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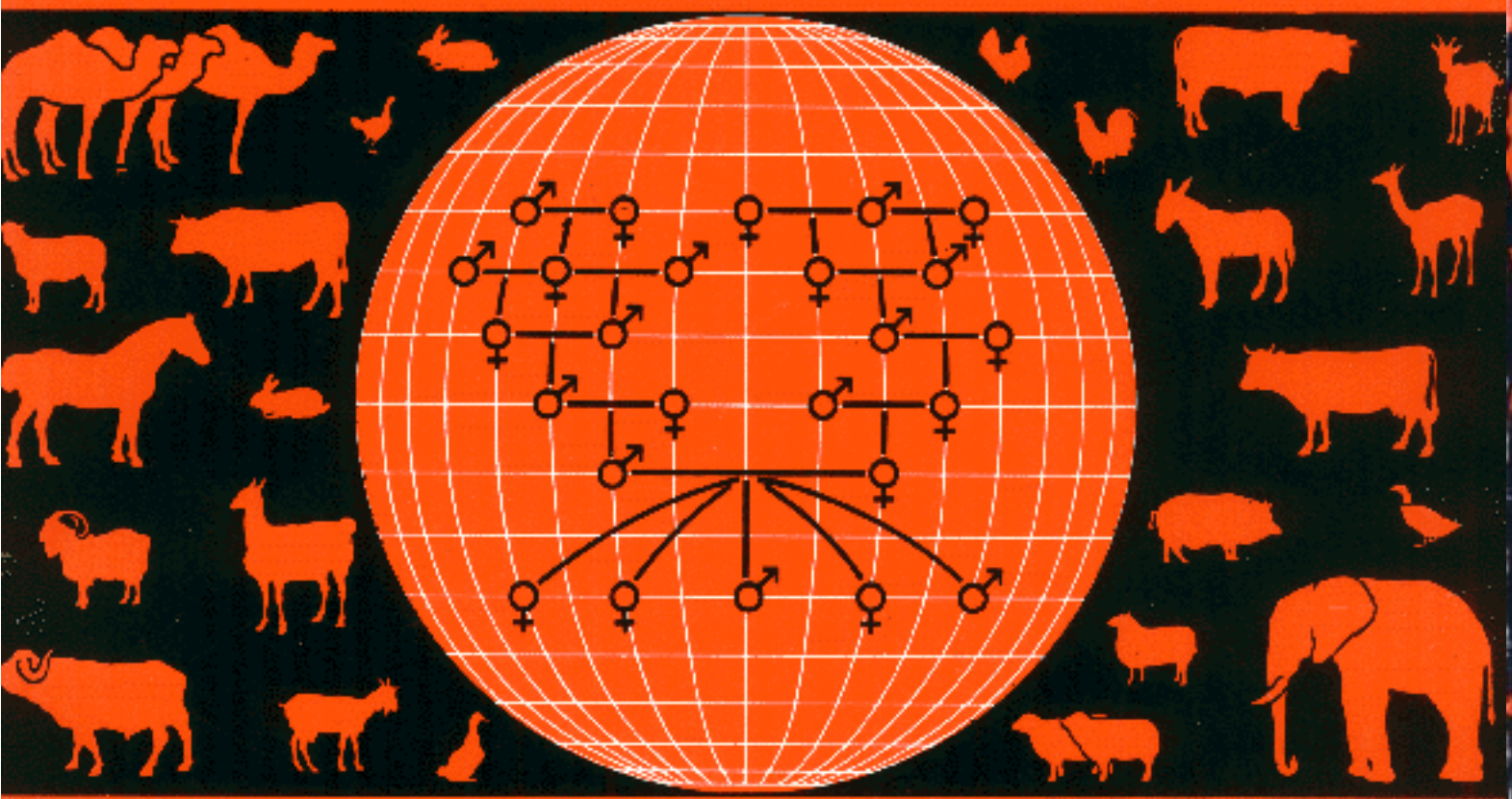
ANIMAL GENETIC RESOURCES INFORMATION

BULLETIN D'INFORMATION SUR LES RESSOURCES GÉNÉTIQUES ANIMALES

BOLETIN DE INFORMACION SOBRE RECURSOS GENETICOS ANIMALES

1991



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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 Editor, at the address on page v

BULLETIN D'INFORMATION SUR LES RESSOURCES GÉNÉTIQUES ANIMALES sera envoyé gratuitement aux personnes intéressées par la conservation,1'élevage ou 1'exploitation du bétail domestique. Les personnes souhaitant recevoir cette publication réguliérement voudront bien faire parvenir leurs nom et adresse á 1'éditeur, á 1'adresse indiquée en page v.

BOLLETIN DE INFORMACION SOBRE RECURSOS GENETICOS ANIMALES será enviado gratuitamente a aquellos quienes estén interessados en la conservación, gestión o utilización del ganado doméstico. Si se desea recibirlo regularmente, se ruega comunicar nombre, apellido y dirección al Editor a la dirección indicada en la página v

GUIDE TO CONTRIBUTORS

Animal Genetic Resources Information will be pleased to receive contributions up to 3000 words long in English, French or Spanish. If accepted, they will be published in the original language. Reports, news and notes about meetings, conservation and evaluation activities, and techniques would be appreciated. Manuscripts should be typed in double space and accompa ied by a summary of not more than 5 percent of the original length. Photographs are acceptable but only high quality black and white prints. AGRI will also review new books on animal genetic resources. Correspondence is invited.

All contributions should be addressed to:

The Editor, AGRI, AGAP, FAO,
Via delle Terme di Caracalla,
00100 Rome, Italy

Le Bulletin d'information sur les ressources génétiques animales souhaite recevoir des articles en anglais, en français ou en espagnol, de 3000 mots au maximum. Les communications publiées paraîtront dans la langue originale. Les rapports, informations et notes concernant les réunions et les activités de conservation et d'évaluation et les techniques seraient particulièrement appréciés. Les manuscrits devront être dactylographiés en double interligne et accompagnés d'un résumé ne dépassant pas cinq pour cent de la longueur de l'original. Le Bulletin accepte les photographies à condition qu'il s'agisse de bonnes épreuves en noir et blanc. Le Bulletin rendre également compte des ouvrages nouvellement parus sur les ressources génétiques animales. Un échange de correspondance est le bienvenu.

Adresser toutes les contributions à l'adresse suivante:

L'Éditeur, AGRI, AGAP, FAO, Via delle Terme di Caracalla,
00100 Rome, Italie.

E1 Boletin de Informaci6n sobre Recursos Genéticos Animales recibirâ con mucho gusto colaboraciones de hasata 3000 palabras de extensiôn en espanol, francés o inglés. Si son aceptadas, las contribuciones se publicará en el idioma original. Interesa recibir informes, noticias y notas sobre reuniones, actividades de conservaci6n y evaluaci6n, y cuestiones técnicas. Los originales deberân presentarse mecanografiados a doble espacio y acompanados de un resumen que no supere el 5 por ciento de la extensi6n original. Se aceptan fotografías, pero ûnicamente en blanco y negro y de buena calidad. AGRI también publicarâ resenas de libros sobre recursos genéticos animales. Se solicita correspondencia. Todas las contribuciones deberân dirigirse a:

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

1992 SURVEY/QUESTIONNAIRE

ORGANIZATIONS INVOLVED IN THE CONSERVATION OF ANIMAL GENETIC RESOURCES

This questionnaire is circulated in order to identify the organisms acting/directly interested in the field of conservation of farm animal germ plasm.

If relevant, please fill in and send back to: J.J. Lauvergne, Génétique Factorielle CRJ, F-78 362 Jouy-en-Josas Cédex, France.

The results will be analyzed for publication in a coming issue of Animal Genetic Resources Information [AGRI].

Name of the organization (in full) :

Acronym :

Address :

Phone number:
Fax number:

Type[1]: governmental/non governmental
international/national/regional

Date of foundation :

Date and place of registration :

President or manager :

Scope of interest :

Species :

Geographical area covered :

Main realizations :

1 Delete what not applicable

EDITORIAL

The fact that this Bulletin has been under way for a number of years is in itself an indication that the future of the world's animal genetic resources is regarded as a serious issue in FAO. In fact, concern for the genetic heritage of our domestic livestock is to be found in programmes going back almost to the beginning of the Organization. So the subject is not new. However, there isnow a heightened awareness that a new level of commitment is required. This is partly because we are all sensitized by the global debate on depletion of genetic resources, be they in plants, wild or domesticated animals, or indeed in whole eco-systems. It is also a reflection of the rapid changes, and pressures for change, which now confront the livestock populations in many developing countries.

Difficult choices are faced by livestock farmers and governmental authorities throughout the developing world. The urgent need to increase productivity is paramount almost everywhere. At the same time, there is increasing evidence that simply replacing local breeds or strains with apparently superior stock from elsewhere in the world is not always the answer. In some cases, introduction of exotic stock has led to great disappointment. Furthermore, particularly where extensive cross-breeding has been practiced, the local genetic resources have been greatly diluted, and sometimes their integrity has been compromised beyond recall.

The need therefore is to balance the requirements of development and conservation. Quite often, they can go hand in hand. A locally adapted breed, which has perhaps in the past not been selected for productivity, may find itself steadily losing ground as the demands for efficiency increase. In such a case, the survival of the local breed is best guaranteed by improving its productivity through selection from within, while at the same time improving the nutrition and husbandry circumstances which make its production system competitive.

To address this problem in a comprehensive and coherent way, FAO has recently put together a Global Animal Genetic Resources Programme. It includes some current activities, but for the most part it sets reasonable but ambitious targets for action over the next five years. The Programme has five main elements.

- Completion of the first world inventory of breeds and strains of domestic livestock.
- Establishment of conservation and improvement programmes in at least 12 key breeds around the world.
- Where appropriate, the development of facilities for long-term storage of semen or embryos.
- Exploitation of the developing DNA technology to underpin conservation programme.
- The establishment of a framework of international agreements on matters of equity, access, patenting and related issues as they affect Animal Genetic Resources.

FAO is committing some US$ 3 million of its existing resources to establish this programme. Its full implementation over five years will require an additional US$ 15 million. This programme is the first coherent attempt to address these questions on a global basis. It is the task whose time has come.

NEWS AND NOTES

TRAINING COURSE ON *IN VITRO* FERTILIZATION IN CATTLE.

A training course has been organized from 5 to 16 November 1990 in Brasilia by CENARGEN/ EMBRAPA with financial support from FAO. This course was attended by participants from Argentina, Brazil, Chile, Colombia, Cuba and Uruguay. Lectures and practical demonstrations were given by Prof. Fulka and Dr. Fulka Jr from Czechoslovakia and by Dr. De Bem from Brazil.

Participants were taught on preparation and handling of media, recovery of oocytes from ovaries recovered from slaughterhouses, in *vitro* maturation of oocytes, in *vitro* fertilization and in *vitro* culture to the stage of morula or blastocyst. Freezing of oocytes and embryos were also demonstrated, as well as recovery of embryos in the cow and in the mare.

During this two week course participants have had the opportunity to practice by themselves several times on a real scale all the steps of these procedures.

WORKSHOP ON BUFFALO OPEN NUCLEUS BREEDING SYSTEMS.

A workshop on Open Nucleus Breeding Systems applied to Buffaloes was held in Shumen, Bulgaria, from 18 to 23 November 1990. Participants from 10 countries (Bulgaria, China, Egypt, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand and Vietnam) took part, each presenting information as a country report. Lectures were presented by D.E. Steane, FAO and B. Mc Guirk of Genus Moet, Great Britain. The problems and advantages of both Open Nucleus Breeding Systems and of Multiple Ovulation and Embryo Transfer (MOET) were fully discussed. Several important aspects were recommended for future action in the development of buffalo breeds worldwide. The proceedings have been published and are available on request from AGA Division, FAO, Rome.

WORKSHOP ON BIOTECHNOLOGY OF REPRODUCTION IN BUFFALOES.

A workshop has been organized by the Buffalo Research Institute of Shumen (Bulgaria) with financial support from FAO, from 13 to 19 May 1991, in Varna (Bulgaria), simultaneously with the Third World Buffalo Congress.

Participants from Brazil, Bulgaria, China, India, Italy, Malaysia, Philippines, Thailand and Vietnam were invited to this workshop which was also opened to all the participants to the world congress.

During a first session, participants presented the status of research and development activities in their respective countries in the field of reproduction. Emphasis was given not only to biotechnologies but also to basic knowledge of reproductive phenomena (Puberty, Postpartum, Oestrous cycle, Fertility...) as well as to relation with environment, such as feeding, management, light or temperature. The role of AI and some possible strategies for the improvement of its use and efficiency were discussed.

During a second session, an attempt was made to classify the main research subjects for the 2 or 3 next years in the participating countries. Intercountry projects have been suggested aiming at using reproductive biotechnologies for increasing the efficiency of genetic improvement of Buffaloes.

STRENGTHENING OF REGIONAL ANIMAL GENE BANKS

The first training course on the organization and implementation of a regional gene bank was held at the Centro Nacional de Recursos Geneticos (CENARGEN) of the Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA) in Brasilia, Brazil, from 20 to 31 May 1991. Twenty four participants from 12 countries - Argentina, Bolivia, Brazil, Chile, Colombia, Costa-Rica, Cuba,

Ecuador, Mexico, Peru, Uruguay and Venezuela - attended the course. Each country was represented by two participants, a specialist in animal genetic and a specialist in reproduction, particularly Artificial Insemination and Embryo Transfer.

Lectures and practical demonstrations were given by two lecturers from Argentina, two lecturers from Brazil, and a lecturer from the FAO Global Data Bank in Hannover. Lectures on genetics addressed the criteria for selection of breeds for preservation (identification of breeds in danger, estimation of level of risk, characterization of breeds and of distances between breeds), kind (semen, embryos, oocytes, DNA) and size of samples (number stored, parental origins), as well as legal and institutional aspects and in situ preseration. Lectures on reproduction addressed the selection and preparation of donors (males and females), the production and storage of samples, the revival and use and the health regulations. Lectures on data handling addressed the collection, storage and use of records characterizing the samples and the production and adaptation of the required software.

A second course was held on the same principles for Asia, from 25 November to 6 December 1991 in Nanjing (China) in cooperation with the Animal Science Department of the Nanjing Agricultural University This course involved participants (one geneticist and one reproduction specialist as for the first course) from Afghanistan, Bangladesh, China, D.P R.Korea, India, Indonesia, Republic of Korea, Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Union of Myanmar and Vietnam. Lectures were given by the regional coordinator of the Latinamerican Genebank, two international consultants, two lecturers from China and one from India.

4TH WORLD CONGRESS ON GENETICS APPLIED TO LIVESTOCK PRODUCTION

The conference was held in Edinburgh in July 1990 and attended by 717 delegated from 54 countries.

There were three Plenary Lectures: Quantitative Approaches to Animal Improvement by E.P Cunningham; Humanity and Livestock: A Saga of Symbiosis and Synergism by R.L. Willham; Genomic Imprinting: Epigenetic Control of Gene Expression by M.A. Surani and N.D. Allen.

There were ten main sessions covering the genetics of reproduction, selection theory and experiments, genetics of adaptation to extreme environments, genetics of growth and one each on the breeding of pigs, sheep, beef cattle and dairy cattle.

There were 19 workshops which dealt with subjects as diverse as breeding value prediction with the animal model, genetic nomenclature of cattle, avian biotechnology and conservation of animal genetic resources.

There were 13 sessions set aside specifically for contributed papers: each sessions dealt with a specific topic aligned to a topic dealt with in either a main session or a workshop.

An innovative idea (at least for WCGALP) was the way in which the poster sessions were organized. There were two sessions both arranged in the evening (20.00-22.00). Each session dealt with a specified list of subjects. The area used was large and bar facilities were available in an adjacent room. The sessions were well attended,socially enjoyable and, according to those presenting posters, provided excellent discussions. It seems that this formula provided the forum which posters should enjoy but, in many meetings, fail to receive.

OPEN NUCLEUS BREEDING SYSTEMS

An FAO conference on Open Nucleus Breeding Systems was held at Bialobrzegi, Poland on June 11-19,1989. A series of papers were presented by scientists from developing and developed countries having developed the use of ONBS. Most papers dealt with aspects of Multiple Ovulation and Embryo Transfer (MOET) and several described newly developed programmes and activities.

Papers reviewing the potential for MOET schemes in terms of genetic progress were also presented, in addition to several papers describing the dairy improvement programme for the authors countries. The conference essentially considered dairy cattle improvement, with only one paper emphasising breeding for dual purpose animals and one on buffalo breeding. The proceeding are published in the Animal Science Paper and Report series of the Polish Academy of Sciences, Institute of Genetics and Animal Breeding and form a most useful collection of information on the subject. Copies are available from AGA Division, FAO, Rome.

WORLD MEETING ON DOMESTIC ANIMAL BREEDS AND THE DISCOVERY OF THE AMERICAS

This meeting is organized by the Departamento de Genetica, Facultad de Veterinaria, Avenida Medina Azahara, 9 E -14005 Cordoba, SPAIN. It will be held on the 21- 23 September 1992, following the 43rd Annual Meeting of EAAP

This congress aims to define criteria on the influence of the discovery of the Americas on the present world animal breed panorama. The persistence of the original types, their development in the new world, the return of modified old genotypes, and the catalogue of “new” and “old” breeds will be discussed.

RECENT PUBLICATIONS

1.0 GENERAL

PERFORMANCE RECORDING OF ANIMALS: STATE OF THE ART,1990 (in English, French and German). P Gaillon and Y. Chabert (Eds.). EAAP Publication No 50. Published by PUDOC, P.O. Box 4, NL-6700 AA Wageningen, The Netherlands (1991).193 pages. ISBN 90-220-1015-5.

These are the full proceedings of the 27th biennial session of the International Committee for Animal Recording (ICAR), held in Paris on July 2-6,1990. During past years, specific Working Groups have been formed to deal with aspects of performance recording, methods used, materials used, and the expression and interpretation of results obtained. These Working Groups, comprising specialists from the 30 member countries, correspond, meet and develop their subject in order to present a report every other year to the plenary sessions of the organization. The 1990 proceedings include the biennial reports of INTERBULL (international bull evaluations), the approval of milk recording equipment, beef recording methods, instrumental means of analysis, computer developments in recording, the identification of animals, lactation calculation methods and the milk recording aspects of sheep and goats. In addition to the main reports, there are specific communications presented for discussion at the meeting. This book is of great actuality to scientists and technicians involved in the performance recording of ruminants, as well as students.

CYTOGENETICS OF ANIMALS. Clive R.E. Halnan (Ed.). Published by CAB International, Wallingford, Oxon, 0X10 BDE, U.K. (1989). 519 pages. ISBN 0-85198-629-3.

There are 25 chapters dealing with various aspects of cytogenetics, mainly of farm animals. The chapters range from complete and detailed treatises to rather fragmentary observations. An atlas of selected karyotype forms appendix 1. Appendices 2 and 3 contain a glossary of terms and technical methods, respectively. This is a most interesting book, and as a scientific publication it is unusual. The editor has really set his mark on this publication by supplying a lengthy introduction, contributing to four of the 25 chapters and adding considerably to the three appendices that account for approximately 150 pages.

UTILIZATION OF ANIMAL GENETIC RESOURCES IN LATIN AMERICA. Published in English, as a supplementary volume to Revista Brasileira de Genetica (Brazilian Journal of Genetics), Vol.12, No 3. Edited by Prof. F.A. Moura Duarte, Departamento de Genetica, Faculdade de Medicina de Ribeirao Preto,14.049 Ribeirao Preto - SP, Brazil (1989). 330 pages.

The publication comprises the proceedings of a Symposium held in September 1989 in Brazil. Some successful Latin America projects are reviewed, and also general principles are presented by leading world authors. The publication should be useful to non Latin American readers interested in the utilization and conservation of Animal Genetic resources, particularly in developing countries. Contents include: Strategies in Genetic Resource.

Utilization, C. Smith; Genetic Models to Predict Crossbred Performance: a Review, E.J. Eisen; Guidelines for the Genetic Evaluation of Dairy and Dual Purpose Cattle in the Latin American Tropics, L. Vaccaro and R. Vaccaro; Direct DNA Transfer and Molecular Approaches to Animal Growth, J. Kopchick, W Y. Chen, A. Shafer and S.J. McAndrew; Beef Cattle Breed Resources Utilization, R. Koch, L.V Cundiff and K. Gregory; Formulation of Breeding Plans for Dairy and Dual Purpose Cattle, E.P Cunningham; Sheep Breeding Programmes in Uruguay, R. Cardellino; The Bovine Lymphocyte Antigen (BoLA) System: Importance and Relationship to Disease in Cattle, D. Bernoco and H.A. Lewin; Genetic Improvement of South American Camelids, C.

