que D. Alonso de Herrera (1777) hace de los celebres caballos utilizados por el Cid Campeador.

En 1922, en la Memoria del "Concurso Nacional de ganados, avicultura, maquinaria e industrias derivadas", organizado por la Asociacion General de Ganaderos, aparece la yegua "Mora" de raza Losina, propiedad de Don Jose Rodriguez, como ganadora del 1º premio de la seccion 21. Esta seccion fue encuadrada en el grupo de ganado caballar de silla, donde se presentaron 423 yeguas de distintas razas, correspondiendo 6 de ellas a la Raza Losina.

En 1924, D. Rafael Janini Janini, ilustre Ingeniero Agronomo de la casa Real, en su libro sobre "Selección de Cria Caballar", al hablar de las razas de caballos que habitan en el Norte de Espana, hace referencia como caballo muy interesante la raza que se criaba en el Valle de Losa.

En el ano 1933, en el libro de "Recopilacion de Estudios de Cria Caballar" del Marques de Negron y Pardo Figueroa, en el capitulo sobre el trabajo premiado en el Certamen de Estudios Hípicos de la Exposición Ibero-Americana (1929) del que es autor D. Jose Mª Garcia Bengoa, cita: "Razas Cantabricas y Losina: En las provincias gallegas, asturiana, santanderina, vascas y especialmente en el Valle de Losa (provincia de Burgos), existen caballos que reconocen los mismos origenes asignados al navarro y que las condiciones de clima, alimentacion y predominio,

Figure 9
Grupo de caballos Losinos en su medio natural

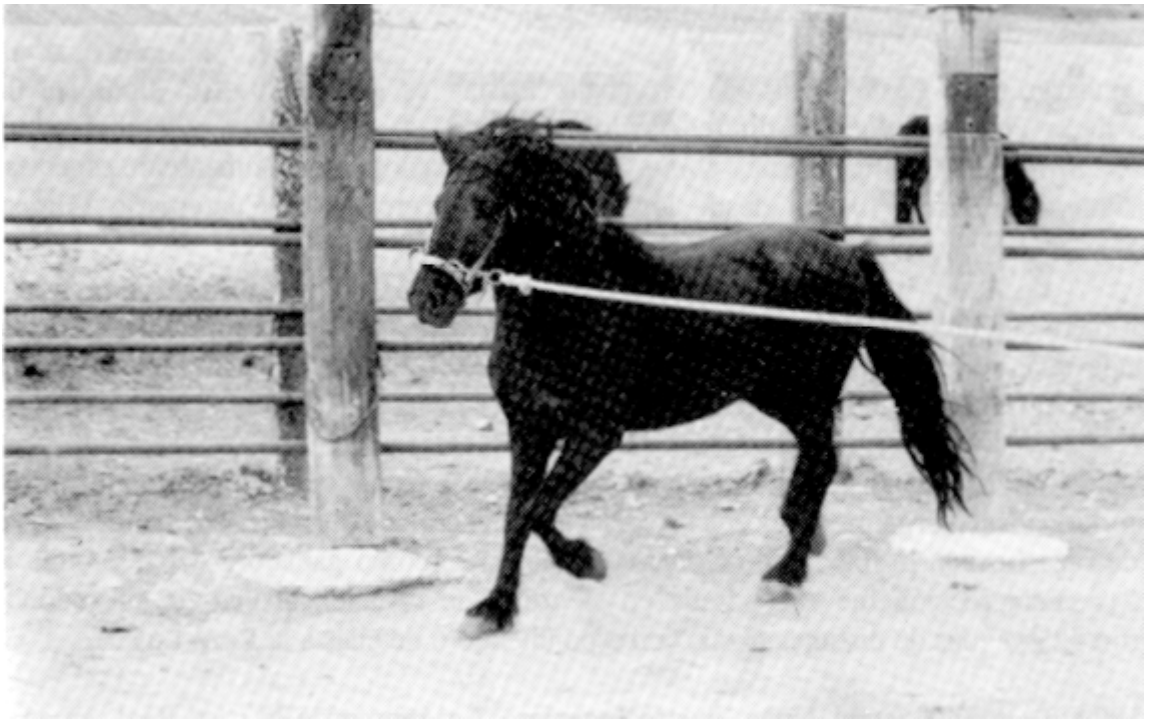


Figure 10
Caballo Losino sometido a doma en picadero descubierto

mas o menos manifiesto, de algunos de sus antecesores, han impreso caracteres que aparentemente los diferencian".

En el ano 1951, el Dr. J.M. Banuelos, inspector veterinario de la zona de Villas de Mena nos señala en su trabajo para el II Congreso Internacional de Zootecnia "El caballo Losino, su nombre esta difiundido por todo el mundo, animal de excelentes cualidades". Asi mismo señala que las hembras son muy lecheras y muy aptas para la cria mulatera.

En el ano 1953, en el articulo de "Archivos de Zootecnia" de D. Rafael Castejon Martinez de Arizala, ilustre Catedratico de la Facultad de Veterinaria de Cordoba, nos cita que uno de los tres tipos caballares indigenas de la Peninsula Iberica es el caballo Castellano: "El caballo Castellano, tipo estepario, entroncado genotipicamente con el Tarpan, de alzada media original de 130 a 140 centimetros, pelaje castano (color salvaje), de netos perfiles rectos y descendiente igualmente de especies que han poblado la Peninsula Iberica desde los tiempos del Terciario y del Cuaternario (Hipparion gracile) hasta nuestros dias. Produciendo en general los actuales caballos indigenas de Castilla, algunas de sus agrupaciones como el Caballo Losino, han sido estudiadas por autores nacionales y extranjeros. Su genotipo *es Equus gmelini Antonius o* Tarpan.

En las posteriores referencias bibliograficas, los autores dan a la Raza Losina como desaparecida o en grave peligro de extincion. Asi, D. Raul Lion Valderrabano en su libro "La Cria Caballar en Santander" del ano 1970, afirma la desaparicion de la Raza Losina.

En el libro sobre "La Cria Caballar" de ediciones Darley (1990) la referencia que se hace sobre el caballo Losino es la siguiente: "... Desde hace tiempos remotos, existe en el Valle de Losa (provincia de Burgos) y zonas limitrofes (Cantabrica, Alava y Vizcaya), una poblacion caballar perteneciente a un posible tronco cantabro-pirenaico, llamada Raza Losina, catalogada como categoria de subespecie, denominandola como *Equus caballus losinus.* Esta raza se halla actualmente por diversos motivos al borde de la extincion..."

2.0 CENSO Y DISTRIBUCION GEOGRAFICA

El area original de cria radico en el Valle de Losa, con una extension aproximada de 50 kilometros cuadrados, correspondiente a las juntas vecinales de Berberana, Villal de Losa, San Martin de Losa, Rio de Losa, Valle de Losa y Traslaloma. El area de dispersion de cria abarcaba los valles de Mena, Valdegovia y Tobalina, desde los montes Obarenes hasta los de Ordunte y las vertientes de estas ultimas en Santander y Vizcaya, mas las zonas limitrofes de la provincia de Alava y Navarra (montes de Urbasa).

Entre los anos 1900-1905 se constato el mayor numero de cabezas de caballo Losino, intensificandose hacia la segunda fecha la produccion de hl'bridos.

Desde 1905 a 1917, va disminuyendo progresivamente la produccion de caballos Losinos, sobre todo los mejores caballos, debido a que las yeguas de mayor calidad se destinaban a producir ganado mular, y, por el contrario, las peores son las que se reservaban para la recria, atravesando por este motivo un momento grave la existencia del caballo Losino.

Segun el censo de Cria Caballar, la poblacion de yeguas a mediados de los aiios treinta era de 1455 animales. En el censo de Ganaderia Española de 1955 se recogía aun la existencia de unas 4 000 cabezas en todo el territorio español.

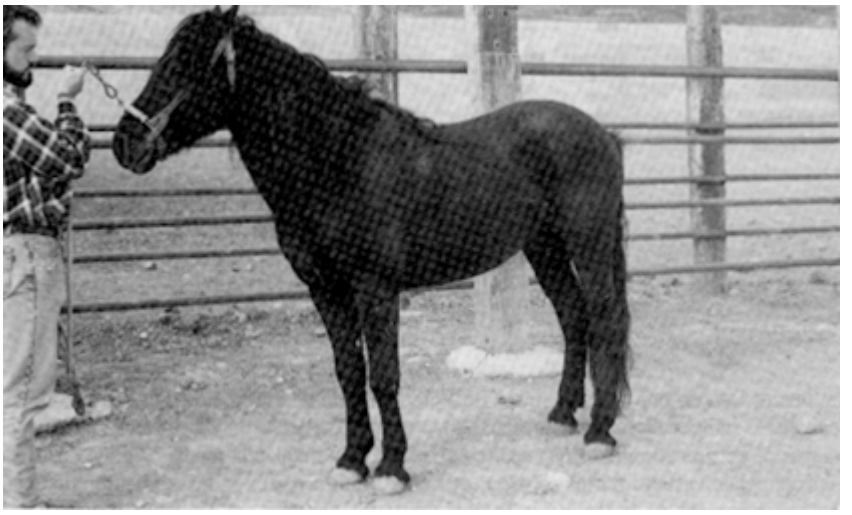


Figure 11
CaballoLosino

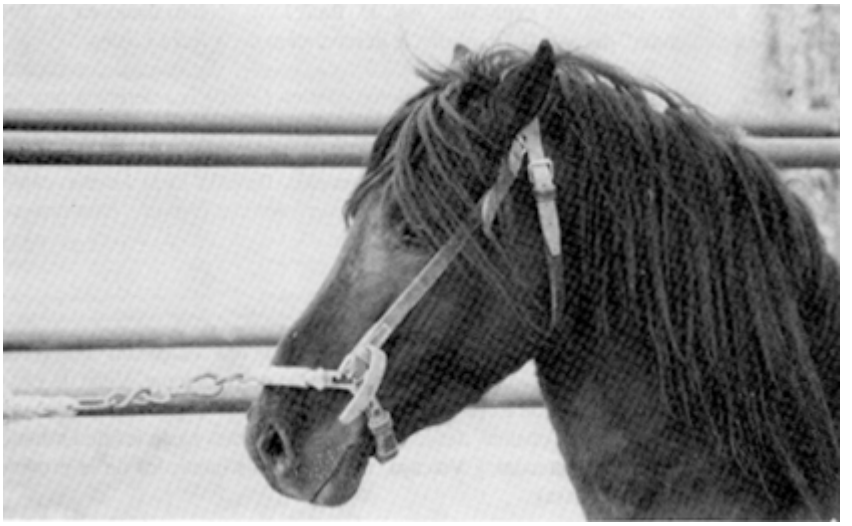


Figure 12
Detalle de la cabeza del caballoLosino

Por el sistematico cruzamiento a que ha venido siendo sometida, sobre todo en la primera mitad del siglo, la raza ha estado a punto de extinguirse, cifrandose en 1988 aproximadamente un total de 23 animales puros. No obstante, gracias al proyecto de recuperación de la raza elaborado por D. Ricardo de Juana, desdel988 la poblacion ha empezado a recuperase, contando en la actualidad con unos 200 animales inscritos en el Libro de Registro de la Raza.

3.0 ECOSISTEMA DEL VALLE DE LOSA

El Valle de Losa y las zonas del norte de Burgos presentan una gran variedad de ecosistemas debido a la gran diferencia de altitud sobre el nivel del mar, desde las zonas del valle de Mena (templada y humeda, con abundantes pastos) a las zonas de alta montaiia (clima frio y terrenos pedregosos). Geograficamente se encuentra enclavado aproximadamente entre los 42º 15' de latitud Norte y los Oº 18'de longitud Este.

En estas zonas las diferencias de temperaturas son muy amplias y selectivas, produciendose durante el ano grandes oscilaciones, que van facilmente de los -10 ºC en invierno a los 30 ºC en verano. Las precipitaciones son abundantes por la superposicion del clima atlantico con el continental de la meseta castellana. A partir de los 1300 metros de altitud las precipitaciones son de nieve en invierno, quedando cubiertas las montanas durante dias, esto hace que los caballos desciendan a cotas mas bajas para protegerse del frio y para encontrar alimento.

Las zonas donde encontramos al Caballo Losino en estado silvestre, cotas de los 800 a los 1500 metros, estan ocupadas por bosques de robles, pinos, encinas, hayas, entre cuyos claros quedan grandes espacios libres formando praderas con flora de montana. Estas praderas estan formadas por un estrato herbaceo compuesto especialmente por trebol blanco, cuernecillo, arveja de los prados, poa alpina, agrosti comun, etc., siendo algo pobre en plantas forrajeras que se encuentran normalmente en las zonas mas bajas.

A esta altura tambien nos encontramos formaciones de matorral representados por coscoja, enebros, brezo, aulaga, espino y endrino. Este matorral precede al bosque en la sucesion ecológica, y se parece a el en la naturaleza resistente de su estructura leñosa. Difiere en la densa ramificacion que lo hace impenetrable al hombre y proporciona al caballo abrigo en los dias frios de invierno y sombra en los dias calurosos de verano.

Este conjunto de condiciones del ecosistema propios del Valle de Losa obliga al Caballo Losino a soportar ayunos prolongados en la epoca invernal, durante los cuales aparecen flacos, extenuados y desconocidos hasta la llegada de la primavera con sus excelentes pastos.

4.0 LA VIDA DEL CABALLO LOSINO EN EL MEDIO NATURAL

En oposicion a los caballos domesticos, los cuales se recogen en albergues individuales, los caballos losinos viven en grupos sociales llamados bandas o manadas, formadas en la mayoria de los casos por un macho adulto, varias hembras y sus crias, que generalmente no tienen mas de tres anos de edad. El tamaño de la manada suele ser de 6 a 10 individuos, dependiendo de la presencia o ausencia de crias que reflejan la reproduccion de cada ano. La dispersion ocurre antes de los 3 anos de edad, con el comienzo de la madurez sexual.

Las zonas de residencia que son usadas para las actividades diarias comprenden lugares de pastoreo, con manantiales de agua y lugares con sombra, brisa y refugio de mosquitos. Los limites de estas zonas suelen permanecer mas o menos fijos, aunque su uso varia segun la epoca

del ano en que nos encontremos, cambiando la zona en funcion de la disposicion de agua y forraje. En verano se moverán hacia zonas donde persistan los manantiales y donde la hierba de los prados se mantenga verde y fresca.

A finales de la primavera se alcanzan las condiciones necesarias para el apareamiento de las yeguas de la Raza Losina, ya que el celo esta en funcion de la disponibilidad de forrajes, horas de luz diarias y de la temperatura. Asi pues, el sistema natural de crianza al que esta sometido el caballo Losino es practicamente en libertad. Las hembras son longevas, fecundas y muy prolificas, viendose traducida su capacidad maternal en la cantidad y calidad de sus producciones lacteas y en el buen instinto de protección sobre sus crias.

5.0 ADAPTACION A LA VIDA EN CAUTIVIDAD

Los caballos de la Raza Losina viven en libertad desde que nacen hasta los 2 o 3 anos en que son recogidos para ser domados y transportados a las caballerizas. El confnamiento solitario en una caballeriza puede dar lugar a estereotipias (caminar en circulos, escarbar la tierra, patear la puerta del box) o incluso autoagredirse, no hay que olvidar el medio en libertad del que procede.

El Caballo Losino al ser capturado para su crianza muestra un comportamiento un tanto arisco, pero una vez que ha disipado su temor al hombre, cambia radicalmente su conducta, comportandose entonces como animal docil, carinoso, noble e inteligente, con gran predisposicion para el aprendizaje. Una vez domado sigue manteniendo el temperamento activo, mostrando gran sobriedad y resistencia.

Segun Don Ricardo de Juana (criador mas importante de caballos Losinos en la actualidad), este caracter se ve reflejado luego en su gran aptitud para la silla, siendo especialmente apto para la equitacion juvenil, ya que por sus cualidades psiquicas y fisiologicas, este caballo aprende y ejecuta cualquier disciplina ecuestre con soltura y buena disposición.

6.0 PATRON RACIAL

El patron racial del caballo Losino según la Asociación de Criadores (1988) es el siguiente:

Peso. Es un caballo eumetrico, con un peso entre 330 y 350 kg.

Perfil. Recto o subconvexo, con un caracteristico abultamiento a nivel de los nasales que aparece mas acentuado en los machos.

Cabeza. Relativamente grande y de rasgos finos. Perfil frontal recto, a veces, con una ligera ondulacion a nivel de los nasales (perfil en S estirada o de potro). Orejas pequenas, delgadas y formando arco de concavidad interior. Frente plana. Ojos a Por de cara, grandes, vivos y expresivos. Ollares amplios. Labios levemente gruesos.

Cuello. Recto o suavemente ondulado en su borde superior. Cuello robusto, de amplia insercion en el pecho, con tendencia a abultarse en su parte inferior, que se hace convexa.

Altura. Se considera como alzada media en hembras 135 cm y en machos 140 cm.

Tronco. E1 pecho es amplio, cruz buena, algo ensillado, lomos anchos

Extremidades anteriores. Las extremidades anteriores son fnas, con buenas articulaciones, vasos

y tendones muy ostensibles exteriormente. Espalda amplia, buen brazo, cana fina, cuartillas cortas y cascos pequenos, duros y negros.

Grupa. Amplia, redonda y derribada. La cola es de insercion baja y hundida entre los isquiones, larga, muy poblada y negra.
Extremidades posteriores. E1 muslo y la pierna estan bien proporcionados, corvejones limpios, a veces algo cerrados. Las regiones situadas por debajo de los corvejones son analogas a las mencionadas en las extremidades anteriores.

Pelo. El pelo de las crines y de la cola es largo y abundante, especialmente en invierno como defensa del frio. Las crias, hasta casi los dos anos, presentan un pelo grosero, parecido al de los asnos, que mas tarde cambiaran para tener el pelo propio de la raza. No presentan un exceso de cernejas.

Capa. La Asociacion de Criadores reconoce solo la capa negra en su variante morcillo, pudiendo presentar tonalidades rojizas en invierno y siendo en verano mas oscura y brillante. Es frecuente la aparicion de lucero en la frente.

Defectos eliminatorios.

a. Cualquier variacion en la capa que no sea la negra
b. Presentacion de manchas en la capa, que no sean estrella o lucero pequeno
c. Cualquier rasgo que haga sospechar el cruzamiento con otras razas
d. Cascos desparramados
e. Exceso de cernejas
f. Grupa cuadrada o recta
g. Variación en el perfil fronto-nasal que no sea el propio de la raza

7.0 FUNCIONALIDAD

Durante mucho tiempo la Raza Losina tuvo un valor inestimable, proporcionando excelentes caballos de guerra, especialmente en la época de la Reconquista. Con posterioridad se convirtió en un caballo apto para las labores de campo y como animal de silla.

Hoy en día la funcionalidad de estos équidos está orientada a la silla y al tiro ligero. El Caballo Losino después de ser capturado y domado, cambia radicalmente su conducta, comportándose como animales cariñosos, dóciles, nobles e inteligentes, con gran predisposición para el aprendizaje, siendo muy apto para la equitación juvenil por su marcada aptitud para el paseo ecuestre.

Debido a la firmeza y seguridad de su pisada, especialmente en los terrenos abruptos de las montañas del norte de Burgos, son muy apropiados para marchas campo a través. Pueden ejecutar cualquier disciplina ecuestre con soltura y buena disposición, desarrollando además un trote corto muy característico de la raza, conocido como paso castellano o pasitrote, mostrando así mismo aptitudes para la ambladura. Todas estas características los hace animales idóneos para el turismo rural, tan de moda en nuestros días.

Como caballo de tiro ligero, en las labores de campo, puede resultar interesante en pequeñas explotaciones muy aisladas de los núcleos urbanos, donde los modernos sistemas de laboreo agrícola tienen dificultad o no son económicamente rentables, como es el caso de numerosas explotaciones forestales de la zona.

8.0 CONSERVACION DE LA RAZA

La recuperación, conservación y mejora del Caballo Losino es una responsabilidad de la administración. Los encargados de la zootécnia deben tener presente que la Raza Losina es la única raza equina autóctona, reconocida a nivel internacional, que posee la provincia de Burgos y toda Castilla y León.

La Comisión Europea aprobó a finales de septiembre de 1994 la concesión de unos 70 000 millones de pesetas, durante los próximos cinco años, para el programa español de medidas agroambientalés ; de los cuales, 2 000 millones deben ser destinados a la conservación de las razas españolas en peligro de extinción. De entre las 55 razas que pueden beneficiarse de estas ayudas se encuentra el caballo Losino. Este reglamento ha sido asumido por la Comunidad de Castilla y León en la Orden del 28 de junio de 1995, de la Consejería de Agricultura y Ganadería donde se establece un régimen de ayadas para fomentar métodos de producción agraria compatibles con la protección y conservación del espacio natural. En esta misma Orden se considera al caballo Losino entre las razas autóctonas en peligro de extinción que es necesario potenciar.

Los pasos a seguir para la recuperación de la raza pueden ser resumidos en 5 puntos:

1. Proteger urgentemente la población existente
2. Crear un centro de reproducción y mejora de la raza
3. Subvencionar su producción
4. Elaborar un plan de promoción de la raza
5. Dar a conocer su utilidad como caballo recreativo

En Castilla y León se inició la recuperación de la población en 1986, año en que la ganadería del caballo Losino descendió a los límites más críticos de toda su historia, con un proyecto de localización de reproductores. Posteriormente se ha establecido en Pancorbo (Burgos) y bajo la dirección de Ricardo de Juana Aranzana, el primer Centro de Cria y Selección del caballo Losino, donde se mantiene el sistema natural de crianza en libertad.

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LIVESTOCK WEALTH OF THE LADAKH: A COLD ARID REGION IN INDIA

S.C. Gupta, T. Tundup, Neelam Gupta, Pushpendra Kumar, K.N. Yadav, A.E. Nivsarkar, B.K. Joshi and R Sahai

National Bureau of Animal Genetic Resources
National Institute of Animal Genetics, **Karnal** -132 001, INDIA

SUMMARY

The Ladakh plateau is an arctic desert in the Western Himalaya having an annual rainfall of 8 to 9 cm. Extreme environmental conditions and persistent hypoxia affect the human and livestock populations. Limited grazing resources are the other limiting factor. Despite these hardships, a great variety of livestock species are available in Ladakh. The yak is the most important species for highlanders providing them subsistence in terms of milk, meat, fibres, skin and hides. It is an excellent pack and transport animal in snow bound passes. Male Yak hybrids with local cattle are excellent bullocks under the hypoxic environment. The small population of local hill cattle is endangered due to large scale crossbreeding with yaks and exotic cattle. The majority of goats•in Ladakh are Pashmmina type. The Changthangi is an important goat breed. Local small sized sheep yield fine carpet type wool and resemble the Tibetan sheep. Zaniskari horses are in danger of extinction. Other horses and ponies available in Ladakh appeared similar to the Tibetan ponies. The local donkeys have a large bulging head with long hair. Only 54 Bacterin camels are left in the region. Poultry and pigs are not popular in Ladakh. Almost all livestock species have long body hair to survive in extreme climatic conditions.

