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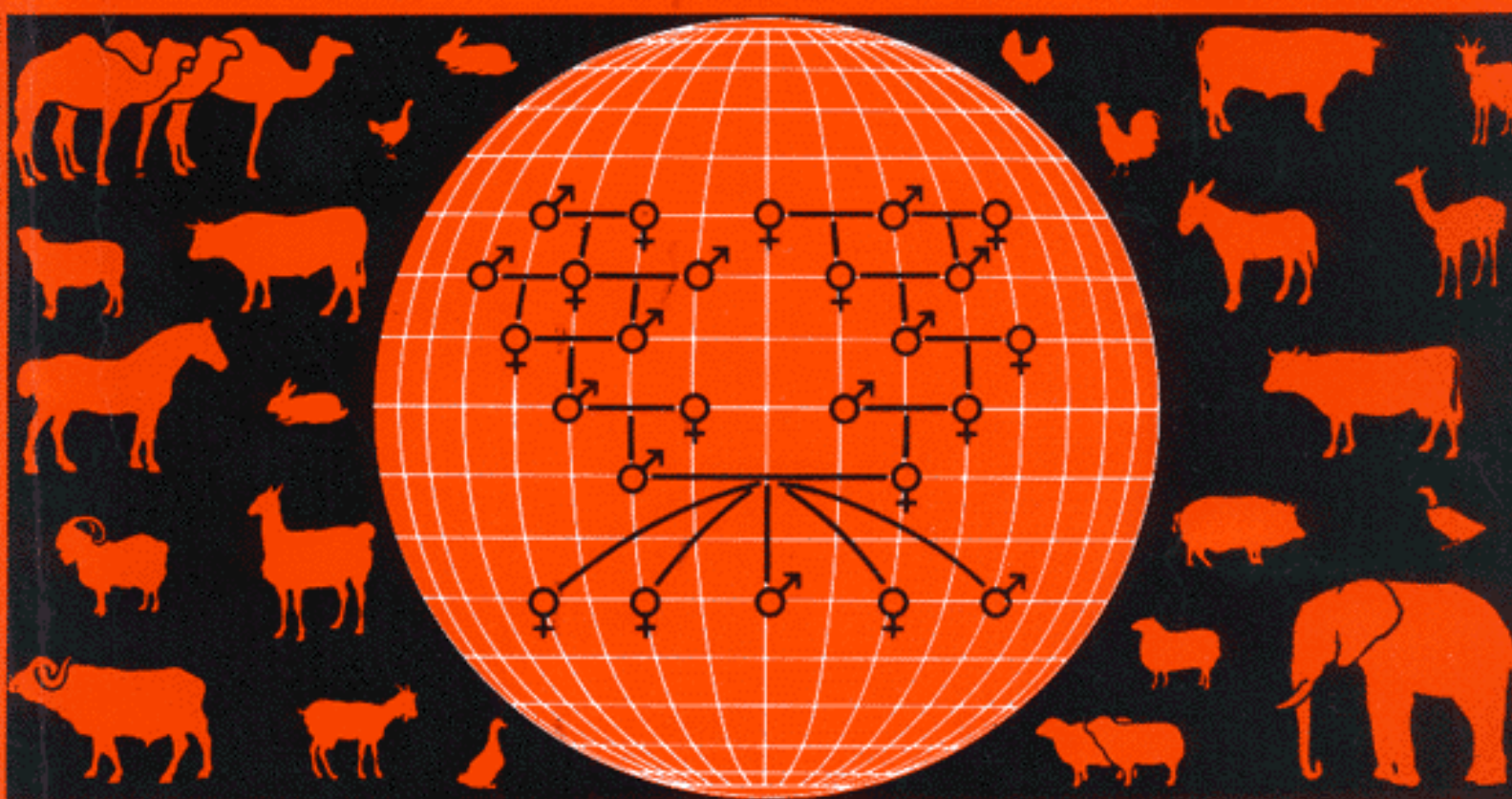
BULLETIN D'INFORMATION SUR LES RESSOURCES GÉNÉTIQUES ANIMALES

BOLETIN DE INFORMACION SOBRE RECURSOS GENETICOS ANIMALES

1996



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

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CONTENTS

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Animal Genetic Resaurces 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 accompanied by a sumary of not more than 5 percent af 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.

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EDITORIAL

FAO's Programe for the Management of Farm Animal Genetic Resources is now a reality! The 174 Member Governments of FAO met in Rome October 1995 to consider the Organization's Programe of Work and Budget for the next biennium and beyond. Implementing the Global Strategy for the Management of Farm Animal Genetic Resources (AnGR) was accepted by the Conference as a priority. Broadening the Comission on Plant Genetic Resources to form the Comission on Genetic Resources for Food and Agriculture, with animal genetic resources to be included as the first step in the expansion process, wvill provide a unique intergovernmental mechanism for input into the Global Strategy for AnGR.

What is the Global Strategy? It is an activity aimed at stimulating, facilitating and coordinating country driven plans of action. The design and imnplementation of sound plans of action are required to substantially upgrade the way essential animal genetic resources are used to produce the great range of direct and indirect products required to satisfy our daily needs. The Global Strategy comprises four basic components: (1) the intergovernmental mechanism, mentioned above, to enable governments to discuss the issues and develop policies and ownership; (2) a country-based global structure of three levels - national focal points, regional focal points and the global focus at FAO Headquarters; (3) a broad technical programe of work covering all key areas in the management process, viz. documenting and describing; developing, using and maintaining; facilitating access to; and reporting on, the range of unique animal genetic resources of interest to food and agriculture; (4) cadres of experts to help in maximizing the cost-effectiveness of the Strategy's delivery.

The Strategy fully integrates with the Convention on Biological Diversity which highlights the conservation of resources, their sustainable use, and sharing of benefits. Further, the Convention clearly recogmïzes that countries have sovereiggnty over their resources; hence with this ownership comes responsibility for their conservation.

Why be involved? Successful global management of anhmal genetic resources must be country-led and sound management must involve all stake-holders. At the national level these stake-holders include farmers and farm service organizations and local comunities; educators, trainers and researchers; non-governmental organizations; administrators and policy makers in departments of agriculture, natural resources and environment, international and foreign affairs. Agencies involved in international cooperation - both donor and loan, are also included in the spectnum of stake-holders. Although conservation of animnal genetic resources is a national responsibility, there is a growing number of intergovernmental, nongovernmental and other international agencies becoming actively involved. They have a key role to play in helping to establish national management action plans by supporting such activities as training, technical advise, infrastructure development and the mechanisms fcoi sharing of benehts aInd dcaling with emergencies.