Novoa M.; Domestication and Potential for Genetic Improvement of Capybara, A. Lavorenti; Crossbreeding Beef Cattle in Southern Latin America, G.E. Joandet; Results from Crossbreeding Bos taurus and Bos indicus in Tropical Latin America, D. Plasse; Cattle Breed Resource Utilization for Dairy Production in Brazil, F E. Madalena; Criollo Cattle Utilization for Dairy Production in Bolivia, J.V Wilkins and F Rojas; New Dairy Breeds in Cuba, D. Lopez; The Brazilian Genetic Resources Conservation Programme, A.S. Mariante and J.B.F. Trovo; Crossbreeding and New Beef Cattle Breeds in Brazil, P.F Barbosa and FA. Moura Duarte; New Dairy Cattle Breeds in Brazil, R.B. Lobo and J.C. Reis; Genetic Improvement Programme of Argentine Holsteins, D.O. Musi.

GENETIC RESOURCES OF PIG, SHEEP AND GOAT K. Maijala (Ed.). World Animal Science, B8. Published by Elsevier Science Publications, PO. Box 211, NL-1000 AE Amsterdam, The Netherlands (1991). 556 pages. ISBN 0-444-88279-0.

The volumes of Subseries B of "World Animal Science" are each devoted to a specific discipline, e.g. reproduction, breeding, climatology, genetic resources etc. Volume B8 of the Subseries refers to the genetic resources of three species: pigs, sheep and goats. Chapter 1 is a general introduction, Chapters 2-8 concern pigs, Chapters 9-24 sheep, and Chapters 25-33 goats, so that the readers interested in a particular species can easily find what they need. Those interested in some special aspect of genetic resources irrespective of species, can find them from the list of contents. Special aspects are discussed in more detail with regard to one of the species, e.g. domestication in pigs, and thus the chapters concerning different species can supplement each other. Conservation of both pig and sheep genetic resources is discussed in the same Chapter 8. The prospects of genetic engineering are discussed in sections of Chapters 5,15 and 17. The prerequisites for understanding the texts vary from chapter to chapter, but in general a basic understanding of animal breeding is assumed. However, some of the chapters contain comprehensive reference lists, while others refer only to reviews and books for further reading.

LA COULEUR DU PELAGE DES MAMMIFÈRES DOMESTIQUES (Hair colour in domestic mammals; in French). Ethnozootechnie No 45. Published by Societe d'Ethnozootechnie, 25 Bd Arago, 75013 Paris, France (1990).116 pages. ISBN 2-901081-28-2.

La couleur du pelage a conserve une importance economique, mais aussi psychologique et symbolique. Pendant longtemps sa transmission hereditaire a intrigue ou inquiete les hommes. Les geneticiens expliquent peu a peu son mecanisme. Ce numero de la serie ETHNOZOOTECHNIE rassemble dix communications presentees a la journee d'étude organisée par R. Laurans, le 4 Avril 1990, au Museum National d'Histoire Naturelle. Généticiens, biologistes, zootechniciens et ethnologues se sont succédés pour expliquer la rôle de la couleur du pelage dans la sélection animale et les mentalités.

ÉVOLUTION DES RAPPORTS HOMMES ANIMAUX EN MILIEU RURAL (Evolution of the relations between men and animals in the rural societies; in French). Ethnozootechnie No 46. Published by Société d'Ethnozootechnie, 25 Bd Arago, 75013 Paris, France (1990). 100 pages. ISBN 2-901081-29-0.

Lévolution des techniques a provoqué des changements souvent importants dans la conduite de l'élevage des animaux domestiques. Elles imposent parfois des contraintes aboutissant à des souffrances physiques ou mentales. Dans quelles limites productivité et droits de l'animal sont-ils conciliables? C'est sur cette question que les douze auteurs des communications présentées à la journée d'étude de la Société d'Ethnozootechnie du 17 novembre 1990, organisée par Nicole

Bochet et Annick Nouza ont échangé leurs points de vue. Le lecteur aura la possibilité d'élargir son champ de réflexion sur le statut de l'animal d'élevage.

2.0 CATTLE

CHARACTERISTICS OF THE CHINESE YELLOW CATTLE ECOSPECIES AND THEIR UTILIZATION. Y Chen, Y Wang, H. Cao and Y Zhang (Eds.). Co-edition of the Chinese Academy of Agricultural Sciences and the FAO. Published by Agricultural Publishing House, Beijing, China (1990). 278 pages. ISBN 7-109-01920-9/S.1276.

This is the first publication (in Chinese and English) of the information made available through the project on "Cluster Analysis on Chinese Yellow Cattle" of the Institute of Animal Science of the Chinese Academy of Agricultural Sciences. The publication refers to the global classification of the Chinese Yellow Cattle breeds (Blood protein polymorphism; Y Chromosome polymorphism; Body-state; Coat colour characteristics; Body size; Origin and historical evolution; Use and conservation practices). The available results of the various analyses and other relevant data are presented and discussed in detail, including aspects of the historical migrations and selection practices. The publication is completed by summary tables, relevant reference lists and a series of colour photos.

GENETIC IMPROVEMENT OF CATTLE IN SOUTHERN MEDITERRANEAN CLIMATES (in French and English). EAAP Publication No 47. M. Taieb Belhadj and J.L. Tisserand (Eds.). Published by PUDOC, PO. Box 4, NL-6700 AA Wageningen, The Netherlands (1990).100 pages. ISBN 90-220-1010-4.

The proceedings report the symposium jointly organized by the Tunisian Department for Animal Production and the International Institutions EAAP, CIHEAM, FAO and ICRPMA, dealing with problems of dairy cattle breeding and production under southern Mediterranean conditions. Invited papers are grouped in four different sections:

Actual situation in Maghreb countries (seven papers); Genotype-environment relations (two); Methods of genetic improvement and economic aspects (three); in addition, the results of two round-table discussions on perspectives of local breeds and of pure breeds are reported. A general synthesis summarizes the conclusions from the presentations and the discussions, resulting in a series of recommendations on lines of action and cooperation in research and advisory activities of the countries involved.

3.0 SMALL RUMINANTS

L'EVALUATION DES OVINS ET DES CAPRINS MEDITERRANEENS (The evaluation of Mediterranean sheep and goats; in French). J.C. Flamant and E.P Morand-Fehr (Eds.). Rapport EUR 11893 FR-EN. Published by the Commission of European Communities, 2920 Luxembourg (1989). 578 pages. ISBN 92-825-9733-4.

These are the proceedings of the PHILOETIOS group's symposium held in Fonte-Boa (Portugal) in September 1987; it was held as an EEC (Agrimed), EAAP, FAO and CIHEAM joint venture. Mediterranean sheep and goat breeds are considered in general as diversified and insufficiently identified despite numerous studies, probably too much restricted to particular points. There is a need for a more global and systematic approach of this animal material, considered as a major key for understanding the local production systems. In this respect the PHILOETIOS symposium took into account four main questions concerning "the evaluation of Mediterranean sheep and goats":

- Why is it useful to evaluate Mediterranean sheep and goats?

- How can we take into account the economic aspects of the production systems in order to achieve this evaluation?
- What are the criteria relevant to this evaluation?
- How can we in practice do the evaluation of Mediterranean sheep and goats within their production systems?

Over and above the definition and characterization of the populations, the proceedings include the data relating to the evaluation of the genetic material within the existing production systems and considers the main possible technical and economic strategies for the region:

- Obtain a higher production level for individual animals.
- Manage and valorize the available territories and their natural resources.
- Produce specific well defined products with local characteristics and a high commercial added value.

L'ALLEVAMENTO DELLA CAPRA (Goat raising; in Italian). R. Rubino (Ed.). Published by Dipartamento Agricoltura e Foreste, Regione Basilicata, Via Anzio 44, I-85100 Potenza, Italy (1990). 278 pages.

The book, written in Italian, focuses on Mediterranean conditions and was intended primarily as a practical guide in setting up a goat herd, or for goat farm management. However, it is not just a popular work. The proposed methods of reproduction, milking, feeding, selection, pathology, cheese making and management result from the latest scientific data presented at EAAP annual meetings in Munich, Madrid, Zagreb, Thessaloniki, Lisbon and Budapest, and from the work of the FAO subnetwork on cooperative research in goat production. The authors focus on these basic data and their own results to present everything that can interest those involved in goat farming. They indicate what is well adapted to the agro-climatic and socio-economic conditions of the South of Italy and, more generally, to the Mediterranean region. This is particularly true for the chapters on housing, cheese making and herd management. The editor and his colleagues have put together a scientifically rigorous book which is also easy to use in resolving practical questions. In this field where good quality information is scarce, it is a basic reference book, not only for extension services, but also for veterinarians, teachers, students and project experts.

LES PETITS RUMINANTS ET LEUR PRODUCTIONS LAITIERES DANS LA REGION MEDITERRANEENNE (Small ruminants and their milk production in the Mediterranean region; in French). J. Bougler and J.L. Tisserand (Eds.). Options Mediterraneennes, Serie A, No 12. Published by CIHEAM,11 rue Newton, F 75116 Paris, France (1990).128 pages. ISBN 2-85352-097-8.

These are the proceedings of two international symposia organized by CENECA and CIHEAM during the Paris Agricultural Show (5-9 March 1990) at which a large spectrum of Mediterranean dairy sheep breed was presented during the first day The characteristics, localization and potential of the breeds, the systems of production and their recent evolution, the orientation and perspectives of milk production were discussed, as well as the objectives and specifics of the existing genetic improvement programmes. During the second day were presented and discussed the production and commercial possibilities of the traditional dairy products of the various parts of the Mediterranean region.

4.0 EQUIDAE

"IL MAREMMANO" (The Maremma horse; in Italian). G. Bonavolonta and M. Silvestrelli. Published by Edizioni Equestri, Viale Bianca Mario 19, Milano, Italy (1989).185 pages.

The Maremmano is probably today the most representative horse breed of the very diverse Italian horse population. The breed was characterized by the many changes and social mutations of the industry, and its breeders still try to find the optimal space for its future evolution. This most interesting book presents this horse breed through its historical links, its cultural evolution and the many events that helped shape its actual phenotype and place. The book gives a good description of the environment and region of its origin (the Maremma) and then develops an objective and even critical evaluation of the horse's origins through the identification of the main breeding lines, the administration of the Herd Book, the problems relating to the systems of raising, selection and management today, and discusses the future possibilities and uses of the breed.

HORSE BREEDING IN FRANCE (in English and French). E. Rossier (Ed.). Published by CEREOPA,16 rue Claude Bernard, 75231 Paris Cedex O5, France (1990).106 pages. ISBN 2-85-903-045-X.

These are the proceedings of an EAAP Symposium held in Toulouse, France on July 11,1990. France has the privilege of having a varied and prosperous horse breeding industry. It has been structured for a long time and statistical assessments of all kinds are widely available to all. Therefore, this book does not dwell on the statistical aspects but rather on the philosophical dimension and what the future has in store. What part is played by horse production in today's society and what are the possible prospects. After a presentation of horse breeds and breeding in France, the financial aspects of the industry and the identification system used are discussed. Horse racing, the appraisal of young horses, the link to agriculture and tourism, BLUP and the new methods of breeding and selection as well as the modern reproduction techniques are critically presented.

5.0 BUFFALOES

OPEN NUCLEUS BREEDING SYSTEMS (ONBS). D. Steane and A.Iv Alexiev (Eds.). Co-edition of the Bulgarian Agricultural Academy and FAO. Published by SIKOM 22, 4a Slaveykov, Sofia, Bulgaria (1990). 298 pages.

This publication presents in length the complete proceedings (papers and reports) of the buffalo workshop held from 16-23 November 1990 in the Buffalo Research Institute in Shumen (Bulgaria) with participants from Bulgaria, China, Egypt, India, Indonesia, Malaysia, Pakistan, Philippines, Thailand and Vietnam. An introduction, summary of the discussions, and the recommendations of the Workshop are followed by the proceedings of the two main sessions (Genetic Aspects of ONBS and Moet schemes for meat and draught animals and biotechnology aspects). Nine country reports and eleven papers on specific national proposals complete this publication.

THE BIOTECHNOLOGY OF REPRODUCTION IN BUFFALOES. D. Chupin and A. Alexiev (Eds.). Co-edition of the Bulgarian Agricultural Academy and FAO. Published by the Animal Production and Health Division of FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy (1991). 48 pages.

These are the proceedings of the FAO Workshop held in Varna (Bulgaria) in May, 1991. Following an introduction, the nine country papers (Brazil, Bulgaria, China, India, Italy, Malaysia, Philippines, Thailand and Vietnam) presented are published in full. A summary of the discussions and conclusions are included in the proceedings.

PRODUCTION POTENTIAL AND BREEDING SCHEMES OF SOME MEDITERRANEAN DAIRY SHEEP BREEDS

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SUMMARY

Examinded are some of the most important dairy sheep breeds, among the great diversity of the Mediterranean sheep population, by focusing on their phenotypic characteristics, their productive and reproductive potential as well as on the management practices and systems of testing. Information is also given on their genetic parameters, with emphasis on heritability coefficients, and the range of respective selection and breeding schemes, applied under their particular husbandry conditions.

RESUME

Parmi la grande diversite qu'offre la population ovine de la region mediterraneenne, on a examine le cas des races les plus importantes de brebis laitieres en s'attachant particulierement a leurs caracteristiques phenotypiques, a leur aptitude a la reproduction et a leur potentiel de production. On s'est attache aussi aux pratiques et aux systemes d'elevage. Les parametres genetiques ont reçu 1'attention necessaire, laquelle a porte en particulier sur les coefficients d'heritabilite et leur selection, ainsi que sur les plans d'elevage.

1.0 INTRODUCTION

In the mountainous and marginal regions, at the perimeter of the Mediterranean basin, traditional small ruminant production has always been an integral part of local rural econamies. In those areas, most of the sheep milk comes from multiple purpose, low yielding animals, raised under extensive husbandry conditions. However, some of these populations evolved to "dairy" type breeds which, in certain cases, combine high milk yield and good prolificacy; they either belong to sizeable groups or have small population size and, in extreme cases, are threatened by extinction (Boyazoglu and Flamant,1990).

In many of these cases, purebreeding and intra-breed selection has been the most popular method in maintaining good productivity and in ameliorating production potential. It should be noted that crossbreeding to upgrade indigenous sheep populations by dairy sheep of northern european origin or by other highly specialized breeds, implemented injudiciously and beyond a certain limit, has in most cases given negative results and introduced health problems and weaknesses, not regularly encountered in the hardy local populations; the latter are reputable for their perfect adaptability to adverse environmental conditions. 'The cases of synthetic dairy breeds resulting from relatively recent crossbreeding schemes (e.g. Assaf, F S.L., Frisarta etc.) are not discussed in this paper. With regard to purebreeding, it should be stressed that variability of the Mediterranean environmental conditions as well as different social, economic and technical situations do not favor the adoption of a unique selection scheme. Appropriate schemes can range widely from pedigree and individual selection within nucleus-flocks, to various sophisticated large scale progeny testing programmes using A.I. and advanced methods of evaluation like BLUP and Animal Models. Programmes combining conventional progeny testing and MOET technology although interesting, are still under scrutiny (Barillet,1991).

The growing importance of the intensive dairy sheep sector was recently become evident by many developments. Among those are well organized selection programmes (progeny testing), modern husbandry methods (improved nutrition, hygiene, housing, artificial insemination, hormonal control, mechanical milking etc.) optimal exploitation of sheep milk (high quality specialized cheeses and other fermented products) and updated marketing practices. Some information concerning production potential and genetic parameters of certain dairy sheep breeds as well as a range of respective breeding schemes, implemented on various occasions and under different circumstances, are presented in this paper.

2.0 GENERAL INFORMATION ON SOME DAIRY SHEEP BREEDS

The wide spectrum of milk sheep populations in the Mediterranean basin includes a great variety of types and breeds, differing largely with respect to their milk yield, milkability, udder morphology, prolificacy, rusticity and growth rate of lambs, as well as to their body size, conformation, coloring and fleece characteristics. Production traits, prolificacy, longevity, vitality, health status etc., besides being dependent on genetic factors, are also decidedly influenced by climate, hygienic conditions, food availability and husbandry systems applied (Boyazoglu,1991).

Indicative information from the main sheep breeds, of a population size of over 100,000 head each and with exploitable milk production as one of their main aptitude, is given in Table l. For some breeds, known for their high milk yield and prolificacy and/or their particular breeding schemes, a brief description is given here, based on the available bibliography. Part of this information has already been presented at the International Symposium on the constraints and possibilities of ruminant production in the dry subtropics, held in Cairo in 1988 (Zervas et al.,1989). Information on the milk recording of sheep was discussed in length by Boyazoglu (1991), also in relation to selection and breeding practices. Dairy breeds known for high milk yield and prolificacy but of a very small population size (e.g. Skopelos - Kimi, Delle Langhe etc.) are not considered in this presentation. The ten main “dairy breeds” of the Mediterranean are the following:

2.1 Awassi (Improved)

This refers particularly to Israel’s Awassi population which totals today some 230,000 head. Interest for the improved Awassi is expressed mainly in the Middle East areas, although in the past it was exported in limited numbers to certain European countries (Spain, Yugoslavia). It is medium to large in size, with height and weight of the females 72-74 cm and 60-70 kg, respectively. The typical color is white with red-brownish head, ears and upper part of the neck. The legs may be partially or totally brownish. The fleece is of carpet wool quality and the tail is fat; this latter might be a major handicap in implementing machine milking procedures. The weight of the tail in rams and ewes can reach 12 kg and 6 kg, respectively The rams are horned but the ewes have small rudimentary horns or are hornless.

The breed demonstrates early to medium sexual maturity and the animals are bred at 8-16 months of age, depending on husbandry conditions. The lambing period extends mainly between November and February The prolificacy is small:1.1-1.2. The breed is kept intensively in cooperative flocks of 600-1200 head or private units of 150-300 head. In 1979/80 the average milk production of all the controlled Awassi flocks was 342 lit. The lactation length is about 200 days and the butterfat about 6%. In large flocks milking and feed preparation and distribution is done mechanically. The first milking machine was imported from France in 1955. The Awassi breed was used in Israel as male parent on local ewes and as female parent with East Friesian to produce the synthetic breed Assaf.

2.2 Chios

It is a highly productive animal, originating from the island of Chios in Greece, where today a population of about 2000 is to be found. This semi-fat-tailed breed has undoubtedly been

influenced by fat-tailed animals of eastern provenance. Over the past 15 years, the breed has extended its influence in continental Greece with the creation of a considerable number of intensively kept flocks. At present, the total population is estimated at 100,000 (purebreds and crossbreds). It is also found in some areas of the western Turkish coast (under the name Sakiz), in Cyprus where there is a sizeable population of 80,000 purebreds and 115,000 crossbreds, and in very small numbers in North Africa, the Middle East, and other countries. It is of medium to large size with height and weight of females 68-77 cm and 45-55 kg, respectively The coloring is white, with some blackish or dark spots around the eyes, at the tip of the ears and nose, and often around the belly and legs. The blackish coloring may sometimes be spread over the entire head. The males have long spiral horns, while the female are hornless. The udder is large with weak attachments. The fleece is more or less uniform.

The Chios breed is early maturing and can be bred at 8-9 months of age. The lambing period extends from November to March with a high prolificacy of 1.8-2.2. In the island of Chios it is kept on a family scale (1-3 head), whereas in the mainland it is exploited under intensive conditions in comparison to other breeds (flock size is around 50-100 head). The commercialized milk production varies between 180 and 200 kg; after a suckling period of 40-60 days. Under good husbandry conditions some individuals can produce more than 500 kg of milk. Since this breed represents a valuable genetic material, part of the island population is under milk control but unfortunately this is not backed up by a specialized breed promotion organization. An additional number of animals is also controlled on the mainland and a major selection nucleus flock (400 breeding ewes) is kept at the Agios Mamas experimental station of Halkidiki, where the various phenotypic and genetic parameters of the breed are studied.

2.3 Churra

It is found mainly in the provinces of Pallencia, Valladolid, Leon, Zamora and Burgos (Northern Spain). The population numbers (1986) were 1,558,000 head, or 9.6% of the total Spanish sheep population. The size of animals depends on the area of raising (mountains-valleys) and varies between 45 and 55 kg for the females. The rams usually have horns while the ewes are usually polled (5% have small horns). The coloring is white with black spots round the eyes, ears and nose and sometimes also on the legs. The fleece is of carpet-wool quality.

Relatively early maturing with an onset of reproduction at 9-11 months of age. The prolificacy varies between 1.3 and 1.4. Average flock size is 200-250 head. Marketable milk production is 110-120 kg in 120 -140 days milking and the officially controlled population (1986) is 10,840 head. Some 6% of all ewes are inseminated.

2.4 Comisana

Originating from the Regusa area of eastern Sicily, it spread because of its good adaptability to the dry conditions of southern Italy, but is also found in other Italian regions. Its population is about 700,000 head. It is medium sized, with the ewe height and weight 70 cm and 60-70 kg, respectively. Hornless, with white body and red-brown head (Testa Rossa). The fleece is of carpet wool quality. They are relatively slow maturing sheep with an onset of reproduction at 12-13 months of age.

The lambing period is from September to December and the prolificacy reaches an average of 1.8 (1.7-2.1). The udder is bulky with good conformation, suitable for mechanical milking. The semi-extensive husbandry system applied is changing gradually to an intensive one (rational feeding, improved housing, mechanical milking, artificial suckling of labs). Average milk production of adult ewes is 166 kg in 180-day lactations. Record productions of 400-500 kg of milk are reported. The fat averages 6.5% and the protein 5.0%. The officially controlled population was 49,601 ewes in 1988 (663 flocks).