Key words: Livestock species, Yak, Goats, Pashmina, Changthangi, Zaniskari horse, donkey, camel

RESUME

Le plateau de Ladakh est un désert artique dans 1'Ouest de 1'Himalaya avec une précipitation annuelle de 8 á 9 cm. Les conditions environnementales extrémes et l'hypoxémie affectent aussi bien la vie des hommes que des animaux d'élevage. Un autre facteur limitant est le manque de páturage. En dépit de ceci, il existe dans la zone une grande variété d'espéces d'élevage. Le yak est 1'expéce plus importante pour les éleveurs des hauts plateaux car il représente leur mode de subsistence du point de vue lait, viande, fibres, peau et cuir. C'est un excellent animal pour le transport á travers les passages dans la neige. Les máles croisés de yak avec les races bovines locales sont des excellents bouvillons adaptés á ce type d'environnement. La petite population locale de colline est en danger á cause de 1'enorme taux de croisement effectué entre le yak et les races bovines exotiques. La plupart des chévres de la zone de Ladakh appartiennent á la race Pashmina. La race Changthangi est un croisement important. Une petite population locale d'ovins du type ovins du Thibet produit une fibre fine pour la fabrication de tapis. La race de cheval Zaniskari est en danger. Il existe dans la zone de Ladakh d'autres types de cheval ou poney trés semblables aux poneys Thibetains. La race locale d'áne posséde une tête bombée et de long poils. Il ne reste que 54 chameaux de la race Bacterin dans la région. L'élevage de porcs et volailles n'est pas trés répandu dans la région de Ladakh. La plupart des animaux possédent de long poils pour survivre dans les conditions climatiques extrémes de la région..

Mots-clés: Animaux d'élevage, Yak, Chévres, Pashmina, Changthangi, cheval Zaniskari, áne, chameau

1.0 INTRODUCTION

The Ladakh plateau is characterised by sandy soil and brown rocks between the high range of mountains (3 000 to 6 000 m above msl) which remain covered with snow throughout the year. This region constitutes nearly one third of the area of Jammu and Kashmir (J&K) state of India. The annual rainfall is only 8 to 9 cm. Dras in Ladakh is one of the coldest places in the world with -50" C ambient temperature in winter while in summer the maximum ambient temperature of Leh could be as high as 35^{o} C. Furthermore, the large variation in day and night temperatures causes diurnal change in animals. Persistent hypoxia causes a number of psycho-physiological changes in man and animals. High intensity electric storms, dry atmosphere, high precipitation are the other environmental stresses that affect the life of animals. Despite extreme environmental conditions and limited grazing resources, some excellent and rare species of livestock are found in Ladakh. Very little information is available on yak and other livestock of the Ladakh region of India. In this paper an eye witness account of livestock species of Ladakh region has been presented.

2.0 TYPES OF LIVESTOCK AND THEIR CURRENT STATUS

2.1 Yak

Of about 40 thousand yaks in India, more than one third (15.7 thousand) are found in Ladakh. They are evenly distributed in the districts of Leh and Kargil. Yaks are mostly domesticated but its wild ancestors *(Bos mulus)* can still be located in higher ranges. A wide variation in body size, colour pattern and production levels was observed in yaks at different altitudes ranging from. 3 000 to 6 000 m above msl. Sex dimorphism in body size is a characteristic feature of yaks found in this region. Adult body weight ranges from 300 to 500 kg in males while females weigh between 200 and 300 kg. Some yak bulls weighing around 1000 kg were also seen. Such selected breeding bulls are kept by Buddhist Gompa and village societies for producing hybrid bullocks by crossing with local cattle for agricultural operations. Yaks are usually black with glossy hair but brown yaks are not uncommon. White patches on black or brown-coloured yaks were more frequent at lower altitudes. White albino yaks are also found. In Ladakh, yak means male while the females are known as demo. Yak rearing is still considered a noble profession by Buddhists living for centuries with ancient history and culture. The yak is particularly valued as a pack animal and can carry heavyloads (100-150 kg) in snow-bound passes. These animals provide milk, meat, fibre and skin. Due to its multifaceted utility at such high altitudes where other bovines cannot survive, the yak is considered as a lifeline for the highlanders.

About 28.6 thousand yak hybrids are distributed mainly in the lower valleys (3 000 to 4 000 m msl) of the Kargil and Leh districts. In Leh, they are found in the Leh, Khaltsi and Nubra blocks where some agriculture farming is feasible only during the short summer. Only F_1 hybrids are considered valuable as they excel in hardiness, body size and strength. The F_1, males (dzo) are considered superior to both yak as well as local cattle bullocks for ploughmg and other draught work under the hypoxic environment of the Ladakh plateau due to their strength and docile temperament. F_1, female (dzomo) yields more milk than demo or local cows. Due to sterility in male hybrids the F_1 females (dzomo) are backcrossed to yak or cattle bulls. All the male hybrids are sterile up to the 7/8th level of yak or cattle inheritance and have a diffeerent nomenclature in each generation of backcross. Except F_1 other backcrosses are of lesser importance and are mostly utilised for meat production. Yak bulls are crossed with cattle heifers and reciprocal crossing of demo with cattle bulls is rarely encouraged in Ladakh unlike in China, Nepal and Bhutan (Epstein,1974).

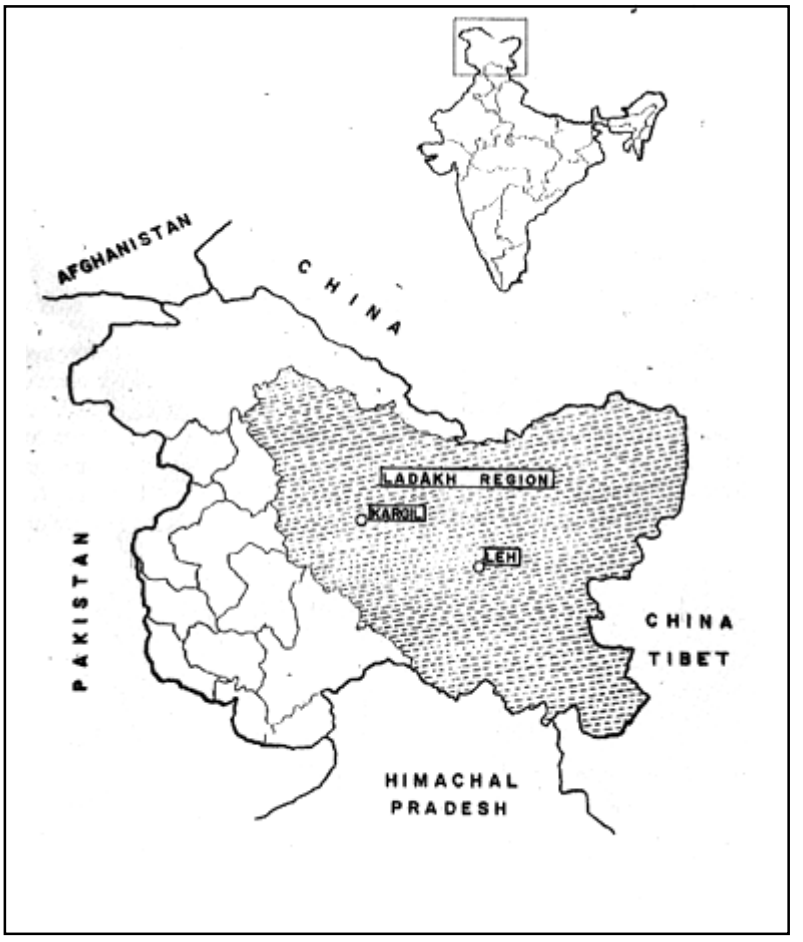

Figure 13
Location of Ladakh region of Jammu and Kashmire State in India

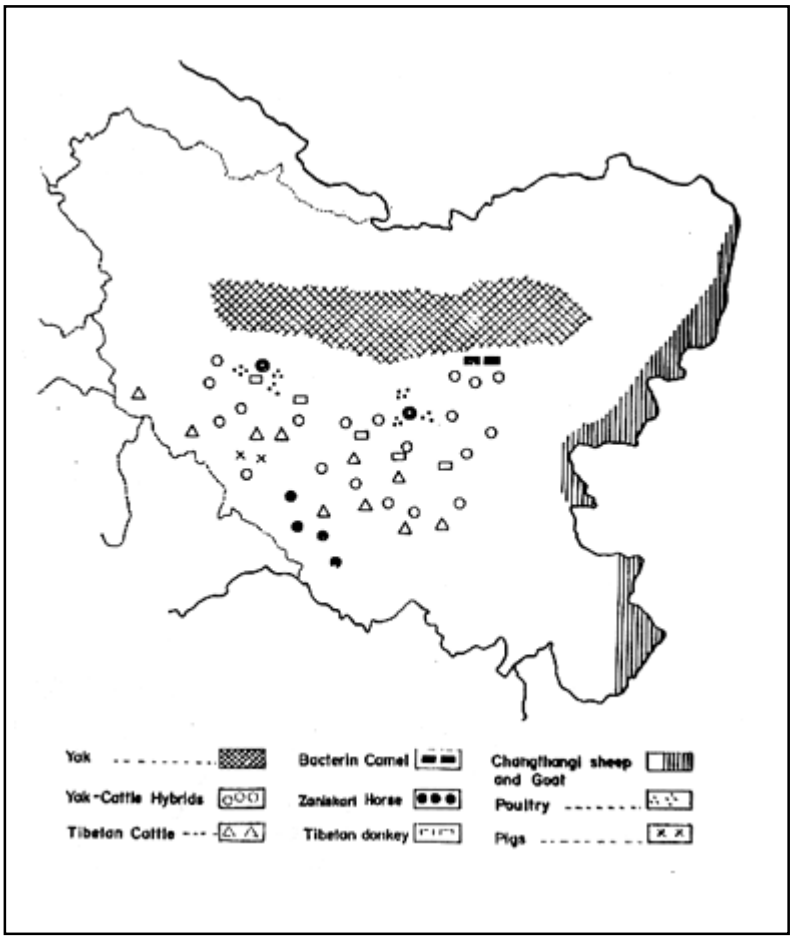

Figure 14
Distribution of different livestock species in Ladakh region

2.2 Cattle

In Ladakh, 45.13 thousand local hill cattle are found. They are mainly distributed in Zaniskari, Leh, Khaltsi and Nubra blocks. It is a small sized humpless cattle like *Bos taurus* but has not been evaluated cytogenetically. They appear similar to the Tibetan cattle (glang). The colour varies from black to brown with white patches resembling somewhat those of Frisian cattle. The horns are thin and curved outside and outwards fonuvards. The milk yield is low, ranging ñom 100 to 300 litres per lactation. The draught capacity of bullocks is also poor. This small-sized type of cattle is showing endangerment trends due to large scale crossbreeding with yak bulls to produce hybrids. Crossbreeding with exotic breeds like Jersey and Holstein is another cause for the decline in population. A pure-bred Jersey Farm has been established at Leh by J&K State Animal Husbandry Department to improve the local cattle through crossbreeding for milk production.

2.3 Goats

In Ladakh the majority of goats are of the Pashmina types. The Changthangi breed is found in the Changthang region. It yields 200 to 250 g of fine grade Pashmina annually. The population of this breed has dwindled to about 25 000. Endangerment of the breed might have been due to

Figure 15
Selected yak bull used for crossing local cattle to produce dzo/dzomo

the widespread crossbreeding with local hair producing goats. In other parts, the Ladakhi Pashmin goats are found in large numbers. This goat is similar to that of Cashmere or Kangra goats of Tibet, described by Hodgson (1847). It is based on the assumption that Gaddi or Kangra goats criginated in the Himachal Pradesh of India. In males, the horns are curved upwards, outward and then twist backward. 'The females have relatively smaller horns with only a slight twist. The body is covered with an outer coat of long straight hair reaching below the knees and hocks. It yields 100-150 g of Pashmina annually.

Figure 16
A pair of dzo used for agricultural operations in valleys

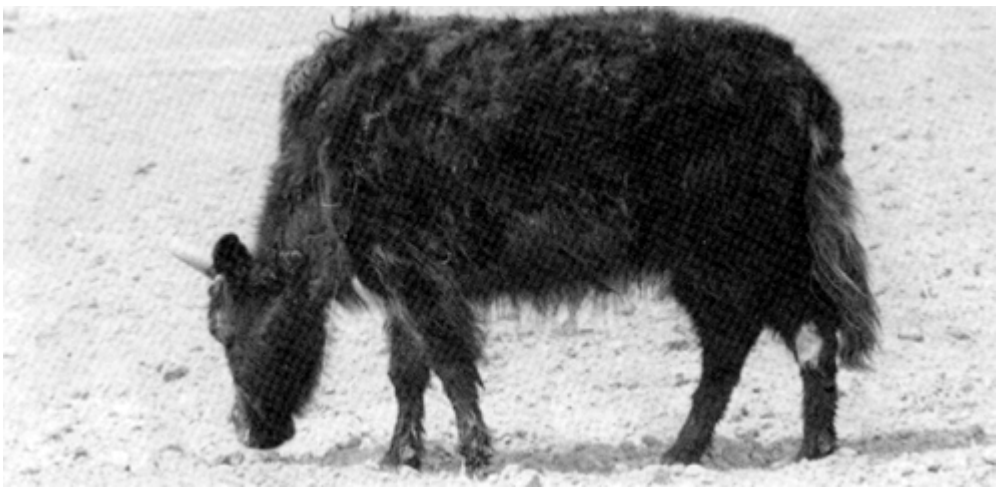

Figure 17
Small size humpless local cattle

2.4 Sheep

The total sheep population of Ladakh is 267.29 thousand which is about 9 percent of the total sheep population of J&K state. The local sheep are small and appear in a mixture of various sheep breeds of Kashmir and Tibet. It yields fine carpet type wool which is used locally to prepare famous Ladakhi carpets which are similar to those manufactured in China. The population of the indigenous sheep is also declining due to large scale crossbreeding.

Figure 18
Pashmina goat

2.5 Horses and ponies

The Zaniskari breed of horses owes its name from the Zaniskar Valley of the Kargil district. These are medium sized well built horses, having a height of around 130 to 140 cm in males and 120 to 130 cm in females. The horse has prominent eyes and uniform gait. A heavy and long tail is the other contrasting characteristic of this breed. The body hair is fine, long and glossy. The most common colour is greyish white but black, white and copper colour are also found. The animal is known for its ability to walk, run adequately and carry loads on oxygen deficient area in slopes of high mountains of Ladakh due to their surefootedness. Local people believe that the efficiency and intelligence of this horse brought laurels to the local warriors during the local wars in the 18th century. Only a few hundred horses at present exist in the Zaniskar and other valleys of Ladakh. Large scale breeding with non described ponies has led to the endangerment of this breed. The Animal Husbandry Department, I, eh, J&K Government has recently established a Zaniskari Horse Breeding Farm at I, eh for selective breeding.

In the Leh, district about 5 500 local horses and ponies are available which appear similar to Tibetan ponies. These animals have a well built body with a heavy and long tail. Long hair on the back and head are the other features. They are valued as pack animals on high hill slopes, mostly covered with snow. These ponies are also used in sports. Leh boasts of having the highest polo ground in the world.

Figure 19
Zaniskari horse

2.6 Donkeys

The majority of 12.45 thousand donkeys in Ladakh are distributed in the Indus valley of I,eh and the Khaltsi blocks. The main features include the large and bulging head with a tuft of long hair and long body harr. The Ladakhi donkey appears quite similar to that found in Tibet (Phillips,1945). These are used mainly for transportation of building material like bricks and soil for the construction of houses.

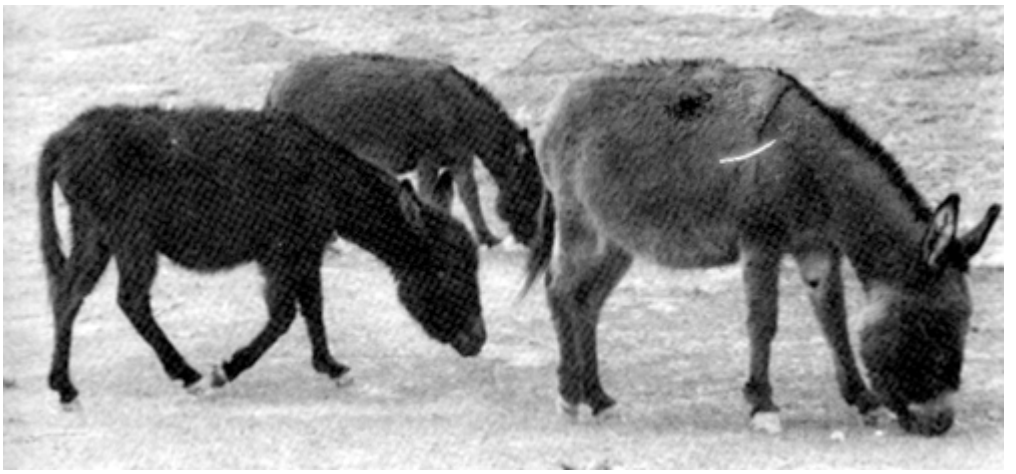

Figure 20
Tibetan type donkeys

2.7 Camel

Only 54 double humped (bacterin) camels (1991-92 census) are present in the Nubra valley of the Ladakh region. They are kept by nomadic people. The Bacterin camel of Ladakh has relatively shorter legs than those of the double hump camel found in the Gobi desert of Mongolia. The first hump is on the withers while the second one is on the loin area. They have a long thick winter fleece, which extends into a mane along the lower and upper ridges of the neck and a prominent tuft of hair on the forehead. The fleece is generally light brown to very dark brown. White fleeced camel are very rare. They are bred for wool, milk, work and meat. Camel fleece has got very good insulating properties like goat Pashmina. The annual yield is about 2 to 2.5 kg of fine wool. Its milk yield varies ñom 150 to 300 kg per lactation in addition to the milk suckled by calf The lactation length varies from 15 to 20 months. The fema e camel normally calves every second year and the average age of camel at disposal varies from 35 to 40 years. They are considered as excellent pack animals of cold arid regions like yaks.

2.8 Poultry and pigs

In Iadakh, poultry rearing is undertaken in the Kargil District on a limited scale. The 27 thousand poultry birds which make up less than 1 per cent of the poultry population of J&K state. In the I.eh district a few small units of exotic layers as well as broiler poultry were started but birds could not flourish due to excessive cold. The Field Research Laboratory, Leh, has developed improved housing and management practices to raise poultry in the sulb-zero temperatures of Ladakh. Pig rearing is not popular in this region as it is in other parts of Jammu and Kashmir.

TABLE I:
Livestock census of Jammu & Kashmir State (1988-1989)

Species	Livestock population *(thousand)*		
	Leh	Kargil	% of J&K State
Yaks	7.70	8.00	73.36
Yak Hybrids	11.80	16.80	100.00
Cattle	24.00	29.10	1.92
Horses	3.90	3.30	7.00
Donkeys	6.54	5.91	72.00
Goats	108.90	95.40	14.60
Sheep	56.80	159.90	9.40
Camels	0.0054*	0.290	3.00
Poultry	9.00	18.00	1.00
Pigs	-	0.08	3.00

**Bacterin Camel*

3.0 CONCLUSION

Hypoxia and persistent low ambient temperature are the main stresses for man and livestock in Iadakh. The vegetation and grazing resources are very sparse in this arctic desert. Due to very limited agriculture, the cultivation is restcicted to few months in a small area. The major livelihood of the Ladakhi people comes largely from animal husbandry. Yaks provide milk, meat and fibre besides their utility as excellent pack and transport animals in snow-bound high altitade mountains. Goats yield milk, meat and valuable pachmina. Horses, ponies and donkeys are extensively used for riding as well as transportation. From the survey on which this study is based, it becomes evident that Iadakh's livestock breeds are by and large similar to those found in Tibet. Tibet and Ladakh region have been traditionally linked due to their geographica proximity, trade, social and cultural traditions. The agricultural and animal husbandry practices in both the regions have been identical. Due to high altitudes and isolation from other parts of the world, local animals are exposed to few ailments. The most common diseases of all the livestock are respiratory and circulatory types. Although some veterinary aid in the form of mass vaccination against common diseases is routinely provided by the state Animal Husbandry Department, due to difñcult topography the veterinary services are very limited. Animals brought to the region for improvement of local livestock however suffer with high altitude sickness and require better feeding and management. Comprehensive surveys to evaluate the animal genetic resources, feed and fodder resources and management practices are warranted before development programmes are launched.

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SIRI: THE CATTLE OF EASTERN HIMALAYAS

M.S. Tantia, P.K. Vij, RK. Vijh, P. Kumar, B.K. Joshi, A.E. Nivsarkar and R Sahai

National Bureau of Animal Genetic Resources, P.O. Box No.129
Karnal I 32 001, **Haryana**, INDIA

SUMMARY

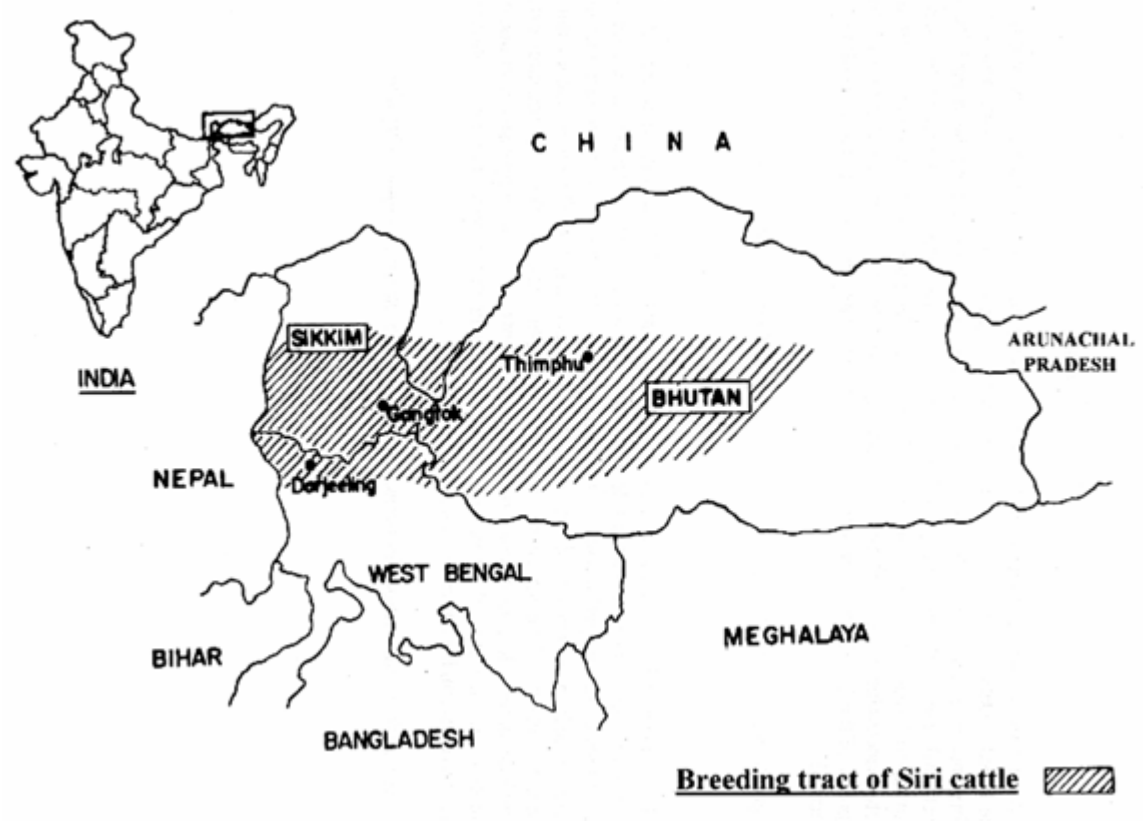
A pilot survey was conducted in the western d.istrict of Sikkim to monitor the status of the Siri cattle breed. Data was recorded on certain morphological characters, management practices and performance of Siri animals. Measurements were recorded of body length, heart girth, body height, paunch girth, hip width, pin width, face length, face width, ear length and horns on 89 animals of age groups up to 1 year,1 to 3 years and adult. It was noted that pure Siri animals were reared only in the remote inaccessible areas. Extensive crossbreeding with Jersey semen/bulls is progressively eroding the purity of the breed. Measures to conserve the Siri cattle breed in its native ecology have been advocated.