How to be involved? Individuals and groups catn obtain further insight into the Strategy and better understand opportunities for involvement, by connecting to the Domestic Animal Diversity Inforrmation System (DAD-ISj. DAD-IS serves as the global axis for implementing the Strategy and beginning March 1996 can be accessed through the Internet on the Web (http://www.fao.org/dad-is). For those lacking Internet access, a stand-alone version of DAD-IS will be provided in late 1996.

Opportunities for involvement may also be pursued with the National Focal Point for the Global Programe. At the invitation of FAO countries are being asked to identify coordinating institutions to be responsible for the national network and contact for the Global Programe. National Focal Points have now been established in some 50 countries of Europe and Asia. National Focal Points in other regions of the world will become operational during 1996 and I997.

Governments are invoIved in the Programme through their membership in FAO and their participation on the Comission on Genetic Resources for Food and Agriculture. Mechanisms are being developed to further involve the range of international institutions such as the International Agricultural Research Centres, donor and loan agencies, and intemational NGOs.

In addition to development of DAD-IS and continuing efforts to establish the countrybased global network of National and Regional Focal Points, other key activities under-way to initiate the Programe include: plans for the launch of the Centre for Domestic Animal Diversity - the Global Focus for the Programe; release of the 2nd edition of the World Watch List for Domestic Animal Diversity; development of multi-language brochures describing the Global Strategy. Plans are also under-way for a mechanism to facilitate involvement of donor and loan agencies; and preparation has begun for intergovernmental consideration of animal genetic resources.

Please consider being involved.

Keith Hamond (AGAP)

BIBLIOGRAPHY NOTE

Ressources génétiques agricoles des Alpes/Landwirtschaftliehe Genressourcen der Alpen Risorse genetiche agricole delle Alpi/Rastlinski in zivalski genetslki resursi v Alpah

Fondation Pro Specie Rara, Engelgasse 12 a, CH-9000 Saint Gall (48 SFr.)

En tant qu'élaborateurs de l'étude signent: Arbenz Markus, Bertha Bela, Bossard Martin. Duraes Norberto, Feldmann Antje, Grünenfelder Hans-Peter, Gubler Richard.

La Comission Internationale pour la Protection des Alpes CIPRA s'engage depuis plus de quatre décennies pour le maintien d'un paysage de cultures proche de la nature. La sauvegarde des variétés et types agricoles adaptés et traditionnels de cette région de cultures en est une condition primordiale. CIPRA veut contribuer à sensibiliser au problème du dépérissement des formes et aider à créer les conditions de base nécessaires à une sauvegarde plus efficace. A cet effet, elle a lancé une étude qui identifie et documente les initiatives de sauvegarde d'anciennes races d'animaux domestiques ainsi que les types végétaux alpins existants et qui devra finalement estimer les déficits d'action. Il fut possible de gagner la Fondation-BRISTOL de Schaan/FL pour subvernir au financement. La fondation suisse PRO SPECIE RARA de St. Gall, ayant déjà de l'expérience dans ce domaine en Suisse et en Europe de I"Est, est chargée de l'élaboration du projet. Presque 100 races alpines d'animaux domestiques (dont 1 /3 en Italie) durent être classées dans les catégories "critique" ou "en danger". Des ressources génétiques disparaissent ainsi avant que leur sig$_{ni}$f$_{i}$cation et leurs possibilités d'utilisation n'aient été examinées à fond et reconnues.

DIVERSITÉ CONTRE HAUTE PERFORMANCE

Un travail d'élevage durant des décennies et des siècles a permis d'adapter les animaux domestiques et les plantes à cultiver aux besoins de l'être humain ainsi qu'aux données de leur entourage. C'est ainsi que de nombreuses races et types se distinguant les uns des autres virent le jour. Chacun avait sa qualité spécifique, était particulièrement facile à contenter, robuste, fertile et défiait l'eau, le froid ou les maladies. Cette diversité est aujourd'hui mondialement menacée. L'élevage de races ne visant que la performance entraîne la disparition de tout ce qui ne correspond plus aux normes actuelles (encore plus de lait, encore plus de viande, etc.). Les races et les variétés rapportant peu sont abandonnées pour l'élevage et périssent. Un patrimoine héréditaire précieux est ainsi perdu à tout jamais, alors que les caractères héréditaires de ces races et de ces types pourraient à nouveau avoir une grande signification dans une autre forme économique (par ex.. lors de la pratique d'une agriculture extensive). Les vieilles formes sont non seulement intéressantes au niveau génétique, mais représentent également un patrimoine eulturel précieux digne d'être conservé. Elles appartiennent souvent à une exploitation traditionnelle d'une niche écologique particulière.

L'arc alpin avec ses contrées très variées et ses conditions de production rendues difficiles dans différents points de vue, a connu le développement d'une grande variété de races qui peuvent être caractérisées de particulièrement modestes et robustes. Elles sont surtout intéressantes parce qu'elles se sont - au contraire des lignes d'élevage courantes - adaptées au terrain alpin, à la proximité des radiations solaires et aux courtes périodes de végétation. La supplantation par l'élevage de performance a heureusement débuté beaucoup plus tard dans ces régions, si bien que des restes de races traditionnelles d'animaux et des types de végétaux sont encore présents. C'est dans des lieux retirés, chez des minorités nationales particulièrement conscientes des traditions (par ex. Rhéto-Romans, Ladins, etc.), des individualistes et des collectionneurs que beaucoup a survécu. L'éloignement de l'exploitation individuelle, l'abandon des bergers ainsi

que la concurrence de produits importés meilleurs marché représentent également ici un danger pour la diversité. Des interventions de l'Etat influent directement sur l'élevage au moyen d'interdictions et d'encouragements partiaux, tels l'obligation d'autorisation (permission obligatoire pour l'élevage), les primes, etc.