2.5 Karagouniko

Originating from central Greece (Thessaly) it is a classical lowland breed of the thin-tailed mixed-wool type. The population numbers around 220,000 head, with additional 800,000 crossbreds. Rams of this breed are used in many cases to upgrade the mountain breeds for better productivity. It is of medium size with a ewe height and weight of 65 cm and 50 kg, respectively. Coloring is varying from white to black. The typical coloring is whitish with black spots on the head and feet. The males have horns.

Breeding can take place at 8-9 months of age, the lambing period is from November to February and the prolificacy reaches an average of 1.3. The flock's size varies between 40 and 100 head. The average marketable milk yield of the whole population is about 120 kg. The average milk of all controlled flocks (300) is 151 kg (1988-1989). Cases of high producing flocks marketing 200-250 kg of milk per ewe are quite common. The officially controlled population (1990) is about 20,000 head in 300 units and a progeny testing scheme is under development (Pappas,1990).

2.6 Lacaune

The breed numbers around 1,100,000 ewes of which 700,000 milked (approx. 3,000 units), centered in the areas of Aveyron, Tarn of Garonne and Tarn and Aude on southern France. Large-sized, with height of ewes 70-80 cm and weight of ewes and rams 70-80 kg and 90-100 kg, respectively Hornless, white-colored with uniform fleece. It is considered to be a mixed aptitude breed (income 60% from milk and 40% from lambs and reformed animals). It is not well adapted to hand milking (20-25 ewes/milker/hour), but well adapted to machine milking. Mechanical milking expanded rapidly and currently is the rule (1960: 263 installations, 3,2% of the farms with average flock size 60 head,1989: 2,800 installations, 88.0% of enterprises and average flock size 250 ewes). Today over 90% of all ewes are machine milked and 45% inseminated.

Early maturing (reproduction from 8 months of age with a lambing period from November to March), it has a prolificacy of 1.3-1.5, increasing steadily together with milk production. Suckling *lasts* 4 weeks, followed by milking during 6-8 months. As a rule, milk exploitation and lamb fattening are separate enterprises. Feeding is based on a combination of grazing and feedstuffs provided in the sheep barn. Average milk production showed considerable increases during the last 25 years. Total lactation yields are estimated at 275-295 kg for 195-day lactation. From the official milk control data it is evident that average marketed milk production rose from 80 lit in 1960 to 220 lit in 1989 (165 days of milking). The genetic improvement is based on an exceptionally well developed breeding scheme, with 145,000 animals under official control, constituting the basis of selection (approx. 368 flocks). Another 430,000 ewes (1351 flocks) are under simplified milk control (type B). The scheme implements progeny testing of rams coming from the controlled population (1500 young males in pre-testing and 400 fully tested every year).

2.7 Lacha

The Lacha breed is found mainly in the provinces of Navarra, Alava, Guipurcoa (Nothern Spain). Its population is about 352,000 head. It is of medium size, with height and weight of females being 55-65 cm and 35-55 kg, respectively In general, all animals have horns. The coloring is white with brownish-bla ck or dark grey head and legs. The fleece is of carpet-wool quality

Reproduction starts at 11-13 months of age and pruli ficacy varies between 1.1 and 1.2. Average flock size is 100-200 head and the husbandry system is semi-extensive with transhumance. The lambs are slaughtered at 25-35 days and weigh 11-12 kg. Marketable milk yield is 120-140 kg in 150 days of milking, but in some cases flocks give over 200 kg milk per ewe. The officially controlled population (1986) is 70,080 ewes. Only 5% of the ewes are machine milked.

2.8 Manchega

The breed is mainly found in the central plateau of Spain and it is considered a triple purpose animal (milk, meat and wool). The population is estimated at 2,300,000 animals (1,200,000 ewes) kept in extensive free-pasturing flocks of 200-400 head. The average weight of adult females is 55 to 80 kg (large-sized animals) and the wool is of medium quality

First breeding takes place at the age of 8 to 12 months. They have a good prolificacy of 1.4 to 1.5. The lambs are slaughtered either after weaning at 30 to 35 days of age (11 to 13 kg) or fattened to 90 or 100 days (25 to 30 kg). Some 8,000 ewes are milk recorded, producing an average of 135 kg of milk in 120 days (6% fat content). Nearly 32% of all ewes are inseminated and a selection scheme (44 rams and 4,000 ewes in 1990) is well developed.

2.9 Massese

It originates from the Val di Forno region of Italy, and is expanded to the regions of Toscana, Liguria and Emilia. The population numbers around 200,000 animals; it is kept in flocks of 150-200 ewes. It is of medium size, with height and weight of females 70 cm and 65 kg, respectively, but without similarities to the rest of the Italian breeds. Both sexes have horns and the wool is relatively uniform, brown-colored body and dark head and extremities. The udder is well developed and although the main breed aptitude is milk, the breed is considered to have good meat properties.

Reproduction starts at 10-11 months and prolificacy is 1.3 to 1.4. The husbandry systems vary from permanently stabled small to medium flocks to larger transhuming flocks. Attention for this breed is increasing steadily Milk production of adult ewes is 143 in 180 days (115 kg in 100 days for first lactation), with 6.2% fat and 5.3% protein. Efforts for improvement aim at increasing prolificacy and milk yield without neglecting meat properties. The officially controlled population (1988) is about 9,101 ewes in 96 flocks. Average total lactation yield is estimated at 200 kg per lactation.

2.10 Sarda

Indigenous of Sardinia, it has played a very important role in the insular economy since the ancient times. With 4,700,000 head, of which more than half on the island of Sardinia, it constitutes 47% of the total ovine population of Italy It is of medium size, with height and weight of females 63 cm and 45 kg, respectively Hornless, white-colored with fleece of carpet wool quality. Relatively early-maturing; the females are bred at 10 months of age.

The lambing season extends from October to April. Prolificacy is l.l-1.5. The Sarda breed is characterized by its good udder conformation, its excellent adaptation to mechanical milking and its ability to produce under difficult environmental conditions. A suckling period of 30 days is followed by milking 174 days in average. Weaned animals are sold and slaughtered as “milk lambs”. Average flock size is 120-130 head, but some transhuming flocks are larger (200-300 head). Average milk yield, according to the official control (1988), was 125 kg (in 100 days) for the first lactation and 202 kg in adult lactations (180 days), with fat and protein 6-7% and 5.3%, respectively Average total yield was 243 kg for full lactations. Intensively kept flocks give over 250 kg and, in some cases, up to 350 kg of milk. Improving efforts are based on progeny testing and a controlled population of approximately 84,026 ewes (796 flocks) in the country (1988 data). Machine milking is nowadays a common practice.

3.0 GENETIC PARAMETERS

The high production potential of some Mediterranean milked sheep populations, traditionally well known to shepherds and practical breeders, became evident to scientists by occasional measurements taken to fulfil research objectives or out of pure scientific curiosity Furthermore, since the post war years this potential was proven by regular testing operations and mainly through various milk control programmes, implemented on a permanent basis. Phenotypic estimations of quantitative and qualitative characteristics of sheep milk production have been

the major selection criteria for dairy sheep improvement. Relatively recent developments, however, in quantitative genetics, with the resulted tendency to apply more efficient breeding plans, necessitated the estimation of genetic parameters, of which more important are heritability and repeatability coefficients and genetic correlations. Some details referring to heritability values found in certain Mediterranean dairy sheep breeds are given in the following.

In an early study with Lacaune data (Boyazoglu et al.,1965) heritability estimates in one and three year old ewes were found, respectively, 0.43 and 0.26 for total milk yield, 0.50 and 0.23 for maximum daily yield and 0.54 and 0.11 for average daily yield. In another research (Romer et al.,1971) heritabilities estimated from half-sister correlations have given for one and three year old ewes, respectively, 0.12 and 0.16 for total milk production and 0.57 and 0.22 for maximum daily production. More recently (Barillet and Boichard,1987) heritabilities were found 0.27 to 0.29 for milk yield and 0.26 to 0.28 for daily milk yield, depending on the method of analysis.

The first investigations of the Sarda breed (Bettini,1952) with dam-daughter regression, have given heritability estimates of milk yield for the 2nd and for all lactations 0.17 and 0.34, respectively. In another study, using the same method (Bonelli, 1969) estimates of heritability were found 0.26 and 0.36 for total and maximum production, respectively In subsequent research (Casu et al.,1975), heritability coefficients of milk yield one flock were found in 0.38, 0.56 and 0.14 for the first, second and third and more lactations confounded, respectively. In another flock, however, where only adult lactations were used, the heritability was found 0.26. More recently, (Flamant et Casu,1977), two methods of analysis have given heritability estimates of post-weaning milk for first and second lactation, respectively, 0.66 and 0.40 for the first method and 0.25 and 0.12 with the second one.

For the Chios breed, initial heritability estimates of post-weaning milk production (Zervas,1965), based on 1428 records from the homonymous island data (half-sib correlations), have given the values of 0.74, 0.31 and 0.40, respectively, for the first, second and third and more lactations. The repeatability coefficient was found to be 0.40. Heritability estimates from the Cyprus population (Mavrogenis,1982) were for first lactation 0.29, for 90-day milk production 0.30 and for total (exploitabie) milk yield 0.39. In recent calculations (Georgoudis et al.,1990) with Halkidiki Agricultural Research Station (Agios Mamas) data, with an animal additive genetic model, the heritability value of exploitable milk yield and the repeatability coefficient of the same trait were found 0.22 and 0.44, respectively The observed differences in heritability between this study and other similar material may be due to the method of analysis used, since half-sibs and dam-daughter regression within sires of the same data, gave heritability values 0.46 and 0.39, respectively. The heritability coefficients of the average and maximum daily milk yield were 0.24 and 0.19, respectively. The repeatability values for the same traits were 0.47 and 0.38.

Data of several other breeds have also given important information regarding heritability values. Thus, in the case of Sopravissana (Dassat and Mason,1954), heritability from dam-daughter regression was found 0.29. When calculated with half sib correlation was found for first and second lactations 0.43 and 0.23, respectively Further investigations with the same breed (Mason and Dassat,1958) have given heritabilities 0.23 and 0.25 with half-sib correlation and 0.45 and 0.48 with dam-daughter regression, when data from two and three year old lactating ewes were considered. Heritabilities for the Awassi were found 0.24 to 0.27 (Soller et al.,1966) and for the Stara Zagora breed 0.22 to 0.57 (Minev et al., 1973).

In conclusion, it should be mentioned that reviews of the literature and discussions regarding heritability values of milk production traits of dairy sheep have been presented by different authors. By Casu et al. (1975) mean heritability values of milk yield from several sources were summarized as follows: for 1st lactation 0.29 (0.00 to 0.51), 2nd lactation 0.38 (0.17 to 0.57) and 3rd lactation and more 0.27 (0.14 to 0.41). Barillet and Boichard (1987) report that heritabilities of milk yield varying from 0.27 to 0.32 are in agreement with the average literature data for

lactating ewes, when several authors were reviewed. They also find that heritabilities for milk yield as well as for fat and protein yield and content are consistent with the average literature data for dairy cows.

4.0 SELECTION AND BREEDING SCHEMES

Due to the diversity of situations in the Mediterranean area, several purebreeding selection schemes have been evolved and applied with a varying degree of success. With criterion the increasing complexity and effectiveness, the relevant schemes can be considered in the following order: nucleus flocks with pedigree and individual selection, organized recording programmes, various forms of progeny testing and recent sophisticated methods of estimating breeding values using BLUP with sire, maternal grand sire or animal model procedures. Some examples of the most common selection schemes applied by breed, will be described briefly in the following.

4.1 Schemes of pedigree and individual selection

4.1.1 Nucleus breeding flocks

These flocks, financed and technically supported by the government or other public organizations, started from a nucleus of ewes collected from different private or state farms. After a transition period of adaptation and testing, males are being distributed throughout the basic population. This was the case with the Sarda breed between 1922 and 1972, the Churra breed in 1950's and with many other breeds. Even today the said nuclei constitute a sound solution for studying and safeguarding breeds threatened with extinction and for maximum diffusion of certain valuable breeds of limited population size. With a similar objective operate in Greece the Chios and Serres breeding nuclei at the Chalkidiki (Agios Mamas) and the Serres Agricultural Research Station, respectively It should be mentioned, however, that this scheme cannot be as effective as other schemes with regard to the rate of genetic improvement, because of inherent weaknesses related to the fact that genetic evaluation is based on individual and ancestral selection (Flamant and Elsen,1979; Zervas et al.,1983).

4.1.2 Nucleus flocks in schemes with recorded private units

One example is the scheme applied to the Chios breed in Cyprus, which is nowadays becoming predominant among the sheep population of this country, totaling about 80,000 pure and 120,000 crossbred animals. A selection programme, initiated in 1977, was founded on a population of 800 animals belonging to three state nucleus flocks and on 3,300 animals owned by 22 officially recorded private units. The scheme is of a pyramidal structure and, for the time being, is based on the concept of individual and ancestral selection. It aims at the evaluation of breeding animals, by using indices combining their body weight at 15 weeks of age and the milk yield of their dams (90-day milk yield). Correction factors are applied for environmental effects and breeding values of individual characteristics are expressed as deviations from year flock averages. A similar but simpler form of selection is implemented in the multiplier (private) units, which receive high quality breeding stock from the state flocks. Promising young rams from private multiplier units are sold to non-recorded units. The effort is to secure a constant flow of breeding stock from the top to the base of the pyramid. The scheme is still at its initial phase and problems having to do with the normal flow of the genetic material and the mistrust of the private breeders are encountered constar t:y (Constantinou,1988). For a complete coverage of the needs of the Chios breed in Cyprus, it is believed that the recorded sheep should reach 10% of the population (20,000). In spite of its limitations, the scheme has already become promising and in the long-run will accomplish its task (Mavrogenis,1990).

4.2 Progenv testing

Selection based on progeny testing has proven to be the most effective scheme for improving the productive traits of small ruminants. This scheme has given excellent results with the Lacaune breed, where it was implemented during the 1960's. Systems of selection with the same basic

structure are applied in several dairy sheep breeds in the Mediterranean basin.

Necessary prerequisite for the effectiveness of progeny testing is the existence of an official milk control network covering an important part of the total population (10-20%), the extensive use of A.I. (with estrous synchronization) and the operation of Centres for individual control of young rams and artificial insemination. For optimal results corresponding to a yearly genetic progress of 1 to 2%, are needed 10-20 years of systematic effort (Barillet,1990).

A brief description of various methods and their evolution concerning the estimation of the genetic value of breeding animals is given in the following.

4.2.1 Contemporary Comparison (CC)

This method, originally developed for evaluating dairy bulls, was used with some modifications in dairy sheep breeding during the years 1964-1980 (Poly et al.,1965). In applying the method in the sheep breeds Lacaune, Manech and Corse was taken into account the milk yield of the first lactation only and that 10% of the difference between flocks is of genetic origin. Before the calculations the records were corrected for post-weaning lactation length and age at first lambing and for the effects flock year season. Special characteristic of the method has been that all lactations were divided into six production classes with the mean of all primiparous ewes at a certain year, being the reference base for estimating the deviations of daughters from each ram.

The contemporary comparison method was especially effective in the case of the Lacaune breed, with the large number of ewes under milk recording and the excellent research and technico-economic support provided. The application of this method of ram selection and the progressively improved husbandry conditions resulted in an increase of milk yield from 80 kg in 1965 to 180 kg in 1980 (Boyazoglu,1991).

Since 1976 this method was adapted to the conditions of the Sarda breed and contributed to the development of the selection scheme of this breed, which was put in effect in 1986. Taking into consideration the particularity of the Sarda breed (large population 4,700,000 head and relatively small number of controlled sheep 80,000), this method of evaluation has as main goal the securing of the maximum number of proven rams for covering the needs of as much as possible a larger number of flocks (Casu and Carta, 1986).

4.2.2 Modified Contemporary Comparison (IF2)

Since 1980, the contemporary comparison method was replaced in French breeds by an iterative method called IF2, which was virtually a Modified Contemporary Comparison procedure (Poutous et al.,1981). This method, which has similar characteristics with those of a BLUP model (sire+maternal grand sire), aimed at correcting known errors of the previous method. The basic advantages of this methodology are the following (Gabina et al.,1990):

- In evaluating rams, considered are the first three lactations of their daughters with a greater accuracy in the estimation of their genetic value - the correction of genetic and environmental influences is done in a combined manner by the model, resulting thus a better estimation of both - new environmental influences are considered, like interactions between lactation number and month of lambing as well as lactation number and flock classthe second lactation and the consecutive take into consideration the influence of each previous one - in evaluating the rams considered is the genetic value of the dams of their daughters.
- As it was found, with the IF2 method the mean value of the calculated indices of the young rams were very close to zero. This means that half of the rams show a positive index versus approximately 40% of rams calculated with the old method.

4.2.3 BLUP - Animal model (AM)

The wide application of BLUP in dairy cattle, the increased computer capacity and the development of software easily adaptable to various species of farm animals, made this method accessible to dairy sheep. In this species, as the number of progeny per female may be higher

than in dairy cattle, the dam-daughter path selection can not be neglected and better female breeding values are very useful. On the other hand, as the number of progeny per sire is much lower than for A.I. dairy bulls, because of the importance of natural mating and the biological limits of A.I. in sheep, the information from other relatives becomes more important. The BLUP-AM method makes an optimal use of all information and takes into consideration the effect of selection of assortative matings and of probable interactions between flocks and number of lactation period, due to different management of young and adult animals (Henderson,1973).

The first application of BLUP - animal model in sheep was in the Spanish breeds Lacha and Churra. The model used was the following:

Y=Xb+Zu+Zp+e

where, the fixed part of the model (Xb) is the matrix that includes the following factors: flock year, season of lambing, age of the ewe at the beginning of lactation and the number of lambs born alive; the first random effect (Zu) is the matrix of the genetic values of the animals and the second random effect (Zp) is the matrix of the non-additive genetic and the permanent environmental effects.

The number of animals tested in the Lacha breed was 73,723 (4,925 males and 68,808 females), with a total of 120,520 lactations, during the period 1982-1988. In the Churra breed the animals tested were 12,388 (11,849 females) with 22,148 lactations during the same as above period (Gabina et al.,1990).

For the French breeds Lacaune, Manesh and Basco-Bearnaise an animal model (similar to the above) is scheduled to replace from 1991 on the currently used IF2 method. It is anticipated that the complexity will be far greater, given the enormous number of available data, the very extended milk recording programme and the elaborate progeny testing scheme. The recorded production, which includes 5 traits (post-weaning milk yield, fat and protein amount and percent) will be corrected for lactation length, according to the procedure of the iterative method.

As reported by Barillet et al. (1990), the animal model evaluation confirmed the efficiency of the dairy Lacaune breeding scheme over the last 12 years. The analysis was carried out with records of 1,003,071 lactations from the 1st to the 7th parity of 340,541 ewes. From 1978 to 1989, milk yield in the first lactation increased from 119 to 181 l. About one third of this phenotypic trend could be attributed to management improvement and two third was the genetic gain which has been estimated to 401 for the females (3.6 1 per year) and 541 for the males (4.91 per year). This annual genetic gain represents about 2.2% of the population mean or 0.18 genetic standard deviation. Results were consistent with those obtained with the previous method. The variability of breeding values was the same. For males, the correlations between breeding values ranged from 0.92 to 0.98, according to repartition of daughters in the different flocks.

In conclusion, a significant improvement in genetic evaluation is expected in recorded sheep populations with BLUP applied to an animal model, especially for ewes and for rams used in natural mating. Moreover, in most sheep populations, which present generally a lower A.I. rate than the dairy Lacaune breed, the interest of animal model is obvious.

4.3 Embryo transfer (MOET) in sheep breeding

Among the new advances in biotechnological methods, being at the moment in strictly experimental stage (e.g. embryo splitting, embryo and sperm sexing, cloning, in vitro fertilization, transgenic animals), the multiple ovulation and embryo transfer (MOET) and the A.I. with frozen semen are already considered to be used in certain ruminant selection programmes. The anticipated advantages of MOET are: increasing the number of progeny of females with low prolificacy, shortening the generation interval, intensifying the selection and augmenting the precision in estimating the genetic value of breeding animals.

Regarding MOET application in sheep, and in spite of the eventually optimist perspectives, many authors believe that the advantages favor the selection nuclei and not the total population

under improvement. In addition, it should be mentioned that the high technical and economic demands, for the time being, restrict the possibilities of an extensive use of MOET under practical conditions (Colleau and Elsen,1988). The MOET technique, as well as other advanced manipulations of biotechnology, should not be regarded as the ideal remedy for solving the problems encountered in sheep breeding, in situation where the classical selection schemes are not rending successful results. In such cases, the analysis of the causes of the low efficacy of the classical and well established schemes, should precede their rejection especially when there is an unjustified haste in seeking the implementation of new advanced but complicated and costly techniques (Gabina,1990).