Key words: India, Breed Conservation, Morphological Characteristics, Survey

RESUME

Une enquéte pilote a été menée dans le district oriental de Sikkim pour contróler 1'état actuel de la race bovine Siri. On a recueilli des données sur certains caractéres morphologiques, sur les formes de conduites et sur les performmances des animaux Siri. On a enregistré différentes mesures sur 89 animaux séparés en groupes de plus d'un an, de 1 á 3 ans et adultes. On a noté que les animaux pure de race Siri étaient élevé seulement dans les zones plus inaccessibles. L'utilisation extensive de semence de taureau de la race Jersey pour des croisements provoque progressivement une érosion de la pureté de la race Siri. II est nécessaire de promouvoir des mesures portant á conserver la race bovine Siri dans son habitat écologique.

Mots clés: Inde, Conservation des races, Caractéristiques morphologiques, Enquéte


C H I N A
INDIA
SIKKIM
Thimphu
BHUTAN
Gangtok
Darjeeling
NEPAL
ARUNACHAL PRADESH
WEST BENGAL
MEGHALAYA
BIHAR
BANGLADESH
Breeding tract of Siri cattle

1.0 INTRODUCTION

Siri is a prominent breed of cattle in Sikkim, the upper reaches of the Darjeeling district in West Bengal and Bhutan. The breed tract lies between 4 000 to 10 000 feet above MSL. The Siri breeding tract has steep hills with narrow valleys. Terrace type cultivation is practised. Rice, maize, ginger, soybeans, millets are major crops. The agriculture is rainfed and suffers from water scarcity. Livestock provide organic manure as the acidic nature of the soil limits the use of inorganic fertilisers. It was noted that the population of this breed has been declining over the last few years due to extensive crossbreeding with Jersey semen.

Information on production and reproduction of Siri cattle is not available. A study was therefore undertaken to record production attributes of this breed in its natural ecology. Morphological, biometrical and production characters of the breed under the prevalent managemental practices have been described. Steps for their conservation have been advocated to save this unique breed from extinction.

Morphological and biometric characters of 89 animals were recorded during a field survey in Sikkim Managemental practices and the performance of Súri animals were recorded by interviewing the cattle owners. The animals were divided into three groups up to one year, one to three years and adult anima s for this study.

2.0 PRESENT STATUS

The livestock breeding plans on the Siri breed are formulated and implemented by the Sikkim Animal Husbandry Department. However owing to inadequate implementation of the breeding plans, genetic dilution of this breed has taken place. Introduction of crossbreeding with Jersey has fiurther reduced the numbers of pure-bred animals. Cattle in Sikkim are either Siri, Siri type, nondescript and crossbred. Despite an increase in the overall population (6.28%) between 1982 and 1988, the population of Siri has not registered comparable increase (table 1). The population rise was due to the increase in the number of crossbreeds (30.98%) in this period.

TABLE I:
Cattle population of Sikkim

Year	Indigenous	Crossbred	TOTAL
1982	140036	32512	172546
1988	140399	42986	183385
1995*	140824	58522	196821

**Projected figure*

Crossbreeds constituted almost 19% of the total population in 1982 which increased to 23.4% in 1988 and 29.7% in 1995. This was due to emphasis on the crossbreeding of Siri cattle with Jersey. The population trend was also confirmed during the survey as Siri animals were confined in the remote and inaccessible areas of Sikkim. Very few Siri breeding bulls were available even in the remote villages which would affect the development of the breed. 'The ongoing development programmes of the Sikkim Government would connect interior areas by road which would fiuther affect the status of the Siri population. The crossbred cows have higher milk production and lower age at first calving as compared to Siri cattle.

3.0 MORPHOLOGICAL CHARACTERISTICS

Siri animals are small, well built and docile. The colour is either black with white patches or brown with white patches. Completely brown or black animals are also not uncommon. Owing to black and white colour pattern native Siri are often mistaken for Holstein from a distance. The shining coat gives a sillcish or glistening appearance. The head is comparatively long, convex and wedge-shaped. The forehead has distinct white patches. The poll is very prominent with a tuft of hair. The muzzle is well developed and black in colour. Eyes are prominent and bright with black eyelids. Ears are of medium length and horizontal in orientation. Horns are of medium size curving outward, forward, upward and then inwards in some cases. The horn tips are sharp and pointed. The dewlap is small to medium Som (1958) described Siri as a humpless breed. Examination of the Siri female revealed a small hump whereas males have a medium sized hump. The naval flap is almost absent. Sheath is tight and of small size in males. The udder is usually small, bowl shaped and firmly attached. Teats are cylindrical and centrally placed with rounded tips.

4.0 MANAGEMENT PRACTICES

Siri herds are let out for grazing in the forests or in fields. Leaves of forest trees such as Kairalo *(Bauhima variegata* Linn.), Chuletro *(Brassaiopsis mitis)*, Chain *(Ficus curia* Ham), Kutmiro *(Laze polyantha* Jess) and crop residues of ginger leaves, paddy straw etc. are also fed to the animals. These fodder tree leaves have 10-13% CP with nearly 50-55 percent digestibility (Balaraman and Golly, I 991). In cows with higher milk yield cultivated fodders like Napper and Guatemala grasses and maize are fed. However, concentrate feeding is uncommon.

Animals are kept in small and open houses having low roofs of galvanised iron. The animal shelter lacks drainage facilities and have kucha floor with very poor sanitation. Provision for drinking water is seldom made and the animals drink water from the natural sources during grazing. Natural mating is practised for breeding pure Siri animals. Artificial insemination is practised for crossbreeding with Jersey semen.

5.0 BODY MEASUREMENTS

Various body measurements in different age groups of Siri cattle are presented in table 2. The average body length, height and heart girth were 129.44,12336 and 153.04 cm respectively in adult males and 124.85, 118.62 and 147.88 cm respectively in adult females. These measurements are within the range reported by Joshi and Phillips (1953). Average length and width of face were 41.72 and 36.16 cm respectively in adult males and 42.74 and 32.76 cm respectively in adult females. Adult males have comparatively thicker horns at base as compared to that of adult females (15.18 cm vs. 13.71 cm).

Figure 22
Siri cattle in natural habitat

Figure 23
A typical housing of Siri

Figure 24
Siri - adult female

Figure 25
Siri calf

TABLE 2:
Body measuremehts (cm) of Siri animals

	Female			Male		
	upto 1 year (7)	1-3 year year (11)	upto 3 year (34)	upto 1 year (1)	1-3 year (11)	upto 3 year (25)
Body length	87.71	106.27	124.85	85.00	124.54	129.44
Heart girth	103.86	132.00	147.88	121.00	146.54	152.20
Paunch girth	102.86	134.00	153.88	124.00	147.71	153.04
Hip width	19.86	28.91	34.65	21.00	30.75	32.44
Pin width	11.14	14.27	17.09	11.00	15.79	16.64
Face length	29.86	37.91	42.74	31.00	41.18	41.72
Face width	33.57	34.09	32.76	34.00	33.50	36.16
Height	89.00	108.82	118.62	88.00	120.36	123.36
Ear length	17.43	19.64	20.26	12.00	20.07	20.16
Horn length	11.00	12.10	19.03	11.00	14.90	19.86
Horn circ.	13.00	11.70	13.71	7.00	14.20	15.18

6.0 PERFORMANCE TRAITS

Performance of Siri cattle is not recorded under field condition. Performance data was generated by interviewing the owners of the animals. Age at first calving ranges between 48 and 56 months. Cows yield about 3-4 kg per day in a lactation of 7 to 9 months. Calving interval ranges between 14 to 16 months. Joshi and Phillips (1953) reported Siri as a late maturing breed with age at first calving of 5-5[1]/ years and an average calving interval between 18 to 20 months. The fat percentage varied from 6-l0[a]/o (Joshi and Phillips,1953).

7.0 CONCLUSIONS

Siri animals are an integral part of the agricultural economy of Sikkim A planned breeding programme should be adopted together with proper feeding, housing and management practices for exploiting production potential and draught power. The State government should ensure the availability of superior Siri breeding bulls in its breeding tract and restrict Jersey crossbreeding to the non descript animals in the urban areas. For sustainable utilisation of this breed measures for conservation are needed.

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CABALLO GALLEGO DE MONTE (PONEY GALLEGO)

I. Sánchez García, A. Iglesias, A. Fernández y J. L. Viana

Departamento de Anatomía y Producción Anima.l. Facultad de Veterinaria.
Universidad de Santiago de Compostela, 27002 **Lugo**, SPAIN

RESUMEN

Se describe el origen, antecedentes históricos y situación censal del poney gallego, así como los sistemas de explotación en libertad. Se realiza una descripción de sus características etnológicas, parámetros biométricos y estructura genética, además de las características productivas y planes de conservación.

Palabras clave: España, Caracteristicas morfológicas, Estructura genética

SUMMARY

Origin, history, census and farming system of Galician pony are descn'bed. Ethnological characteristics, biometrical parameters and genetic structure, in addition to productive characters and protection-conservation programs are also reported.

Key words: Spain, Morphologiccal characteristics, Genetic structure

1.0 INTRODUCCION

El caballo de monte (poney explotado en libertad), población ganadera destinada a cumplir un transcendente papel como controlador de la invasión excesiva de la cubierta vegetal, dedicado a la producción de carne y con un fondo de tradición y cultura ("rapa das bestas"), se encuentra en la actualidad dentro de un Programa de Conservación, Fomento y Mejora establecido por la Xunta de Galicia. Hasta el momento, se han catalogado las zonas de ubicación y realizado una caracterización etnológica de cuatro topotipos en base a comarcas geográficas naturales (Sánchez García et al., 1989).

La justificación de este trabajo es la de facilitar toda la información sobre la situación de esta raza, las características etnológicas, genéticas y productivas, así como los planes y programas de conservación.

2.0 ORIGEN, ANTECEDENTES HISTORICOS Y SITUACION ACTUAL

La presencia de los caballos en los montes de Galicia (España) data de tiempo inmemorial, existiendo pnuebas documentales de la Edad de Bronce (2500 a.C.) que así lo acreditan, como son los petroglifos de Viladesuso (zona de A Groba-Pontevedra), que representan caballos arrastrando carros, o el complejo escultórico rupestre de los cinco caballos de Campo I,ameiro (Pontevedra).

Sin embargo, la formación del poney gallego hay que retenerla como posterior, teniendo su origen en el *Equus gmelini* (agriotipo del E. *tarpan)* e influyendo sobre él los dos tipos de poneys primitivos: el del noroeste de Europa e islas adyacentes y el del norte de Europa y Asia. E1 primero es un animal de frente ancha, amplios ollares, orejas pequeñas, perfil recto, gnupa fiuerte y cola muy poblada. E1 segundo es más voluminoso y pesado, con cabeza tosca, orejas largas, gnupa mclinada y crines erectas.

La variante prehistórica así conformada después de la llegada del pueblo celta a Galicia (siglo VI a.C.), viene a configurar una población equina compuesta por caballos elipométricos de suave paso de andadura, muy corredores y que se desarrollaban en libertad en los montes; son los équidos que se encuentran los romanos al conquistar Galicia 138 años a.C., que llamaban asturcones y celdones y sobre los que poco o nada ejercieron su afición a la cria y explotación del caballo. Contrasta esta actitud con las abundantes referencias a los caballos salvajes por parte de los cronistas de esta época histórica, como Estrabón, Plinio o Columela.

La invasión bárbara tampoco tuvo una influencia importante sobre la cabaña equina del noroeste penínsular, pues aun cuando hay quien otorga a los suevos la i$_{m}$portación de un tipo caballar elipométrico, la investigación histórica no ha podido demostrar que tuviera una influencia en los caracteres etnológicos de los poneys que ya existían en Galicia.

La dominaciòn árabe en España, que tanta importancia tuvo en el fomento y mejora de la población equina en general, apenas dejó notar su influencia en Galicia, con lo que una vez más, las poblaciones autóctonas gallegas de ganado caballar mantuvieron su situación. No obstante, en la Edad Med.ia y épocas posteriores pudo existir influencia de otras razas caballares sobre estas poblaciones de la zona montañosa, ya que eran accesibles a pesar de su aislamiento. Sin embargo, resultó evidente la poca atención a los caballos de Galicia criados en libertad, como

indica el hecho de que en el conjunto de las medidas y disposiciones dictadas para la defensa de la ganadería caballar no hay una sola referencia a este tipo de explotación. Aún así habría que poner de manifiesto la vinculación que existió entre la explotación de caballos en libertad e instituciones de la Iglesia, como los monasterios (Oia, Melón, etc.)

A principos de siglo, el caballo en el Estado Español sigue manteniendo su importancia como animal traccionador y como cabalgadura, pero comienza la verdadera etapa de utilización de este aninual como res de abasto ante una creciente demanda del consumo de carne equina.

Estos cambios y esta evolución, llevaron a un número considerable de propietarios de las provincias de Lugo y La Coruña a la utilización del cruzamiento con reproductores de razas más especializadas en la producción cárnica, fundamentalmente el Bretón y Posteir Bretón, con el fin de incrementar el peso del potro comercializable y, como consecuencia, su valor económico.

Esta circunstancia tuvo grandes repercusiones en la estabilidad racial de la población autóctona del poney gallego, por significar una agresión indiscriminada a un recurso genético (Iglesia,1973).

En la actualidad, el poney gallego criado en libertad queda relegado a áreas muy concretas donde aprovecha una vegetación fibrosa y poco nutritiva, jugando un papel ecológico muy importante dentro del ecosistema.

Según el Censo General Ganadero de Marzo de 1986 (información estadística má.s reciente que existe), Galicia es la comunidad autónoma española que más caballos tiene con 41492, que representa el 16,7% del censo total del ganado caballar estatal.

Galicia en el año 1986 contaba con 20 364 yeguas de vientre que suponen el 18,9º/a de las yeguas de vientre nacionales. Tiene un porcentaje de yeguas superior al que correspondería de acuerdo con su población caballar. Por otro lado, el número de animales menores de un año es de 7 304 cabezas que representan el 17,9% del total de potros españoles. Se deduce de los datos anteriores que la Comunidad Gallega es una zona importante de cria de ganado caballar que dispone de una población vegetativa muy alta.

Un dato que llama la atención es el pequeño porcentaje de caballos sementales, 660 ejemplares que significan el 12% del total nacional; se piensa que existen más pero están incontrolados en el monte, no interesando a sus propietarios que se conozca su existencia.

3.0 SISTEMAS DE EXPLOTACION DEL CABALLO EN GALICIA

La cría de caballos de monte o bravos en libertad es tradicional en ciertas zonas de Galicia, concretándose los principales núcleos en zonas de amplia sierra y monte con abundante vegetación arbustiva.

Estas zonas se caracterizan por situarse entre el nivel del mar y los mil metros de altitud (la mayor parte entre 300 y 800 m). Están ausentes de ganado caballar las montañas más altas de Lugo (Os Ancares, O Cebreúro y Caurel), así como las de Orense (Sierras de San Mamede, Queixa y Eixe), lo que nos indica que el caballo rehuye de zonas de invierno riguroso, situándose en aquellas zonas de clima más benigno.

CUADRO I:
Censo de ganado caballar (marzo 1986)

	Animales menores de 36 meses		Animales mayores de 36 meses			Total
	< 12 meses	12-36 meses	Sementales	Hembras de vientre	No reproductor	
Coruña	2320	2313	168	6372	1093	12266
Lugo	2444	1855	262	5719	2974	13254
Orense	304	436	48	887	905	2580
Pontevedra	2236	2485	182	7386	1103	13392
Galicia	7304	7089	660	20364	6075	41492
España	40741	40718	5442	107603	53374	247878

Fuente: Anuario de Estadística Agraria (1992)

En las zonas tradicionales, los montes tienen predominio de las "toxeiras" (Ulex), pudiéndose observar una gran cantidad de especies herbáceas y arbustivas distintas según la época del año y la zona geográfica. Así, la zona norte de Galicia, que abarca As Pontes, Ortigueira, Muras, Ourol, donde los montes tienen un componente muy importante de pasto natural y tojo y, en general, son tierras de buena calidad, son diferentes de las zonas oeste y centro-sur de Pontevedra (Oia; A Guarda, Forcarei) donde tienen montes de peor calidad, con abundancia de "carpanzas" (Calluna) e incluso "carqueixas" (Erica).

El sistema de explotación consiste, en general, en la utilización de grandes superficies, hasta 6 000 ha con yeguas de distintos propietarios que tienen derecho al uso del monte y que agrupan anualmente su ganado en cercados ("curros"), donde les cortan las crines, se marcan las crías, y se retiran los potros nacidos el año anterior para venderlos.

En este sistema no existe ningún control de la alimentación. El caballo se alimenta de lo que proporciona el monte en cada momento y en épocas de penuria pasa hambre, lo que va a repercutir en su fertilidad.

El potro nace con 30-40 kg de peso en la época del año en la que hay mayor disponibilidad de alimentación (abril-mayo) y se vende al año de edad con un rendimiento de canal bajo debido a la mala conformación y a la mala alimentación, muy fibrosa, que le hace desarrollar un gran vientre.

La venta se hace a carniceros (expendedores detallistas), por medio de tratantes (intermediarios) y parte también sale fiuera de Galicia. Los precios en principio son bajos debido a la poca importancia que el "besteiro" (propietario-cuidador), le da a un producto que, en principio, no le cuesta nada producir.

En la zona norte de la Comunidad Autónoma las yeguas oscilan entre 300-400 kg de peso vivo y la calidad del monte con abundancia de "toxo" (Ulex) y pasto natural admite la presencia de machos mejorantes. Los potros de un año llegan con facilidad a los 100 kg/canal.

Sin embargo, en la zona oeste, desde Pontevedra hasta A Garda, las yeguas pácticamente no pasan de los 250-300 kg siendo un ganado totalmente adaptado al medio en el que se desenvuelven.

Los intentos de introducir machos mejorantes fracasaron, ya que las crías no se adaptaron al sistema de alimentación.

Entre los inconvenientes existe el problema de la fertilidad, como consecuencia de la alimentación que reciben, ya que la yegua necesita casi un año para recuperarse y que generalmente no pasa del 50%, siendo normal en la zona oeste de Galicia que no llegue al 23%. Los "besteiros" consideran normal un parto de yegua cada dos años.

4.0 CARACTERISTICAS ETNOLOGICAS

El poney gallego es elipométrico (225-340 kg), de perfil recto y proporciones longilíneas. La cabeza es siempre grande, pesada y generalmente alargada, su longitud supera siempre un tercio de la alzada. La frente plana no muy ancha y con abundante tupé, con órbitas mal delimitadas y salientes, ojos pequeños, orejas cortas, móviles y velludas. Tiene los labios muy desarrollados, firmes y duros, frecuentemente con un gran bigote en el superior, y el hocico es pequeño con ollares no muy anchos.

El cuello es corto, recto y piramidal, plano y descarnado y se inserta de forma desarmónica en la espalda. Lo puebla una abundante crinera, con pelos largos y bastos.

De cruz destacada y región dorsolumbar arqueada por el peso del vientre, posee lomos estrechos y despegados de la grupa.

E1 torax es muy aplanado, con los costillares poco arqueados, tiene un pecho estrecho y hundido y espaldas deprimidas. Su vientre es voluminoso (vientre de vaca) a consecuencia de una alimentación excesivamente ñbrosa.

Tiene la grupa derribada, ligeramente oblícua, con muslo y nalga de escaso desarrollo muscular. Las extremidades anteriores son cortas, de regulares aplomos, con cierta tendencia general al izquierdo y a los animales un poco plantados hacia adelante. Espalda corta y poco oblícua. En las extremidades posteriores son estrechos de corvejones y algo zancajosos. Poseen cañas delgadas recubiertas de una piel fina y tersa.

La piel es gruesa y adherida al tejido celular subcutáneo, con un pelaje abundante que varía con las estaciones. Poseen cernejas pobladas. El bigote constituye un carácter racial muy significativo y está preseñte en el labio superior de un buen número de poneys gallegos. Arrancan estos penachos del surco medio del labio superior que crecen con el paso de los años alcanzando las longitudes máximas en los adultos y animales viejos.

El casco es de volumen pequeño y poseen un estuche córneo excelente con la tapa compacta, poco lustrosa sin ceños ni resquebrajamientos.

Posee espejuelos en ambas extremidades, pese a la consideración de muchos autores que entienden que la ausencia de espejuelo en las extremidades posteriores es un carácter étnico de los poneys actuales derivado de los caballos celtas.

La capa característica del poney gallego es la castaña, que alterna con otras menos numerosas, alazanas, negras y tordas. Son frecuentes las manchas blancas en la cabeza (estrellas y luceros) y en la parte inferior de las extremidades (calzados).

La caracterización etnológica por topotipos se ha realizado atendiendo a comarcas naturales donde habita el poney gallego y en base a la topografia, población, habitat y uso del suelo (Sánchez García et al.,1989). Después de estas investigaciones (cuadro 2), los resultados indican la presencia de, al menos, tres topotipos de poneys gallegos (figura 1), adaptados a sus diferentes entornos geográficos:

1. Los poneys de la zona Norte habitan esta área de las provincias de La Coruña y Lugo. Su perfil es recto y la cabeza algo más corta, aunque sigue siendo desproporcionada con respecto al cuerpo. Son animales más anchos, con mayor diámetro transversal y alzada más elevada. En general, da la impresión de que son animales más compactos que los de otros topotipos. La capa predominante es la castaña pero con cierta abundancia de alazanes y escasos tordos.

2. Los poneys de la región Central conservan igualmente el perfil recto. Su tamaño y conformación son intermedios entre los otros dos topotipos. Son animales de mejor porte y más alargados. La cabeza es larga y en cuanto a la capa aunque sigue siendo mayoritario el castaño se observan también muchos tordos, alazanes y algunos negros.

3. Los poneys del Suroeste son los ultramenores de toda la población caballar de Galicia. La desproporción de su cabeza con el cuerpo es marcada. El costillar es muy aplanado, las regiones del brazo, antebrazo y caña son finúsimas y desproporcionadas con el volumen que tiene la masa abdominal. La región de la grupa es caida, muy inclinada y descarnada.

] cuente.