L'ARC ALPIN EN TANT QUE CENTRE GÉNÉTIQUE SECONDAIRE POUR LES VÉGÉTAUX

Aucune des plantes de culture "importantes" ri a son origine, c'est-à-dire des ancêtres, dans les Alpes. Vavilov (Vavilov, N. (1929): The problem of the origin of cultivated plants) décrivit dans les années vingt l'arc alpin en tant que centre génétique secondaire: ce qui signifie que les plantes apportées de l'extérieur ont, par leurs conditions d'emplacement extrêmes ainsi que sous l'influence des êtres humains, formé des nouvelles combinaisons indépendantes. L'exemple le plus connu est celui des nombreuses variétés de céréales différentes de l'arc alpin. Les centres génétiques secondaires jouent dans le cadre de la formation de la biodiversité un rôle aussi important que les centres génétiques primaires. La question d"'indigène" ou "non-indigène" est uniquement une question temporelle dans l'arc alpin et joue un rôle central dans la conservation de la biodiversité. Les facteurs climatiques sont d'une importance primordiale quant à la présence de plantes (de cultures). Le elimat influe sur le spectre des types et des formes. Seul un petit nombre de variétés de plantes des champs ou des jardins réussirent à se reproduire sous ces conditions extrêmes. Par contre, une plus grande diversité de formes se maintient dans le cadre de chaque type, vu que les influences de l'environnement sont également diffërentes et la radiation solaire plus élevée provoque un plus grand taux de mutation.

ELEVAGE D'ANIMAUX DANS L'ARC ALPIN - UNE DIVERSITÉ SANS PAREILLE

Les animaux domestiques sont depuis des millénaires indigènes dans l'arc alpin. Malgré les différents contacts des habitants, les animaux ne furent que rarement échangés. Par la sélection de la descendance, les animaux fizrent adaptés dans chaque vallée de façon optimale aux conditions y régnant. Vu les moyens limités, les connaissances restreintes de médecine animnale, les rudes conditions climatiques et le fourrage maigre, des animaux robustes furent avant tout privilégiés. Afin de pouvoir réagir contre des événements inattendus, la diversité des animaux domestiques, et non pas les hautes performances, était d'importance prïmordiale pour assurer la survie des êtres humains.

Le concept de race naquit seulement durant ces derniers siècles et entrâîna une mise en catégorie de groupes d'animnaux. Les possibilités de comunication et de transport permirent pour la première fois l'échange d'animaux sur de grandes distances, provoquant ainsi la diffsion de différentes races sur de plus grandes étendues. L'autoznatisation dans la production de nourriture rendit une standardisation des produits et des aniznaux nécessaire. Des connaissances d'hérédité fiurent conséquement acquises sur cette voie et l'on atteignit de gros avantages de races particulières, modernes, à unique fonction, ce qui eut pour conséquence de refouler les races économiquement plus faibles. Les succès d'élevage conduisent toujours à des modifications dans d'autres domaines non façonnés par l'élevage. Parallèlement à l'augmentation de production de lait chez les ruminants, on observa par exemple un mal physiologique des animaux. Ils devinrent plus sensibles aux maladies et aux cond.itions climatiques. Des races moins productives sont la plupart du temps plus robustes.

ESTIMATION DU HESOIN D'ACTION

Le maintien de la diversité génétique est le désir principal de l'étude et représente ainsi la base pour l'estimation du besoin d'action chez les différentes variétés. Des critères économiques ou agronomiques n'y jouèrent aucun ou qu'un rôle mineur. La conservation *in situ* reçoit une attention particu ière, car l'utilisation est la meilleure conservation.

Il existe un grand nombre de clefs et de modèles nationaux ou internationaux courants afin d'évaluer le danger des effectifs d'animaux. L'étude ici présentée s'oriente aux degrés de danger de la FAO (1992j. D'après cette elef, une race ou une espèce est avant tout jugée d'après le nombre de sa population. Des risques supplémentaires spéciaux (par ex. base génétique très étroite, peu de mâles, croisement avec d'autres races, pas de gestion de herd-book, etc.) peuvent avoir pour conséquence une revalorisation du risque d'extinction.

Les quatre catégories des races en danger sont:

Nombre de femelles	Degréde danger
< 100	critique/critical
100-1000	en danger/endangered
1000-5000	vulnérable/vulnerable
5000-10000	rare/rare

Dans le domaine des végétaux il n'est pas possible d'évaluer d'après des critères similaires relatifs au nombre de la population come il en est le cas chez les animaux. On renonça donc à une répartition en catégories par degré de danger. Afin d'estimer les groupes de plantes d'après les données à disposition, on évalua le besoin d'action à chaque fois personnellement.

SUR LES TRACES DE SHERLOCK HOLMES

Tout l'arc alpin avec sa vaste étendue et sa diversité, certes en danger, mais toujours existante, ne put être étudiée par une seule personne. Voilà pourquoi il fut divisé en trois espaces comprenant l'Ouest, le Centre et l'Est. L'Ouest se forme des régions alpines dans lesquelles le français est parlé: la France, la Suisse romande et la vallée d'Aoste. Le Centre s'étend des Alpes du reste de la Suisse, sur le Liechtensteinn et sur l'Italie, et l'Est se compose des Alpes bavaroises, de l'Autriche et de la Slovénie. Pendant près d'une année, des spécialistes firent des recherches dans leurs régions. Les expériences faites furent échangées par intervalles réguliers afin de comprendre les connexions au-delà des frontières.

CONTRASTES ENTRE LA SUISSE ET L'ITALIE

Les résultats de l'étude redonnent de façon très concrète la situation dans chacun des pays ainsi que la législation dans le domaine de l'agriculture. La différence entre la Suisse et l'Italie est particulièrement frappante. La Suisse se caractérisa par un refoulement et une élimination rigoureuse des races traditionnelles du pays dans le cadre de l'assainissement des races, mais elle occupe aujourd'hui une position de relief en ce qui conceme le maintien de ce qui reste, un besoin d'action existe à peine. En Italie par contre, l'élimination ne fut jamais entreprise de manière très conséquente, la variété est encore grande. Peu d'initiatives existent, le besoin d'action est très grand. La situation est très hétérogène dans le domaine végétal. L'abondance de la matière est telle qu'elle ne permet que difficilement d'en avoir une vue d'ensemble. L'étude pointe sur des domaines de grande insécurité et là où il y a des taches blanches, des clarifications supplémentaires sont nécessaires.

SYNTHÈSE DE L'ÉTENDUE ALPINE

Le but de l'étude fizt de démontrer les déficits d'action lors du znaintien des ressources génétiques dans les Alpes, d'éveiller éventuellement les responsables, les personnes concemées et les éventuels intéressés et de mettre en route des mesures. Ceci demande la publication de l'étude de façon qu'elle ait un effet étendu aussi vaste que possible. Les résultats de l'étude seront donc résumés sous forme de synthèse au-delà des pays et imprimés dans les quatre langues principales de l'arc alpin. Les parties des pays y seront ajoutées dans leur langue. Cette publication

est parue en été 1995. La publication en quatre langues comprends 540 pages. La composition des initiatives présentée, ainsi qu'une vaste liste d'adresses des autorités et des personnes responsables pour des projets existants ou â réaliser, est de grande importance pour des travaux supplémentaires dans ce domaine, ainsi que pour la perception du besoin d'action démontré.