5.0 CONCLUSIONS

The use of the most suitable selection scheme presumes the thorough study of each one of the situations with regard to the available genetic material, the scientific potential and the technical and economic possibilities. Under difficult technical, economic and social circumstances the implementation of simple selection schemes should have priority, since in combination to the amelioration of the environmental conditions, they can bring about substantial improvement. The gradual application of more advanced schemes and methods as well as the adoption of new biotechnological procedures are justified in cases where the overall conditions are very favorable and, therefore, a successful outcome is anticipated with a reasonable degree of certainty

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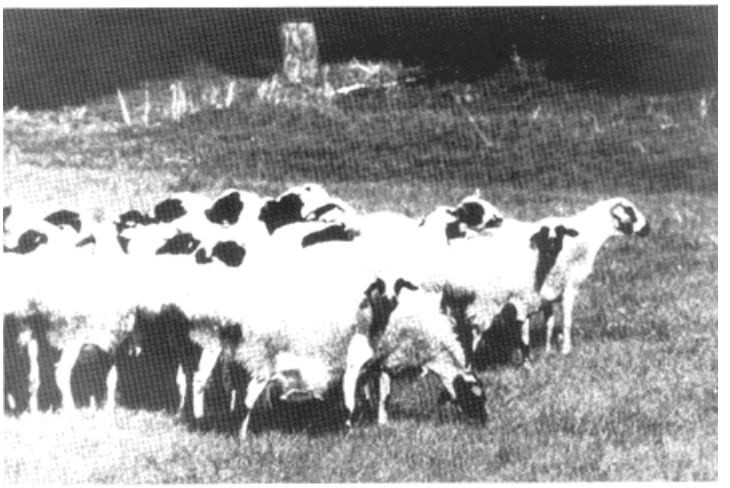
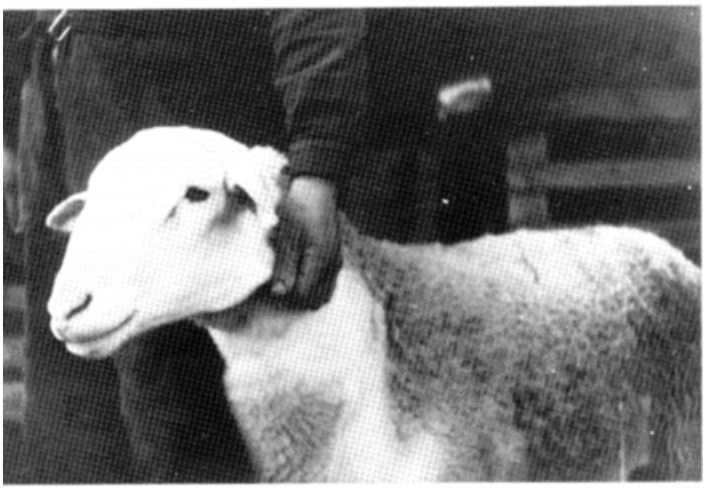
Awassi



Chios

Karagouniko



Lacaune

Comisana

Sarda

LA RAZA OVINA LATXA: CARACTERÍSTICAS MORFOLÓGICAS Y PRODUCTIVAS. PROGRAMA DE MEJORA GENÉTICA.

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RESUMEN

En el presente artículo se describen los censos, características morfológicas y sistemas de producción más frecuentes de la raza Latxa, presentándose asimismo los resultados relativos a caracteres de reproducción, de peso y de crecimiento de los corderos y de producción de leche. Finalmente se describen los programas de control lechero y de selección en esta raza.

SUMMARY

Number of sheep, morphological characteristics and systems of production in the Latxa breed are described in this article. Results on reproduction, live weight and growth of lambs and milk production are also presented. Finally, there is a description of milk recording and selection programmes for this breed.

1.0 INTRODUCCIÓN

La raza ovina Latxa es una raza de aptitud lechera originaria del País Vasco que está repartida entre los estados español (Comunidades Autónomas del País Vasco y Navarra) y francés (Departamento de los Pirineos Atlánticos), lugar este último en donde recibe la denominación de Manech. Su origen es probablemente muy antiguo y según Sánchez Belda y Sánchez Trujillano (1.986) habría que atribuírlo a las remotas inmigraciones de los pueblos indoeuropeos y a su posterior acantonamiento en España dentro del área de la montaña húmeda. El clima del País Vasco, es templado-húmedo, con precipitaciones anuales que oscilan generalmente entre los 800 y 1.200 mm y con temperaturas medias mensuales entre 3ºC y 22°C.

2.0 CENSOS Y DISTRIBUCIÓN

La actual población de Latxa-Manech se puede estimar que tiene en torno a las 770.000 cabezas, de las que 440.000 serían Latxa y 330.000 Manech. Los rebaños están ubicados en las zonas más montañosas del País Vasco y son, en general, de tamaño reducido, del orden de 75 cabezas de media en la Comunidad Autónoma Vasca (Anuario Estadístico del Sector Agroalimentario,1990) y de 120 en los Pirineos Atlánticos (Arranz, 1990).

3.0 CARACTERÍSTICAS MORFOLÓGICAS

E1 Stándar Racial de la raza Latxa, ha sido definido como sigue:

La raza Latxa presenta dos variedades: La de cabeza oscura (Latxa Cara Negra) y la de cabeza rubia (Latxa Cara Rubia). E1 prototipo general es el siguiente:

- Ovejas de tamaño medio, formas alargadas y perfil recto, con vellón abundante que cuelga en largas mechas a ambos lados del cuerpo.
- Cabeza con perfil frontonasal recto o muy ligeramente convexo en las hembras, sensiblemente más acarnerado en los machos a nivel de supranasales. Orejas de longitud media y muy móviles. Cuernos generalmente en los machos y presentes en mayor proporción en las ovejas Labca Cara Negra que en las Cara Rubia.
- Tronco. Línea dorso-lumbar ligeramente ascendente hacia la grupa. Vientre ligeramente voluminoso.
- Extremidades bien aplomadas, delgadas y enjutas.
- Mamas globosas, bien desarrolladas, de piel ma, desprovistas de lana y con pezones. simétricos ligeramente alargados, moderamente divergentes y hacia adelante, colocados en la porción infero-externa.
- Piel fina y sin pliegues, con las zonas desprovistas de lana cubiertas de pelo fino. En la variedad rubia, la piel y mucosas se encuentran despigmentadas. En la variedad oscura la piel y el pelo son blancos salvo en la cabeza y las extremidades donde son oscuras, variando desde un negro intenso hasta un pardo grisáceo o marrón oscuro.
- Vellón. Blanco, abierto, de mechas cónicas muy largas que cuelgan a ambos lados de la línea superior del cuerpo. El vellón recubre el tronco y deja libre la cara, axilas, vientre, bragadas y extremidades. Fibra de lana gruesa, poco ondulada y de gran longitud.
- Peso adulto. E1 peso adulto de las hembras oscila entre 45 y 55 kg. en la variedad Cara Negra y 35 y 50 kg. en la variedad Cara Rubia. En los machos va de 55 a 75 kg. en Cara Negra y de 50 a 70 kg. en Cara Rubia.

Además de estas dos variedades también se pueden distinguir diferentes tipos dentro de la Latxa Cara Negra y Cara Rubia con diferencias fanerópticas, de coloración y de formato.

En el estado francés, las variedades rubia y negra de la raza Latxa se denominan por el U.P R.A., organismo que se encarga de la certificación genealógica en Francia, como Manech Téte Rousse y Manech Téte Noire.

4.0 ESTRUCTURA Y SISTEMAS DE EXPLOTACION DE LOS REBAÑOS DE RAZA LATXA

En este apartado nos vamos a referir principalmente a los sistemas de producción de la raza Latxa del estado español.

Base Territorial

La base territorial de las explotaciones oscila entre 3 y 20 Ha. de superficie total en la Comunidad Autónoma Vasca y entre 5,5 y 16 Ha. en Navarra (Echevarría Belzunegui y Echevarría Sesma,1.976). También se alquilan temporalmente praderas o monte, fundamentalmente en invierno. Además un elevado porcentaje de los rebaños pastan en terrenos comunales (generalmente montes del interior) durante el verano, en un período siempre superior a cinco meses.

Instalaciones

Los apriscos son en general instalaciones antiguas, habilitadas únicamente con el objeto de dar cobijo al ganado. En los últimos años se están construyendo nuevos apriscos o mejorando los ya existentes con vistas a dar mejor respuesta a las necesidades de intensificación del rebaño y a mejorar las condiciones de trabajo del ganadero (pasillos de a imentación, sala de ordeño,...).

Mano de obra

Los ganaderos son generalmente propietarios y pastores del rebaño. La mano de obra es familiar y es poco frecuente la contratación de personal.

Alimentación

El sistema de alimentación tiene, por lo general, dos períodos. En verano-otoño, se realiza un aprovechamiento de los pastos de altura en montes comunales, a 800-1.000 m de altitud. La alimentación de invierno-primavera, que coincide con el parto y la lactación, se basa en el pastoreo de praderas, heno y, con menor frecuencia, silo de hierba, que se ven complementados con productos adquiridos fuera de la explotación: heno de alfalfa, pulpa de remolacha, soja y alimentos concentrados.

Lactancia

La duración de la lactancia de los corderos destinados a sacrificio es de 20-30 días, siendo destetados y sacrificados a los 10-12 kilos de peso vivo, pasando entonces sus madres a ordeño. No es habitual la simultaneidad de lactancia y ordeño en este período a no ser en determinadas ovejas muy productivas del rebaño. Las corderas y corderos de reposición no se suelen destetar, permaneciendo con sus madres sin recibir otra complementación. Algunos ganaderos de buen nivel productivo separan por la noche, a partir de los 60 días, a las corderas de recría y ordeñan a sus madres por la mañana, destetando completamente estas corderas en torno a los 100 días.

Ordeño

La duración del período de ordeño es de aproximadamente 120 días, estando condicionado el secado en la mayor parte de los casos por el traslado veraniego del ganado a los montes comunales. En la mayor parte de las explotaciones el ordeño se realiza a mano, con o sin amarre. En el momento actual hay en torno a cincuenta instalaciones de ordeño mecánico en las que se ordeña con una rutina sencilla de colocación de pezoneras y apurado-retirada, sin repasar a mano y con unos rendimientos próximos a las 120 ovejas por hombre y hora.

5.0 RESULTADOS REPRODUCTIVOS Y DE CRECIMIENTO DE LOS CORDEROS

En Urarte et al. (1990) y Gabiña et al. (1990) se ha realizado un estudio detallado de los caracteres de reproducción en la raza Latxa. El manejo reproductivo continúa siendo muy tradicional. En gran parte de los rebaños los machos no son separados nunca de las ovejas. E1 número medio de ovejas por macho es de 38. Además, el 43% de los ganaderos evitan que las corderas se cubran durante su primer año de vida. Con esta práctica la media de edad al primer parto se sitúa entre los 600 y 700 días. La fertilidad media anual de las ovejas adultas oscila

alredor del 90%. Las épocas de parto (Noviembre-Diciembre en la costa, Enero a Marzo en las zonas del interior) se eligen en función del crecimiento espontáneo de la hierba. La prolificidad media de los rebaños oscila entre 1,06 y 1,43. La mortalidad de los corderos es muy reducida (2-4%). La productividad numérica media o número de corderos vivos producidos por oveja mayor de 1 año es de 0,88 y 0,84 en la Latxa Cara Negra y Cara Rubia, respectivamente. Este índice presenta amplias variaciones entre rebaños (hasta un máximo de 1,31).

El peso al nacimiento de los corderos es relativamente alto comparado con razas dc formato similar: 5,1 kilos para los nacidos simples frente a 4,2 kilos en los nacidos de parto doble, presentando una superioridad de unos 400 gr. de media los machos frente a las hembras. E1 crecimiento de los corderos durante la fase de lactancia es de alrededor de 250 gr/día.

6.0 PRODUCCION LECHERA

Cantidad de leche

En la Figura 1 se representa la evolución de las producciones cuantitativas medias semanales de los rebaños de las dos variedades de la raza Latxa controlados en la Comunidad Autónoma Vasca durante los años 1.988,1.989 y 1.990. Se observa que, en la Cara Negra, la producción máxima se da en la semana cuarta y es ligeramente superior a 1,2 litros mientras que la producción máxima en la Cara Rubia, que se da en la semana quinta, es de algo más de 1,1 litros. La cantidad de leche estimada por lactación, para la Cara Negra y la Cara Rubia ha sido, respectivamente, de 127 y 124 litros en lactación total (desde el parto al secado) y de 94 y 93 litros para la lactación ordeñada (desde el día 31 post-parto hasta el secado), con unas duraciones totales de lactación (parto-secado) de 144 y 157 días.

Porcentaje de rasa Porcenta'e de roteína

En la Figura 2, se observa que el porcentaje de grasa oscila en torno al 6% en las primeras quincenas para ir creciendo hasta llegar a superar el 9% al final de la lactación. El porcentaje de proteína presenta también una evolución creciente, con mínimos cercanos al 5% y máximos alrededor del 6,5%.

7.0 PROGRAMA DE MEJORA GENETICA

Programa de control lechero

EI programa de control lechero de la Comunidad Autónoma Vasca se inició en 1.982. En el año 1991 se controlaron 232 rebaños, con alrededor de 63.500 ovejas presentes y 27.500 lactaciones calculadas.

E1 programa técnico de control lechero comprende las siguientes operaciones:

- Identificación de todos los animales, machos y hembras, del rebaño.
- Libro de Partos. En él anota el ganadero, cada vez que una oveja pare, su número, la fecha, el número total de corderos paridos y el número de corderos muertos.
- Control de la cantidad de leche. Se realiza un control alternado AM/PM.
- Control del porcentaje de grasa y proteína. Se controlan unicamente las lactaciones de las hembras de 2 años.

Programa de Selección

El programa de selección se puso en funcionamiento en la Comunidad Autónoma Vasca en 1.984. El método de evaluación genética utilizado es el BLUP Modelo Animal.

Las distintas fases del programa son:

- Selección de machos por ascendencia materna. Se califican como madres de machos las ovejas cuyo valor genético para la producción lechera se sitúa en el 10% superior del rebaño. Los corderos hijos de estas ovejas entran en el Centro de Selección de Arkaute cuando tienen entre 3 y 4 meses.
- Eliminación de machos por su aspecto externo o por la imposibilidad de recogerles el

semen en vagina artificial. Selección, para ser puestos en testaje sobre descendencia, de los que tienen mejor valor genético para la producción de leche.

- Testaje sobre descendencia. A finales de mayo comienza la campaña de inseminaciones, la cual finaliza a primeros de octubre. Se intenta inseminar un mínimo de 100 ovejas por macho en testaje, para garantizar 20 hijas con lactaciones completadas en la campaña en que éstas cumplen 2 años.
- Difusión de los machos mejorantes. Los machos calificados como mejorantes son difundidos con tres objetivos: a) Producir los machos que serán puestos en testaje en el Centro de Selección. b) Producir machos de monta natural para los rebaños en control lechero; una buena parte de la reposición de hembras procede todavía de este tipo de machos y c) Producir corderas de reposición.

En el Cuadro 1 figura la actividad del programa de selección en las razas Latxa y Carranzana desde sus comienzos. En él se puede apreciar que la última campaña entraron 118 machos en el Centro de Selección de Arkaute, se pusieron en testaje 54 moruecos y que se realizaron un total de 11.379 inseminaciones de las que el 45% fueron con moruecos mejorantes.

CUADRO 1

ACTIVIDAD DE INSEMINACION Y SELECCION

Año	N° de machos que entran en Arkaute	Machos testados sobre descendencia	N° de ovejas inseminadas	Porcentaje de inseminaciones con mejorantes
1.984	35			
1.985	67	16	1.993	
1.986	74	33	4.373	
1.987	77	33	5.238	
1.988	121	38	9.394	
1.989	96	57	7.964	30%
1.990	103	50	10.014	40%
1.991	118	54	11.379	45%

Estructura de la organización de selección

Inicialmente, fue el Departamento de Agricultura y Pesca del Gobierno Vasco el responsable directo del programa de Selección. A finales del año 1.988 se constituyó la Sociedad Anónima ARDIEKIN, S.A. cuyos socios son actualmente las Asociaciones de Criadores de Ovino Latxo de Alava, Bizkaia, Gipuzkoa y Navarra.

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FIGURA 1 .EVOLUCION SEMANAL DE LA CANTIDAD DE LECHE EN LA RAZA LATXA.

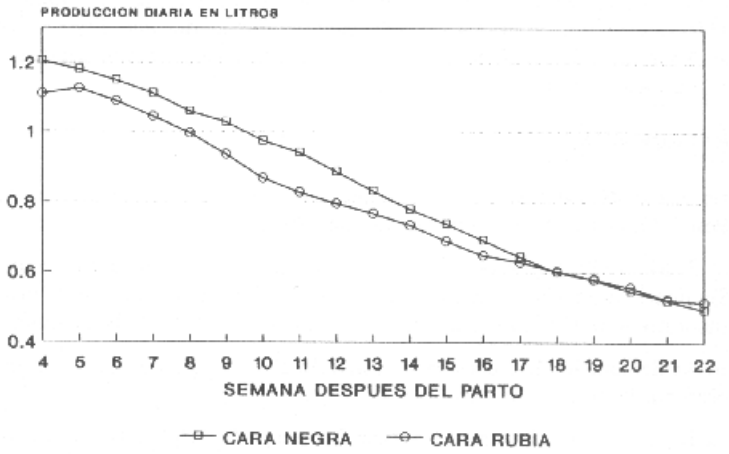
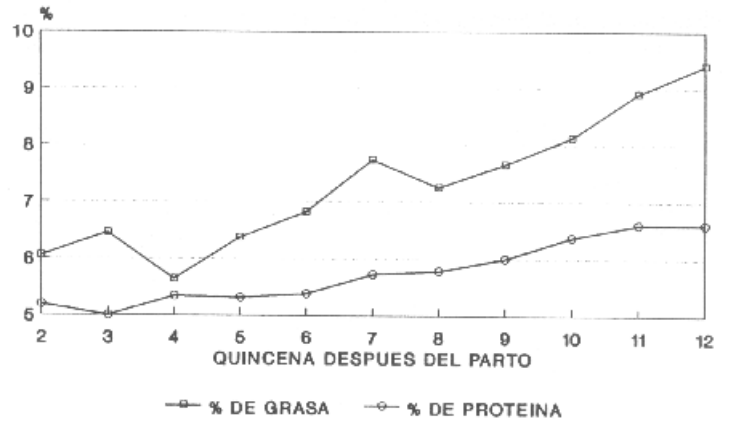
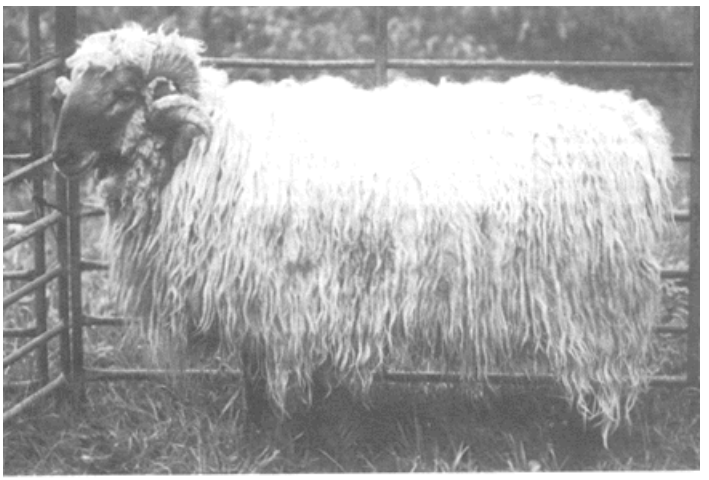


FIGURA 2. EVOLUCION QUINCENAL DE LOS PORCENTAJES DE GRASA Y DE PROTEINA EN LAS HEMBRAS DE RAZA LATXA DE 2 AÑOS.





Semental de Latxa Cara Negra

Semental de Latxa Cara Rubia

GOATS IN YEMEN

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SUMMARY

This article was first prepared (1988/89) when there were two Yemen States, the Yemen Arab Republic also known as North Yemen and the People's Democratic Republic of Yemen or South Yemen. These two united in 1990 to form the Republic of Yemen. The authors describe the various goat populations in North Yemen, the regional distribution, numbers, flock sizes and production systems; the future of goat raising is also discussed. A short updating note on the goat population of South Yemen completes the picture.

RÉSUMÉ

A l'origine, cet article fut préparé en 1988/89, lorsqu'il y avait deux Yémens: la République Arabe du Yémen, connue aussi comme Yémen du Nord et la République Démocratique Populaire du Yémen ou Yémen du Sud. Elles s'unirent en 1990 pour former la République du Yémen. Les auteurs décrivent les différentes populations caprines du Nord Yémen, leur distribution régionale, leur nombre, la taille des troupeaux et les systèmes d'élevage. Lavenir de l'élevage de la chèvre est aussi examiné. Une courte note de mise à jour sur la population caprine du Yémen du Sud complète le tableau.