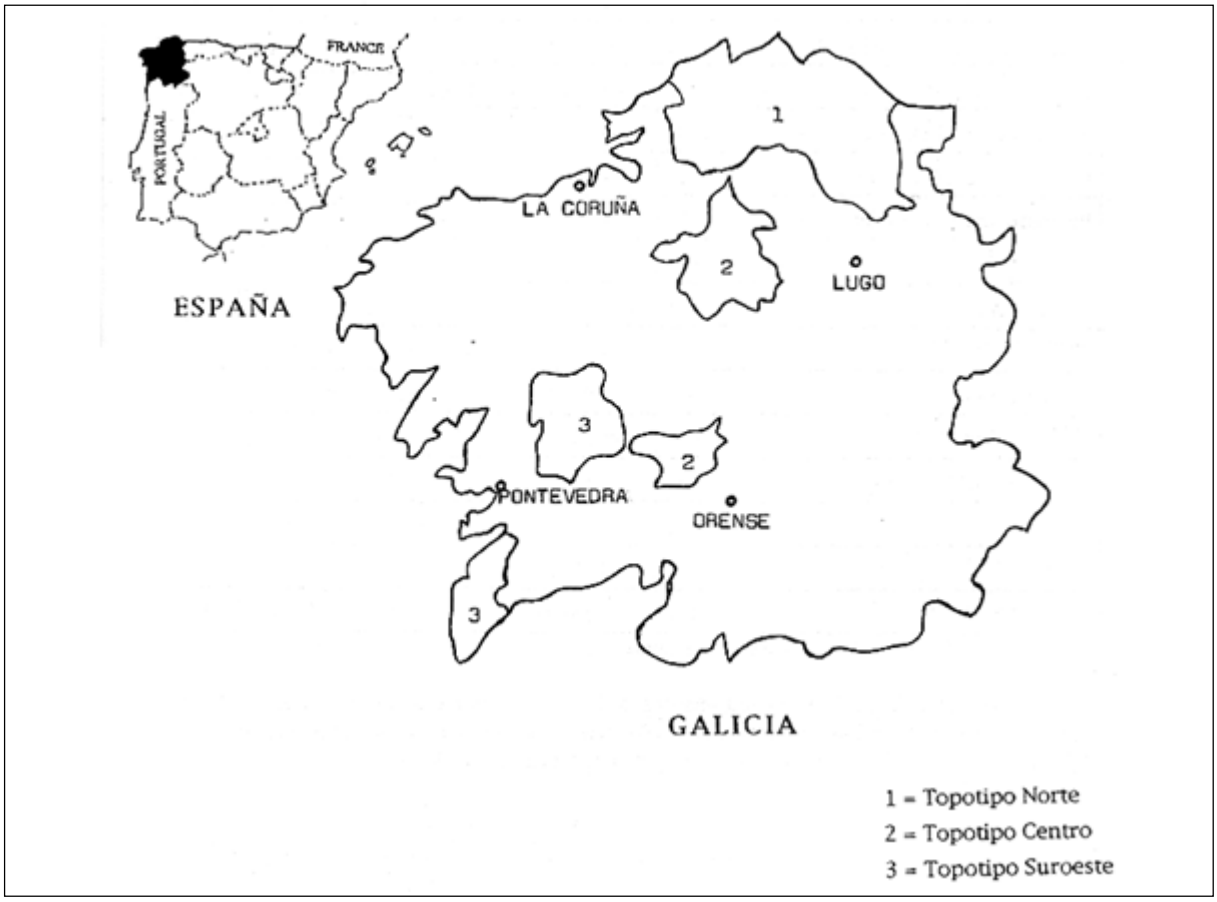

Figure 26
Distribución geográfica de los diferentes topotipos de Poney Gallego

Está considerada la variedad más pura y filogenéticamente más próxima al agriotipo. Quizás por ello y por la poca interacción que tienen con el hombre es la variedad más indómita y nerviosa (Iglesia,1973; Sánchez García et al.,1989).

CUADRO 2:

Caracteristicas etnológicas estudiadas en 202 poneys gallegos, procedentes de cuatro zonas geográficas naturales gallegas (m±DT)

VARIABLES	ZONA 1 (n=26)	ZONA 2 (n=57)	ZONA 3 (n=42)	ZONA 4 (n=77)	F
Alzada a la cruz (ACr)(cm)	130,24±7,71	128,75±6,60	125,93±8,40	130,94±10,40	3,25+
Profundidad de pecho (AP)(cm)	70,00±4,32	64,70±5,45	67,39±4,48	63,57±7,68	8,87++
Anchura pecho (AcP)(cm)	43,81±1,78	41,39±4,05	41,98±2,32	41,68±3,86	3,18+
Anchura ilíaca (AcI)(cm)	55,39±2,87	51,22±5,49	54,16±2,32	47,05±8,93	17,07++
Anchura cabeza (AcC)(cm)	21,48±2,62	20,66±2,11	21,95±2,58	21,99±3,35	2,84+
Longitud corporal (LEI)(cm)	148,84±7,15	143,85±7,54	144,01±8,50	138,52±14,24	7,10++
Longitud grupa (LG)(cm)	47,02±3,36	45,11±3,33	45,02±3,41	44,16±5,61	3,79+
Longitud cabeza (LC)(cm)	52,51±4,27	52,14±3,85	51,74±4,04	53,67±4,79	2,24
Perímetro torácico (PT)(cm)	163,99±9,87	164,03±8,35	159,04±12,21	153,02±19,02	7,99++
Peso vivo (Pv)(cm)	348,04±64,81	347,58±54,93	318,02±79,38	289,79±94,58	7,31++
Indice corporal (IC)	90,91±4,05	87,75±3,19	90,69±2,95	90,80±4,06	9,64++
Indice torácico (IT)	62,75±3,69	64,19±3,53	62,43±3,41	66,22±7,76	4,16++
Indice pelviano (IP)	118,1±6,9	111,39±12,42	120,30±8,06	105,97±11,31	20,91++
Indice cefálico (ICf)	40,88±3,44	39,63±2,81	42,42±3,45	40,78±3,57	5,71++
Indice compacidad (ICm)	12,00±2,69	12,52±2,69	13,11±3,51	9,69±2,34	19,04++
Perfil (Per)	1,27±0,45	1,39±0,94	1,26±0,45	0,75±0,73	15,51++
Tamaño (Tam)	1,15±0,54	1,07±0,37	1,05±0,31	0,61±0,57	16,30++
Proporciones (Prp)	1,31±0,68	1,86±0,91	1,36±0,52	0,78±0,82	22,16++

+P<0,05; ++ p<0,01; m: media; DT:desviación típica

En lo que se refiere a la estructura genética de esta población racial, las investigaciones se han realizado a partir de polimorñsmos bioquímicos determinados mediante técnicas electroforéticas (Iglesias et al.,1995) y con el análisis de nueve sistemas genéticos (cuadro 3).

CUADRO 3:
Fenotipos, frecuencias fenoli'picas y génicas y x2 de adecuación al equilibrio genético, en seis sistemas genéticos del poney gallego (n = I04)

Sistema genético	Fenotipos	Frecuencias fenotipicas	Frecuencias génicas	X^2 equiiibrio
Hb	A	0.865	Hb^A = 0.933	
	AB	0.135	Hb^B = 0.067	0.021
	B	0.000		
Ct	S	0.990	Ct^S = 0.990	
	SF	0.000	Ct^F = 0.010	25.194 ***
	F	0.010		
Ch	A	0.913	Ch^A = 0.957	
	AB	0.087	Ch^B = 0.043	0.492
	B	0.000		
AmI	A	0.721	AmI^A = 0.837	
	AB	0.231	AbI^B = 0.163	1.659
	B	0.048		
A1	S	0.942	$A1^S$ = 0.010	
	SF	0.058	$A1^F$ = 0.990	27.604 ***
	F	0.000		
TF	D	0.500	Tf^D = 0.683	
	DF	0.356		
	DH	0.010	TF^F = 0.312	84.854 ***
	F	0.134		
	FH	0.000	Tf^H = 0.005	
	H	0.000		

*** p < 0,001*

Asimismo, Vallejo et al. (1993) evidencian el polimorfismo del potasio eritrocitario (Ke) poniendo de manifiesto la presencia de animales de dos tipos, bajos potasios (LK) y altos potasios (HK) (cuadro 4).

CUADRO 4:
Distribución del Ke (mEq/l) en el poney gallego

Ke	N	m	DT	ET	CV	CT	SG	W	Pr<W
Hk	14	32,04	5,65	1,51	17,63	1,23	0,34	0,923	0,239
Lk	79	15,73	3,01	0,34	19,15	1,55	-0,31	0,960	0,052

m: media; DT: Desviación típica; ET: Enor de la media; CV: Coeficiente de variación; CT:Curtosis; SG: Sesgo; W: Prueba de normalidad

El cálculo del grado de heterocigosis por locus y heterocigosidad mediá racial (Iglesias et al.,1995) queda expuesto en el cuadro 5.

CUADRO 5:
Grado de heterocigosis por locus (h) y heterocigosis media racial (H), en el poney gallego

Sistemas geneticos (loci)	Heterocigosis/locus (h)	Heterocigosis media (H)
Hemoglobina (Hb)	0,125	
Catalasa (Ct)	0,020	
Colinesterasa (Ch)	0,082	0,165
Amilasa (AmI)	0,273	
Albúmina (A1)	0,020	
Transferrina (TF)	0,436	

El estudio de los perfiles orgánicos (Santamarina, 1993), ha permitido establecer los parámetros hemáticos y séricos (cuadro 6), poniéndose de maniñesto la marcada eosinofilia (parasitosis), particular metabolismo lipídico (talla baja) y disminución de oligoelementos (alimentación).

Figure 27
Poney gallego

CUADRO 6:
Parámetros hemáticos y séricos del poney gallego (Santamarina,1993)

Hematocrito:	39,46±0,51%	Monocitos:	3,02±0,10%
Hemoglobina:	13,56±0,09 g/dl	Basófilos:	1,08±0,06%
Glób. Rojos:	8,89±0,09.10^6/mm^3	Eosinófilos:	6,36±0,17%
VCM:	46,43±0,42 fl	Neutr. Banda:	10,01±0,29%
HCM:	15,86±0,13 pg	Neutr. Segm.:	35,97±0,43%
CHCM:	34,48±0,14 g/dl	Linfocitos:	43,57±0,49%
Glób. Blancos:	15,16±0,1810^3/mm^3	Neutr/Linf :	1,25±0,04
Glucosa:	74,82±084 mg/dl	Gammaglob.:	16,68±0,27 g/1
Lípidos Tot.:	337,9±4,00 mg/dl	Alb./Glob.:	0,43±0,01
Triglicéridos:	74,24±1,32 mg/dl	Urea:	39,44±0,43 mg/dl
Colesterol:	144,02±2,57 mg/dl	Creatinina:	0,99±0,01 mg/dl
Prot. Tot.:	84,74±0,48 g/l	Bilirr.Tot.:	1,57±0,02 mg/dl
Albúmina:	44,55±0,25 g/l	Bilirr. Dir.:	0,42±0,06 mg/dl
Globulinas:	60,18±0,45 g/l	Bilirr. Ind.:	1,15±0,02 mg/dl
Alfa1glob.:	4,84±0,18 g/l	ASAT:	188,67±1,74 UI/1
Alfa2glob.:	13,33±0,20 g/l	ALAT:	11,10±0,16 UI/1
Beta1glob.:	13,31±0,25 g/1	SAP:	209,3±3,23 UI/1
Beta2glob.:	13,03±0,33 g/1	GGT:	12,40±0,23 UI/1
Ca:	10,92±0,007 mg/dl	Cu:	1,44±0,02 mg/ml
P:	4,59±0,05 mg/dl	Zn:	1,20±0,02 mg/ml
Mg:	2,03±0,02 mg/dl	Se:	25,72±0,23 ng/ml
Na:	13 8,42±0,19 mEq/1	Mo:	30,13±0,19 ng/ml
K	5,04±0,03 mEq/1	Fe:	1,23±0,23 mg/ml

5.0 CARACTERISTICAS PRODUCTIVAS

Tradicionalmente, el principal uso del caballo fuze como elemento de trabajo, siendo la carne un subproducto de baja calidad que provenía de aquellos animales que eran sacrificados al final de su vida útil. El sector equino de carne sufrió una profunda crisis por el empleo de animales viejos y desnutridos que desprestigiaron este tipo de carne. En la actualidad, se está revalorizando al ofrecer al consumo canales de animales jóvenes, de muy buenas características de calidad.

Analizando la producción de carne de equino en Galicia, se aprecia un descenso hasta el año 1988 con recuperación progresiva en los últimos años. En el año 1991 la producción fue de 242 toneladas (t) con un incremento del 19,8% sobre el año 1990. La producción en España en el año 1991 era de 7 580 t con un aumento del 6,4% respecto al año anterior. La contribución gallega al total estatal en este año 1991 representó el 13,19%.

Llama la atención las diferencias en porcentajes Galicia/España en lo referente a la producción de carne de equino (3,19%) y el censo caballar (16,7%); pues cabría esperar una mayor importancia de producción cárnica teniendo en cuenta el censo equino constituido fundamentalmente por caballos de carne.

Por otro lado el número de équidos sacrificados en el año 1989 fue de 1 994 que supone el 4,56% del total de España (por especies 1 837 corresponden a ganado caballar, 42 a mular y 115

a asnal). En este mismo año el número de cabezas de equino vendidas en Galicia para sacrificio fue de 6 075.

De los datos referidos hasta el momento se deduce un hecho preocupante: un gran número de reses equinas destinadas al sacriñcio salen vivas fuera de la Comunidad gallega para ser sacrificadas y comercializada su carne por mataderos y empresas foráneas originando un notable menoscabo en la generación de valor añadido y en el propio protagonismo cárnico de Galicia. El principal destino de los caballos es Francia (vía Bilbao) y Levante.

En el año 1992, el peso medio por canal de caballo en Galicia fue de 93,8 kg muy inferior a la media nacional de 177,7 kg. Esto se explica por la nula selección del equino autóctono a la que se añaden problemas en la alimentación, manejo y sanidad (parasitosis principalmente).

Las canales de los caballos gallegos son de poco peso (siendo las de los poneys de la Groba las de menor peso y calidad), muy angulosas con escaso desarrollo de las masas musculares del tercio posterior; la coloración es oscura por la alimentación rica en cloroñla y carotenos, así como por ejercicio continuado. Son canales muy magras casi carentes de grasa de cubierta y de riñonada pero con un gran desarrollo óseo, Sin embargo, como los caballos sacrificados son generalmente potros, la carne es blanda y tierna, de gran fineza y buena palatabilidad.

6.0 PLAN DE CONSERVACION, MEJORA Y FOMENTO DEL CABALLO DE MONTE

Teniendo en cuenta que Galicia es una de las Comunidades, como se ha comentado, que destaca por el número de cabezas de ganado equino, y además está muy sensibilizada por los problemas de conservación de los recursos genéticos animales, como lo ha demostrado con los planes de conservación de las razas bovinas Morenas Gallegas, a la vista de la degradación censal y étnica de la especie ganadera equina ha elaborado un "Plan de Conservación, Mejora y Fomento de Ganado Equino de Galicia", que pretende solucionar los problemas existentes en esta ganaderia, potenciando la cría caballar de esta Comunidad, y proyectando para su futuro unas posibilidades que puedan ser alternativas a otras producciones ganaderas (Xunta de Galicia, 1993). '

Figure 28
Lucha de garañones

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GOAT GENETIC RESOURCES IN INDIA AND THEIR IMPROVEMENT FOR INCREASING PRODUCTIVITY

S.C. Chopra

Indian Council of Agricultural Research, Krishi Bhavan, New Delhi-110001, INDIA

SUMMARY

Goats have an important place in the Indian economy. There is a need for proper description anid evaluation of existing genetic resources and determining the need for their conservation. The paper explains the philosophy of progeny testing in goats for production of proven bucks. It contains the observations on existing selection programmes and recommendations for an improved system to provide the knowledge required to adapt record keeping and progeny testing technology to the unique Indian environment.

Key words: Progeny Test, Selection Schemes

RESUME

Les caprins occupent une place importante dans 1'économie de 1'Inde. II serait nécessaire de réaliser une description et une évaluation des ressources génétiques qui existent pour déterminer le niveau de besoin de conservation. Cet article présente la philosophie des tests sur les descendents avec les caprins pour la production de boucs améliorés. On présente les observations reprises dans différents programmes de sélection existants et les recommandations pour un systéme amélioré añn d'obtenir les connaissances nécessaires pour adapter les données recueillies et la technologie des tests sur la descendence á 1'environnement particulier de 1'Inde.

Mots clés: Test sur les *descendents, Schémas de sélection*

1.0 INTRODUCTION

Goats have an important place in the Indian economy. They are a major source of much needed protein through meat and milk. Above all, they are a source of livelihood for the millions of rural poor in the country. Considering the economic and social importance of small ruminants specially for the rural poor, there is a need for large-scale research and development investments in sheep and goats. The goat is more important both because of numbers and distribution. It is necessary to understand the major trends in goat population in the country in relation to the economy and the efforts for goat improvement through research and development programmes in the various Five Year Plans.

Goat rearing was taken up in ecological regions where, under the given ecosystem, the autotrophic organisms are limited and are at the minimum level of the homeostatic plateau. Such areas may be considered relatively fragile due to the fact that the ecosystem is at a stage where excessive exploitation of any ecofunction may take the wholé ecosystem to a non-recoverable stage. Small ruminants were introduced in these zones which were already ecologically fragile, so these herbivores were not responsible for making the ecosystem fragile. The advantage of goats is their capacity for survival even at minimum level of tolerance around the homeostatic plateau in comparison to other animals. A comparative study of goat and sheep rearing and of cattle in ecologically fragile zones indicates that within the desired grazing pressure, small ruminants are more economical and less harmful than large ruminants.

2.0 POPULATION TRENDS AND ECONOMIC CONTRIBUTION

The censusdata of the goat population indicate that there was a steady increase in the goat population during 1951-1987 from 47 million to 99.4 million. Annual growth rate between 1961 and 1982 was 2.7%. From 1982 to 1987, the goat population increased by 4.3% registering an annual growth rate of 0.87%. The highest growth rate was registered during 1977-1982 at 5.2%. During 1977-1987 the population increased by 31.48% with an annual growth rate of 3.15 per cent.

The contribution from goats to rural self employment, economics and food is substantial and has been improving over the years largely due to their increasing numbers. Of all the species offtake in goats is the highest and some reports indicate it to exceed 60^{a}/o although official figures are around 40%. The meat production from goats was around 0.521 m.t. in 1994, whereas the goat milk production was around 2.35 m.t. in 1992. The per cent increase in goat milk production has been lower than goat meat and skin production.

3.0 THE GENETIC RESOURCES

In India there are 20 well defmed breeds of goats. There is a large inter mixture among breeds in regions where two or more breeds exist. There are no breeding societies or agencies as those existing in Europe and America to register animals of a particular breed to maintain hocks and ensure the purity of a breed or type. Little systematic effort has been made to conserve, develop and improve the native breeds.

Most of the goat breeds have evolved through natural selection for adaptation to the agroecological conditions. Only to a very limited extent, has there been artificial selection based on social or economic needs of the breeders. Most of these indigenous breeds are well adapted to harsh climates, long migration, poor nutrition and scarce water resources.

Figure 29
Marwari male

Figure 30
Marwari female

Figure 31
Pashmina goat male

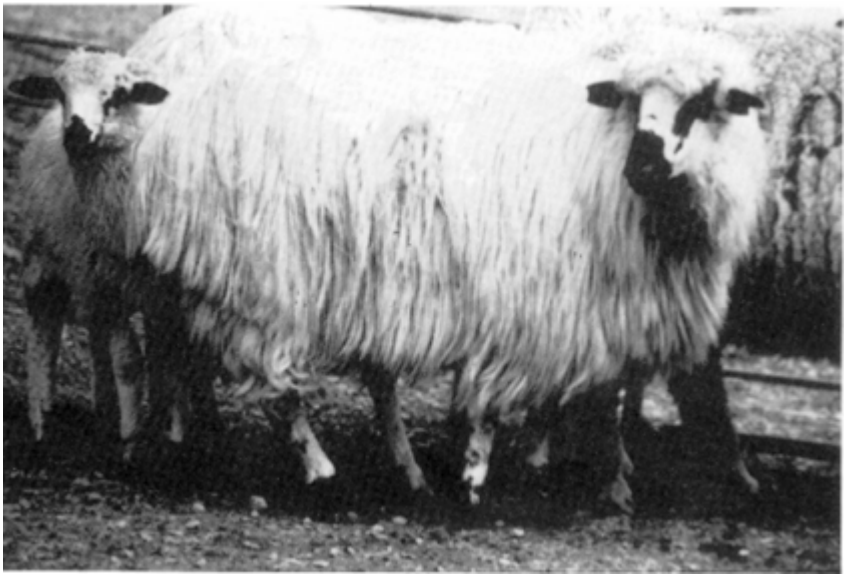

Figure 32
Pashmina goat female

On the basis of body size, goat breeds can be broadly classified as:

i. large sized e.g. Jamunapari, Beetal, Jhakrana;
ii. medium sized e.g. Sirohi, Marwari, Gohilwadi, Zalawadi, Surti, Sangamneri, Osmanabadi, Gaddi, Gangam and Chegu; and
iii. small sized e.g. Black Bengal.

Acharya (1982) described the important Indian breeds of goats primarily in terms of their home tract, population size, flock size, adult body size (body wt., length, height at withers and chest girth) and physical conformation and their performance in terms of body weights (3 and 12 months), lactation performance and reproductive performance.

Jamunapari, Beetal, Jhakrana, Barbari and Surti can be considered as dairy breeds and the rest as meat breeds. The majority of the Indian goat breeds are highly prolific especially the Bengal type. There is no special goat breed in India which produces mohair. Some breeds, especially in northern and north-western region have long body hair. `Changthangi' and `Chegu' breeds produce Pashmina of finest quality. Indian breeds of goats like Jamunapari, Barbari and Beetal have been utilised as improved breeds for milk and meat within India and in a number of South Asian countries.

Some very important breeds of goats in India needing immediate conservation measures have been identified. These breeds are Jamunapari, Barbari and Surti. It is not only the loss of genetic variability in populations of these breeds becoming extinct but also due to a decline in genetic variability within a breed due to use of a small number of selected sires that result in low effective population size and consequent random genetic drift and inbreeding. Conservation may involve (a) *in-situ* conservation involving (i) live animals with the breeders by ensuring avoidance of introduction of outside genetic material and maintenance of a sufficiently large effective population size and (ii) establishment of conservation units on organised farms or (iii) utilising the existing institutional farms maintai>ming these breeds ensuring similar considerations as in (i) above. For maintenance of genetic variability,100% of the original level, an effective population size of 500 is required, and (b) *Ex-situ in vitro* conservation involving sperms, oocytes and embryos, as the cost involved will be much smaller.

4.0 SELECTION AND BREEDING SCHEMES

Research on different aspects of goat production in India has been carried out at the Central Institute for Research on Goats (CIRG) and earlier by the Indian Council of Agricultural Research (ICAR). The ICAR had implemented projects on improvement of goats on a regional basis which allowed investigations into the aspects of productivity of the indigenous breeds of goats, possibility of their improvement through selection, grading up with superior breeds. The emphasis was primarily on improvement in milk in goats, although meat and mohair did attract some attention.

The All India Co-ordinated Research on Goats was launched in the year 1971 to augment the production of goat milk and goat ñbre (Mohair/Pashmina) in the country through cross breeding with high-yielding exotic germplasm during N Plan period. The results of the crossbreeding experiment indicated that Saanen crosses performed better than Alpine crosses in milk production, irrespective of the breed of the dam and the climatic condition of the location (semi arid/ hot-humid). Albeit the milk yield of the crosses depended upon the dairy potential of indigenous dam breeds. The crosses of Beetal had significantly higher milk yield than the crosses of Malabari.

Further, there was consistent increase in the milk production of higher crosses of large size dam breeds with the increase in exotic inheritance, while no improvement was noticed in the case of the crosses of small size breeds e.g. Malabari beyond 50 per cent level of exotic inheritance.

A new mohair breed "Synthetic Angora" has evolved by introduction of Angora genes into the native goats of the Deccan plateau. The mohair produced by "Synthetic Angora" was as good as pure-bred "Angora" in quality although the quantity of average greasy mohair yield was relatively less.