Hans-Peter Grünenfelder

REPOBLAMIENTO Y BIOECOLOGIA DE LA VICUÑA SILVESTRE EN LA PROVINCIA DE JUJUY, ARGENTINA

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RESUMEN

Los autores presentan los esfuerzos realizados para la salvaguardia de la vicuña silvestre, así como las distintas metodologías empleadas para el censo (mediante: a) censos totales; b) censos por muestreo y a través de transectas lineales; y c) censos estratificados) junto con su caracterización biológica y ecológica. Estas características se basan principalmente en una mayor dimensión respecto a la subespecie a la que pertenecen *(vicugna vicugna* vicugna); por otra parte, la raza posee una lana con buenas características. Este animal está bien adaptado a su ambiente, con poco dimorfismo entre sexos y con un comportamiento social y sexual particular. Dado que se trata de un animal protegido, las poblaciones campesinas han necesitado autorizaciones particulares para la explotación de su lana.

SUMARY

The authors describe the studies realized for the saveguard of the wild vicuna together with the different methods applied for its counting. Jointly, they present the biological and ecological characteristics of this animnal. Mainly, this characteristics are based on bigger body dimensions compared to that of the subspecie to whom it belongs *(Viicugna vicugna vicugna).* Wild vicuna is well adapted to its environment, with few dimorphism between sexes and with a particular social and sexual behaviour. Considering that this is a protected animal, the rural population needed special authorization for exploitation of its wool.

1.0 EXPLOTACION PASADA Y ESTADO ACTUAL

Perseguida por el alto valor de su fibra, la situación de la vicuña resultaba crítica en la Provincia de Jujuy hace 25 años (mapa nº 1). En 1973, por ejemplo, la población censada en el Departamento de Susques sólo ascendía a 398 animales. Resultaba entonces una situación similar a la planteada por los Gobiernos de Perú y Bolivia y expresada a través del "Convenio para la Conservación de la Vicuña" firmado en agosto de 1969.

En 1978, la Dirección de Ganaderia de Jujuy inició el "Plan Vicuña" (Sánchez Mera,1980), en el que se planteaba establecer una reserva dentro del ámbito provincial. Desde entonces, se han ido concretando medidas para lograr la recuperación efectiva de sus poblaciones mediante la creación de áreas protegidas y el control de la caza furtiva.

Actualmente, la provincia cuenta con nueve Centros de Protección de la Vicuña (1 261400 ha, aproximadamente) que, en su conjunto, abarcan una extensión de casi un 23,7% de su territorio.

A partir de 1987, se han llevado a cabo estudios de uso del habitat, capacidad de carga,autoecología y preferencia alimenticia de las vicuñas en la Reserva de Olaroz - Cauchari, la más importante en extensión y en población de vicuñas (mapa n" 2). Dichos estudios se instrumentaron a través de un convenio interinstitucional entre el Gobierno y la Estación de Fauna Silvestre de la Universidad Nacional de Jujuy, con participación de docentes y estudiantes universitarios.

Merece especial atención la aprobación gubernamental de un Criadero Modelo de Vicuñas, en el Campo Experimental de Altura de Abra Pampa, dependiente del INTA (Instituto de Tecnología Agropecuaria). Como resultado de las experiencias realizadas durante la última década, se han podido establecer métodos de rodeos y esquilas vivas de gran fiabilidad, así como datos referentes a rendimientos y promedios de esquila y su periodicidad, influencia del manejo sobre la sociobiología de esta especie, longevidad, vida útil, etc. (Rebuffi y col.1995). De esta manera, se está promoviendo un plan para la crianza de vicuñas en campos privados de pequeños productores locales.

Complementario al proyecto original (Alberio, 1993), INTA - Balcarce y la Estación de Fauna Silvestre están llevando a cabo un programa para el desanollo de técnicas de crianza y reproducción artificial en camélidos sudamericanos, que se ocupa de la obtención, preservación y difusión de semen con el objeto de mantener alta la variabilidad genética de las poblaciones tanto silvestres como en cautiverio.

2.0 EVALUACION DE LAS POBLACIONES DE VICUÑAS SILVESTRES

La UICN (Unión Internacional para la Conservación de la Naturaleza) indica varias metodologías de censos que pueden aplicarse a las poblaciones de vicuñas (Rodríguez y Núñez, 1994). Son las siguientes:

a) Censos totales

Consiste en contar en forma directa y total a los animales, recorriendo el área en plazos de tiempo en los que no se produzcan modificaciones en la composición poblacional, ya sea por nacimientos, muertes o migraciones.