1.0 INTRODUCTION

1.1 The origin of goats

Goats were probably one of the first, if not the first, animals to be domesticated. Archaeological evidence indicate that goats have been associated with human beings for about 10,000 years. Several breeds of wild goats are thought to be the ancestors of the present day domesticated populations. While the type of horns is generally employed to determine the wild progenitor of domesticated goats, this cannot always be taken as conclusive evidence. On the basis of horn type, the Yemeni goat breeds appear to originate from the Bezoar wild goats of south-west Asian region (western Pakistan, southern Afghanistan and eastern Iran) as their progenitors.

1.2 World situation

In 1989 there were 526.5 million goats in the world with a vast majority of these (94%) being in the developing countries. Together, they produced 2.37 million tons of meat, 8.57 million tons of milk and half a million tons of fresh skins. Moreover, in the developing countries the goats produced more milk (6.43 m. tons) than the sheep (4.92 m. tons) in spite of the fact that the sheep population in these countries is about 25% more than that of the goats.

1.3 The situation in North Yemen

In North Yemen there are about two million goats, the overall situation is not any different from that in many other parts of the region. Livestock in spite of its great importance did not receive the attention it deserves, at least, until recently Within the livestock sector, goats have virtually received no support what so ever; even the farmers neglect these as compared to cattle and sheep. This attitude is more due to the recognition of their capabilities, rather than any prejudice against them. Farmers are aware that the goats are intelligent, independent, agile, tolerant to many diseases and parasites and can look after themselves much better than other livestock. Goat meat is highly considered in this country and goat's milk is the major source of the famous cheese of the Taiz area. Although there are about one million more sheep than goats, the latter produce as much meat as the sheep.

2.0 POPULATION AND DISTRIBUTION

According to the first Agriculture Census completed in 1983, there were 2.085 million goats in North Yemen compared to 3.041 million sheep and 0.976 million cattle. Although all the provinces in the country have goats, on a national basis only 24% of the farms maintain goats. However, a very high proportion of farms in Mareb (87.2%) and Al Jawf (80.5%) have goats.

2.1 Distribution

Sana'a province has the largest population of goats (0.44 million) followed by the provinces of Hodeidah (0.28 million) and Al Jawf (0.22 million). When the goat population is viewed in relation to the human population, the distribution is radically different. Thus, there are more goats per person in Al Jawf (3.2) and Mareb (2.1) than in Sana'a (0.30) which has the highest overall goat population but also a very large human population. This, among other things, means that the provinces of A1 Jawf and Mareb have more marketable surpluses than the other provinces. On a national basis there are only 0.29 goats per person against 0.42 sheep and 0.13 cattle. The provincial distribution is as follows:

Province	Population	Percentage	Population per 100 persons
Al Bayda	141.300	6.7	51.3
Al Jawf	221.100	10.7	320.4
Dhamar	148.700	7.1	22.6
Hajjah	168.300	8.0	22.8
Hodeidah	280.100	13.4	30.8
Ibb	174.500	8.3	15.4
Mareb	197.800	9.4	218.0
Mahweet	25.400	1.2	10.7
Sa'dah	82.700	3.9	29.8
Sana'a	444.700	21.3	30.5
Taiz	198.100	9.5	15.2
Total of North Yemen	2,085.100	29.1	

2.2 Flock size

Overall, goats are kept in smaller flocks (11.7 per flock) than sheep (14.5 per flock). The smallest flocks are in Hodeidah (7.8), Mahweet (9.6) and Taiz (9.9), while the largest ones are in Al Jawf (18.0), Sa'dah (18.0) and Mareb (16.0). Frequency distribution of flock size indicates that in the country as a whole 53.6% of the flocks comprise of 5-19 goats with only 3.3% flocks of 50 and over. Most of the larger flocks of goats (30 and over) are in the province of Al Jawf. Half of the goat population (50.6%) are females one year and over in age, while only 14.2% are males of the same age group. The remaining (35.2%) are young males and females under one year

3.0 PRODUCTION SYSTEMS

Irrespective of the region, climate or agro-ecology goats, along with sheep, are essentially managed under one type of production system namely, extensive system based primarily on grazing on rangelands as well as on stubbles.

3.1 Housing

In the highlands there is generally no special housing for goats. They are mostly kept with cattle and sheep in the ground fIoor of the family dwelling. Kids are, however, housed separately for two reasons. Firstly, to avoid kids being injured by adult animals due to over crowding and secondly to enable milking of does in the morning. In the warmer parts of the country the goats are penned in open enclosures adjacent to the family dwelling. The enclosures are made of thorny bushes and stones to discourage theft and predators.

It may have a thatched roof to provide protection from sun but not from rain, which in any case, is very scanty In the north eastern region, most of the pens have now canvas, plastic or tarpaulin roofs. The same pen may be partitioned to keep sheep and goats separately Young kids may be housed separately Watch dogs are always present. The animals are grazing almost throughout the day, except in the eastern region where they may be stall-fed when the grazing is very poor.

3.2 Feeding

It comes almost entirely from grazing either on rangelands or stubbles, shrubs and trees. The animals are taken out for grazing early in the morning in the warmer regions and at about 10 a.m. in the highlands, specially during winter. They spend the whole day grazing when they may cover 5-10 km to graze. Shepherding is done mostly by children and old men and women. Several flocks owned by relatives and friends are generally grazed together. Shepherds when hired are older boys or young men. Goats and sheep are mostly run together, although for grazing

they do tend to segregate; Goats are browsers, agile and more active in their movement when grazing. Supplementary feeding with roughage, like sorghum stover or wheat straw, may be provided when grazing becomes really very poor towards the end of the dry season. Wherever available acacia and zizyphus trees are lopped as the only source of green feed. Domestic food waste and sometimes even grains (sorghum, millet, barley) may be offered to lactating does and kids. Animals meant to be slaughtered for special occasions (e.g. Eid Al Adha) may also be given supplementary feed.

3.3 Breeding

The breeding seasons of Yemeni goats have not been studied so far. However, field observations indicate their capability to breed almost throughout the year There may be one or two peaks of greater oestrus activity following rains and improved grazing. The breeding is haphazard and the bucks generally run with the flocks all the time. The number of bucks available in the country appears adequate. However, there is a general practice of using young bucks born during the previous year for breeding before they are slaughtered. This results in a large turn-over of breeding bucks and seriously reduces chances of selection. Selection, if any, is mainly on the basis of colour and size.

No special care is generally needed or provided during kidding and to kids; does with new-borns may, however, be separated from the flock for a day or two. Very young kids are retained in or near the house when their mothers go out for grazing, then they are allowed to suckle before the does departure. Not all does are milked daily or fully, it depends on their milk yield and the demand for milk. Moreover, milking is generally done during the second and the third month of lactation to avoid adverse effect on the health of kids. Weaning takes place around 3-5 months of age, perhaps more as a result of inadequate milk availability rather than as a management practice. Kids not selected for breeding are generally sold around six months of age.

3.4 Diseases

When compared with cattle and sheep, goats appear to remain in better health throughout the year. This does not, however, mean that goats do not suffer from diseases, they are simply affected but by fewer diseases. Moreover, they show fairly high tolerance, if not resistance, to many diseases and infestations. Pox and caprine pleuropneumonia are their most serious diseases, the latter, if not treated timely, causes high mortality Foot and mouth is quite common but not fatal. Black disease and brucellosis are also reported from time to time. Goats seem to tolerate fairly high loads of round worms, tape worms and coccidia. Of the external parasites, fleas are more common and serious than mange. Phosphorus deficiency, so serious in cattle and sheep in some regions, does not appear to be a problem in goats.

4.0 “BREEDS”

The first ever comprehensive survey to identify and characterise livestock population in North Yemen was completed by the Agricultural Research Authority (ARA) in 1987. This survey, interalia, identified five “breeds” of goats. In early 1988 the ARA established a goat research unit at Taiz with flocks of all the five “breeds” for further studies. All the populations are horned but some polled specimens are also seen. Ears are short, alert and generally held upright or laterally with the ventral surface facing forward. Throat tassels are frequently present. Adult weights of the males are about 5-10 kg more than those of adult females.

There is generally no tradition of naming livestock “breeds”. With an exception or two all the “breeds” are called “Baladi”, which means local. The five “breeds” of goats identified by the survey were, therefore, named for the first time. Of these, one is long haired while the remaining four are short haired or smooth coated:

1. Yemeni Mountain (long haired)
2. Taiz Black (short haired or smooth coated)

3. Taiz Red (short haired or smooth coated)
4. Surdudi (short haired or smooth coated)
5. Mawr (short haired or smooth coated)

4.1 Yemeni Mountain

Black in colour and small in body size with long hair specially towards the extremities. Lower parts of the feet have short hair Beard may be present particularly in the older animals. There may also be a lock of hair on the fore-head. The horns rise backward, upward and outward, curling down. Adult weight of females is about 20 kg. The body measurements (cm) are girth 67.6, height 60.0 and length 61.4. This population is widely distributed in the highlands from Ibb in the south to beyond Sa'dah in the north and Mareb and Al Bayda in the east.

4.2 Taiz Black

Black in colour and medium in body size. It has characteristically beautiful curly coat of different patterns prominent on the back and the sides. Horns rise backwards, slightly upwards and almost parallel in the early stages; with age they spread out laterally. Adult females weigh about 23 kg. The body measurements (cm) are girth 69.1, height 61.1 and length 64.9. Milk from this breed is the major source of the famous cheese of the Taiz area. They are mainly kept in the southern highlands extending up to around Qa'taba in the north east and the foothills of the Tihama in the north west.

4.3 Taiz Red

Red or brown in colour with a lighter coloured belly and a medium sized body. A black line runs from the face, all along the back to the tip of the tail. The face is like that of a gazelle. Horns are like those of the Taiz Black goats. Adult females weigh about 24 kg. The body measurements (cm) are girth 69.4, height 63.1 and length 64.3. The area of extension is more or less the same as that of Taiz Black but this population is less numerous and more common in areas around the city of Taiz.

4.4 Surdudi

Red and white in colour with patches of red colour generally dominating. This is the largest-sized goat in the country. The tail is generally black, horns are like those of the Taiz Red but somewhat larger. The udder is well developed. Adult females weigh about 27 kg. The body measurements (cm) are girth 70.6, height 66.3 and length 66.9. They are found in the Wadi Surdud area north east of Hodeidah city

4.5 Mawr

Almost white in colour with small black patches mainly on the face. Small in body size, compact bodied with rather small horns. Adult females weigh about 20 kg. The body measurements (cm) are girth 67.1, height 64.3 and length 64.0. They are found mainly in the Wadi Mawr area of the northern Tihama.

Liveweights (kg) and body measurements (cm) of adult females of the five populations are:

Populations	Liveweigth	Girth	Height	Lenght
Yemen Mountain	20.5	67.6	60.0	61.4
Taiz Black	23.7	69.1	61.1	64.9
Taiz Red	24.1	69.4	63.1	64.3
Surdudi	26.5	70.6	66.3	66.9
Mawr	20.6	67.1	64.3	64.0

5.0 THE SITUATION IN SOUTH YEMEN

According to the first and the last agricultural census in 1985 there were 1,256,682 goats in South Yemen. Two "breeds" have generally been described namely the Thamud and the Attaq. But according to a very recent survey by the senior author (HUH) these"breeds" are essentially the same as the Mawri and Taiz Black in North Yemen. The Attaq "breed" is a somewhat diluted form of Taiz Black, mainly in respect of having less pronounced coat curls on its body, while the Thamud is exactly the same as the Mawri.

Moreover, the other three "breeds" of the former Yemen Arab Republic namely Taiz Red, Surdudi and Yemeni Mountain have been mostly seen in mixed flocks, particularly in the Aden, Lahej and Abyan governorates. Of these three "breeds", Surdudi is the most common followed by Taiz Red. The long haired Yemeni Mountain is the least common. These have been described as "mixed breeds" by other workers.

It is understandable to see Taiz Black, Taiz Red and Yemeni Mountain in the adjoining northern regions of the former Democratic Republic (South Yemen). But the habitat of the Mawri is far north in the Tihama in the former Yemen Arab Republic and that too in a restricated area of Wadi Mawr only Since the same "breed" is found under a different name (Thamud) in a pure form, over a much wider area (the whole of the two largest governorates of Hadramaut and Mahra and part of Shabwa) and in large numbers (nearly half a million) in the eastern region, chances are that this "breed" was taken to the Wadi Mawr and not brought from it. The Surdudi may have been brought from Wadi Surdud in the Tihama (near Hodeidah city) to the southern governorates of Lahej, Aden and Abyan due to its large body size and good udder for milk production.

In 1973 the Beetal breed from Pakistan and in 1982 the Shami (Damascus) breed from Cyprus were imported for crossbreeding with the local populations, mainly to improve milk production. The programme was later abandoned. But their traces can be seen in some animals with long reddish hair, pendulous ears and elongated teats.

6.0 CONCLUSION

Attempts were made in the past to improve the milk production of Yemeni goats through crossbreeding with two exotic dairy goat breeds (Anglo-Nubian and Saanen). The idea was to substitute the low milk yielding Yemeni cows with high milk yielding crossbred or even purebred exotic goats. What was not taken into account were the facts that the Yemeni cattle are triple purpose animals, that is for work, meat and milk and the Yemeni goats are more or less scavengers that fend for themselves. Milk production by the Yemeni cow is only incidental to its primary function of producing work animals. Moreover, the high milk yielding crossbred goats were not likely to survive or produce efficiently under the rigours of the traditional extensive goat production system. No consideration was given to select the right type of the local goat for its milk potential. Except a few remaining animals in some projects, hardly any of the exotic breeds can be seen today

Virtually, nothing else was done since then until recently when ARA started a national survey to identify populations of local livestock, including goats, and to study their production systems. ARA established a goat research unit in 1988 at Taiz with flocks of all the five goat populations identifed earlier. This is the frst ever such unit in North Yemen. It is also the first unit of its kind in the whole region where all the goat "breeds" are maintained. The main purpose of this unit is to study the comparative performance of all the Yemeni goat populations and conduct research on various aspects of goat production. Collaborative research and development work will also be undertaken with all the regional agricultural development projects in the country. As ARA also works closely with the Faculty of Agriculture and the Agricultural Training Institutes, this unit can play an

important role in training and education and also organise demonstrations for farmers on different aspects of goat production.

In due course, a great deal of information is likely to become available on the potential of these goat populations for milk and meat production. That will help determine future policies and strategies in selection, improvement and development of new production systems for boosting milk and meat production. With greater mechanisation of the farm operations, the cattle are likely to lose their importance, at least in some regions of the country When that happens, improved goats could play a greater role in producing milk and meat more economically. With the increasing human population and the rising standards of living, the demand for milk and meat will also go up. Goats, if managed properly, can become a significant source of these products in addition to earning a sizeable foreign exchange through the export of quality skins.

APPORT DE L'ENDOCRINOLOGIE EN SELECTION LAITIERE BOVINE

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RÉSUMÉ

Dans les schémas de sélection actuels, l'appréciation du potentiel génétique d'une vache laitière ne peut se réaliser que tardivement avec l'instauration d'une production. Il est également bien établi que la régulation endocrinienne de la lactation est un phénomène complexe dans lequel l'hormone de croissance (GH) et son médiateur hépatique l'Insulin-Like Growth Factor I (IGF-I) jouent un rôle central. Dans ce texte, les différentes applications possibles de ces hormones en tant que critère de sélection en production laitière sont discutées.

SUMMARY

In the present scheme of selection, evaluation of the genetic merit of dairy cows is only realized after first lactation. It is also well known that endocrine control of milk production is a complex phenomenon in which growth hormone (GH) and insulin-like growth factor I (IGF-I) play a key role. In this context, the possible application of these hormones as predictive criteria of selection in dairy breeds is discussed herein.

1.0 INTRODUCTION

Dans les schémas actuels de sélection en production laitière, les généticiens accordent une grande importance aux techniques permettant une connaissance rapide du niveau des performances des animaux testés. Un des facteurs essentiels intervenant dans l'amélioration génétique demeure l'identification des individus à haut potentiel.

Toutefois, au sein d'un programme de sélection basé sur les performances de la descendance, le progrès génétique espéré sera limité par le fait qu'il n'est exprimé qu'une fois l'animal adulte et après la mise bas. De même, l'évaluation du potentiel génétique des taureaux sélectionnés ne pourra s'estimer qu'à partir des performances d'un nombre relativement élevé de ses filles. Ce type de sélection induit un allongement de l'intervalle de génération; celui-ci est actuellement en moyenne de 6 à 7 ans. Théoriquement, cette limitation au progrès génétique pourrait être surmontée s'il était possible d'évaluer la valeur génétique des taureaux sur leur propre potentiel laitier et ce le plus tôt possible.

Enfin, il apparâît que les différences intra- et interraciales observées au niveau des productions laitières résulteraient de variations génétiques d'un ou de plusieurs mécanismes physiologiques contrôlant la production lactée. Dès lors, il est probable qu'une meilleure compréhension de ces mécanismes permettra d'améliorer les schémas de sélection. Par ailleurs, pour les pays en voie de développement, le coût élevé des schémas de sélection actuellement proposés, milite également pour l'élaboration de critères précoces de sélection susceptibles d'améliorer les races locales surtout si ces derniers peuvent être utilisés dans les régions rurales.

2.0 REGULATION ENDOCRINIENNE DE LA LACTATION

Depuis une trentaine d'année, il est connu que l'oxytocine facilite la libération du lait, que la prolactine, l'hormone de croissance (GH ou somatotropine), les hormones sexuelles, les glucocorticoïdes et les hormones thyroïdiennes sont essentiels pour la lactation, que l'insuline exogène inhibe la production lactée et que l'ovarioectomie est sans effet sur cette dernière (Collier et al.,1984).

Le début de la lactation se caractérise par une augmentation substantielle de la concentration plasmatique de prolactine, celle-ci régressant toutefois au cours de la lactation. Une corrélation faible mais significative a été observée entre les taux moyens plasmatiques en cette hormone et la production laitière. La présence de récepteurs spécifiques à la prolactine au sein du tissus mammaire, le nombre de ces récepteurs augmentant avec la lactation, indique bien l'importance de cette hormone dans la lactation.

Hormis la GH (voir paragraphe 4), les autres molécules ont une action moins marquée sur la lactation bien que leur présence soit essentielle pour une production lactée maximale.

3.0 IMPORTANCE DE IÂXE HYPOPHYSO-HEPATIQUE DANS LA LACTATION

Parmi les hormones impliquées dans la lactation, l'hormone de croissance produite au niveau hypophysaire, joue un rôle déterminant. Depuis une dizaine d'année, avec l'obtention de quantités importantes de GH par la technologie du DNA recombinant, un nombre très important d'études est venu étayer la thèse d'une action de la GH sur la production lactée (Chilliard,1988).

Lactivité galactopoïétique de la GH semble être essentiellement obtenue par une action indirecte via un facteur produit principalement au niveau hépatique (Ooi & Herington,1988) à savoir l'Insulin-Like Growth Factor I (ou IGF-I ou somatomédine-C). En effet, l'augmentation de la production laitière en réponse à un traitement à la GH s'accompagne d'une augmentation des taux sériques d'IGF-I (Glimm et al.,1988). Selon ces auteurs, les relations entre la GH et l'IGF-I indiquent que ce dernier joue un rôle de médiateur des effets de la GH en stimulant la mitogenèse ou en induisant des modifications des processus métaboliques des cellules épithéliales mammaires. Toutefois, au cours d'expériences sur le contrôle énergétique et azoté, Spicer et al. (1990) ont

observé une corrélation négative (r=0.6) entre les niveaux de production lactée et les taux sériques de GH ainsi qu'avec les concentrations plasmatiques d'IGF-I. Selon Shamay et al. (1988), l'IGF-I n'a pas, en début de lactation, de rôle de médiateur des effets galactopoïétiques de la GH.

Toutefois, la présence de récepteurs spécifiques à l'IGF-I sur la membrane cellulaire des tissus mammaires (Glimm et al.,1988) montre bien le rôle direct de cette hormone sur la production lactée. Ce fait fut confirmé récemment par Prosser et al. (1990), lesquels observèrent une augmentation significative de la production lactée après infusion d'IGF-I recombinante au niveau d'une artère pudique.

4.0 GH, IGF I ET SELECTION LAITIERE

Il apparait donc que la GH et l'IGF-I jouent un rôle central dans la régulation de la lactation. Dès lors, plusieurs chercheurs ont étudié la possibilité d'établir des relations entre la variabilité génétique et les taux hormonaux circulants chez le bovin.

Les races à haut potentiel laitier présentent des taux moyens circulants de GH supérieurs à ceux enregistrés chez des races moins performantes surtout pendant le pic de lactation (Bonczek et al., 1988). Cette observation ne fut toutefois pas confirmée par McKenzie et al. (1988).

Chez le veau, des relations positives et significatives entre le potentiel génétique des animaux et les taux de GH ont été particulièrement mises en évidence au cours de périodes de sous-alimentation (McKenzie et al.,1988). Kazmer et al. (1989) ont notamment observé que des veaux à potentiels génétiques variables soumis à un jeûne de 30 h présentent une corrélation positive entre le nombre de pics de libération de GH au cours du rîycthémère et la valeur du "predicted difference of milk" (PDM) du père ou leur index propre à partir de leur pedigree. Enfin, Gibson et al. (1990) ont indiqué que la réponse de la production lactée au traitement hormonal est positivement correlée au potentiel génétique de l'animal.