The milk and meat production of small size breeds e.g. Black Bengal, showed significant improvement by crossing with large size sire breeds viz. Jamunapari and Beetal. The BeetalBlack Bengal cross was prefened by the local tribal population of Chota Nagpur region in Bihar over the crosses of Jamunapari due to its high fecundity and black coat colour.

The breeding policy involves organisation of goat development activities with emphasis on production of quality breeding bucks for use by the farmers under the Government of India's centrally sponsored scheme on a 50:50 basis taken up during the Eighth Five Year Plan.

5.0 PROGENY TESTING

In view of the problems encountered in involving farmer flocks in genetic improvement programmes hindering progress, formulation of an alternative strategy has become eminent for improving the majority of goat breeds in India. The only choice left is to establish institutional herds and improve the productivity through selection. The emerging elite sires will be distributed to the farmers through appropriate agencies. As such, one of the main reasons for the deterioration in the productivity of goats in the farmers flocks is the paucity of quality bucks. Due to the small flock size of individual farmers, it is uneconomical to maintain breeding bucks for each flock and village co-operatives are almost non existent to provide this facility. Therefore, the progeny testing programme will be beneñcial to the farmers and fulfil their need by supplying superior sires of high genetic merit.

1. Selection based on progeny testing has proven to be the most effective scheme for improving the productive traits of small ruminants.

2. A necessary pre-requisite for the effectiveness of progeny testing is the existence of an official network covering an important•'part of the total population (1'0-20%), the extensive use of AI and the operation of centres for individual control of young bucks and AI. For optimal results corresponding to a yearly genetic progress of 1-2%,10-20 years of systematic effort are needed.

3. A selection institution would require identification of animals, pedigree recording and performance recording. In small flock situations with essentially uneducated farmers, it is difficult to convince them of the need for such recording. On-station recording is more convenient but the population size is generally small to provide sufficient selection intensity and even selection accuracy where performance is the criterion, is low. Furthermore, it does not allow production of the required number of superior males.

The Indian Council of Agricultural Research at CIRG is establishing the progeny testing programme in the VIIIth Plan for the important indigenous goat breeds, namely Jamunapari, Barbari, Sirohi and Marwari for milk and meat.

Figure 33
Jamuna Pari male

Figure 34
Jamuna Pari female

Figure 35
Barbari male

Figure 36
Barbari female

The Objectives of the above programme will be:

i. selection of genetically superior sires through progeny testing;
ii. creation of an elite germplasm centre of proven bucks;
iii. use of superior sires for improving milk and meat production in goats; and
iv. to evaluate the socio-economic status of goat breeders and the economics of goat production in the farmers' flock.

5.1 Selection criteria

Each unit will maintain 250 breedable does and 15 bucks for the progeny testing programme.

The male kids (N = 30) will be ranked on the basis of 90-day milk yield of the dam (90 litres) suitably corrected for non-genetic factors. Twins born in a litter would be given preference over single born kids.

The male kids will be put in a feed lot at 3 months of age and will be selected (N = IS) on the basis of 9 months body weight.

The selected young bucks will be put to progeny testing at or above one year of age.

The breeding value of sires will be estimated on the basis of 90-day milk yield of the progeny (N=20). The proven bucks (N =10) will be maintained at the elite germ plasma centre.

For strengthening of progeny testing programmes of goats in India, it is necessary to observe and consider the following aspects:

a. Most of the programmes are designed to collect records on too few daughters and too few sires. A minimum of 30 daughters per buck should be obtained and a minimum of 15 bucks should be tested. It would be better to get accurate genetic evaluations on a few bucks than to get poor estimates on a large number.

b. Where possible, bucks should be mated in flocks large enough so that each buck's daughter has contemporary flock mates. Using the daughter average for determining genetic merit has a low reliability and thus will lead to a faulty interpretation of genetic merit.

c. Each daughter record should be standardised for those conditions that cause genetic errors in a genetic evaluation.

d. Statistical treatment of the data needs to be evaluated and standardised.

6.0 APPROACH SUGGESTED

The application of the most suitable breeding approaches for improvement of goats should consider taking up in-depth study of the scientific potential and the technical and economic possibilities. Under existing technical, economic and social circumstances, the implementation of the simple selection scheme should definitely have priority since through the associated improvement in environmental and feeding conditions substantial improvement in production can be brought about. Gradual introduction of more advanced selection schemes and methods such as progeny testing, multiple ovulation embryo transfer and associated selection of males on the

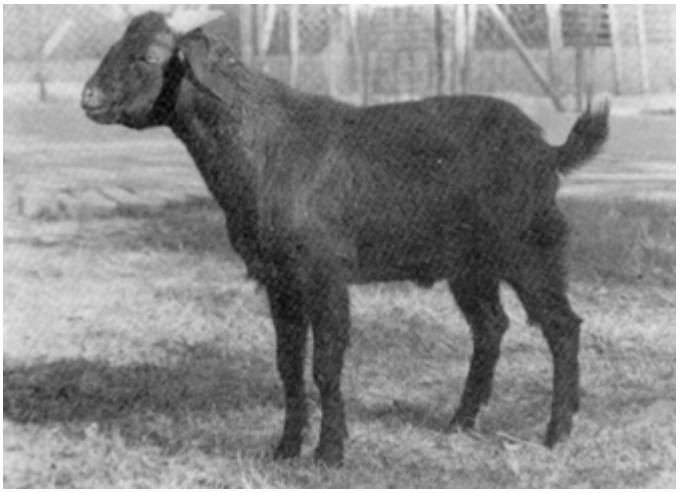

Figure 37
BlackBengal male

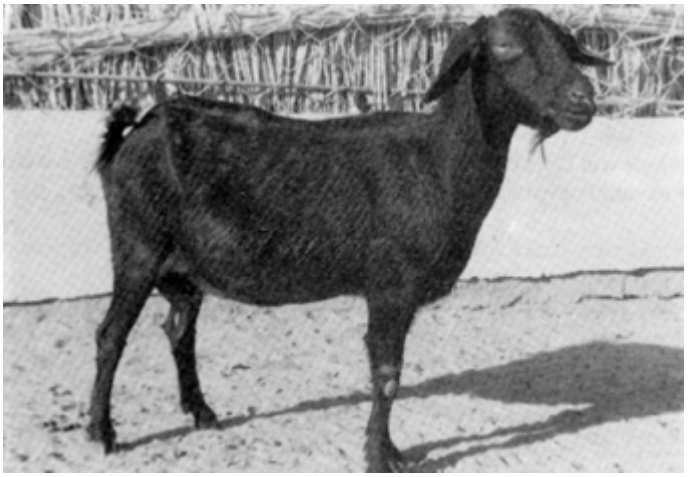

Figure 38
BlackBengal female

Figure 39
Beetal female

Figure 40
Beetal male

basis of their half and full silb-performance are justífied. Devising functional systems of recording and reporting basic performance data on-farm and in farmers' flocks is perhaps the most complex issue to be resolved. Thus the ñrst challenge is to develop co-operative programmes involving nucleus breeding flocks and farmers' flocks to obtain the desired information. In all recording schemes it is essential for the goat farmer to understand that the recording programme will be valuable to him for day to day management and feeding. It may also be more appropriate that the progeny testing programme in goats for production of proven bucks on a small scale be taken up where successful recording is possible and where farmers are eager to take the initiative in developing production recording programmes. Supervision is necessary to ensure timely and accurate collection, computation and reporting of the data to the co-ordinating agency and to provide feedback to the goat farmers on management aspects which will improve the performance of their hocks.

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GENETIC AND PHENOTYPIC PROFILES OF ENDANGERED ANDALUSIAN SHEEP AND GOAT BREEDS

Rodero E., de la Haba M.R.*, Rodero A.* y Herrera M.

Ethnology and Animal Identification Unit - Department of Animal Production
*Genetics Unit - Department of Genetics
Faculty of Veterinary - University of **Córdoba** - SPAIN

SUMMARY

The Grazalema Merino and Lebrija Churro Sheep and the Andalusian White and Andalusian Black goat breeds, previously chosen as priority breeds in need of conservation, were considered as having priority for this study. In order to define the genetic as well as the phenotypic profiles the following characters were used: head profile, ear size, ear orientation, ear consistency, horns, pigmentation of mucous, hoofs, udder, ñneness of fur, hair or wool, length of hair or wool, presence of wattles and goatee bear, supernumerary nipples·, udder shape, orientation and pigmentation of nipple, and peculiarities of coat. The allelic frequencies for each system were calculated to obtain the genetic profiles of each breed. In the two goat breeds and in the Grazalema Merino breed, the majority of the loci were genetically in Hardy-Weinberg equilibrium, but this was not true of the Lebrijan Churro breed which seems to indicate that the latter was either subjected to natural or artificial selection for these genes or crosses with outside breeds had taken place. The profiles of the breeds were compared with foreign breeds considered traditional or unmodified by man. The profile of the Andalusian White has already been studied by Rodero and they reached the conclusion that this breed can be considered traditional, completing the studies made on other breeds from the Mediterranean area. The data on the Andalusian Black seems to indicate that this breed might be considered traditional or subtraditional with strong polymorphism in most of its characters. Although less markedly than in the latter breed, the same is true of the Lebrijan Churro. In this breed the deñning characters of Archaism fit well within those common to an archaic breed. The Grazalema Merino is more standardised than the above mentioned not as ñxed than the precocious ones.

Key words: Spain, Phenotypic Profiles, Genetic Profiles, Grazalema Merino, Lebrija Churro, Andalusian White, Andalusian Black

RESUMEN

Se ha trabajado con diferentes ganaderías de las razas ovinas andaluzas Merino de Grazalema y Churra Lebrijana y con las caprinas Blanca Serrana y Negra Serrana, elegidas entre el resto de las razas de Andalucía como prioritarias para su conservación. Para definir tanto los perfiles génicos como los fenotípicos se han considerado los siguientes caracteres: perfil cefálico, tamaño de la oreja, dirección de la oreja, consistencia de la oreja, tipo de cuernos, pigmentación de mucosas, pezuñas y mama, finura de piel y pelo o lana, longitud de pelo o lana, presencia de mamellas y de perilla, pezones supernumerarios, forma de ubre, dirección de los pezones y coloración y particularidades de la capa. Se han calculado las frecuencias alélicas de los distintos sistemas para, a partir de ellas, obtener los perfiles génicos de cada raza. Mientras en las dos razas caprinas y en la Merina de Grazalema, la mayoría de los diferentes loci se encuentran en

equilibrio genético de Hardy-Weinberg, en la Churra Lebrijana no ocurre así, lo que es indicativo de que o bien esta raza ha estado sometida a selección natural o artificial para esos genes, o bien se ha cruzado con otras razas foráneas. Los perfiles de estas razas se comparan con otras extranjeras consideradas como tradicionales, es decir, escasamente modificadas en sus características por la acción del hombre. El perfil de la Blanca Serrana ya ha sido estudiado por Rodero, llegándose a la conclusión de que puede considerarse como raza tradicional, lo que completa los estudios efectuados para otras razas del área Mediterránea. Los datos referentes a la Negra Serrana parecen indicar que nos encontramos frente a una raza que puede ser estimada como tradicional o subtradicional, con un fuerte polimorfismo en la mayor parte de los caracteres. Algo semejante se presenta en la raza Churra Lebrijana, aunque con menor intensidad que en la anterior. Para ella, los caracteres deñnidores de arcaicismo se ajustan bastante bien a los propios de una raza arcaica. El Merino de Grazalema se encuentra más estandarizado que los anteriores, pero menos fijado que los precoces.

Palabras clave: España, Profiles fenotipicos, Prof les genéticos, Grazalema Merino, Lebrija Charro, Blanca Serrana, Negra Serrana

1.0 INTRODUCTION

In work being performed by the Genetic and Ethnology Units at the Veterinary Faculty in Córdoba for acquiring a greater knowledge of endangered autochthonous Andalusian breeds and to establish guidelines for the conservation of these breeds, we believe it essential to define the profiles of breeds examined in our previous study (Rodero, et al. 1992a) and believed to be in most dire need of protection against disappearance.

The objective of this study was to determine genetic and phenotypic profiles of endangered Andalusian sheep and goat breeds through the estimation of phenotypic and allelic frequencies, in cases of known mode of inheritance, for traits considered.

2.0 MATERIAL AND METHODS

2.1 Methodology for the determination of racial profiles

Lauvergne (1982) introduced the concept of standardised breeds, derived from traditional populations determined by a group of alleles in a homozygotic state. This state was due to selectivity over succeeding generations in a population deemed traditional and that may originally have been very variable in its extension and purposes owing to the practice of many types of reproduction.

The phenotypic profile is made up of all the characters that deñne a particular breed. The genetic proñle is obtained through the allelic frequencies of these characters.

The first problem to confront (Lauvergne, 1986) is to identify the traditional or subtraditional populations. Although the above cited author, with regard to Spain, considered as traditional only the goat breeds from the north of Spain and none of the sheep breeds, we have gone beyond this to make a more detailed study in order to reach a conclusion as to whether the breeds in this investigation should be regarded as traditional breeds and taken as references. The goats we used for comparison were from Central Asia, Norway, Sardinia, Corsica and Provence.

In this paper, the phenotypic profiles were obtained from a wide range of characters that were in turn grouped into those that form the exterior attributes of the animal and ultimately into those that are common to biochemical polymorphism. The characters used, their classes and the code employed for statistical treatment are shown in tables 1 and 2.

TABLE I:
Controlled Characters Common to Goats

Discreet Variables			**Classes**			
Code	**0**	**1**	**2**	**3**	**4**	**5**
Head profile	Concave	Upright	Sub-Convex	Convex		
Ear size	Small	Average	Large			
Ear orientation	Erect	Horizontal	Drooping			
Ear consistency	Rigid	Peduncular	Drooping			
Presence of horns	No	Yes				
Horn type	Arched	Spiral	Other			
Mucous pigmentation	None	Some				
Hoof pigmentation	None	Some				
Udder pigmentation	None	Some				
Hair length	Short	Raspil (1)	Calzon (2)	Raspil + Calzon	Long	
Presence of wattles	No	Yes				
Presence of beard	No	Yes				
Supernumerary left nipple	0	1	2			
Supernumerary right nipple	0	1	2			
Udder shape	Globose	Baggy	Conical			
Coat pigment pattern	Eumelanic	Pheomelanic				
Coat pigment alteration	Black	Ruane	White			
Coat spots	No	Yes				
Haemoglobin	AA	AB	BB			
Albumin	SS	SF	FF			
Catalase	SS	SF	FF			
X Protein	+	-				
Carbonic anhydrase	AA	AB	BB			
Transferrin	AA	AB	AC	BB	BC	CC
Potassium	Low	High				

(1)Raspil: longer hair in back central line. (2) Calzón: longer hair in pelvic zone.

The genetic profiles were obtained thorough qualitative characters whose genetic determination is deñned. If this happened to correspond with heredity by co-dominance, the allelic frequencies were calculated by direct recount. When the heredity was by dominance the frequencies were calculated supposing the population to be genetically at equilibrium.

The genetic profiles of the sheep consist of the following variables: type of head profile, ear orientation, type of horns, pigment pattern, presence or absence of wattles, presence of left or right supernumerary nipples, ear size, type of haemoglobin, of transferrin, of albumin, of catalase, of X protein and of potassium.

In goat we took into account the following: ear size, presence or absence of horns, wattles, goatee, length of hair, type of eumelanine, pigmnet alteration, hoof and udder pigment, shape of udder, rigth or left supernumerary nipples, types of haemoglobin, of transferin, of albumin, of catalase, of X protein and of potassium.

TABLE 2.
Other additional characters typical in sheep discrete variables

Discrete variables	**classes**				
Code	**0**	**1**	**2**	**3**	**4**
Spyral type horn	Open	Closed			
Horn section	Triangular	Oval			
Presence of dewlap	No	Yes			
Fleece type	Open	Semi-open	Dense		
Presence of head wool	No	Yes			
Fleece extension	Leaves belly and oesophageal band uncovered (a)	To upper third of limbs (b)	To upper third of foreleg and 2/3 of hindleg (c)	To knee and joint (d)	To hoof (e)
Jowl wool	No	Yes			
Type of staple	Rectangular	Triangular	Pyramidal		
Fibre length	Short	Average	Long		
Fibre fineness	Average	Thick	Very thick	Fine	
Haemoglobin	AA	AB	BB		
Albumin	SS	SF	FF		
Catalase	SS	SF	FF		
X protein	+	-			

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Transferrin	AA	AB	AC	AD	AE	BB	BC	BD	BE	CC	CD	CE	DD	DE	EE

For the description of the direct variables and their genetic determination, we followed the already cited work by Lauvergne (1986) and that done by Lauvergne *et al.* (1987), as well as the works of Serra (1948, 1949 a and b) and Serra *et al.* (1968) in sheep. The following authors' works have allowed us to gix the genotypes of coats in sheep, basically, and, in some cases, in goats as well: Lauverge (1976), Lauvergne and Adalsteinsson (1976), Sponenberg (1990), Lauvergne (1975), Lauvergne and Hoogschasen (1978), Lauvergne (1978), Ricordeau and Lauverge (1971) and Nicholas (1987).

2.2 Methodology for the genetic determination of genetic profile variables

2.2.1 In goats. The guidelines established by Lauvergne *et al.* (1987) were generally followed.

a. **Ears.** It is believed that the length of the ear is determined by a Mendelian autosomical gene, with intermediate heredity, in the following ways: the EL^+ allele in a state of

homozygosis produces a normal length ear; the heterozygote causes a shortening of the ear, and EL^R in homozygosis causes its disappearance. We have not included the genetic base of the ear's tonicity because its genetic profile character has not been well researched but we have included its phenotypic profile character with three variables: rigid, peduncular, and drooping.

b. **Horns.** We examined presence, absence, and types of horn. Heredity regarding the presence or absence of horns is well known because of the importance of their genetic constitution in both sexes with xegard to the animal's fertility. We studied a single locus with two alleles: the Ho^P which produces the absence of horns and is dominant over the Ho^+ which, in a state of homozygosis determines the presence of horns both in males as well as females in a wild state. For the phenotypic profile we distinguished three types of horns: Ibex, Markhar, and others.

c. **Wattles.** We examined one locus with two alleles: Wa^w, dominant for the presence of wattles over the Wa^+ which causes their absence.

d. **Beard.** As with the presence of horns, this is a character induced by an autosomical sexdependant gene, it is dominant in males and recessive in females. According to Lauvergne (1987), it is determined by the Br locus, the Br allele being bearded and the Br^+ being wild. The statistics that were obtained correspond exclusively to females as there were not enough males for this determination.

e. **Length of hair.** According to the above cited author, this is due to one locus with two alleles: HL^2 for long hair, and HL for a wild type of short hair, the latter being dominant. This locus however has an incomplete penetration and expressivity.

f. **Coat colour.** In the Andalusian White breed, there was a locus with two alleles that determined the colour: Wb for the white coat and Wk for the creamy coat, the latter being dominant. Furthermore, we specified the locus Rn for pigment alterations with the ruane allele Rn^R and the recessive wi1d allele Rn. In the Andalusian Black breed, we also verified the Rn locus and the B locus that induces eumelanine with two phenotypes, one black and one brown along with two alleles: the B, black and the B^b, brown.

g. **Biochemical Polymorphism.** We bore in mind the systems already pointed out for the genetic profile following Zamorano's (1995) methodology.

The alleles detected were the following:

- Haemoglobin: A and B, co-dominant.
- Transferrin: A and B, co-dominant.
- Albumin: S and F, co-dominant
- Catalase: S and F, co-dominant
- Anhidrase Carbonic: A and B, co-dominant.
- X Protein: + and -, the + being dominant
- Potassium level: High (K^H) and low (K^L), the latter dominant.

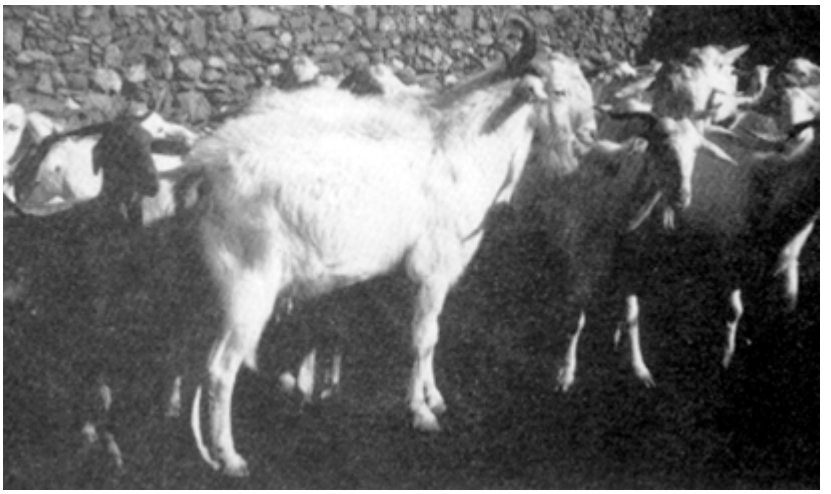

Figure 41
Andalusian white goat

Figure 42
Black serrana

Figure 43
Merino Grazalema

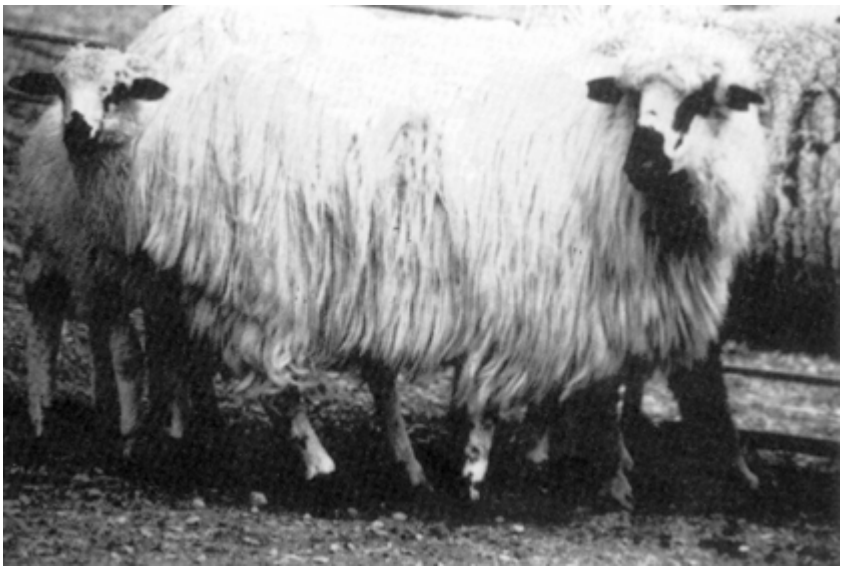

Figure 44
Churra Lebrijana

2.2.2 In sheep

a. **Head profile.** We agreed with Serra (1948) for this character recognising the existence of a Te locus with two alleles related by dominance, the "convex profile" character dominating over the "upright or concave profile".

b. **Ears.** Phenotypically, ear size, orientation and direction all differed, even though only the first two variables were used to define the genetic profile. With respect to ear size, there were only normal and short ones. In neither breed did we find the residual class. Because of the intermediate heredity, individuals may have normal 00 ears or short Oo ones. The two classes of ear orientation were horïzontal and drooping. We recognised the gene type OpOp for the drooping ear and Opop for the horizontal ear.

c. **Horns.** There were animals with and without horns. As is well-known this character is sex-dependent. The number of available males being few, the figures shown for the genetic profile refer exclusively to the female population. Lauvergne (1986) recognised three alleles: Ho^{p} (unhorned) incompletely dominant over the other two. Ho+ (horned) endowing large horns in males and smaller ones in females in homozygosis, and Ho^{hl} (we neither found nor studied this) which endows females with smaller and larger horns when in a state of Ho^{hl} Ho^{hl}, indistinguishable from the male Ho+Ho+.

d. **Coat colour.** We followed Lauvergne's method (1976) for the Lebrijan Churro breed citing the Agouti (A) locus with six alleles: A^{e} (eumelanic), A^{s} (grey), A^{t} .(bronze eumelanic, A^{b} (badger face), A+ (wild) and A^{wh} (pheomelanic). Likewise we examined the E locus (extension locus) in two alleles: normal E+ and E^{d} dominant; the S locus in two alleles, normal S+ and S^{b} which on a red backgrown produces the colour white; and finally, the L locus (spotted) which was adduced by Lauvergne according to whom it had two alleles: L+ and L^{ak}. This is responsible for the almost total de-pigmentation except for the centrifugal spots on head and legs. Because the anima1s of the Lebrijan Churro breed are homozygotic for the A^{wh} and S+ alleles, only the genetic values for the E and L locus are shown.