b) Censos por muestreos

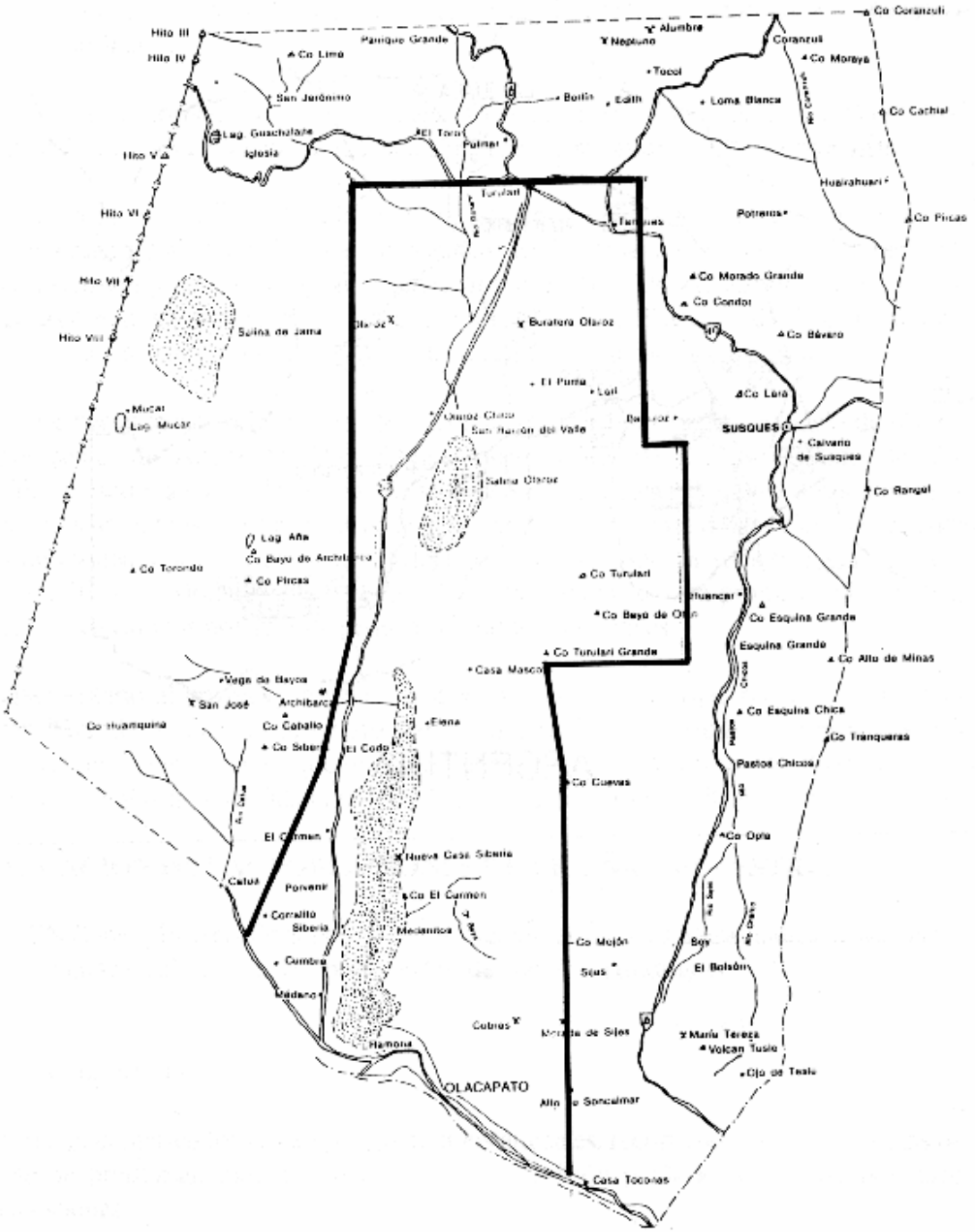
Se estima el número de animales del área total a partir del número contado en sitios de muestreos. El recuento se hace directo y los resultados se analizan estadísticámente. Los censos por muestreos pueden cumplirse a través de transectas, bloques y totales.

2.1 Censos de vicuñas en la Provincia de Jujuy

Las poblaciones de vicuñas en los centros de protección son cuantificadas mediante censos totales realizados por agentes gubernamentales. Fuera de los centros, las poblaciones se estiman mediante encuestas. Las resultados obtenidos se muestran en el cuadro nro.1.

Mapa 1: *Provincia de Jujuy (Argentina). Ubicación geográfica y vías de acceso*

Mapa 2: *Susques - Reserva de Olaroz-Cauchari*



CUADRO 1:
Existencia de vicuñas en la provincia de Jujuv (Cabezas,1994)

I. Estado silvestre. Censada en Centros de Protección

No.	Centro de Protección	Superficie (ha)	Vicuñas
1	Olaroz-Cauchari	548000	6500
2	Vilama	97000	590
3	Carahuasi-Pozuelos	208000	2750
4	Sta. Victoria-Condor	54600	268
5	Palca de Aparzo	55800	295
6	Caballo Muerto	38500	350
7	Abra de Zenta	69000	180
8	Casa Colorada	31600	110
9	Serranías del Chañi	158900	568
Total en áreas protegidas		1261400	11611

2. En criadero - INTA Abra Pampa

No.	Centro de Protección	Superficie (ha)	Vicuñas
10	CEA-Miraflores	257	780
Total en semicautividad		257	780

3. Estimadas por encuestas en áreas no visitadas

No.	Centro de Protección	Vicuñas
11	Cóndor; Abra la Cruz; Vicuñayoc; Colorado; Larca	5100
Total estimado		5100
Total de vicuñas existentes en 1994 en Jujuy		5100

2.2 Censos en la Reserva de Olaroz - Cauchari

Dada (a importancia de esta reserva, sus pobtaciones de vicuñas han sido sujetas a censos totales mensuales y censos por muestreos anuales.

a) Censos totales (Cabezas,1995)

EI reconocimiento y los recuentos se llevan a cabo mediante sucesivos contactos visuales, siguiendo un recorrido que se adapta a los accidentes topográñcos. El itinerario lo realiza el guardafauna, montado en bicicleta para evitar perturbaciones ruidosas para los animales que, por estar habituados a su presencia, facilitan su visibilidad y disminuyen la distancia de fuga. I,os resultados alcanzados durante aproximadamente veinte años se muestran en el cuadro nº 2; gráfico nro. 1.

CUADRO 2:
Evolución de la población de vicuñas en la Reserva de Olaroz-Cauchari según censos directos y totales (Cabezas,1994)

Años	Cuntidad	Densidad por km²
1973-1974	330	0,06
1975-1976	398	0,07
1977-1978	780	0,14
1979-1980	850	0,15
1981-1982	1426	0,26
1983-l984	-	-
1985-1986	2620	0,47
1987-1988	3617	0,65
1989-1990	5601	1,02
1991-1992	6250	l,l3
1993-1994	6500	1,18

b) Censo por muestreo a través de transectas lineales (Black de Décima y col. l 993).

Se utilizó el método propuesto por Burnham y col. (1980), por el cual se asume un área dada por la longitud de la transecta y un ancho de franja basado en la visibilidad (2 km). Se contaron todas Ias vicuñas observadas dentro de esta franja, se clasificaron los animales teniendo en cuenta el sexo, edad y filiación familiar, y se calculó la densidad basada en el área de recorrido de las transectas. Se asumió que no hubo recuentos dobles por no haberse hallado grupos con la misma constitución en censos sucesivos llevados a cabo en áreas cercanas. El recorrido total fue de 178 km, dando una superficie de censo de 35 600 ha.

La determinación del área de censo se hizo en base a imagen Land-Sat 1:250 000 y mapa base. La calibración del instrumental se realizó mediante brújula taquimétrica y siluetas de vicuñas en escala 1: 1.