Toutefois, malgré ces observations encourageantes, il est peu probable que la GH puisse être utilisée dans la pratique comme critère de sélection vu le caractère pulsatil de sa libération nycthémérale, rendant nécessaires de nombreux prélèvement sanguins pour obtenir une appréciation correcte des taux hormonaux.

Par contre, il apparait que l'IGF-I pourrait jouer ce rôle de caractère prédictif, vu les relations existant entre cette hormone et la GH et compte tenu de la stabilité nycthémérale de sa libération.

Le rôle physiologique de l'IGF-I a été essentiellement étudié dans les mécanismes de régulation de la croissance et il existe très peu de données concernant les relations entre l'IGF-I et la lactation.

Diverses études ont été entreprises dans notre laboratoire. C'est ainsi que nous avons pu démontrer que les taux plasmatiques d'IGF-I des vaches Holstein-Friesian sont supérieurs à ceux d'autres races moins performantes (Pie-Rouge, Angler, Normande et Blanc Bleu Belge); ces différences se marquent davantage au jeune âge (Renaville et al.,1990). Confirmant les observations de Spicer et al. (1990), nous avons observé une corrélation négative entre les taux d'IGF-I et la production laitière lorsque l'animal est en bilan énergétique négatif (période faisant directement suite au part).

Dans une dernière expérience, nous avons suivi 120 vaches primipares de race Holstein-Friesian dont l'origine paternelle se répartit entre 50 taureaux. Un échantillon sanguin a été prélevé 65, 95 et 125 jours après le part. Au cours de la période expérimentale, si les taux de protéines et de matières grasses du lait restent relativement stables, les taux d'IGF-I et la production journalière de lait présentent une évolution opposée (tableau 1). Les relations entre les taux d'IGF-I pour chaque période de collecte sanguine et les différents paramètres de production lactée sont présentés au tableau 2. Des corrélations significatives sont obtenues entre les taux de protéines et la production d'IGF-I à chaque période; les autres paramètres ne présentant aucune corrélation avec l'hormone.

5.0 CONCLUSIONS

Ces quelques considérations montrent l'apport que pourrait avoir l'endocrinologie dans la sélection animale. En effet, les corrélations significatives que nous avons observées entre les taux d'IGF-I et les taux de protéines du lait sont particulièrement intéressantes surtout pour les producteurs de lait destiné à la fromagerie. Des études supplémentaires sont toutefois nécessaires afn d'accroître la précision des valeurs mesurées. De même, pour une sélection précoce, il sera nécessaire de préciser si ces relations existent toujours entre les taux en protéines du lait que produira l'animal et son taux plasmatiques d'IGF-I à un âge précoce (encore à définir).

Enfin, l'intégration dans les techniques de sélection des informations et des nouvelles connaissances endocrinologiques acquises sur les synthèses hormonales de l'axe hypophyso-hépatique et plus spécialement sur la production d'IGF-I devrait permettre l'amélioration du potentiel productif du troupeau laitier en induisant l'accroissement du taux de gain génétique et/ou la réduction des frais de sélection.

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TABLEAU 1

Paramètres de production laitière et taux plasmatiques d'IGF I 65, 95 et 125 jours après le part chez des vaches primipares Holstein-Friesian.

	Nombre d'animaux	Jours de Lactation			Moyenne cumulée à 100 jours
		67	95	125	
Lait (kg)	116	21.6 ± 3.9	20.5 ± 3.8	19.8 ± 3.9	2153 ± 356
FCM (kg)	116	22.0 ± 4.4	21.5 ± 4.2	21.2 ± 4.4	2271 ± 411
Matières grasses (%)	116	4.25 ± 0.49	4.34 ± 0.55	4.49 ± 0.57	4.36 ± 0.43
Protéines (%)	116	2.84 ± 0.24	2.97 ± 0.26	3.12 ± 0.25	2.88 ± 0.22
IGF-I (ng/ml)	116	144 ± 8.9	170 ± 25	270 ± 34	

TABLEAU 2

Corrélation entre les taux plasmatiques d'IGF-I et les paramètres de production laitière 65, 95 et 125 jours après le part chez des vaches primipares Holstein-Friesian.

	Nombre d'animaux	Jours de lactation		
		65	65	65
Lait (kg)	116	0.176	0.141	-0.080
FCM (kg)	116	0.197*	0.108	-0.073
Matières grasses (%)	116	0.064	0.080	0.145
Protéines (%)	116	0.309**	0.263**	0.205*

(= P<0.5; ** = P<0.1)*

DAIRY CATTLE BREEDING PROGRAMME AND GENETIC PROGRESS IN KENYA

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SUMMARY

The state of the dairy herd in Kenya is described. The organization of the national dairy cattle breeding programme and the sire evaluation methods used are discussed in the light of the available data (1978-1988) and the relevant bibliography It is underlined that it was only possible to keep-up milk production - which matches consumption - by a dairy cattle population growth of 220% in the past decade, while the average yield remained unchanged around 3500 kg milk/lactation. The author underlines the need to improve livestock management practices and the genetic potential of dairy cows as the only means to face the needs of a growing human population.

RÉSUMÉ

L'état du troupeau laitier au Kenya est décrit. L'organisation du programme national d'élevage et les méthodes d'évaluation des géniteurs sont examinées à la lumière des données disponibles (1978 -1988) et de la bibliographie pertinente. On souligne qu'il a seulement été possible de maintenir la production laitière, laquelle correspond à la consommation, par nne augmentation de la population du cheptel laitier de 220% au cours de la dernière décennie, alors que la production moyenne est restée inchangée - environ 3500 kg de lait par lactation. Lauteur souligne la nécessité d'améliorer les pratiques de gestion du troupeau et le potentiel génétique.

1.0 INTRODUCTION

The dairy cattle population in Kenya in 1987 was estimated to be 2.68 million heads (Ministry of Livestock Development Annual Report 1987). Approximately 30% of these are purebred Friesians, Ayrshires, Guernseys and Jerseys and 70% grade animals. Only 2.5% of the pure dairy cattle are registered with the Kenya Milk Records (KMR). The total amount of milk produced in 1987 is estimated to be 2054.5 million litres. About 925 million litres of milk is marketed through the formal market. The biggest marketing channel, the Kenya Cooperative Creameries (K.C.C.) handled 347.2 million litres (K.C.C.,1987). 80% of the marketed milk came from small farms and 20% from large units. Currently (1991), Kenya is self sufficient in milk production.

2.0 ORGANIZATION OF THE DAIRY CATTLE BREEDING PROGRAMME

The genetic improvement of the dairy cattle population in Kenya is coordinated by the National Dairy Cattle Breeding Programme (NDCBP). The NDCBP works in conjunction with the following bodies to achieve its goals.

i. Livestock Recording Centre (LRC)
ii. Kenya Milk Records (KMR)
iii. Bull Purchasing Committee (BPC)
iv. National Artificial Insemination Service (NAIS)
v. Kenya Stud Book (KSB)
vi. Breed Societies (BS).

The NDCBP has two main activities: The Contract Mating and the Progeny Testing Schemes.

2.1 Contract Mating ScScheme

The aim is to breed the next generation of test sires for the four dairy breeds. The bull purchasing committee identifies, inspects and contracts bull dams within the herds officially milk recorded, registered and served by artificial insemination. The criteria for selecting the bull dams are:

i. the dam must have had at least 3 calvings with calving interval of less than 14 months.
ii. the dam must have a production record 10% above herd average.
iii. the conformation must meet the breed association standards.

Semen of the most outstanding proven bulls (imported or locally bred) is used on the selected bull dams and if a bull calf is born, it is purchased by CAIS at the agreed price at one month of age and is reared at the CAIS premises.

2.2 PROGENY TESTING SCHEME

The test herds for progeny testing purposes were, in 1987, from only 24 farms. For a farm to qualify to be included in the progeny testing scheme, it must meet the following requirements:

i. the cows must be purebred.
ii. the farm must be officially milk recorded.
iii. the bulls used on the farm should be on the mating list and used randomly

With only 24 farms forming the test herds, the biggest limiting factor in the progeny testing scheme is getting sufficient daughters for the evaluation of the bulls in a short period of time.

2.3 Livestock Recording Centre (LRC)

LRC does the progeny testing. It receives the data for computation of breeding values from the Kenya Milk Record Centre located 70 km from the LRC of fices. The LRC does the data processing and computes the breeding values. It is also responsible for recruiting test herds for the progeny testing scheme.

2.4 Kenya Milk Records (KMR)

KMR collects officially the milk production records for all animals which are registered. Also collects milk samples for butterfat determination (BF). The BF determination is done by the LRC. Officials from the KMR visit farms at bi-monthly intervals to check the weighing and recording of milk at the farm level. The farms also submit their daily milk records to KMR once

a week.

2.5 Bull Purchasing Committee (BPC)

BPC comprises officials from CAIS, LRC, Animal Production Institutes (e.g. Universities), Breed Associations and farmers' representatives. Its task is to identify, inspect and contract bull dams locally and to purchase bulls for CAIS from Overseas.

2.6 Central Artificial Insemination Station (CAIS)

CAIS has the responsibility of raising bull calves, managing the bull herds and the collection, evaluation, packing and storage of semen. It also imports semen for its own use and has the sole monopoly of importing semen for commercial farmers and breeders.

2.7 National Artificial Insemination Services (NAIS)

NAIS distributes semen and carries out inseminations at the farm level.

2.8 Kenya Stud Book (KSB)

KSB maintains the pedigree registers of registered animals.

2.9 Breed Societies

Breed Societies set up the breed standards for the various breeds.

3.0 SIRE EVALUATION METHODS

Many methods of sire evaluation have been in use in the last 70 years. These are:

i. 1920s to 1930s - Daughters' Average
ii. 1930s to 1960s - Dam Daughter Comparisons
iii. 1960s to 1970 - Herdmate Comparisons
iv. 1970 to 1974 - Contemporary Comparisons
v. 1974 to 1989 - Modif ed Contemporary Comparisons
vi. 1976 - - Mixed Model (for SNF and protein)
vii. 1989 - - Animal Model

3.1 Methodology

In Kenya the sires are evaluated on the basis of the contemporary comparison method (C.C.). Of course, this method does not utilize a lot of available records in computing breeding values. Records on ancestors' merit, 2nd and subsequent lactations, records from unregistered animals and grade animals are not used. Rege and Mosi (1987) re-evaluated sires which were previously evaluated by the C.C. method using a programme having the properties of Best Linear Unbiased Prediction (BLUP) and established that the ranking of bulls is significantly changed in the latter method (see also Philipsson,1988).

3.2 Results of Sire Evaluation in Kenya

The CAIS purchases bulls locally and also from Germany, Holland, United Kingdom, Sweden, Canada, Finland and New Zealand. These bulls are bought at a very young age and are reared at the station; they are used extensively at an early age. Simultaneously, they are progeny tested; this is done in groups (teams). The first groups were progeny tested in the 1960s. By 1988 the LRC was progeny testing bull team number 12. The results in groups 1 to 8 was published in 1985. In all, 54 Friesian bulls were evaluated by 1985 and their breeding values released; later on, the results for Ayrshire, Guernsey and Jersey bulls were also released. Tables 1 and 2 give the results of the locally bred Friesian bulls and those purchased from Germany Only 46% of all the Friesian bulls in groups 1 to 8 had positive breeding values. By the time the results were obtained, most of the bulls were already disposed off because of death or old age. By 1985 only 4 bulls from groups 1 to 8 were still active - one from Holland and three from Kenya - all 4 had negative breeding values. All the bulls were used extensively because of high demand for semen.

4.0 SELECTION OF BREEDING ANIMALS AND THE EXPECTED GENETIC CHANGE

In Kenya, selection of young untested breeding animals is based on the performance of their parents (Rendel and Robertson,1951). The parental genes are transmitted to the progeny by the following four paths:

Breeding Animal	Superiority in Breeding Value	Average Age at Birth of progeny
Sires of Bulls	I_{BB}	A_{BB}
Sires of Heifers	I_{BB}	A_{BC}
Dams of Bulls	I_{CB}	A_{CB}
Dams of Heifers	I_{CC}	A_{CC}

For each path the superiority in breeding value equals i-Grp_G (Rendel and Robertson,1951)

The bulls calves are bred from dams with production records 10% above the herd average. This gives intensity of selection of 0.89 for the dams of bulls. The sires of the bulls are selected from among the tested A.I. bulls with the highest breeding va ues. These constitute about 10% of the bulls and give intensity of selection of 1.75 for sires of bulls. The sires of heifers are selected from among 45% of all the bulls and give intensity of selection of 0.89. All registered dams of heifers which reach maturity are bred and therefore intensity of selection for I_{CC} is zero.

Using a heritability value of 0.188 and a phenotypic standard deviation of 660 (Rege and Mosi,1987), the probable genetic superiority of the four paths is:

Ics = 0.89 x 283.8 x 0.43 = 108.6
Igg = 1.75 x 283.8 x 0.43 = 213.6
Igc = 0.89 x 283.8 x 0.43 = 108.6
Icc = = 0.0

The sum of genetic superiority of the parental generation is 430.8 kg of milk per generation. Using the generation interval of the Kenyan Friesians which is as follows (average age at birth of progeny):

Sires of bulls = 15 years (12-25 years)
Sires of heifers = 5 years
Dams of bulls = 6 years
Dams of heifers = 5 years

The four paths add up to 31 years.

Consequently, the maximum yearly genetic progress in Kenya without progeny testing is expected to be 13.9 kg and this represents 0.05% of lactation yield per year.

The actual genetic progress made from 1979-88 computed from KMR figures is small if any.

5.0 DISCUSSION AND CONCLUSIONS

Kenya has a population growth rate of about 4% per year. This represents one of the highest growth rates in the world. The population increased by 40% from 1978 to 1988. Consequently, the demand for dairy products also increased. This demand was largely met by increasing the number of dairy cattle by 237% between 1978 and 1988. Most of this increase was realized by crossing the local Zebu cattle with exotic dairy cattle. Semen was then costing only one shilling per conception; this represented only 1/30th of the cost of producing semen. Milk production therefore increased by 32%. This made it possible for the increased demand for milk and dairy products as the result of increased population and improved standard of living to be matched by supply.

The number of dairy cattle cannot be increased indefinitely There is a limit dictated by available

land and other production resources. We believe that this limit has already been reached. An alternative method is to improve the management and genetic potential of the Kenyan dairy cattle. This was successfully done in U.S.A. where the number of dairy cattle was reduced by 7% between 1971 and 1983 and milk production increased by 17%. Similar improvement can be achieved in Kenya if certain steps are taken to improve the National Dairy Cattle Breeding Programme. These steps should, first of all, aim at reducing the generation interval.

When selecting superior parents for breeding without progeny testing, Rendel and Robertson (1951) showed that the maximum yearly genetic progress possible is 1% of lactation yield. In Kenya the expected yearly genetic progress is almost negligible (0.05%). The reason is that parents of both the breeding heifers and bulls are selected at a very old age. The sum of the generation interval for all the parents is 31 years as compared to 18 years for the British Frisians (Robertson and Asker,1951). It takes a long time to prove bulls in Kenya (12 to 25 years) and also unnecessary long time is spent to evaluate the dams used to breed bulls; the dams being required to calve at least three times before being selected. Bulls take a long time to be evaluated because there are only a few test herds available for progeny testing (the requirements for a farm to qualify to be included in the progeny testing scheme are difficult for most farms to meet and the cost to a farmer to meet these requirements is high while the benefit is non existing).

There is a large number of government and private farms which keep good records; these can be used for progeny testing. The cows on these farms are not registered but the records are reliable and most of these farms use A.I. About 80% of the dairy cattle are on small farms which use A.I. Most of these farmers keep records and those who do not can be included to do so, thus their animals can be used for sire evaluation. Records from grade animals which constitute 70% of the dairy population can also be used for sire evaluation. If this is done, an adequate number of daughters can be obtained in a relatively shore period of time to allow early sire evaluation and cut down the generation interval considerably

There is no much advantage in waiting for three calvings to decide whether a dam can be used to breed bull calves or not. Calving interval has low heritability and, in most cases, long calving interval demonstrates the existence of a management problem. Dams to breed bulls can be selected after first calving, thus the generation interval will be shorter.

If bulls are evaluated early in life and those with negative breeding values culled, the accuracy of selection will be improved and the yearly genetic gains increased above those achieved by selection based on parental performance.

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TABLE 1

A list of Kenya Bulls Progeny Tested in Groups 1-8

No	Bull Code	Bull Name	Milk Yield Kg	Date of disposal
1	0245	Ruyter	+25	26.01.81
2	0246	Riebeck	+166	16.11.80
3	0247	Hodari	-145	06.04.80
4	0248	Friso	+18	18.06.83
5	0256	Wielaard	-92	25.06.82
6	0258	Meru	-263	
7	0259	Mwariama	-222	26.06.79
8	0261	Mbogo	-6	
9	0262	Malberg	+59	13.03.84
10	0264	Plesman	+32	20.10.80

Source: Ministry of Livestock Development

TABLE 2

A list of German Bulls Progeny Tested in Groups 1-8

No	Bull Code	Bull Name	Milk Yield Kg	Date of disposal
1	0209	Legatuv	+17	25.09.73
2	0210	ABT	-69	23.11.70
3	0217	Weberheld	+32	26.03.79
4	0218	EWALD	-41	22.07.76
5	0223	Uagabond	-12	29.04.78
6	0231	Poldi	-135	04.05.74
7	0232	Panther	+28	03.07.81
8	0241	Romeo	+226	10.01.80
9	0242	JUWNA	+118	05.09.79
10	0243	PABST	+101	09.05.81

Source: Ministry of Livestock Development

LA RACE BOVINE MAROCAINE BLONDE D'OULMÈS-ZAËR

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RÉSUMÉ

La race bovine marocaine Blonde d'Oulmès-Zaër, race traditionnelle et originale du Moyen-Atlas, est exploitée pour son lait et sa viande en conditions difficiles. Comptant 8000 vaches environ dans les communes de Boukachmir et d'Oulmès, dans la province de Khemisset, elle est l'objet d'un programme de conservation et d'amélioration génétique cohérent pouvant servir de point de départ à la revitalisation de cette région attachante.

SUMMARY

Moroccan Blonde d'Oulmès-Zaër cattle is an original and native breed of MoyenAtlas, providing milk and meat in severe conditions. Population size is appr. 8000 breeding cows in Boukachmir and Oulmès communes, province of Khemisset. Its well coordinated breeding-scheme may be a basis for a new start of this attractive region.

La race Blonde d'Oulmès-Zaër se distingue par son aspect extérieur et ses caractéristiques zootechniques moyennes du restant de la population bovine autochtone, comme le montre le tableau n°l. Son aire d'élevage actuelle correspond au communes d'Oulmès et de Boukachemir, dans le quart sud-est de la province de Khemisset, zone de collines, de plateaux et de montagnes basses du Moyen-Atlas. La végétation naturelle y est une forêt claire de chênes-liège offrant d'octobre à mai un pâturage herbacé. Anciennement la race Blonde était présente en pays zaër, de Rabat à Maaziz, exploitée en élevage extensif. La mise en culture de cette région l'en a chassée.

Contrairement à certaines opinions, la Blonde d'Oulmès-Zaër n'est pas une variété de la Brune de lÂtlas, dont la distinguent son format, sa conformation et les fréquences des divers types d'hémoglobine; les apports extérieurs y ont joué un rôle limité et passager. La Blonde d'Oulmès-Zaër paraît tout simplement autochtone et correspondrait à un élevage bovin fort ancien d'aire beaucoup plus largement étendue en des périodes plus humides.

Dans son aire d'élevage, les animaux d'un an au moins seraient 16.000, 8000 étant des vaches reproductrices. Traditionnellement les troupeaux transhument en forêt pendant la période de végétation des cultures et exploitent les chaumes âpres. La réduction de la forêt conduit cependant à recourir de plus en plus aux parcours et aux aliments du commerce. La taille moyenne du troupeau est de moins de 10 vaches, produisant chacune 500 l. de lait environ par an pour la consommation familiale, et animaux de boucherie: vaches de réforme et jeunes taureaux, vendus à 2 ans. Ces bovins sont en général associés à des chèvres et à des moutons produisant respectivement de la viande pour la famille et pour la vente. L'intervalle entre vêlages est d'environ 20 mois et le recours à la monte naturelle est la règle. Le taureau est acheté, emprunté, échangé ou élevé sur place.