In the Grazalema Merino, we only show the allelic frequencies of the Agouti system with three alleles: A^{wh}; $Á^{b}$, and A^{e}, shown in order of dominance.

e) **Wattles.** we identified a single locus, Wa, with two alleles: Wa^{a}, wattled and Wa+, without them, the latter being wild and dominant.
f) **Supernumerary nipples on both right and left sides.** In each case we identified one P locus with two p alleles (without supernumerary nipples) and P (with supernumerary nipples).
g) **Biochemical polymorphism.** We examined the following systems:

- Haemoglobin: A and B alleles co-dominating between themselves.
- Transferrin: A, B, C, D and E, also co-dominant.
- Albumin: S and F alleles, co-dominant.
- Catalase: similar genetic determination to the above S and F alleles.
- X Protein: Px and Px, the former being dominant.
- Potassium: As in goats, there were two alleles, K and K that determine low and high potassium, respectively, the former being dominant.

The biochemical polymorphism were analysed by the methods described by Rodero et al. (1992c).

For the discrete variables we calculated the absolute frequencies of the various classes, the áccumulated frequencies and the absolute and accumulated percentages. Subsequently we estimated the phenotypic and genetic frequencies in those cases where we knew the genetic determination.

3.0 RESULTS

3.1 Andalusian White

Their phenotypic frequencies deñne the visible phenotypic profile. As Lauvergne indicated, this profile is less exact than the genetic but it is still useful for identífying all the alleles in segregation with their frequencies. Therefore we have used both profiles. In goat the normal procedure is to examine the ear (length, curl and tonicity), horns (presence, absence), wattles (presence, absence), goatee bear (with or without) aud pigment pattern, type of eumelanine and spots.

In this paper we have added other characters that we believe may complete and characterise the breed.

If we add to these data thé phenotypic frequencies of the various systems of biochemical polymorphism and the overall continuous variables that we studied before (Rodero et al.,1992b) that make up the biometrics profile, we believe that this breed to be perfectly defined and therefore in conditions to be compared with traditional breeds and to calculate the possible effects of the genetic erosion that it may have experienced.

The observation in table 3 makes it clear that the exterior traits (with some exceptions) show great uniformmity, in such a way that only one class contains more than 90% of the frequency. This indicates that selective criteria were applied to constitute a breed based on its phenotypic characters. On the other hand, the biochemical polymorphism probably demonstrates the absence of human action in a selection based on these characters.

3.2 Andalusian Black

The same guidelines were followed with this breed as in the Blanca even though the variables of the pigment pattern had to be adjusted for the peculiarities of the coat colour of these animals.

In table 3, the phenotype class frequencies for the various systems are shown.

The general trend towards monomorphism is also noted, although perhaps not as much as in the Andalusian White breed. The presence of monomorphism does not seem to be due to character type but rather to the population purity or some type of crossing with other breed in earlier generations.

The biochemical polymorphism systems also have irregular behaviour, taking into account the frequencies that usually occur, in these systems and the selective practices that determine a specific frequency.

3.3 Lebrijan Churro Breed

As in goats, in table 4, the results of the frequencies of various classes of all the systems is shown for the breed in question.

With respect to the exterior trait frequencies, it was difñcult to find data from other authors that allow comparison with those obtained by us. However, the variables of biochemical polymorphism systems have been well documented in works that facilitate data for the Churra breed. These data nevertheless refer to what the authors call Tensine and Genuine ecotypes and not to the population we have catalogued as the Lebrijan Churro breed.

In general, it might be said that the population studied here shows a certain variability in both exterior and biochemical traits, a variability surpassing that of the other breeds studied by us, although some fixed characteristics are noted.

3.4 Grazalema Merino Breed

Data from each system obtained from an exceptional number of farms represents this breed precisely.

TABLE 3:
Frequencies of each class of the studied qualitative variables in the goat breeds

Systems	Code	Andalusian white		Andalusian black	
		Frequencies	%	Frequencies	%
Head profile	1	4	1.90	0	0
	2	29	14.10	3	4.29
	3	173	84.00	67	95.71
Ear size	0	0	0.00	0	0.00
	1	5	2.40	0	0.00
	2	201	97.60	70	100.00
Ear orientation	0	0	0.00	0	0.00
	1	4	1.90	63	90.00
	2	202	98.10	7	10.00
Ear tonicity	0	11	5.30	37	52.86
	1	195	94.70	33	47.14
Presence of horns	1	206	100.00	70	100.00
Horn type	0	21	10.20	2	2.86
	1	185	89.80	61	87.14
	2	0	0.00	7	10.00
Mucous pigmentation	0	184	89.30	1	1.43
	1	22	10.70	69	98.57
Hoof pigmentation	0	205	99.50	3	4.29
	1	1	0.50	67	95.71
Udder pigmentation	0	177	85.90	2	2.86
	1	29	14.10	68	97.14
Hair length	0	198	96.10	70	100.00
	1	7	3.40	0	0.00
	3	1	0.50	0	0.00

TABLE 3 (cont.)
Frequencies of each class of the studied qualitative variables in the goat breeds

Systems	Code	Andalusian white		Andalusian black	
		Frequencies	%	Frequencies	%
Presence of wattles	0	141	68.40	69	98.57
	1	65	31.60	1	1.43
Presence of beard	0	29	14.10	62	88.57
	1	177	85.90	8	11.43
Supernumerary left nipple	0	174	91.60	61	98.39
	1	10	5.30	1	1.61
	2	6	3.10	0	0.00
Supernumerary right nipple	0	175	92.10	59	95.16
	1	8	4.20	0	0.00
	2	6	3.10	3	4.84
	3-4	1	0.50	0	0.00
Udder shape	0	47	24.90	12	22.22
	1	41	21.70	18	33.33
	2	101	53.40	24	44.44
Coat spots	0	200	97.08	90	80.17
	1	6	2.91	20	19.83
Haemoglobin	0	204	99.00	122	88.41
	1	2	1.00	16	11.59
	2	0	0.00	0	0.00
Albumin	0	124	60.50	127	92.03
	1	54	26.30	8	5.80
	2	27	13.20	3	2.17
Catalase	0	54	26.20	100	72.46
	1	109	52.90	31	22.46
	2	40	20.90	7	5.07
X protein	0	174	84.50	102	74.45
	1	32	15.50	35	25.55
Carbonic anhydrase	0	206	100.00	137	100.00
Transferrin	0	192	93.20	137	99.27
	1	9	4.40	1	0.73
	2	5	2.40	0	0.00
Potassium	0	122	59.50	88	64.23
	1	82	40.50	49	35.77

In table 4, some new systems that were not controlled in the Lebrijan Churro are shown while, on the contrary, others are lacking. This is due to the specific characteristics of each breed.

The uniformity of the morphological characters (profile, tonicity, and orientatiozi of ears, presence of horns, etc.) can be seen along with the certain variability given in pigments, presence of head wool, presence of supernumerary nipples and the overall variables related to wool.

Unlike the Genuine Merino, the pigment pattern is not unique although light-coloured coats predominate.

In this breed the biochemical polymorphism systems show normal behaviour: high variability in transferrin, catalase, including haemoglobin and X protein. The albumin and potassium are practically fixed.

4.0 GENETIC PROFILES

Under previous headings, phenotypic profiles using all the variables of external expression have been described. Phenotypes and genotypes generally coincide in most of these variables, being genetically determined by co-dominance.

TABLE 4:
Frequencies of each class of the studied qualitative variables in the sheep breeds

		Lebrijan Churro		Grazalema Merino	
Variables	**Code**	**Frequencies**	**%**	**Frequencies**	**%**
Head profile	0	0	0.00	1	0.66
	1	49	84.48	9	5.92
	2	9	15.52	142	93.42
Ear size	0	2	3.45	125	66.84
	1	54	93.10	62	33.16
	2	2	3.45	0	0
Ear orientation	1	55	93.10	180	96.26
	2	3	3.45	7	3.74
Ear tonicity	0	58	100.00	186	99.47
	1	0	0.00	1	0.53
Presence of horns	0	45	77.59 *	171	91.44 **
	1	13	22.41 *	16	8.56
Mucous pigmentation	0	1	1.72	99	52.94
	1	57	98.28	88	47.06
Hoof pigmentation	0	5	8.62	79	42.25
	1	50	91.38	108	57.75
Udder pigmentation	0	36	62.07	127	67.91
	1	22	37.90	60	32.09
Presence of head wool	0	0	0.00	27	14.44
	1	58	100.00	160	85.56

TABLE 4 (cont.)

Frequencies of each class of the studied qualitative variables in the sheep breeds

Variables	Code	Lebrijan Churro		Grazalema Merino	
		Frequencies	%	Frequencies	%
Coat Pigment pattern	All black	0	0.00	5	3.03
	Blonde	0	0.00	69	41.82
	All white	1	1.72	54	32.73
	White with mucous pigmented	0	0.00	5	3.03
	Reddish Churro type	1	1.72	1	0.61
	Black Churro type	56	96.55	8	4.85
	Red spotted	0	0.00	1	0.61
	Badger face	0	0.00	22	13.33
Fleece extension	1	58	100.00	5	2.72
	2	0	0.00	47	25.54
	3	0	0.00	102	55.43
	4	0	0.00	30	16.30
Jowl Wool	0	58	100.00	20	10.70
	1	0	0.00	167	89.30
Fibre fitneness	0	0	0.00	37	24.50
	1	0	0.00	49	32.45
	2	58	100.00	7	4.64
	3	0	0.00	58	38.41
Fibre length	0	2	3.85	62	41.06
	1	3	5.77	57	37.75
	2	50	90.38	32	21.19
Presence of wattles	0	1	1.72	187	100.00
	1	57	98.28	0	0.00
Supernumerary left nipples	0	18	32.73	102	56.04
	1	37	67.28	78	42.86
	2	0	0.00	2	1.10
Supernumerary right nipples	0	22	40.00	105	57.69
	1	33	60.00	76	41.76
	2	0	0.00	1	0.55
Haemoglobin	0	0	0.00	4	2.17
	1	19	11.11	38	20.65
	2	152	88.89	142	77.17
Transferrin	0	4	2.34	14	7.65
	1	8	4.68	24	13.11
	2	8	4.68	21	11.48
	3	6	3.51	11	6.01
	4	0	0.00	10	5.46

TABLE 4 (cont.)

Frequencies of each class of the studied qualitative variables in the sheep breeds

Variables	Code	Lebrijan Churro		Grazalema Merino	
		Frequencies	%	Frequencies	%
Transferrin	5	10	5.85	29	15.85
	6	26	15.20	14	7.65
	7	19	11.11	13	7.10
	8	6	3.51	8	4.37
	9	26	15.20	14	7.65
	10	35	20.47	9	4.92
	11	8	4.68	3	1.64
	12	14	0.58	5	2.73
	13	1	8.19	7	3.83
	14	0	3.51	1	0.55
Albumin	0	167	95.98	182	97.85
	1	4	2.30	2	1.08
	2	3	1.72	2	1.08
Catalase	0	65	38.01	56	30.27
	1	87	50.88	98	52.97
	2	19	11.11	31	16.76
X protein	0	55	32.16	23	12.37
	1	116	67.84	163	87.63
Potassium	0	174	100.00	69	100.00

** In males: N = 33.33; S = 66.67% * In females: N = 88.00%; S = 20.00%*

*** In males: N = 60.00%; S = 40.00% ** In females: N = 93.22%; S = 6.78%*

TABLE 5
Allelic frequencies in the studied goats populations

Variables		Andalusian white		Andalusian black	
		Freq.	S.E.	Freq.	S.E.
Ear size	EL^{+}	0.987	± 0.002	1.0000	
	EL^{R}	0.013	± 0.002	0.0000	
Mucous pigmentation	p^{NP}	0.673	± 0.0047	0.0072	
	q^{p}	0.327	± 0.0047	0.9928	
Hoof pigmentation	p^{NP}	0.945	± 0.0048	0.0217	
	q^{p}	0.055	± 0.0048	0.9783	
Udder pigmentation	p^{NP}	0.375	± 0.0310	0.0144	
	q^{p}	0.625	± 0.0310	0.9856	
Hair length	HL^{+}	0.978	± 0.0001	1.0000	
	HL^{2}	0.022	± 0.0001	0.0000	
Presence of wattles	Wa^{+}	0.173	± 0.0021	0.0072	
	Wa^{W}	0.827	± 0.0021	0.9928	
Presence of beard	Br^{b}	0.073	± 0.0032	0.2200	
	Br^{+}	0.927	± 0.0031	0.7800	
Pigment pattern	B^{+}			0.7200	
	B^{b}			0.2800	
Pigment alteration	Rn^{R}			0.7405	
(ruane)	Rn^{+}			0.2595	
Coat colour	W^{k}	0.027	± 0.0014		
	W^{b}	0.973	± 0.0014		
Haemoglobin	Hb^{A}	0.995	± 0.00001	0.942	± 0.00057
	Hb^{B}	0.005	± 0.00001	0.058	± 0.00057
Albumin	$A1^{S}$	0.736	± 0.0594	0.949	± 0.0003
	$A1^{F}$	0.264	± 0.0594	0.051	± 0.0003
Catalase	Cat^{S}	0.527	± 0.0008	0.837	± 0.0027
	Cat^{F}	0.473	± 0.0007	0.163	± 0.0027
X Protein	Px^{+}	0.606	± 0.0221	0.494	± 0.0016
	Px^{-}	0.394	± 0.0220	0.506	± 0.0016
Carbonic anhydrase	CA^{S}	1.000		1.000	
	CA^{F}	0.000		0.000	
Transferrin	Tf^{A}	0.966	± 0.0004	0.966	± 0.00003
	Tf^{B}	0.022	± 0.0003	0.003	± 0.00003
	Tf^{C}	0.012	± 0.0001	0.000	
Potassium	K^{L}	0.364	± 0.0027	0.402	± 0.0133
	K^{H}	0.636	± 0.0026	0.598	± 0.0134

TABLE 6:
Allelic frequencies in the studied sheep population

Variables	Alleles	Lebrijan Churro Frequencies	Grazalema Merino Frequencies ± E.S.
Head profile	Te^{CX}	0.0776	0.9375 ± 0.0352
	Te^{R}	0.9224	0.0625 ± 0.0352
Ear size	O	0.9827	0.1711 ± 0.0366
	o	0.0173	0.8289 ± 0.0366
Ear orientation	Op	0.5229	0.5588 ± 0.0017
	op	0.4741	0.4812 ± 0.0017
Presence of horns	Ho^{+}	0.4772	0.2604 ± 0.0340
	Ho^{P}	0.5228	0.7396 ± 0.0340
Pigment pattern	E^{+}	0.9913	
	E^{-}	0.0087	
	L^{ak}	0.8813	
	L^{+}	0.0087	
	A^{wh}		0.5955 ± 0.0016
	A^{b}		0.2304 ± 0.0016
	A^{e}		0.1741 ± 0.0016
Wattles	Wa^{+}	0.0086	
	Wa^{W}	0.9914	
Supernumerary left nipples	p	0.5721	0.7486 ± 0.0164
	P	0.4279	0.2514 ± 0.0164
Supernumerary right nipples	p	0.6325	0.7595 ± 0.0176
	P	0.3675	0.2405 ± 0.0176
Haemoglobin	Hb^{A}	0.0556	0.1250 ± 0.0015
	Hb^{B}	0.9444	0.8751 ± 0.0015
Transferrin	Tf^{A}	0.0877	0.2568 ± 0.0039
	Tf^{B}	0.2310	0.3197 ± 0.0171
	Tf^{C}	0.3772	0.2409 ± 0.0002
	Tf^{D}	0.3602	0.1366 ± 0.0011
	Tf^{E}	0.0439	0.0820 ± 0.0025
Albumin	$A1^{S}$	0.9713	1.0000
	$A1^{F}$	0.0287	0.0000
Catalase	Cat^{S}	0.6345	0.5676 ± 0.0031
	Cat^{F}	0.3655	0.4324 ± 0.0031
X Protein	Px^{+}	0.1763	0.0639 ± 0.0032
	Px^{-}	0.8237	0.9361 ± 0.0032
Potassium	K^{L}	1.000	1.0000
	K^{H}	0.000	0.0000

Estimation of the allelic frequencies permits the description of the genetic profile which is more important even than the phenotypic in deñning the population or breed and in considering it to be traditional or standardised.

The allelic frequencies were calculated by a minor number of variables, since the mode of inheritance is only known in fewer number of them. In cases of dominance mode of inheritance a Hardy-Weinberg equilibrium was assumed in order to estimate allelic frequencies.

5.0 DISCUSSION PHENOTYPIC AND GENETIC PROFILES

5.1 Andalusian White Breed

As we indicated in a previous study (Rodero et al. 1992b), the Andalusian White breed, traditionally meat-producing, has recently been orientated towards milk production which has, to a certain extent, modified its morphostructure. At the same time it has retained its external qualities that define it ethnologically. This perhaps may explain the very slight variability that its allelic frequencies for said characters show.

A wide range of variation is observed in characters neutral to selection such as the biochemical polymorphism. This may also be a sign that high milk production has been achieved by the introduction of reproductive aniznals from other high-producing autochthonous breeds.

Andalusian White and Black breeds phenotypic profiles, as seen in Table 7 which reflects and completes data published by Lauvergne (1988), permits us to compare and include it among the goat breeds considered traditional in the Mediterranean zone because the variability of its exterior traits prevent it from becoming fiilly standardised despite a tendency to fix certain external characters.

5.2 Andalusian Black

We know that the Andalusian Black comes from the primitive Prisca trunk with early reference to the Ibex and more recently to the Granadina and to a lesser extent to other breeds.

Of all the qualitative external variables examined (table 3) only two are monomorphical. Even in the pigment variable a certain polymorphism is appreciated despite a tendency to melanization. The allele for short hair has been ñxed as had occurred in other traditional breeds such as the Macedonian goat (Boyazoglu et al.1988).

It might be interesting to examine the possible genetic erosion produced by various African breeds and especially by the Granadine breed through comparison with data of this type on variables that may have determined the high frequency of black coats.

If we compare the results shown in table 5, with the presence or absence of each class expressed, with those results given for the traditional breeds used as references in our previously published study, it can be concluded that this is a breed that could be classed as traditional or sub-traditional, even though Cañón and Dunner (1988) on Spanish breeds, limit the traditional character exclusively to populations ñom the north of Spain.

TABLE 7:
Comparison of the visible phenotypic profiles among the traditional goats breeds

Character	Locus	Phenotype	1	2	3	4	5	B	N
Ear size	EL	Normal	0	0	+	+	+	+	+
		Short	0	0	-	+	+	+	-
		Vestigial	0	0	-	-	-	-	-
Ear tonicity		Erect	0	0	0	0	+	-	-
		Pedunculated	0	0	0	0	+	+	+
Presence of horns	Ho	Yes	0	+	+	+	+	+	+
		No	0	+	+	+	+	-	-
		Ibex	0	0	0	+	+	+	+
Horn type		Markhar	0	0	0	+	+	+	+
		Intermediate	0	0	0	0	0	-	+
Wattles	Wa	Yes	0	0	+	+	+	+	+
		No	0	0	+	+	+	+	+
Beard	Br	Yes	0	0	+	0	+	+	+
		No	0	0	-	0	+	+	+
		Short	0	0	+	-	+	+	+
Hair Length	HL	Medium	0	0	+	-	+	+	-
		Long	0	0	+	+	+	+	-
Coat pigmentation		Pheomelanine	+	+	0	+	+	+	+
		Others	+	+	+	+	+	+	+
Ruane	Ru	Normal	-	+	+	+	+	-	+
		Ruane	-	+	+	+	+	+	+

(1)= Central Asia (Eidrigevic,l941); (2)=Norwey (Haugen,l960)*; Sardinian (Brandano,l978)*; (4)= Corsican (I,auvergne,1978); (5)= Provence (Lauvergne,1987) (B)=Andalusian White y (N)= Andalusian Black*
+ = Presence- = absence; 0 = not studied. (*) Cited in *Lauvergne,1988.*

5.3 Grazalema Merino

As indicated, the profiles of the sheep breeds are much less standardised than goat profiles, probably because those populations unmanipulated by znan that may be considered as traditional are very few. Thus, the characters to take into account are not as clearly defined as those of goats.

In table 8 we show the data for deñning a phenotypic profile of this breed along with the Lebrija Churro.

Of the 15 variables that can be taken as reference, we only considered as ñxed, ear consistency and the absence of peduncules.

If this data are compared with the phenotypic profile variability of some sheep breeds included in Lauvegne's work (1988), the Grazalema Merino could not be considered a more standardised breed than others.

Its pigment, so common to the Merino trunk, is dispersed and variable in these animals although blonde and white predominate.

Let us keep in mind that we are dealing with a well differentiated population of the pure Merino or of the early Merinos which doubtlessly are fully fixed. This differentiation refers both to the racial patterns as well as its productivity or formation process.

If we take into consideration the characters that Bonacini et al. (1982) describe as discriminatory for defining the index of archaism in a sheep breed (format, profile, ear shape, colour of distal zones and horn presence), the Grazalema Merino ñts well except for the reference to horns.

TABLE 8:
Comparison of the visible phenotypic profiles among the traditional sheep breeds

Character	Phenotype	1	2	3	4	MG	CHL
Ear size	Normal	+	+	+	+	-	+
	Short	+	-	-	-	+	+
	Vestigial	-	-	-	-	+	+
Presence of Horns	Yes	+	+	+	+	+	+
	No	+	+	-	-	+	+
Pedunculated ears	Yes	0	0	-	-	-	+
	No	0	0	+	+	+	+
Pigment Pattern	Eumelanic	+	+	+	+	+	+
	Grey	+	0	0	+	+	-
	Pheomelanic	+	+	+	+	+	-
	All White	+	+	+	+	+	-
Eumelanine type	Black	+	+	+	+	+	+
	Brown	+	+	-	-	+	+
	Normal	0	0	+	0	0	0
Pigment alteration	Diluted	0	0	0	0	0	0
	All White	0	0	+	0	+	0
Spots	Spotted	-	+	+	-	+	-0
	Non spotted	+	+	+	+	+	+

(1) = Karakacan de Bulgaria (Alexieva et a1,1988); (2) = Corsican (Franceschi and Vallerand,1988); (3): Landais (Benadjaoud;1988); (4) = d'Quessant (Abbé and Benadjaoud,1988); (MG)= Grazalema Merino; (CHL)= Lebrijan Churra; + = presence; - = absence; 0 = non studied

5.4 Lebrijan Churro

We show the results for this breed tables 4 and 6 and comparison with other breeds studied in table 8. From the data shown it can be said that the variability is somewhat less. Of the nine qualitative ethnological variables, some are practically non-varying and others are close to being fixed. Among them is the pigment pattern, with respect to which only two animals are outside of the norm, perhaps because of the influence from others breeds. However the defining characters of archaism fit those common to an archaic breed.