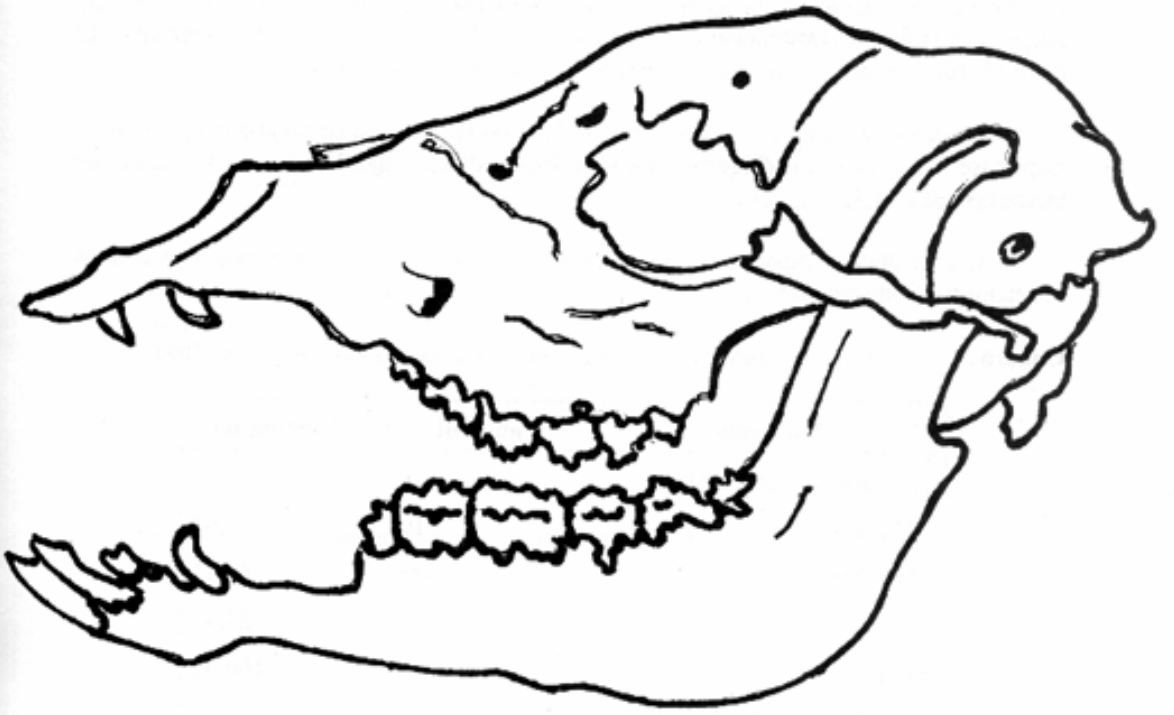
Los resultados (cuadro nro.3) no demostraron mayores variaciones comparados con los obtenidos mediante censos totales.

CUADRO 3:
Censo por transecta en Olaroz-Cauchari (Black de Décima y col., I993)

Población	Cantidad	% Población
1. Grupos familiares:119		
- Machos	119	11,62
- Hembras	628	61,33
- Crías	277	27,05
Total	1024	100,00
Densidad: 2,88 vicuñas/km²		
2. Tropillas y solitarios: 209		
- Machos	579	98,30
- Hembras	1	0,02
- Añales	9	1,53
Total	589	100,00
Densidad: 4,72 vicuñas/km²		

Superficie total del área de estudio: 570 km²
Recorridos por transectas:189 km
Superficie censada: 356 km²
Relación superficie censada/área de estudio: 62%
Densidad de vicuñas/superficie total del área de estudio:1,02 vicuñas/km²

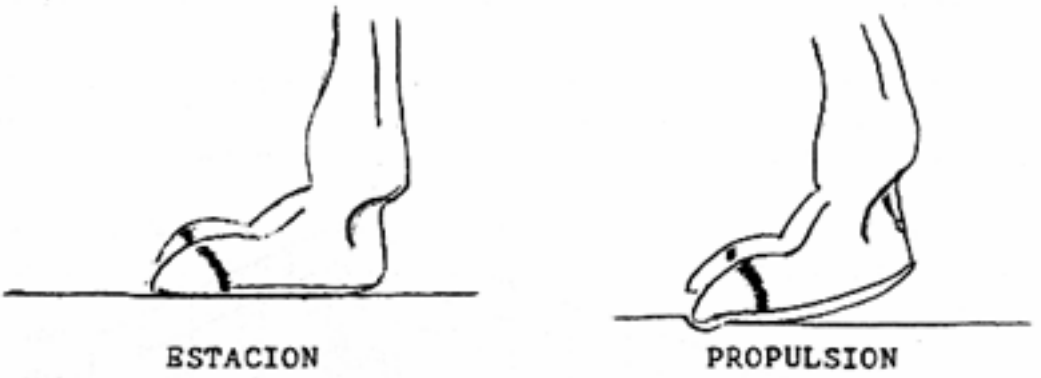
Figura 1: *Cráneo, fórmula y característica dentaria de la vicuña*