Un programme de conservation et d'amélioration génétique est applique depuis 1988. Son maître d'oeuvre est la Société Nationale de Développement de l'Elevage (SNDE), chargée de cette mission par le Ministère de l'Agriculture et de la Réforme Agraire (MARA), avec l'appui du Programme des Nations Unies pour le Développement (PNUD) et de l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture (OAA/FAO). Ce programme repose sur un noyau de sélection, de 150 femelles en âge de reproduire, à l'UREB, ouvert sur les cheptels de 25 éleveurs associés, totalisant 320 vaches environ. Un contrôle d'origine maternelle, de poids à la naissance et de croissance est effectué dans l'ensemble de ces troupeaux, la monte en lots avec 4 à 6 taureaux permettant, à l'UREB, d'enregistrer l'ascendance paternelle. Les vaches sont classées sur leur production laitière, mesurée par la croissance de leurs veaux, et les jeunes mâles sur leur croissance, avant sevrage, puis pour les 15 à 20 meilleurs d'entre eux en conditions uniformes leur gain moyen journalier est de 800 g. La meilleure moitié est destinée à la reproduction, soit à l'UREB soit chez les éleveurs-associés.100 à 200 doses de semences sont congelées et stockées pour chacun des taureaux servant à l'UREB, et il en sera de même pour des embryons. Les éleveurs associés ont constitué deux coopératives pourvues d'un secrétariat commun. Depuis trois ans, un concours spécial de la race réunit à Oulmès 130 animaux et de nombreux visiteurs.

Originale, la race bovine Blonde d'Oulmès-Zaër est donc l'objet, depuis plusieurs années, d'un programme cohérent, susceptible de la maintenir et d'en assurer la promotion dans d'autres régions où elle pourra servir de support de croisement, et de constituer un point de départ à une action de revitalisation d'ensemble de cette région du Moyen-Atlas.

Caractéristiques comparées des bovins Blonds d'Oulmès-Zaër et Bruns de l'Atlas (d'après Vaysse J.,1952, Lélevage au Maroc, La terre marocaine, Ed. Casablanca; cité par ASRI A.,1984)

		BLONDS	**BRUNS**
Tête		**Chanfrein convexe** Arcade orbitaire peu saillante Cornes horizontales puis courbées vers le haut et l'arrière **sans extrémités noires**	**Profil droit** Arcade orbitaire saillante Cornes horizontales ou légèrement relevées ver l'arrière, **à extrémités noires**
Membres et pieds		Canons assez forts **Onglons de coloration blonde ou marron**	Canons fins sans être grêles **Onglons de coloration noire**
Peau		**Claire**, sans être rose, ni tâchetée **Fanon assez développé**	**Noire** **Fanon moyen**
Robe		**Acajou**, fortement foncée chez le taureau, chez la femelle, la couleur s'éclaircit avec l'âge	**Fauve foncée**, renforcée de noir aux extrémités (tête, membres). Ligne plus claire sur le dos, bordure blanche autour des naseaux
Hauteur au garrot		**1,20 à 1,35 m**	**1,15 à 1,35 m**
Poids vif	Taureau	450 kg	375 kg
	Vache	325 kg	300 kg

THE MAREMMANA CATTLE

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SUMMARY

The origins, historical evolution and actual situation of the breed are discussed. These cattle played a major role in the central part of the Italian peninsula since Roman times. The breed's vital statistics, numbers and systems of production are presented.

RÉSUMÉ

Les origines, l'évolution historique et la situation actuelle de cette race sont examinées. Depuis l'époque romaine, ces bovins ont joué un rôle capital dans la partie centrale de la péninsule italienne. Les statistiques sur la vitalité de la race, le nombre d'animaux et les systèmes de production sont présentées.

1.0 THE ORIGINS

The origins of the Maremmana breed date back to many centuries ago. According to the prevailing hypothesis (Giuliani, 1937; Lucifero et al., 1977) they are the direct descendants of "Bos primigenius", the steppe's big grey macrocerus animals, known in Italy as "podolic", which from Asia spread into the South-East Europe.

During the IVth century, in the wake of the Hun invasions, they are thought to have been crossed with the "Bos silvestris" breeds of the Etruscans and the Romans, mostly preserving their original features. Their hardiness and adaptability to adverse conditions allowed their permanent settlement on the entangled mosaic of bush, woods and natural pastures typical of this region.

There was, at the same time, a total marginalization of breeds with higher food requirements, and a merciless natural selection within the Maremmana breed. Owing to the elimination of the less adaptable subjects, the chances of survival were gradually enhanced; until the XIXth century, only buffaloes were able to compete with the Maremmana in exploiting the Mediterranean coast's scarce food resources.

We know very little about the consistency, evolution and ethology of the Maremmana cattle, up to the beginning of the XXth century The Maremma region's natural state of isolation, doubtless helped to preserve substantially the breed's original genetic and morphologic characteristics. It would be wrong, however, to think that there was no connection at all with other breeds, especially in Central Italy

The Maremmana herds, settled in largely underpopulated areas, and had a far greater overall output (meat and work) than was required locally; the surplus animals and products were sold elsewhere. We know, for instance, that the Dukes of Este used to buy beef cattle in the Maremma, in order to sell them in the Ferrara market. More recently, it was customary to send Maremmana draught oxen to the soil-poor Central Appennine regions.

2.0 THE FIRST HALF OF THE XXTH CENTURY

Environmental factors were thus the strongest defense of the Maremmana's distinctive features and we can reasonably assume that, till the beginning of the XXth century, the changes in the breed composition and systems of management were very limited. The first substantial alterations coincide with the first major survival crisis of the breed and correspond to the time of the great land transformations carried out between the end of the XIXth and the beginning of the XXth century The drainage of the marshes and their subsequent conversion to farm-land, definitively upset a centuries-old equilibrium. The herds were pushed out of the plains and had to move to the even poor grazing of the hills. But, above all, for the first time, the Maremmana's capacity to adapt to changing conditions began to be disputed.

Substitution and crossing with more "productive" breeds, such as the Chianina , Romagnola and Marchigiana, became a mode. Crossbreeding was practiced even more widely after World War I, when land transformations increased considerably.

At the beginning of the thirties, the Maremmana's fate seemed to be sealed. The breed had almost become a symbol of a backward and disappearing world. Its substitution with higher-yielding breeds, or at least its profound modification through continuous crossing, seemed therefore unavoidable.

In the beginning it seemed that this opinion would prevail, but fortunately it was strongly opposed by a few academics among whom one must cite Prof. Renzo Giuliani in the thirties, who passionately fought for the conservation of the Maremmana pure breeding systems of production:

- any evaluation of preference among breeds would have been misleading if environmental factors were not taken into account;

- a breed had to be judged not only on the grounds of its performances, but also on its capacity to evolve;
- the output in meat and work had to be evaluated in the light of production costs and capital investments required.

Giuliani reasoned that if these points were taken into account, it would be evident that in most of the coastal areas of Tuscany and Latium, the Maremmana was still preferable to any other alternative. There was no need, moreover, to resort to a crossbreeding policy as the existing wide genetic variability would permit a profitable selection within the breed.

Based on this principle, an important selection programme was planned and carried out, since 1932. The breed's standards were fixed and the Herd Book was established (Mercuri,1935).

Later, selection units were formed, each of them made up of 25-30 cows and one bull. First in two groups (1932), then more and more, the control was gradually extended. On the eve of the Second World War, 21 selection units with a total of 504 cows were under control. The calves were periodically weighed and the bulls tested through the evaluation of their offspring - a proceeding which anticipated by about ten years the introduction of "progeny tests" in the main Italian dairy breeds. The livestock's identification by branding, an already widespread custom, was made compulsory

This policy helped to raise the breed's standard and numbers, in spite of some decrease due to the Second World War; 254 bulls were registered in 1951, while the total population was estimated at about 170.000 head of cattle.

3.0 FROM THE FIFTIES TO TODAY

In the early 50's the second and major survival crisis of the Maremmana breed began. Two were the causes (Geri,1962):

- The land reform, carried out in the entire Maremma region through the expropriation and the breaking up of large estates. The philosophy underlying this policy was the development of peasant small holdings. In this framework, the Maremmana breed was once more considered the symbol of large unproductive "latifundia", and was replaced by dairy cattle kept indoors in small farm units.
- The development of mechanization drastically reduced Maremmana breeding, a rriain role of which consisted in the supply of draught animals.

These two causes acting in synergy, started the downward trend which lasted until the middle sixties. Once more the disappearance of the Maremmana was foreseen, and once more the forecasts were disproved. While in the often irrigated plains the replacement of the Maremmana proved to be irreversible, in the hilly marginal areas the attempts to bring in more demanding breeds, turned out to be a total failure and the Maremmana cattle emerged again as the only breed able to adapt to the environmental constraints. During the years 1965-1975 we witnessed therefore a new recovery

The number of selection units started to rise again; the breed's total numbers, which at the beginning of this decade were down to 30.000, reached in 1975 60.000. In recent years however the trend was again reversed.

The evolution in consumers' nutritional habits, now tending towards younger, tender and easy-cooking meat, has favoured the products of the dairy and specialized beef breeds.

In marginal areas, particularly in Southern Latium, an attempt was made to cope with the consumers' new demands through upgrading, which caused the loss of the most typical characteristics of the breed. In the more traditional areas, first generation crossing with mostly Charolais, but also Chianina and Limousin bulls, was introduced. This practice, although it reduced the total Maremmana population, it has, nevertheless, ensured the maintenance of pure breeding units, since the results of F2 crossings have, in general, been disappointing.

It is worth pointing out that the general decrease of the Maremmana livestock numbers has not been followed by a similar decrease of the Herd Book cattle numbers. The “hard core” of the breed survives, and we cannot exclude, for the future, the possibility of another recovery.

Since 1961, the Maremmana breeders joined ANABIC (Italian Beef Cattle Breeders Association) together with those of the Marchigiana, Chianina, Romagnola and Podolic breeds.

4.0 THE ENVIRONMENT

The link that exists between Maremmana cattle and their traditional environment has already been underlined.

In few European breeds is this link as deep and powerful; it would be very difficult to appraise the Maremmana - its morphology, its ethology, its history - if we failed to consider the land on which for centuries it has been reared, its austere beauty, the people who live on it, the usages and customs typical of extensive husbandry. Vice versa the Maremma itself would Iose most of its deeper being without the presence of these herds, grazing in the plains or up the wooded hills, under the watchful eye of the “buttero” (the herdsman) on horseback.

The Maremma is the coastal area which from the mouth of the Arno, descending along Southern Tuscany and Northern Latium, reaches the immediate surroundings of Rome. The name seems to derive from “Maritima” and appears for the first time in today s form in a text dated 1294, by the Tuscan poet Guittone dÂrezzo.

Until the great drainage work was begun in the XIXth century, one of the most peculiar of the Maremma’s features was the extent of wide marshy areas, only a few relics of which can be seen today. In their place now are the most fertile soils one can dream off, often irrigated and intensively farmed. Almost unchanged, on the contrary, are the hilly areas, mostly filled with Mediterranean “macchia” (bush), woods, natural grazing and a few cereal crops. It is here where most Maremmana cattle are now found.

This is a very difficult environment. The climate is very arid, almost rainless during the summer. The soils are acid and poor, both chemically and physically Accordingly, the pastures are not highly productive and, what is more, their productivity is concentrated in spring and a short autumn renewal period.

In this very marginal environment, the great resource that allows the Maremmana cattle to survive is the Mediterranean “macchia”. This is a plant association distinguished by a set of shrubby evergreens, which thickly covers the soil. The prevailing species are heaths, broom, lentisk, strawberry bushes, holm-oak and myrtle. In summer, when the pastures almost disappear, the “macchia” constitutes together with some stubble and dried feed, the only possible feed supply for the extensively grazing cattle.

Besides the “macchia”, there are a few mixed woods (oak, flowering ash, holm-oak). These are also important as food resource and as shelter against the heat of summer.

Publically-owned property occupies an important part of the land. In Latium, a peculiar form of this land tenure system is the “Universita Agraria”, a sort of association going back to Middle-Ages whose territories are open to the local inhabitants: they have the right of grazing their cattle and gathering firewood.

The Maremmana cattle country, up to a few decades ago, was rather wider than the Maremma proper It stretched out to nearly the whole of Latium, and embraced, besides Southern Tuscany, large areas of Umbria and Abruzzi.

Nowadays, outside its natural habitat, there are few herds left, but in the Lepini Mountains, south of Rome, they are highly crossbred. In the Simbruini Mountains, east of Rome, a few Maremmana cattle are also reared but, owing to the different weather and altitude, semi-extensive grazing prevails. Extensive cattle grazing co-exists in the Maremma with sheep and horse breeding. This latter is very important, as the local Maremmana horse breed supplies the saddle horses

used by the "butteri" to tend the cattle. The buttero, his traditionally harnessed horse and the Maremmana herd, live in a symbiosis rooted in the most ancient history of Europe, symbolizing the true spirit of that Maremma which hasn't yet given way to the modern often mass consumption approach of today's way of living.

5.0 THE BREED

Today, the total number of pure Maremmana cattle is estimated at about 25-30.000 head. Their most peculiar characteristics are:

- grey coat, turning to deep grey in bulls; red-brown birth coat up to three months;
- black loose skin;
- considerable body development, with height at withers of 1.50 to 1.55 m for bulls and 1.40 to 1.55 m for cows;
- light triangle-shaped head;
- long horns: lyre-shaped in females, crescent-shaped in males;
- fair regularity of the back line with manifest development of the hind-quarters;
- broad chest, long and rectilinear hind quarters;
- wide, long and big croup;
- large and well-shaped udder;

As far as the functional characteristics are concerned, the Maremmana breed, as already mentioned, is fit for extensive grazing conditions; rustic, vigorous and hardy The cows have a good milk production, which can exceed ten liters a day, and the breed is known for its resistance to diseases: piroplasmosis, perinatal and postnatal problems, foot and skin diseases, tuberculosis, and obstetrical - gynecological pathologies (Fagiolo,1988).

As for reproductive parameters, while the rather advanced average age at first calving (3 years, 9 months,13 days) is a negative point, calving interval (less than 14 months), age, of culling (12 years) and number of calves born per cow (more than 7), are all positive points. The frequency of twin births is 1.17% and the percentage of stillborn calves 1.5% (Lucifero et al.,1979).

In the better managed farms the custom is now of lowering the heifers' mating age from three to two years.

A remarkable change in recent years has been the average live weight (kg) of the cattle (ANABIC,1990):

	1951		1984	
	Males	**Females**	**Males**	**Females**
6 months	170	170	220	185
12 months	230	220	320	245
18 months	300	290	430	320
24 months	350	330	500	350

In the Presidential Estate of Castelporziano, where selection work and modern management are applied, the results are even more remarkable (average of the last five years):

	Males	**Females**
6 months	223	206
18 months	450	338
24 months	641	478

The true problem of the Maremmana breed is doubtless the net dressing and meat dressing percentages, which are considerably lower than in other beef breeds (Gigli and Romita,1988):

	MAREMMANA	CHAROLAISE	MARCHIGIANA
Net dressing %	61.50	68.54	66.80
Meat dressing %	63.66	69.63	68.95
Fifth quarter %	32.03	25.06	27.06
Head %	3.01	2.08	3.00
Skin %	13.20	9.06	11.06

While uncontrolled crossbreeding in many of the marginal areas, damaged the Maremmana breed, careful limited first generation crossing helps maintain the pure-bred lines for herd replacement; this is a sound and profitable practice (Magagnini,1986; Gigli and Romita,1988).

6.0 THE SYSTEMS OF PRODUCTION

The prevailing system for Maremmana cattle is totally extensive grazing on marginal lands (Nardone and Ronchi,1988).

Mating is usually seasonal, mating takes place from April to July and the majority of births occur from January to April. Each bull is given 20 to 30 cows. At the end of September, the suckling calves are weaned and, on the following May, marked.

Usually, cattle pass the winter on “macchia” which is their main feeding. In March, the herds are transferred to natural grazing, where they stay until September.

The benefits of this method are clear. There are no fixed infrastructures, apart fences and a few rudimentary sheds, thus a limited starting capital is needed; low labour costs, given the high livestock labour ratio; very reduced feeding costs as, besides some fodder, the entire feed requirements are supplied from grazing and better sanitary conditions than in stabled-in cattle.

Finally, from an environmental point of view, it is noteworthy that extensively grazing cattle integrate better with the ecosystem in which they live.

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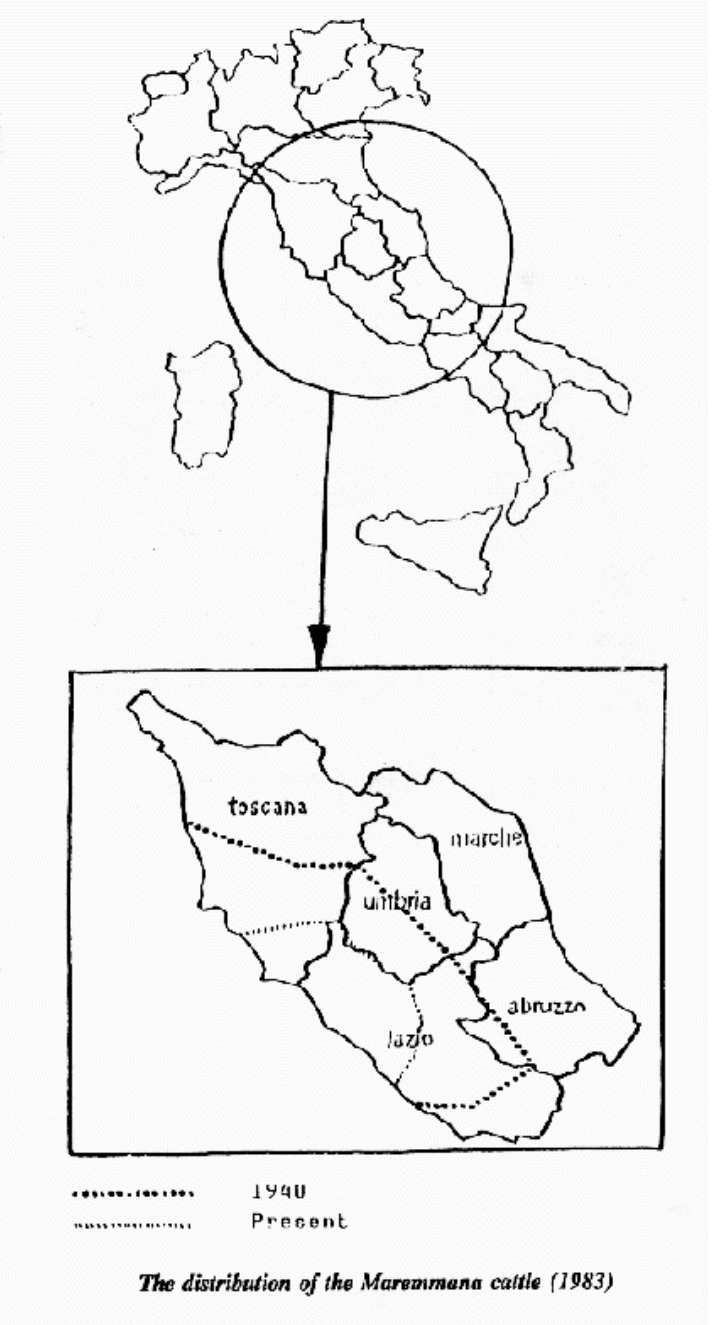
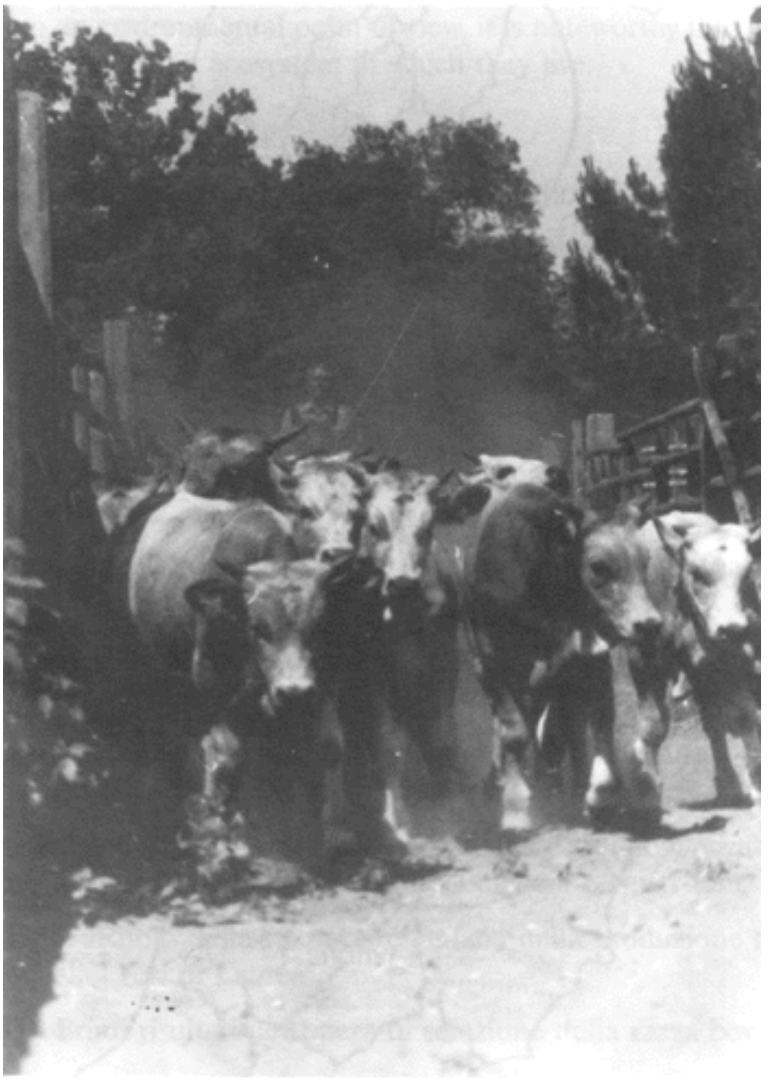
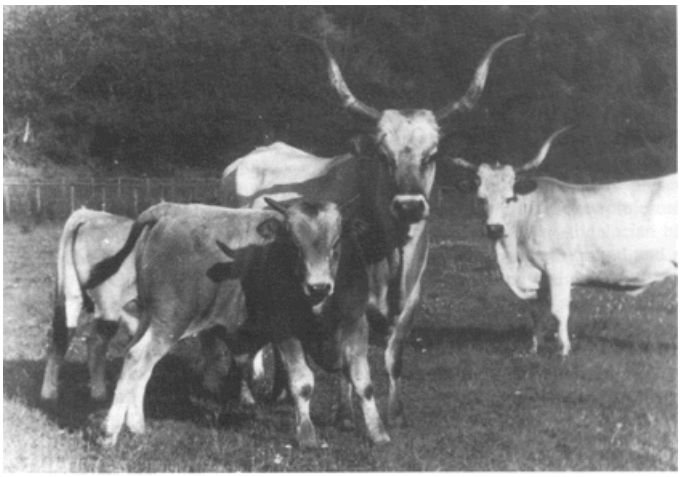


The distribution of the Maremmana cattle (1983)



Traditional cattle-herding on horseback



Cows and calves

Extensive grazing

THE MAREMMANO HORSE

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SUMMARY

The Maremmano horse, one of the most important and ancient Italian breeds, has a Stud Book only since 1980. This breed is used for saddle horse production, both as a purebred and as a crossbred. A systematic breeding programme has been implemented to maintain the old genotype and ensure wider variation within the breed.