The different habitat in which the Lebrijan Churro lives, its different production, its relatively is Q lated reproduction, the size of the populations and other factors could have determined the configuration of these populations.

6.0 ACKNOWLEDGEMENT

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REVUE DE LA SITUATION DES RACES D'ANIMAUX DOMESTIQUES DE COTE D'IVOIRE

Yapi-Gnaore C. V.*', Oya B.A. et Ouattara Zana***

*Institut des Savanes (IDESSA) Ol BP 633 **Bouaké** O1-COTE D'IVOIRE
ANADER/PNSO Ol BP 1166 **Bouaké Ol-COTE D'IVOIRE

RESUME

L'article présente une révision intéressante de 1'état actuel des ressources génétiques animales en Cóte d'Ivoire. Les cinq espéces principales (bovins, ovins, caprins, porcins et volailles) sont présentées. I1 existe trois groupe de bovins autochtones: le Baoulé, le N'Dama et le Lagune; les deux derniers sont considérés trypanotolérants. Le Baoulé posséde une population de presque 500 000 animaux et le N'Dama quelques 100 000, tandis que la population de Lagune de petite taille est de moins de 1000. I1 existe également u.ne population transhumante formée de zébus croisés (Baoulé x zébu) ainsi que de N'Dama croisés avec des German Fleckvieh ou des French Abondance. La race d'ovin plus répandue est la fameuse Djallonké (environ 1200 000 animaux) que 1'on rencontre aussi bien dans les foréts que dans les savannes. L'Institut des Sciences a initié un programme de sélection en 1980 qui se poursuit actuellement. Dans le cas des chévres la seule race présente est la naine de 1'Afrique de 1'ouest, appelée aussi Djallonké, avec une population de un peu moins de 1 000 000. Les secteurs porcins et de volailles sont dominés par la présence de races locales et de quelques croisements avec des races importées. L'article présente une description approfondie des systémes de production traditionnels et de leur évolution; il donne également des indications sur les normes de conservations existantes pour les races N'Dama, Baoulé et Djallonké.

Mots clés: *Animaux d'élevage, Baoulé, N'Dama, Lagune, Djallonké, Systémes de production traditionnels, Programme de sélection national*

SUMMARY

This article successfiilly reviews the state of the art of animal genetic resources in the Ivory Coast. All fivé major species (cattle, sheep, goat, pigs and poultry) are presented. There are three autoctonous groups of cattle: the Baoulé, N'Dama and the Lagune; the latter two breeds are considered as being resistant to trypanosomiasis. While the Baoulé still numbers about half a million and the N'Dama some 100 000 head of cattle, the very small bodied Lagune has a population of less than 1000. A zebu transhuming population and a number of zebu cross breeds (Baoulé x zebu) as well as a N'Dama cross with German Fleckvieh and French Abondance exist. The main sheep breed is the well known Djallonké (some 1200 000 animals) which is present in both forest and savannah conditions. A national selection programme is started in 1980 by the Institut des Sciences and is still actively pursued. For the goats the only breed is the Dwarf of West Añica also called Djallonké; just under one million head. Both the pig and poultry sectors are dominated by the local genetic material with some crossbreeding with imported breeds. The

[1]Adresse achielle: International Livestock Research Institute (ILRI). P.O. Box 5689 Addis Ababa, Ethiopia.

article describes well the traditional production systems and their evolution and some indication is given on the existing conservation policies of the N'Dama, Baoulé and Djallonké.

Key words: Livestock Species, Baoulé, N'Dama, Lagune, Djallonké, Traditional Production Systems, National Selection Programme

1.0 INTRODUCTION

Le patrimoine génétique animale de la Cóte d'Ivoire est composé de trois races locales de taurins, d'une race locale d'ovins, de caprins et de porcins, d'une race "synthétique" de porcins issue de croisement stabilisé et de la volaille de race locale. Outre ces races locales, on rencontre aussi des zébus d'introduction récente, et des animaux issus de croisements anarchiques et raisonnés et de la volaille de race importée. La Cóte d'Ivoire ne posséde pas de races locales d'ánes, ni de chevaux. Ceux-ci n'apparaissent pas dans les statistiques officielles de 1'élevage. ; Cependant on y trouve des chevaux iznportés pour les clubs équestres ou lors des échanges commerciaux. Ces derniers proviennent surtout des régions de Bamako, Ségou, Macina (Mali), de la Haute Guinée ou du pays Mossi (Burkina Faso).

Le patrimoine génétique des races locales, tout comme celui de 1'Afrique tropicale, a été largement décrit par des auteurs depuis de longues années (Doutressoulle,1946; IEMVT,1971', 1973) et plus particuliérement par Aillerie (1926), Tidori et al. (1975) et Glattleider (1976). Ce rapport présente les points majeurs de la situation des races d'animaux domestiques en Cóte d'Ivoire et va porter sur les bovins, ovins, caprins, porcins et volailles.

2.0 LES BOVINS

Les trois races locales de taurins dont dispose la Cóte d'Ivoire sont la race Baoulé, la race N'Dama et la race Lagune ou Lagunaire.

2.1 La race Baoulé

Elle constitue la race la plus importante du point de vue effectif 350 000 á 590 000 tétes, soit environ 34 á 57% de 1'effectif national bovin (Atsé,1990; République de Cóte d'Ivoire,1991, 1992). Son aire géographique couvre le Nord (zone de Boundiali-Korhogo-Sinematiali), surtout le Nord-Est (zone de Bouna), en zone soudano-guinéenne et le Centre (zone de BouakéDabakala), en zone guinéenne (Tidori et al., 1975; Camus et al., 1881). Ces régions se caractérisent par des savanes arborées ou arbustives et des foréts galleries le long des cours d'eau. La pluviosité de la zone soudano-guinéenne suit une répartition monomodale, d'avril á octobre, avec en moyenne 859 mm de pluie par an. En zone guinéenne, les précipitations annuelles, moyennement plus abondantes, sont réparties en deux saisons de pluie d'avril á juin et d'aoút á octobre. La végétation est constituée en majorité de Lophira lanceolata, Isoberlinia doka, Daniellia oliveri, Parinari curatellifolia, Uapaca togoensis, Detarium microcarpum et de jachéres anciennes á Andropogon gayanus (CRZ, 1977; César, 1981). A une date trés récente (1973) des bovins Baoulé ont été introduits au sud de la Cóte d'Ivoire, en zone forestiére en élevage sous palmeraie avec la Société pour le Développement du Palmnier á Huile (SODEPALM), qui avait pour mission d'opérer la sélection et la multiplication de la race Baoulé.

Selon Aillerie (1926), cette race est arrivée en Cóte d'Ivoire par Bondoukou, á 1'Est, et Kong, au Nord-Est, vers le début du XVéme siécle lors des mouvements migratoires des Foulbés (Peulh). Gráce aux transactions commerciales, les troupeaux ont gagné la région Centre de la Cóte d'Ivoire,

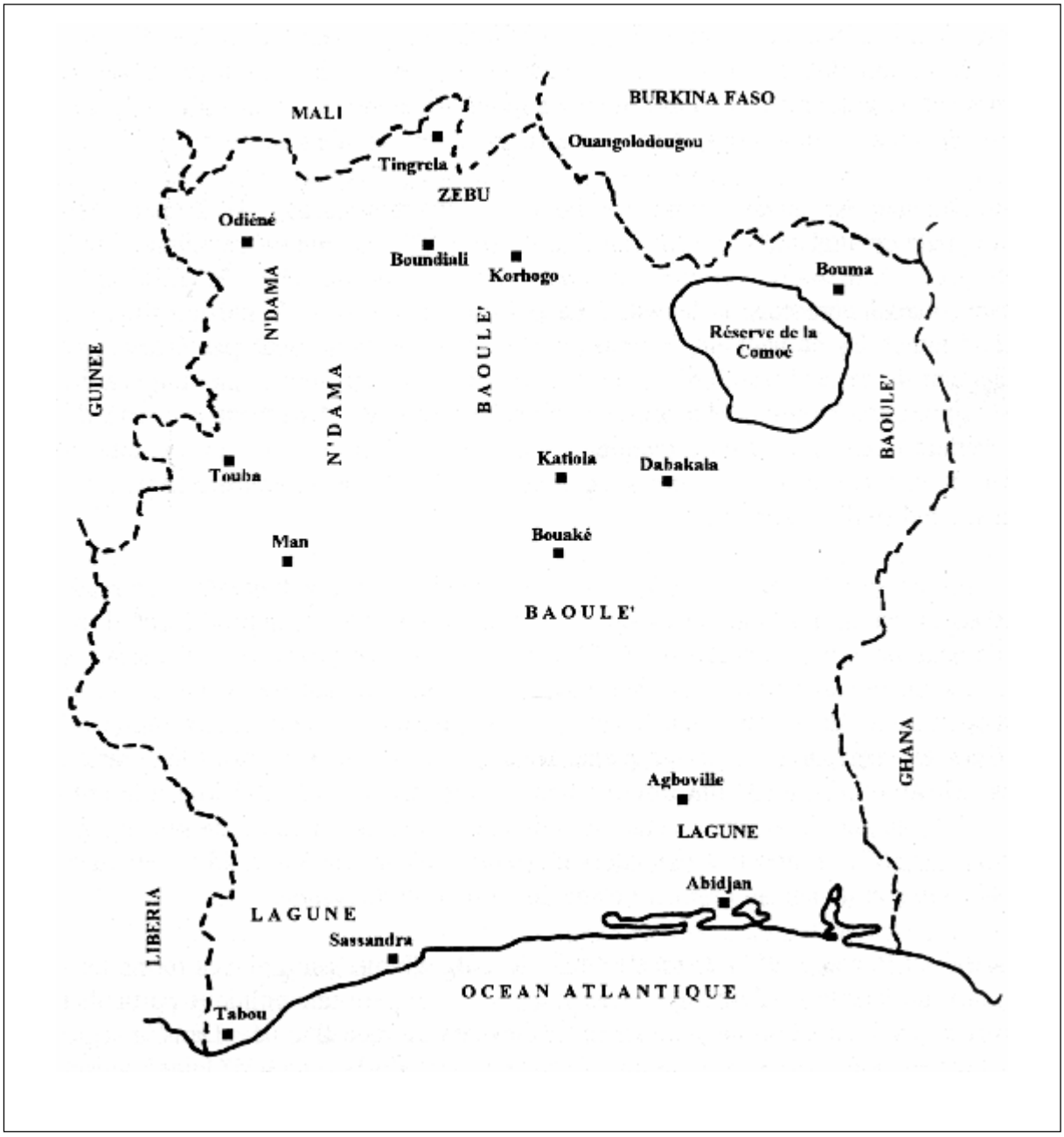

Figure 45
Distribution des principales races bovines de Côte d'Ivoire

en région Baoulé. Par suite de consanguinité et d'isolement des populations, les caractéres premiers de la race se sont modiñés pour s'adapter au milieu, au climat et á 1'alimentation. Ce qui a conduit á la formation et á 1'appellation Baoulé de cette race.

Le bovin Baoulé est classé parmi les bovins á courtes cornes de 1'Ouest Añicain , généralement appelé en anglais "West African Shorthorn". C'est un animal rectiligne, breviligne et ellipométrique. L'encolure un peu courte, est plus épaisse chez le mále et porté horizontalement; mais légére chez la femelle. La poitrine est ample et la partie postérieure du tronc est cylindrique. La couleur de la robe est trés variable et ne peut pas étre considérée comme un élément de caractérisation de la race. La robe peut étre noire, pie-noire, noire-pie, pie-rouge avec une dorsale rouge. La présence de robe fauve pie et froment est généralement rare. Les extrémités sont foncées et la muqueuse est en général noire. Les cornes sont courtes avec une forte base, formant un léger croissant chez le mále. C'est un animale trypanotolérant bien adapté á son milieu d'élevage.

La taille varie de 95 á 110 cm et quelque fois 115 cm chez certains taureaux. Le poids á la naissance des veaux est en moyenne de 13 kg. L'aptitude dominante est la production de viande avec un rendement pouvant atteindre 48 á 55% par rapport au poids vif Chez les sujets engraissés, le rendement carcasse peut atteindre 57-60%. L'aptitude laitiére est faible. En milieu sédentaire, la quantité de lait prélevée par femelle peut atteindre 400 á 600 ml par jour (Godet et al.,1981). Chez les meilleures vaches en pleine lactation, la production journaliére varie entre 2,5 et 3 litres. Hoste et al. (1983) ont observé une production de 2,22 litres/jour á la premiére lactation, á 1,21 litres/jour á la 7éme lactation, soitune production laitiére de 400 kg en 210 jours. Tidori et al. (1975) rapportent des intervalles entre vélages de 300 á 480 jours avec une moyenne de 421 jours et un áge au premier vélage de 25 mois en moyenne.

Selon Landais et Poivey (1981), la race Baoulé de Cóte d'Ivoire est á moyen terme menacée d'absorption, surtout dans le nord du pays. Ces auteurs préconisent une politique particuliére de défense de la race par la création de groupement d'éleveurs de race Baoulé. Dans la région de Boundiali, la race est métissée avec du sang N'Dama venant de la région d'Odiéné voisine au Nord-Ouest du pays, et du zébus en provenance des pays voisins du Sahel, surtout dans la région de Tingrela au Nord (Tidori et al.,1975).

2.2 La race N'Dama

La race N'Dama représente 8-14% de 1'effectif national, soit 75 000 á 140 000 tétes. Elle est présente au Nord, au Centre et surtout au Nord-Ouest dans les zones d'Odiéné et Touba (Atsé, 1990; République de Cóte d'Ivoire,1991,1992). La distribution de Ía N'Dama suit la méme zone agro-écologique que la Baoulé, en zone de savane soudano-guinéenne et guinéenne. Elle aussi a été introduite en zone forestiére dans le cadre des élevages sous palmeraie.

La N'Dama fait partie des taurins á longues cornes. C'est une race trés rustique, possédant une grande résistance á la trypanosomiase. La conformation générale est massive et trapue chez les taureaux, mais fine chez la vache. La téte est forte et large avec des cornes en lyre effilées aux extrémités. La robe présente toutes les nuances du fauve, mais la plus répandue est le froment ordinaire. Les muqueuses sont roses, mais aussi fréquemment noires. C'est un animal de petite taille:110 cm chez le mále,118 cm chez quelques sujets et 1 I4 cm chez la femelle, pour des anim ux ágés de 4 ans (Coulomb,1976). Le poids moyen á la naissance est de 17 kg. Une moyenne de 20 kg a été obtenue á 1'Institut des Savanes (IDESSA) de Bouaké. Sur cette méme station de recherche, le poids adulte de 450 kg a été enregistré chez le mále. Le poids adulte généralement peut atteindre 300 kg. Des máles sélectionnés ayant un périmétre thoracique de 175 cm, une

hauteur au garrot de 122 cm et un poids de 436 kg ont été obtenus. Les valeurs moyennes pour les femelles étaient respectivement de 145 cm, 105 cm et 255 kg. Le bovin N'Dama est un animal bien conformé pour la boucherie, avec un rendement carcasse variant entre 48-55%. La vache est mauvaise laitiére selon Doutressoulle (1946). Des productions laitiéres de 269 á 731 kg pour une durée de 157 á 210 jours ont été enregistrées (Coulomb, 1976). En milieu sédentaire, au nord de la Cóte d'Ivoire, 400 á 600 ml/jour ont été prélevés sur des vaches N'Dama (Godet et al.,1981). Hoste et al. (1983) ont enregistré des productions laitiéres allant de 2,62 á 1,35 litres/ jour, de la premiére á la septiéme lactation.

La sélection sur la race N'Dama a commencé en 1955 á 1'IDESSA (ex Centre de Recherches Zootechniques, CRZ) de Bouaké en vue d'augmenter le format et d'améliorer la précocité. Les critéres de sélection étaient le format (poids), la conformation, les qualités reproductrices (précocité, fécondité, allaitement des veaux), les phanéres et la croissance. La robe fauve, du clair au foncé, avec des extrémités charbonnées, était acceptée. Tout animal ayant une robe avec des taches blanches était éliminé (Coulomb, 1967). Bien avant la sélection á 1'IDESSA, la multiplication de la N'Dama se faisait au ranch d'Abokouamékro en région Centre du pays, qui est devenu aujourd'hui le Centre Animalier d'Abokouamékro. La sélection de la N'Dama se poursuit au ranch de la Marahoué, au Centre-Nord de la Cóte d'Ivoire, créé depuis 1975, en vue de constituer des troupeaux destinés á fournir des géniteurs máles et femelles aux paysanséleveurs. En 1985, des taureaux N'IDama ont été introduits du Záire, de la compagnie Jules Van Lancker, au ranch de la Marahoué. Le ranch de Sipilou á 1'ouest de la Cóte d'Ivoire, créé depuis 1964, avait aussi pour objectif la multiplication de la N'Dama. Ce ranch, caractérisé par une savane á Andropogon macrophylles sur les plateaux et les pentes et des foréts galeries dans les bas-fonds et vallées, est malheureusement en voie d'étre envahi par les ligneux et les épineux *(Solannum verbacifolium, Harungana madagascariensis, Trema guineensis, Dicrostakis gomerata, Acacia* ataxacantha, *Mimosa pigra).*

2.3 La race Lagune

C'est une race en voie de disparition. Les derniéres statistiques estiment la population de Lagune á moins de 1000 tétes (République de Cóte d'Ivoire,1988, 1991). La disparition de la race Lagune avait été signalée par Aillerie depuis 1926. La raison du déclin de 1'effectif de la race Lagune est principalement la négligence. Cette race ne fait 1'objet d'aucun programme de recherche et n'est pas prise en considération par les programmes récents de développement. Au contraire, elle tend á étre remplacée par les races Baoulé et N'Dama, dans le cadre de 1'opération "Elevage sous Palmeraie".

TABLEAU I:
Tableau récapitulatif des effectifs et performances zootechniques des taurins de race locale[a]

Nom	Effectif[b] de race	Poids adultes (kg)	Age ler velage (mois)	Interval inter-velage (jours)	Fécondité (%)	Production Latière (kg)	Rendement carcasse (%)
Baoulé	389000	283 189	37 (26-38)	435 (300-480)	41V (28-56) 83S (82-85)	360 en 210j	52 (48-60)
N'Dama	92000	336 287	43V 37S	428 (410-479)	50V (50-52) 83S (70-95)	588 en 206j	53 (50-60)
Lagune	< 1000						

[a]*Les moyennes ont été calculées á partir des valeurs de divers rapports cités. La plupart d'entre elles sont les résultats obtenus au Département des Ressources Animales de 1'IDESSA, ex-CRZ.*
[b]*Les effectifs bovins ont été estimés á partir du total taurin et zébu et des pourcentages de diverses sources. V: milieu villageois; S : station de recherche*

Figure 46
Vache Baoulé au pâturage

Figure 47
Troupeau de vache Baoulé à la Station de l'IDESSA, Bauaké

Figure 48
Vache N'Dama et son veau à la Station de l'IDESSA, Bouaké

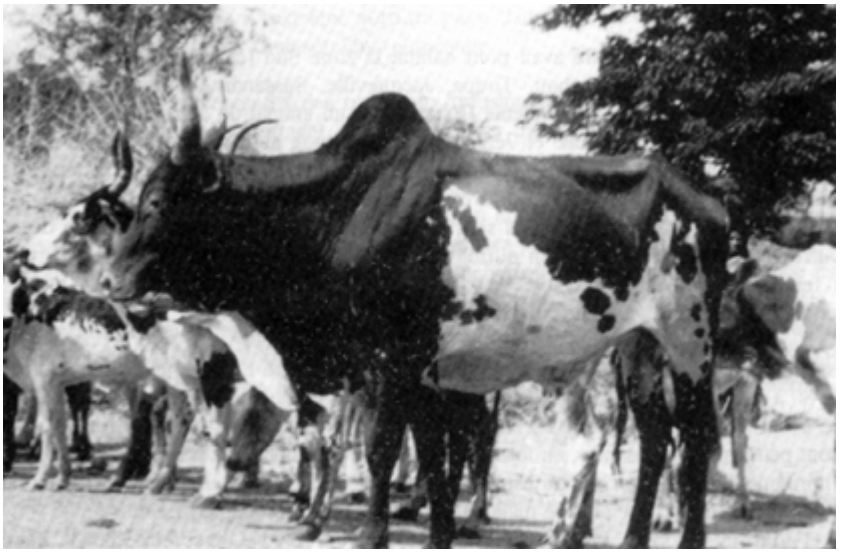

Figure 49
Troupeau transhumant de zébu

La race Lagune ou Lagunaire avait pour habitat la zone Sud (cercle des lagunes, Adzopé, Abgoville, Alépé), le littoral (Dabou, Toupa, Jacqueville, Sassandra, Lahou, Tabou) et les régions d'Aboisso (Sud-Est) et de 1'Indénié (Est). C'est un animal·de la zone forestiére et des mangroves du littoral, entre le 5éme et 7éme degré de latitude nord, dans les bassins inférieurs des fleuves Bia, Comoé, Bandama, Sanssandra et Cavaly. La zone forestiére se caractérise par la forét dense oú la végétation graminée est rare. Les quelques zones de savanes herbeuses sur le cordon littoral et les terres marécageuses sont colonisées par une végétation herbeuse de faible valeur nutritive pour les animaux. En outre, ces terres sont de plus en plus occupées par les cultures telles que le palmier á huile, le cocotier, 1'hévéa, 1'ananas, le bananier, etc. Les précipitations, abondantes, varient de 1600 á 2 000 mm par an.

C'est un animal de petite taille (plus petite que celle de la race Baoulé), avec une hauteur au garrot de 80 á 100 cm et un poids adulte de 100 á 180 kg. La Lagune est un animal breviligne et rectiligne avec u.ne conformation assez uniforme. La téte est épaisse avec un front plat. Les cornes sont pendantes ou absentes, en forme de croissant ou crochet. Les oreilles sont petites et portées horizontalement. Le chignon est arrondi et assez développé. Le tronc est cylindrique, mais le phanon est trés accusé chez le mále. La robe noire est commune. Le noir s'allie souvent au fauve et au froment foncé. La ligne dorsale porte souvent une bande comme chez le Baoulé. La robe totalement blanche est rare. La Lagune est mauvaise laitiére mais est une excellente race de boucherie. C'est une race rustique, trypanotolérante, très bien adaptée dans son milieu d'élevage.

TABLEAU 2:
Tableau récapitulatif des effectifs et performances zootechniques des Zébus et croisés bovins[a]

Nom de groupes	Effectif[b]	Poids adultes (kg)	Age ler velage	Interval inter-velage	Fécondité (%)	Production Latière (kg)	Rendement carcasse (%)
Zébu Peulth	419000	395 302	50 (45-60)	474	58-63 (pic à 83)	765 en 255j	54,8 (50-58)
Croisés	245000						
Méré		260					
N'Damaze						925 ml/j (800-1000)	
N'Damance		260 en 12 mois	31	382 (361-416)	94,73 (n=19)	7.2 kg/j (5,5-9,55)	61

[a]Les moyennes ont été calculées á partir des valeurs de divers rapports cités. La plupart d'entre elles sont les résultats obtenus au Département des Ressources Animales de 1'IDESSA, ex-CRZ.