Incisivos: 1/3; Caninos: 1/1; Premolares: 3/3; Molares: 3/3; Total: 36 dientes

Figura 2: *Acción erosiva del pisoteo*

a) Camélidos sudamericanos (digitígrados). Acción mínima



b) Ovinos y caprinos (ungulígrados). Acción significativa

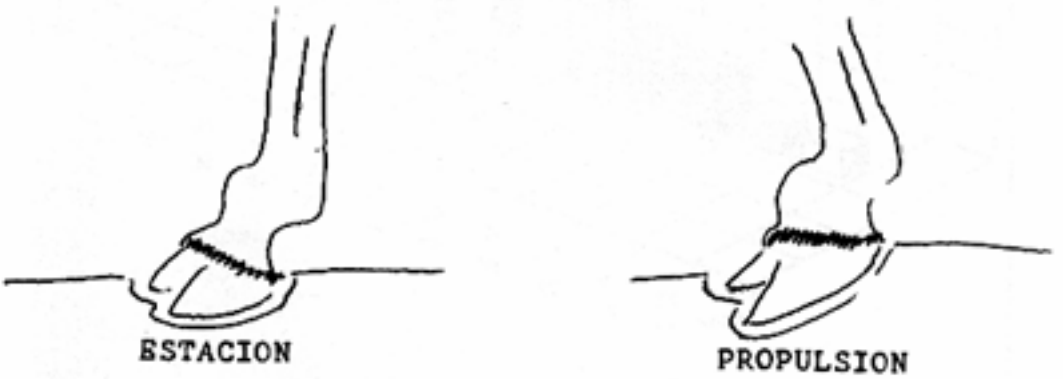
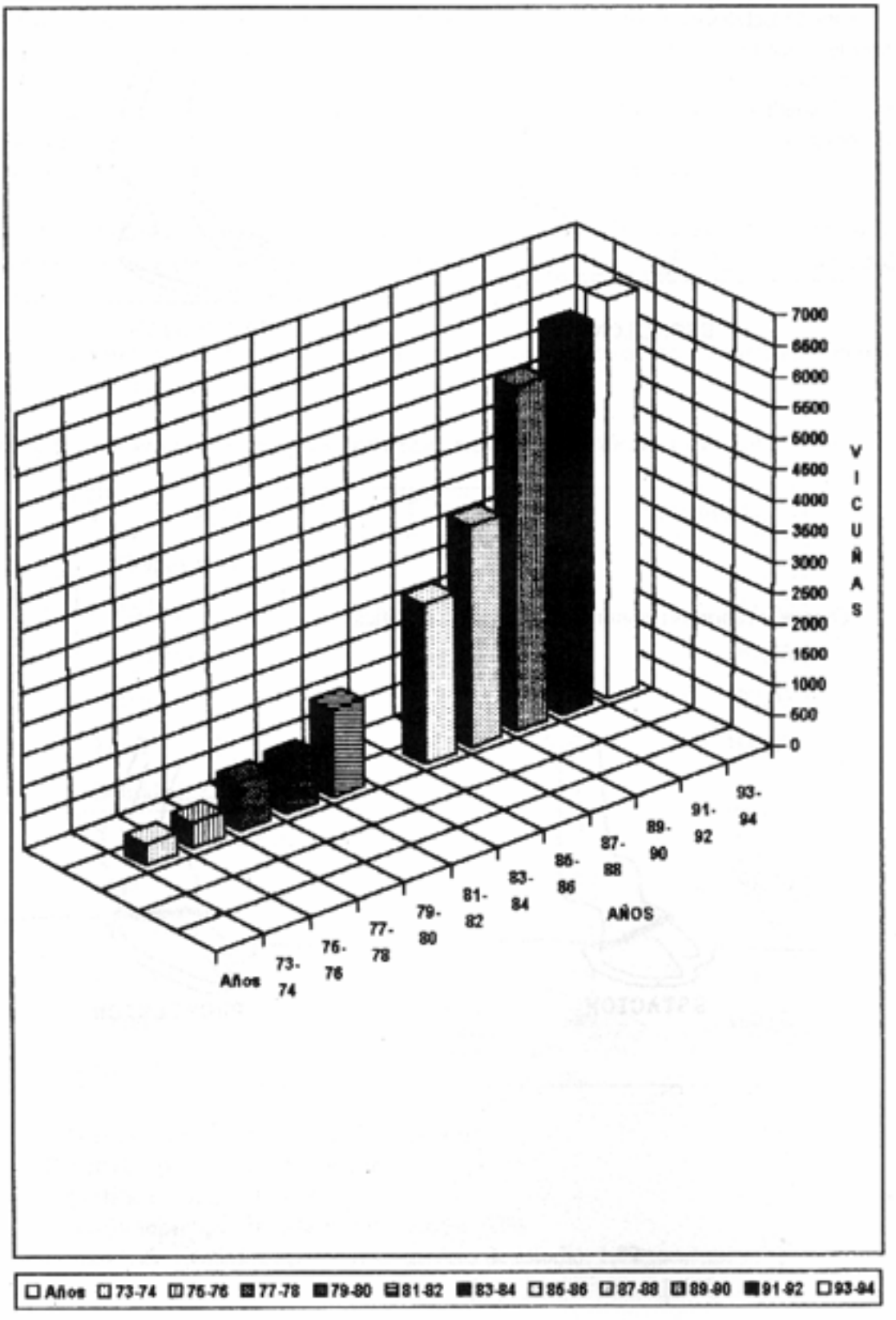


Gráfico 1: *Evolución de la población de vicuñas en la reserva de Olaroz-Cauchari (Sardina Aragón, 1995)*



c) Censos estratificados (Alonso de Sleibe y col.1994)

Como la oférta ambiental es heterogénea, también la densidad de vicuñas se deberá relacionar con dicha variable. Por ello, el objeto de este tipo de censo fiue determinar áreas que, por su topografía y población de vicuñas, justificasen la inslalación de mangas para capturas; a la vez que permitió estimar la población que podrá ser sujeta a estas experiencias de manejo.

En base al área de censo previamente determinada por Black de Décima y col. (1993), se seleccionaron 9 sitios con topografia de características suaves, casi plana, de fácil avistaje y factibles de arreos masivos. También se tuvo en cuenta la carga animal. De los lugares censados, sólo se seleccionaron para la instalación de mangas de capturas aquéllos cuya población total estimada superaba las 100 vicuñas. Tales criterios se sustentaron en las experiencias de Núñez Araya y col. (1993), que expresan que se pueden capturar entre 110 y 210 vicuñas aproximadamente por manga (tablas nº 4 y 5; gráfico nº 2).