RÉSUMÉ

Le cheval Maremmano qui représente l'une des races italiennes les plus importantes et les plus anciennes a un livre généalogique seulement depuis l'année 1980. Cette race est utilisée pour la production de chevaux de selle, aussi bien comme pur sang que comme produit de croisement. Un programme de sélection systématique a été introduit implanté pour chercher de sauvegarder le génotype original et préserver la race par une ample variation génétique.

1.0 ORIGINS AND HISTORY

The Maremmano is an indigenous Italian horse fixed in type despite a long history of cross-breeding. This horse, always present along the Tyrrhenian coast, was the native breed of the Etruscans (800 b. C.), the first Italian people to take horse breeding seriously. In Roman times inevitably much interbreeding took place, and the careful methodical breeding systems of the Etruscans were ignored or forgotten. Then the dark ages with a long improductive period, but during the Renaissance (l6th Century) there was a revival of scientific horse-breeding. In the Papal State and Tuscany considerable attention was given to the breeding of Maremmano horses, whose heavy build and luxuriant manes and tails were greatly appreciated. These horses had a good head carriage and plenty of "presence". The Papal State used black horses (socalled "Roman horses") while Tuscany preferred the bay ones. In this period the breed was infused with Arab, Barb and Andalucian blood. After the Italian unification (1860) the fame of the Maremmano horses spread and many of them, stallions mainly but also mares, were sent all over Italy to improve the other breeds. The Maremmano horse was much in demand by the cavalry and with a careful addition of Thoroughbred blood, it resulted in strong saddle horses having a good appearence and excellent conformation. The breed declined sharply in numbers after the Second World War, but interest in it revived in the seventies.

2.0 CHARACTERISTICS OF THE BREED

The coat colours are: black, brown, bay, and chestnut only for the females; white marks are indesiderable. The height at the withers is not less then 1,58 metres for the males and 1,55 for the females, at 42 months of age. The Maremmano is a handsome, attractive strongly built horse, intelligent and sensible. I.arge head, in some cases convex, long neck with often wavy mane. Solid shoulder and ecxeptional depth to the girth. A very strong, slightly long back and powerful hind quarters, well-set tail. Short, strong, clean legs with ample bone; hard and sound hooves. The environment conditions of its natural habitat (Maremma region) were never favourable and natural selection dominated, thus the breed became well adapted to the harsh milieux. They have a strong, enduring, calm, steady, frugal and excellent constitution; longevity, good fertility and desease resistance, high survival rate of the foals but are also late-maturing.

3.0 THE PRESENT SITUATION

With the mechanization of the army in the twentieth century and also of most forms of farming, the future of this breed looked gloomy.

Since the end of the sixties the question of reviving the Maremmano horse draw the attention of many breeders in Latium and Tuscany In those years a commission to evaluate the remaining Maremmano horses which had not been crossed with heavy sires was created. In 1972, about 450 horses of the true type were identified. In 1974, 500 mares were selected, the owners of which were prepared to mate them with suitable stallions. In 1979 the Maremmano breeders decided to form ANAM (National Association of Maremmano Breeders) to preserve and promote the Maremmano horse and with this object the Stud

Book was established in 1980. As a result of that about 2000 mares and 200 stallions are now registered.

The genealogies of all Maremmano Stud Book stallions, born until 1985, were studied. The male lines (sire by sire) were completely investigated until one sire was found not to be Maremmano or a Maremmano without further back genealogy, but this was not the case of the female lines (dam by dam and dam by sire). For the female lines a lot of animals are thus still unknown and/or missing. The studies are still in course.

The major male line founders were four:

- one is Maremmano: Otello, bay - brown born in 1927;

- one is Salernitano (from the Southern Tyrrhenian cost, a Maremmano-like breed): Ussero, with birth data and coat colour unknown;
- two are Thoroughbred: Aiace (bay, born in 1926) and Ingres (bay, born in 1946).

These sires contribute to the genetic heritage of the Maremmano stallions with only 11.1% (Otello 3.8%, Ingres 3.6%, Aiace 2.8%, and Ussero 0.9%). All Maremmano stallions are now subdivided in lines in relation to the major contribution of each founder

The female lines are even more important when we consider their breed contribution. The known Maremmano stallions blood percentages are here:

- 13.1 % by Thoroughbred;
- 5.3% by Maremmano;
- 1.1 % by Salernitano;
- 0.7% by Half Arab;
- 0.5% by Norfolk (a Thoroughbred-like breed).

The Ussero line is the most heterogeneous (79.1% by unknown, 5.3% by Thoroughbred, 4.9% by Maremmano, 4.7% by Salernitano, 5.8% by Half Arab, 0.3% by Norfolk), it is the only with blood from these five breeds but it .also has the highest inbreeding coefficient (0.02 ± 0.01).

The mean inbreeding coefficient of the stallions has been estimated to be 0.01 ± 0.003. The inbreeding coefficient is relatively low because many dam genealogies are missing. Where both the sires' and the dams' genealogies are known the inbreeding coefficient increases (0.086, 0.125, 0.164). The mean relationship coefficient between the stallions is of 0.040 ± 0.02. The genetic variability found among the blood markers suggests the possibility of applying a strict selection plan.

4.0 GEOGRAPHIC DISTRIBUTION

The breed originated in the Maremma (provinces of Pisa, Livorno, Grosseto, Viterbo, Rome, and Latina) and is now expanding all over the country: Veneto, Emilia Romagna, Piemonte, Lombardia, and Basilicata. The bulk of the population is in the provinces of Viterbo, Grosseto, Rome and Latina where there are about 650 small and large stud-farms. This distribution is due to the extensive or semi-intensive production systems of these areas where the advantage of the breed in the harsh agricultural/environmental conditions is appreciated. Other important factors of this particular distribution are the breeding traditions and the social-cultural aspects.

5.0 PRODUCTION SYSTEMS

The Maremmano was the horse of the largest farm units and selective breeding was adapted to meet the different needs. Over the years its development has been greatly influenced by changing demands. The Maremmano's qualities of strength, good constitution, and intelligence are known. Actually the Maremmano and the Thoroughbred are kept in similar production systems. The future success of the Maremmano depends on a good coordination of selection goals. Although the breeder must never loose from sight the fact that the modern Maremmano horse has many possibilities one must keep in mind that the total number of horses registered for showjumping in Italy is considerably lower than the number used for leisure riding (trekking, hunting, horse-ball, etc.), other horse sports (three day event, dressage, driving, endurance, steeple chase, plane race, etc.) or traditional cowherding (Butteri, the Italian type of cowboys).

6.0 PERFORMANCES

The Maremmano is one of the few Italian breeds that has a Stud Book. This gives possibilities for applying selection planning. The breed is now often used in crossbreeding to produce show-jumping horses. The evaluation of the Maremmano horse performances is now possible by their morphological traits. The heritability ($h^2 \pm$ s.e.) of these traits is 0.369 ± 0.305, 0.901 ± 0.391,

0.728 ± 0.368 respectively for wither height, heart girth, and cannon bone circumference.

In the Maremmano breed, all the horses are judged by a commission when they are at least 30 months old. There are ten different aspects to be subjectively evaluated, and for each of them the score ranges from 1 to 10; to be admitted in the Stud Book, total score must be 70 or more for females, and 80 or more for males, and no partial score can be less than 6. Judges can also subjectively describe any positive or negative aspect that they find during the evaluation. If possible, they must also measure the wither height, girth circumference, and cannon bone circumference, which must be within breed standards. All this data was not used in selection until now, but only for the economical evaluation of animals on sale. Table 1 shows means ± s.e. of morphological measurements; sexual dimorphism is not very evident; males are 2.6% higher, their heart girths are 1.2% larger, and their cannon bones are 5.8% wider than those of females. Table 2 shows partial scores: the highest score is for "coat and pigmentation" (8.76 ± 0.01), the lowest score for "legs" (7.73 ± 0.02); highest and lowest partial scores for females are "coat and pigmentation" and "legs" respectively, whilst highest and lowest scores for males are "coat and pigmentation" and "stance and gait" respectively.

The greatest correlation between total score and a morphological measurement is given by wither height (0.657); total score is more related with morphological measurements in females than in males. The lowest correlation between total score and a partial one is for "coat and pigmentation", and the highest for "body conformation" (0.809); males showed overall lower correlations than females (table 3).

In table 4 are shown the correlations between partial scores: the highest is between "type" and "body conformation" (0.595), and the lowest between "coat and pigmentation" and "neck" (0.056). 52.4% of all animals had no described morphological defects (54.6% for the females and 38.8% for males); the most common defects are toeing in (9.5%), toeing out (8.4%), long topline (6.4%), cow-hocked (4.7%), and splints (3.8%). Table 5 shows the estimates of heritability of liability for some vice in the Maremmano horse. It is interesting to note that the highest correlation is total score and height at withers; this is amongst the most important goals of Maremmano horse selection, and judges are very sensitive to this aspect.

In males, morphological measurements seem to be less related to the final score than in females, probably because of the different score requested for admission into the Stud Book and the practical need of approving at least one stallion for each breeder if horses are kept in natural breeding conditions.

7.0 MEASURES OF CONSERVATION

The decline of the horse in Europe since the early 50's, brought about by the competition with the internal combustion engine, seems today stopped.

The increse in the richest countries of leasure time and of investiments in the racing industry, created a growing interest and demand for "riding horses" and in particular for high performance animals for different kinds of competitions.

This demand is likely to be met in Italy by:

a. the Arab horse, the Thoroughbred, and the Anglo-arab;
b. crosses between the Thoroughbred, Arab, Anglo-arab or their derivates and horses from local populations;
c. some local populations that reached a national recognization thanks to their characteristics and to particular socio-cultural and productive situations.

In the last two groups we find first of all the Maremmano horse with its strong tradition. The Italian breeders are now concerned with the conservation and better use of the local genetic resources for the production and future development of the Italian Saddle Horse. By defending

the local resources the choice of the breeder counterbalances the general tendency towards the homogenization of the riding horse population in the country.

In line with the international philosophy of animal genetic resources conservation (Maijala et al.1984) the following can be proposed:

a. The first logical approach is the maintenance of genetic variation among populations for meeting changing demands of the future. However, since our attention is focused on variation it is necessary to consider that in the horse, more than in other domesticated species, we observe the presence of consistent genetic flows among populations with a continous redistribution of genetic variation. Considering costs and difficulties of conservation planning, a main challenge is how to quantify genetic individuality of populations in terms of conservation significance.
b. The close relation between man and horse through centuries, traditions and cultures is often associated with specific horse populations. The maintenance of these populations can contribute to the preservation of cultural diversity.
c. Some populations have been influenced by their harsh habitat (Maremma). Their adaptation to particular environments can be today useful for land management purpose.

It is therefore necessary to develop a strategy, at the national and international level, to better understand the problem and preserve the available variation.

The concept of genetic individuality is probably in the horse different as that in other domesticated species. However together with genetic variation there are other important issues for conservation policies (culture preservation, land management, etc.). A survey of these aspects was recently initiated by the Italian National Research Council (IDVGA-CNR).

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TABLE 1

Morphological measurements (mean ± s.e.)

		females	males	overall
Wither height	cm	161.22±.24	165.46±.41	161.94±.23
Heart girths	cm	190.59±.52	192.84±,85	190.92±.46
Cannon bone circumference	cm	20.91±.05	22.12±.11	21.11±.05

TABLE 2

Partial scores (mean ± s.e.)

	females	males	overall
Type	8.03±.02	8.33±.04	8.06±.02
Coat and pigmentation	8.74±.02	8.96±.02	8.76±.O1
Skeletal growth	7.96±.02	8.40±.05	8.01±,02
Body conformation	8.04±.02	8.26±.03	8.07±.O1
Neck	7.98±.02	8.25±.04	8.01±.02
Shoulder or withers	8.04±.02	8.30±.03	8.07±.01
Breast	8.11±.02	8.35±.04	8.14±,02
Topline	7.82±,02	8.00±.04	7.84±.02
Legs	7.70±.02	8.00±.04	7.73±.02
Stance and gait	7.82±.01	7.92±.04	7.83±.01

TABLE 3

Correlations with “total score” value

	females	males	overall
Wither height	.627	.470	.657
Heart girth	.400	.276	.400
Cannon bone circumference	.437	.235	.506
Type	.721	.641	.722
Coat and pigmentation	.260	.066	.275
Skeletal growth	.733	.494	.728
Body conformation	.819	.649	.809
Neck	.673	.580	.670
Shoulder or withers	.728	.650	.731
Breast	.653	.423	.640
Topline	.619	.509	.612
Legs	.647	.433	.641
Stance and gait	.633	.406	.612

TABLE 4

Correlations between partial scores

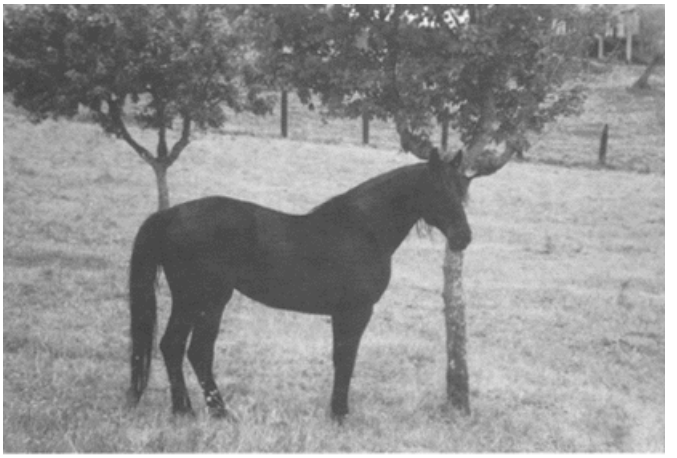
	vs	2	3	4	5	6	7	8	9	10
1 Type		.188	.434	.595	.575	.515	.329	.373	.352	.354
2 Coat and pigmentation			.096	.102	.056	.097	.134	.094	.078	.077
3 Skeletal growth				.571	.426	.550	.465	.338	.370	.306
4 Body					.526	.561	.495	.562	.458	.433
5 Neck						.538	.311	.291	.347	.335
6 Shoulder or withers							.441	.372	.383	.351
7 Breast								.317	.337	.364
8 Topline									.352	.298
9 Legs										.546
10 Stance and gait										—-

TABLE 5

Heritability of liability (mean ± s.e.).

Weak legs	.24 ± .03
Short pasterns	.57 ± .03
Sickle hocks	.19 ± .01
Calf-kneed	.51 ± .04
Short rump	.24 ± .0l
Long pasterns	.32 ± .03
Spavin	.32 ± .02
Hock synovitis	.40 ± .05

Distribution of the Maremmano horse



Stallion

Mares

INDIGENOUS CHICKEN GENOTYPES OF ETHIOPIA

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SUMMARY

The paper deals with the indigenous chicken types of Ethiopia and attempts to characterize them according to some morphological attributes. In addition, their growth, reproductive ability and importance in the national economy are also discussed.

RESUME

Ce papier traite des types indigènes de poulets en Éthiopie et essaie de les caractériser suivant certains attributs morphologiques. De plus, les objets relatifs à leur croissance, à leur croissance, à leur aptitude à la reproduction et à leur importance dans l'économie nationale sont aussi examinés. ‘

1.0 INTRODUCTION

Livestock productivity in Ethiopia is generally low for all types of animals, reflecting under-exploited resources because of inadequate nutrition, disease, poor management, under developed market infrastructure and unimproved genetic potential. However, the unimproved local domestic populations show good adaptability to local environmental conditions.

The great demand for animal protein in the midst of protein scarcity is further highlighted by the high rate of population growth which, in Ethiopia, is estimated to be close to 4% annually (FAO,1989).

Of all poultry species found in Ethiopia only chicken is of economic importance (SIDA,1987). Other birds like geese, ducks and turkeys are not raised at all while ducks, geese and guinea fowls are only known in their wild habitat.

2.0 THE LOCAL POPULATIONS

The native chicken types constitute the majority of the chicken population in Ethiopia. The distribution of chicken varies with altitude. At higher and at lower altitudes, where it is too cold and too hot, chicken concentration is low. In medium altitudes, where temperature is moderate, concentration of chickens is rather dense. Thus, the highest concentration is in the regions of Shewa, Sidamo, Gojam and Wello. Illubabor, Gamo Gofa and Bale regions, on the other hand, show the lowest concentration (Fig.1).

Local chickens exhibit a large variation in body shape and feather contours. They have various combinations of plumage colours, comb types and body sizes. Five predominant genotypes can be found which are often identified by their plumage colours. Thus, names like Tikur (for black), Kei (for red), Gebsima (for grayish mixture) and Netch (for white) are common:

	Tikur	**Melata**	**Kei**	**Gebsima**	**Netch**
Predominant plumage color	black	barley	red	gray	white
Common comb type	rose single	rose single	rose single	rose/walnut single	pea/rose single
Colour of ear lobe[1]	..... red or white				
Shank feathered[2]	?				
Male	No	No	sometimes	No	No
Female	No	No	sometimes	Yes (small)	Yes

[1] *White ear lobe is an indication of Mediterranean origin.*

[2] *Feathered shank is an indication of Asiatic origin.*

3.0 EGG PRODUCTION

Egg production traits of the five local genotypes of chickens are as follows:

Tikur	Melata	Kei	Gebsima	Netch	
Age at lst egg (d)	173	204	166	230	217
Mature body weight (kg)					
Male	1.3	1.7	1.6	1.5	1.4
Female	1.0	1.2	1.2	1.1	1.1
Feed intake (kg/bird.year)	50.9	53.2	37.0	36.4	39.1
Eggs/bird.year	64	82	54	58	64
Egg weight (g)	44	49	45	44	47
Egg mass (kg/bird.year)	2.8	4.0	2.4	2.6	3.0
Egg shape index	75.4	69.3	70.7	-	69.0
Shell thickness (mm)	.374	.311	.383	-	.317
Albumen % egg	50	49	51	49	49
Yolk % egg	36	38	38	36	36
Fertility (%)	56	60	57	53	56
Hatchability of all eggs (%)	42.0	41.8	44.3	39.3	39.0

Compiled from: Forssido (1986), Australian Agric. Consultancy & Management (1984); Beker & Banerjee (1990) and through personal communication.

4.0 MEAT PRODUCTION

Meat production traits can be summarized as follows:

	Tikur	Melata	Kei	Gebsima	Netch
Bodyweight (g) at 6 months (d)	960	1000	940	950	1180
Body gain (g/d)	5.2	5.4	5.0	5.1	6.4
Feed conversion (g DM/g body gain)	4.17	3.57	3.45	4.00	3.70
Carcass weight (g)	541	560	543	511	608
Dressing (%)	56.4	56.0	57.8	53.8	51.5
Carcass composition (%)					
Bone	23.0	25.0	22.5	24.2	21.3
Meat	65.7	64.3	65.8	65.1	68.0
Skin	11.3	10.7	11.7	10.7	10.7

Compiled from: Forssido (1986), Australian Agric. Consultancy & Management (1984), Beker & Banerjee (1990) and through personal communication.

Based on the figures provided in this review, it is quite clear that egg and meat productivity of the local chickens is low. This may partly be due to the unimproved environmental and managerial factors (SIDA,1985). They are, however, well adapted to the harsh environment and, no doubt, form an extensive gene pool which breeders can exploit through selective breeding, perhaps in combination with improved environmental conditions.

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