[b]Les effectifs bovins ont été estimés á partir du total taurin et zébu et des pourcentages de diverses sources. V: milieu villageois; S : station de recherche

2.4 Autres types de bovins

Outre les trois races locales de taurins, il existe en Côte d'Ivoire des zébus et des métis. Les zébus et métis sont concentrés à l'extrême nord du pays, dans les zones de Tingrela, Boundiali, Korhogo et Ferkessédougou, en zone soudano-guinéenne.

Les zébus constituent l'essentiel des troupeaux transhumants (environ 71 % des troupeaux transhumants). Les zébus proviennent des pays voisins du Sahel, Burkina Faso et Mali en

particulier, et sont composés de diverses races. Les troupeaux des pasteurs Peuhls sont composés essentiellement de zébu Peuhl Voltaïque (Camus et al., 1981), en voie de sédentarisation au nord et au centre du pays. C'est un animal à tête fine, haut sur patte, peu éclaté. Les robes sont diverses. Les cornes sont moyennes ou longues dirigées vers l'avant chez le mâle. Les muqueuses sont souvent noires ou mouchetées. Le poids à la naissance est en moyenne de 23 kg avec un gain moyen quotidien (CrMQ) de 489 g j entre 0 et 12 mois. La fécondité moyenne des femelles âgées de 3-4 ans est de 30,6% et celle des femelles de 5-6 ans est de 83,2%, période à laquelle le pic est atteint selon les résultats obtenus à l'IDESSA (Petit, 1980). Le poids adulte des zébus Peulh est de 208 à 332 kg, pour un âge compris entre 4 et 5 ans. Les zébus Maure pèsent en moyenne 305 kg et les zébus Peuhl entre 307 et 319 kg. Le rendement carcasse est compris entre 53 et 55%.

Les élevages de la région Nord présentent des signes très importants de métissage, de l'ordre de 43 à 57% (Camus et al.,1981; Atsé,1990). On rencontre trois types de métis:

Le Méré: croisé Baoulé x zébu
La N'Damaze : croisé N'Dama x zébu Gobra
La N'Damance : croisé N'Dama x Fleckvieh et N'Dama x Abondance.

Les Méré sont issus de métissages anarchiques pratiqués par les éleveurs entre les zébus et les Baoulé; alors que les N'Damaze et N'Damance sont des produits de croisements raisonnés développés grâce aux projets de développement de l'élevage de la Société pour le Développement des Productions Animales (SODEPRA), en vue d'accrohre le format des races locales et la valeur laitière des mères. Les croisements N'Dams. x Fleckvieh et N'Dama x Abondance ont démarré en 1980.

Les veaux Méré peuvent atteindre 32 kg à la naissance avec une moyenne de 200 kg et 250 kg à 8 mois. Le poids moyen des Méré, au stade trois dents, varie entre 195 et 231 kg, avec un GMQ de 214-586 g/j et un rendement carcasse de 52% (Lhoste et Cloé,1980; Lhoste et al., 1980).

Le poids à la naissance des veaux N'Damance se situe entre 26 et 30 kg avec une moyenne de 28 kg. Le poids moyen de 19 vaches N'Damance âgées de 8 ans a été de 490 kg; la plus lourde pesant 522 kg. Leur production de lait varie entre 1500 et 1800 kg en 300 jours. Le Centre de Noroningué de la SODEPRA, situé à 3 km de Ouangolodougou, en zone Nord, était chargé de produire les noyaux laitiers.

Le croisement N'Dama x zébu Gobra était réalisé au Centre de Panya, situé à 15 km de Boundiali, en région Nord. L'objectif était de produire des animaux demi-sang pour la culture attelée. Le métis N'Damaze est un animal eumétrique, médioligne. Bien que sa conformation se rapproche plus de la N'Dama que du zébu, le cornage et la bosse sont assez bien développés. La robe varie du froment au rouge. La muqueuse noire est dominante.

D'autres croisements en vue de la production de lait et de viande ont été réalisés à la station de recherche de l'IDESSA: le croisement N'Dama x Jersiais (Charray et al., 1977). Ce croisement, débuté en 1965, fût arrêté en décembre 1975. Les animaux demi-sang pesaient en moyenne 19,3 et 17,6 kg à la naissance et 392,2 et 324,4 kg à l'âge de 4 ans, respectivement pour les mâles et femelles. Leur rendement moyen en carcasse présentait une valeur de 57,0% avec un record de 59,5%. La production moyenne de lait était de 1277±52 kg de lait à 56 g de matière grasse en 257±6 jours, toute lactation confondue.

3.0 LES OVINS

Une seule race constitue la race locale de Côte d'Ivoire: la race Djallonké dont l'effectif en 1991 était de 1161000 têtes. La race ovine Djallonké est présente dans tout le pays de la zone forestière aux zones de savane, avec une plus grande concentration en Région Centre et Est. Au niveau des grandes villes, dans les marchés à moutons, l'on rencontre des moutons sahéliens de race Touareg ou Peuhls ou des croisés Djallonké x Sahélien. Ces animaux proviennent des pays voisins du Sahel et ne constituent pas des noyaux d'élevages en tant que tels. Quelques têtes seulement (I à 10) sont gardées pour Yélevage de moutons de case.

Le mouton Djallonké est réputé pour sa grande tolérance à la trypanosomose et son aptitude à utiliser des fourrages de faibles valeurs nutritives dans les zones humides. La race Djallonké est constituée d'animaux de petite taille, 50 cm en moyenne et un poids adulte moyen de 25 à 30 kg. C'est un animal de type brachycéphale, médioligne et rectiligne. La tête est épaisse et étroite avec un chanfrein droit ou légèrement busqué chez le mâle. Les cornes chez le mâle sont peu développées et annelées. L'encolure est fme. Des poils longs et épais couvrent le bord inférieur et se prolongent dans l'intèr-ars formant une crinière et un camail chez le mâle. La poitrine est étroite et sanglée. La queue est courte, d'une longueur moyenne de 17 cm, se situant au dessus ou au niveau du jarret. Les robes noires et blanches sont les plus réparidues, avec des poils courts, fins et brillants. Le noir couvre fréquemment le train antérieur.

Le mouton Djallonké est considéré comme un très bon animal de boucherie, avec un rendement carcasse par rapport au poids vif de 48% chez les béliers entiers, 49% chez les castrés et 51 % chez les agnelles. La fertilité et la prolificité en station de recherche varient respectivement de 70 à 88% et de 111 à 136%. Dans les fermes de l'Etat, la fertilité et la prolificité varient de 88 à 99% et de 102 à 130%. En élevage villageois, en station de recherche et dans les fermes d'Etat, les fécondités moyennes respectives sont de 67,146 et 162% (Charray, 1984).

Le Centre National Ovin (CNO) créé en 1976, et qui sera suivi en 1977 par l'encadrement et la promotion des fermes d'élevage ovin, constitue la structure d'appui au développement de la race Djallonké. L'objectif est de produire des géniteurs mâles et femelles, expérimenter les différents systèmes d'exploitation des pâturages et contribuer à la formation et au recyclage des techniciens (Ministère Production Animale,1980; République de Côte d'Ivoire,1993).

En 1980, le Département des Ressources Animales de l'IDESSA a commencé un programme de sélection sur la race Djallonké. Le poids au sevrage à 90 jours se situe entre 8 et 12 kg, avec une moyenne de 11 kg. Le poids de 20 kg peut être obtenu à l'âge de 261 jours. Le rendement carcasse varie entre 44 et 50% (Aman,1987). La sélection sur la race Djallonké a été renforcée par le programme national de sélection ovine (PNSO), mis sur pied depuis 1983. La procédure de sélection du PNSO est basée sur la sélection massale, selon le principe d'amélioration à noyau ouvert, et a pour critère le poids individuel des béliers (Oya,1989). En fin d'année 1991, la base de sélection du PNSO comptait Il 194 brebis réparties dans 71 élevages dont le CNO (République de Côte d'Ivoire,1993). Dans les troupeaux de la base de sélection, la moyenne du poids à la naissance est 2,2 kg; celle du poids à 80 jours est de 9,1 kg et des béliers à un an de 31,8 kg. Parmi les béliers d'élite, certains sélectionnés de 1 an d'âge peuvent atteindre 40 kg. La sélection a permis de réaliser en moyenne un gain génétique de 28,11 et 14 g/an, respectivement sur les poids à 80, 180 et 365 jours; ce qui correspond à des progrès génétiques annuels, par rapport à Yannée de base, de 0,28; 0,05 et 0,04%, respectivement (Yapi,1994).

Figure 50
Troupeau de brebis Djallonké au Centre National Ovin, Béoumi

Figure 51
Bélier sélectionné Djallonké

4.0 LES CAPRINS

La seule race caprine locale est la Djallonké ou Naine d'Afrique de l'Ouest. Son effectif en 1991 était de 908 000 têtes (République de Côte d'Ivoire,1993). La chèvre Djallonké, comme le mouton Djallonké, se trouve partout en Côte d'Ivoire. Les performances de la race sont peu connues. Cependant sa viande est très appréciée par les populations qui en consomment. Les performances enregistrées sur un noyau donnaient de 1,04 à 1,44 kg pour le poids à la naissance, 2,6 à 3,7 kg pour le poids à 30 jours et 8,1 à 8,3 kg pour le poids à 180 jours (Berger,1980).

C'est un animal de taille faible, 40 cm en moyenne. La tête est forte, bosselée au niveau du front, du fait de la présence des cornes. Les cornes sont dirigées en arrière et en bas, couchées sur le bord supérieur de l'encolure chez le mâle. Le chanfrein est court. L'encolure est fme. Le tronc est trapu avec des membres courts et épais. La queue est courte et relevée. Les robes de couleur gris-marron, fauve clair ou noir avec de grandes taches blanches sont assez répandues. Le mâle porte une barbiche longue et bien fournie et une ligne de poils dressés plus ou moins foncés sur le dos. C'est un animal vigoureux, rustique surtout trypanotolérant et très vagabond qui digère bien les matières ligneuses.

Figure 52
Caprin Djallonké en élevage traditionnel

5.0 LES PORCINS

L'élevage traditionnel de la race locale, à croissance lente et dont le nom n'est pas défini, est le plus important (324 000 têtes). Selon Aillerie, ces animaux se rattachent à ceux de la race circum-méditerranéenne. Les oreilles sont courtes et horizontales. Le groin cylindro-conique est droit et très allongé. La robe est généralement noire, parfois pie-noire. L'âge de commercialisation se situe entre 12 et 15 mois, avec un poids de 50 à 60 kg. La taille est d'environ 50 cm. C'est une race très prolifique. L'animal vit dehors sans aucune surveillance, très rustique, résistant au milieu souvent peu favorable. Cette race locale se trouve partout en Côte d'Ivoire mais ne fait en ce moment l'objet d'aucun programme de recherche ou de développement.

L'élevage moderne de porcin se fait avec la race Korhogo (croisé Yorkshire Large White x race locale, Berkshire x race locale) ou avec la race Large White. Les premiers essais de croisement ont eu lieu à Bouaké dans les années 1930, puis ont été ensuite transférés à Korhogo, où ils ont plus de succès auprès des éleveurs qu'à Bouaké (Lalanne, 1948). Cette activité étant devenue florissante, le Centre d'Elevage Porcin a été créé avec pour objectif la production et la diffizsion de porcelet amélioré du type Korhogo. Le poids à la naissance de la portée est en moyenne de 11,4 kg. Le poids au sevrage à deux mois est en moyenne de 15 kg. A 90 jours le poids est de 20 kg; à un an les animaux pèsent entre 60 et 100 kg. Le pourcentage de gras varie entre 28 et 34%, avec une moyenne de 29% (Centre d'Elevage de Korhogo,1968).

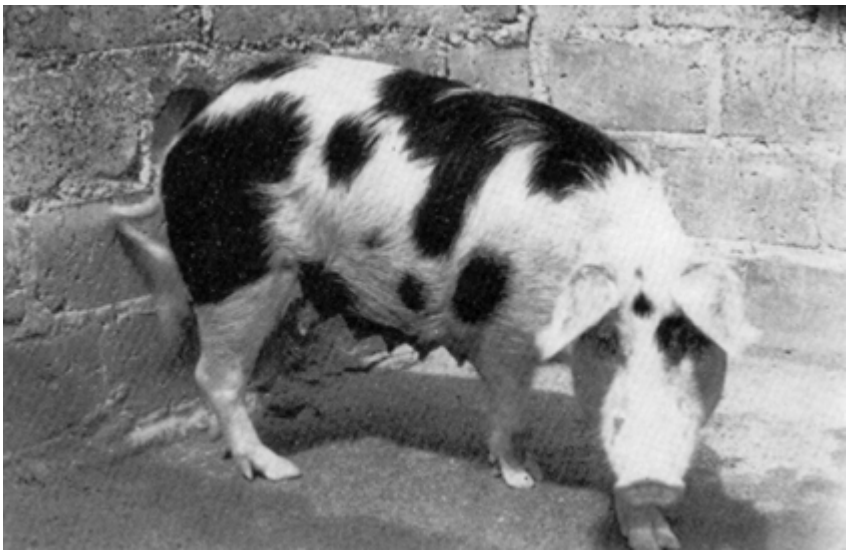

Figure 53
Porc croisé Korhogo en élevage intensif

TABLEAU 3:
Tableau récapitulatif des effectifs et performances zootechniques des ovins, caprins et porcins[a]

Espèces/ Race	Effectif[b]	Poids naissance (kg)	Poids adultes (kg)	Age lère mise-bas (mois)	Interval entre mise-bas (mois)	Fècondité (%)	Rendement carcasse (%)
Ovin Djallonké	1161000	2,1 (1,5-2,5)	35 25	12	7 (portée 1,13)	145 (130-206) (fertilité 83,8%)	48,9 (40-50)
Caprin Djallonké	908000		± 15				
Porcins							
Traditionnel	324000		75				65 à 70
Moderne	48000	1,3	314 236		(portée 9,4)		74

[a] *Les moyennes ont été calculées à partir des valeurs de divers rapports cités. La plupart d'entre elles sont les résultats obtenus au Département des Ressources Animnales de l'IDESSA, ex-CRZ.*
[b] *République de Côte d'Ivoire,1992: pour les effectifs ovin, caprin et porcin.*

6.0 LA VOLAILLE

La volaille, avec un effectif de 26 000 000 de têtes, est constituée de poules et pintades de souche locale très rustiques et de poules de souche importée. Les canards et dindons, dont l'élevage reste accessoire à celui des poules et pintades (Ministère de la Production Animale, sans date), avaient des effectifs respectifs de 94150 et 48 900 en 1975 (Barbuat, 1978). L'élevage traditionnel de volaille est concentré dans le Nord, les régions de Bondoukou, Bouna, Kong et Korhogo et le nord de la région Centre, Katiola-Dabakala. La région de Bouna est la plus riche en volaille, soit 12 volailles par habitant. Cependant, on rencontre les poules de souche locale à travers tout le pays. Cet élevage participe largement à l'approvisionnement des centres de consommation, mais leur productivité est faible. Le poids à la commercialisation des poules et pintades se situe entre 1 et 1,4 kg et elles produisent en moyenne 26 oeufs par an (Ministère de la Production Animale, sans date).

L'élevage moderne de volaille est concentré aux alentours des grandes villes telles que Abidjan et Bouaké. Cet élevage se fait avec des souches sélectionnées, importées d'Europe. Il s'agit des souches Vedette INRA et Hydro-Hubbard pour les poulets de chair et Harco et Warren, pour les poules pondeuses. Le poids moyen des poulets de chair est 1,5 kg avec un taux de mortalité de 10%. La poule pondeuse pèse en moyenne 2,4 kg avec un taux de mortalité de 10 à 12% et une production moyenne de 160 à 200 oeufs par an (Barbuat,1978).

7.0 LES SYSTÈMES D'ELEVAGE ET LEUR EVOLUTION

La plus grande partie du cheptel vit dans les villages, avec un système de production et de conduite de troupeau en majorité traditionnel. Les moutons, chèvres, porcs et volailles vivent dans l'indépendance la plus absolue. Avec l'encadrement de la SODEPRA, quelques améliorations ont été apportées. Cela s'est traduit par la construction de parcs individuels ou communautaires, surtout pour les bovins. Les parcs individuels ne représentent que 4% des effectifs; les élevages communautaires étant les plus nombreux (Ministère de la Production Aniznale,1986). La complémentation alimentaire est faite suivant la saison et l'état physiologique des animaux

(gestation, lactation) avec l'utilisation de sous-produits agro-industriels (mélasse, graine et tourteau de coton). La complémentation minérale est assuurée toute l'année. Le déparasitage interne ou externe est réalisé par les éleveurs avec des produits mis en vente par la SODEPRA à des prix subventionnés allant de 0% pour les trypanocydes et pulvérisateurs, à 75% pour les acariçides de bain détiqueur. Les campagnes de vaccination sont largement suivies par les éleveurs.

7.1 Système sédentaire traditionnel des bovins

Il a été largement décrit par Landais (1983). Il s'agit du type d'élevage pratiqué par les agriculteurs et accessoirement par des fonctionnaires et commerçants. Les animaux de plusieurs propriétaires sont regroupés en un seul troupeau communantaire. Le gardiennage est souvent confié à des bouviers Peuhl, logés et nourns et qui traient les vaches à leur profit, en plus de leur salaire. Dans la région de Bouna, le gardiennage est confié aux enfants. La nuit les animaux sont parqués dans des enclos aménagés à côté des cases. Le jour, ils pâturent sur la savane naturelle ou sur les jachères. Ils reçoivent quelquefois des déchets de cuisine ou des résidus de récoltes. La traite des vaches est pratiquée le matin avant le départ au pâturage. L'élevage traditionnel sédentaire a ëvolué vers l'intégration entre l'agriculture et l'élevage dans la zone cotonnière avec l'adoption de la traction animale par les paysans.

7.2 Système d'élevage transhumant des bovins

Ce système est relativement récent en Côte d'Ivoire et est l'oeuvre des éleveurs Peuhls venus des pays voisins du Sahel. Le système porte essentiellement sur les zébus. Ces éleveurs, qui ont ouvert des pistes à travers le nord du pays, descendent vers le sud à la recherche de points d'eau permanents et pâturage, avant de remonter en saison de pluie, vers leurs pays d'origine. Le troupeau est divisé en deux lots: un troupeau laitier qui reste et pâture autour du campement et un troupeau de parcours qui part en transhumance. Le lait du troupeau laitier, dont une partie sert à la consommation, est commercialisé par les femmes. Dès que le pâturage se dégrade fortement ou devient rare, le troupeau et le campement se déplacent.

Ce système évolue vers une semi-sédentarisation des troupeaux transhumants. Les Peuhls créent des campements et les troupeaux effectuent des parcours plus ou moins longs sous la conduite de bouviers. L'Etat de Côte d'Ivoire a créé des infrastructures de base avec pour objectif la sédentarisation des élevages transhumants, afin de réduire les situations conflictuelles entre agriculteurs et éleveurs Peuhls. Cette mesure n'a pas toujours obtenu l'adhésion des Peuhls. Certains se sont installés à proximité des villages des populations locales sédentaires, avec lesquelles ils tissent un nouveau type de relation, à la recherche de bon voisinage (AISA,1991).

7.3 Système d'élevage traditionnel villageois des petits ruminants

Ce système d'élevage, avec plus de 90% de l'effectif national ovin (Gadji et Oya, 1989) concerne les ovins et caprins de race locale, où les animaux sont en divagation permanente à la recherche de pâturage et consomment les résidus des ménages. En période de culture, surtout dans les zones denses de Korhogo, les petits ruminants sont parqués la nuit et mis au piquet le jour. Ils reçoivent alors du fourrage et de l'eau. Quelquefois la garde est confiée aux enfants. Ce système évolue vers un système semi-intensif avec l'encadrement de la SODEPRA et la formation de jeunes éleveurs par les programmes de développement.

7.4 Système d'élevage traditionnel des porcins et volailles

Comme celui des petits ruminants, ce système se caractérise par la divagation totale des animaux et concerne presque la quasi-totalité des porcins et volailles de race locale. Les animaux ne reçoivent presque pas de soin de la part des propriétaires. Ils se nourrissent en fouillant dans les ordures ménagères et les alentours des villages. La volaille bénéficie de graines de céréale distribuées par les propriétaires. Dans les villages et campements la volaille reçoit quelquefois des termites. La nuit, les animaux sont livrés à eux mêmes et dorment en plein air. Toutefois certains agriculteurs-éleveurs construisent des poulaillers traditionnels pour abriter la volaille pendant la nuit, disposent d'abreuvoirs et dispensent quelques soins.

7.5 Système d'élevage intensif

Ce système concerne les espèces animales domestiques telles que les taurins, ovins, porcins et la volaille. II s'agit des élevages modernes des fermes d'Etat, des centres de recherche ou des fermes commerciales privées. Les aniznaux sont sous garde permanente. Ils sont logés dans des abris construits, souvent avec du matériel durable, reçoivent une co$_{m}$plémentation alimentaire et un suivi sanitaire adéquat.

Dans le système de production intensive dè bovin, l'insémination artificielle (IA), sous le contrôle du Centre National d'Insémination Artificielle (CNIA) de Bingerville, est souvent pratiquée, surtout dans les programmes de croisement des bovins laitiers. Des essais d'IA ont été réalisés sur la race ovine Djallonké dans les années 1979-1980, donnant des taux de fertilité de 39 à 72% (Ministère de la Production Animale, 1986). Cependant l'IA des ovins n'est pas utilisée couramznent.

8.0 PROGRAMME DE CONSERVATION DES RACES

Les programmes de sélection entrepris sur les races N'Dama, Baoulé et ovin Djallonké, constituent des programmes de conservation par l'utilisation de ces races. Bien que l'aspect conservation de la race ne faisait pas spécifiquement partie des objectifs, ces programmes de sélection sont suivis par la diffizsion et la promotion de ces races auprès des éleveurs sédentaires. Depuis 1962, la Côte d'Ivoire entreprend la cession de noyaux d'élevage à des paysans qui en font la demande et qui remplissent certaines conditions. La taille du noyau varie selon les régions, la disponibilité en pâturage et en eau et les possibilités de gardiennage. Les animaux sont cédés sous forme de prêt remboursable, nombre pour nombre, en quatre ans, à partir de la 7ème année. Le bétail remboursé sert à reconstituer de nouveaux noyaux. Toutefois, étant donné le besoin accru des éleveurs de fournir des animaux de format comparables à ceux des zébus, surtout dans les zones cotonnières pour la culture attelée, et des ovins Sahéliens pour les cérémonies religieuses ou traditionnelles, on assiste en ce moment à des croisements anarchiques de la part des éleveurs dans l'extrême Nord du pays avec les bovins, et dans les grandes villes avec les ovins. Ceci peut à la longue mettre en danger certaines races locales. Des actions devraient être menées pour contrôler ces croisements et les maintenir dans une certaine limite. Les races locales constituent un capital génétique, qu'il est indispensable de sauvegarder et d'accroître parce qu'elles sont parfaitement adaptées au milieu et système d'élevage, qui souvent sont hostiles à d'autres races. En outre, ces races supportent un certain degré d'infestation des glossines, sans présenter des signes de maladies. Ces races ont une excellente conformation bouchère et particulièrement la race N'Dama est apte à la traction animnale.

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