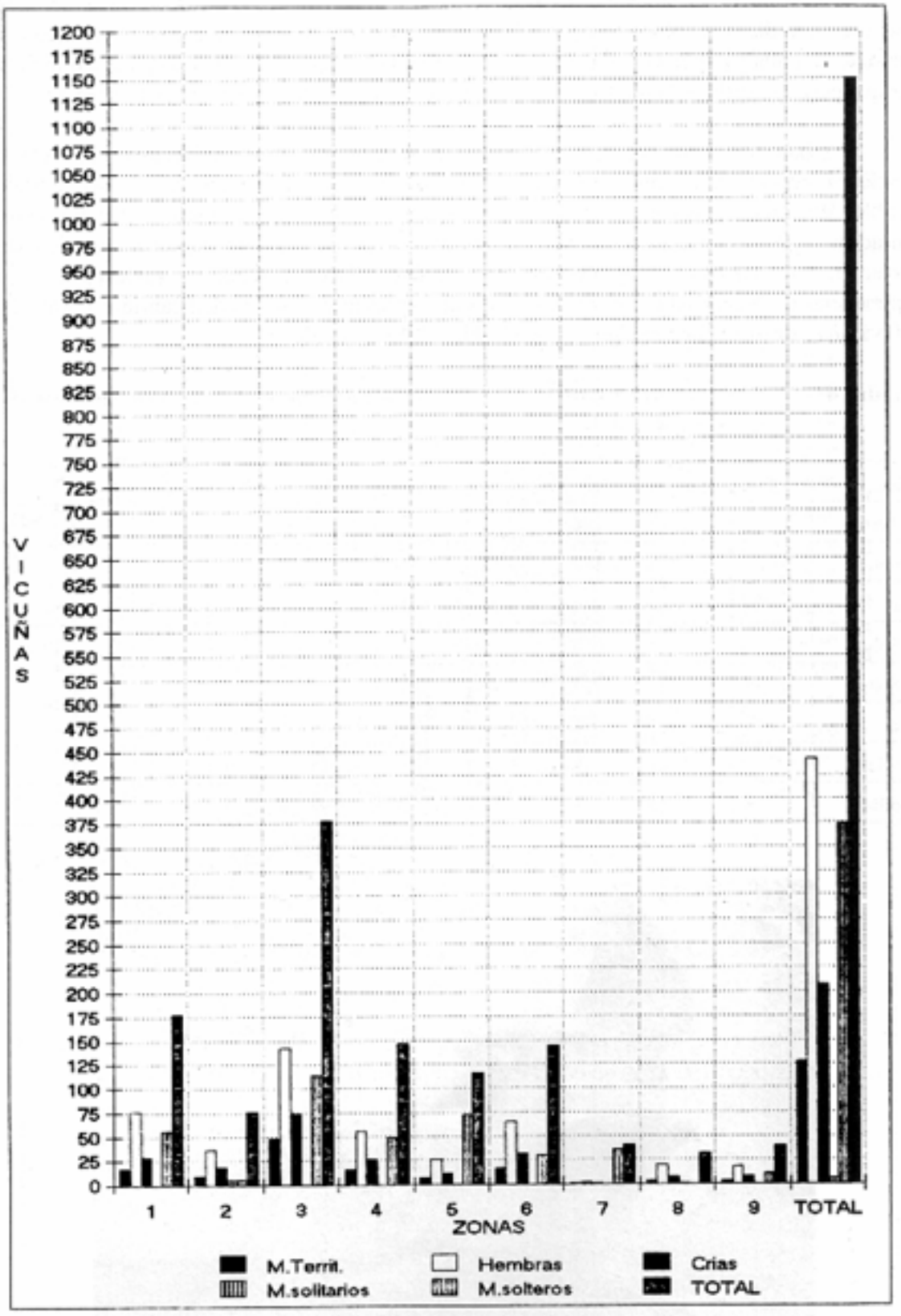
CUADRO 4:

Población de vicuñas en zonas de manejo de Olaroz-Cauhari (Alonso de Sleibe y col. 1994)

Sitios	1	2	3	4	5	6	7	8	9	Total
M.Territ.	17	9	48	16	7	17	1	3	3	127
Hembras	76	37	142	56	26	65	2	20	18	442
Crías	29	19	74	26	11	32	1	8	8	208
M. Solit.	-	5	-	-	-	-	-	1	-	6
M.Solter.	56	6	114	49	72	30	36	-	10	373
Total	178	76	378	147	116	144	40	32	39	1150
Familias	17	9	48	16	7	17	1	3	3	121
Tropillas	8	1	25	12	14	16	3	-	3	82

Crianza artificial de vicuñas

Gráfico 2: *Población de vicuñas en zonas de manejo de Olaroz-Cauchari*



CUADRO 5:
Densidad estimada de vicuñas en zonas de manejo previstas en la reserva de Olaroz-Cauchari (Alonso de Sleibe y col.,1994)

Sitio	Area total (ha)	Area recorrida (ha)	Vicuñas	R	Estimada
1	7272	3000	178	5,9333	431,472
2	2216	1400	76	5,4285	l20,297
3	4444	2100	378	18,000	729,200
4	2584	1600	147	9,1875	237,405
5	l608	1000	116	11,6000	186,528
6	2254	1100	144	13,0909	295,069
7	1042	500	40	8,0000	83,360
8	4084	1125	*32*	2,8444	116,167
9	1120	1100	39	3,5454	39,709
Total	26620	12925	1150		2309,207

Intervalo al 5%
Límite inferior: 2 060,11466 Límite superior: 2 558,3002l Desviación típica:108,01941
Densidad por km^2: 8,6747
Densidad real: 8,8974

Conclusiones

De los sitios censados, se seleccionaron para arreos y capturas únicamente aquéllos cuyo número de vicuñas superaban las 100 (se excluyeron los sitios 7 y 9).

3.0 BIOECOLOGIA DE LAS VICUÑAS DE LA RESERVA DE OLAROZ-CAUCHARI

La reserva de Olaroz-Cauchari se encuentra ubicada en el Departamento de Susques, por encima de 4 000 m sobre el nivel del mar, y comprende una superficie de 548 000 km^2.

Se trata de una zona extremadamente árida, con prolongados períodos de frío y notables variaciones térmicas diarias determinadas por la intensa radiación solar, de marcada sequedad ambiental, y con un régimen pluviométrico escaso (menos de 300 m anuales) y concentrado entre los meses de diciembre y marzo. Fitogeográficamente, corresponde a las Provincias Puneña y Altoandina, con predominio de gramíneas y plantas herbáceas halófilas pequeñas, acompañadas por plantas en cojín y algunas compuestas.

3.1 Rasgos anatomo-fisiológicos sobresafientes

La vicuña de Olaroz-Cauchari, al igual que las que habitan en el resto de la Provincia de Jujuy; pertenece a la subespecie *vicugna vicugna vicugna* (Molina,1782), caracterizada por su mayor tamaño, color más claro y, básicamente, por carecer de una “pechera” o vellón pectoral tan desarrollado como el que muestra la subespecie *vicugna vicugna mensalis*

A partir de animales muertos naturalmente, hemos podido determinar que su peso corporal ronda los 35 kg, el peso del vellón alcanzó los 300 gr y el diámetro de su lana es de alrededor de 14 micrones.

Las vicuñas presentan los labios superiores hendidos, con gran movilidad, hecho que les permite una gran selectividad tanto del pasto que consumen como de las partes que lo componen. Poseen 32 dientes, a los cuales hay que sumar dos deciduos que no son reemplazados por permanentes. La figura n” 1 muestra la forma y disposición que, sumadas a su fuerte estructura, les permiten ser altamente selectivas en cuanto a las partes de las plantas que consumen (por ejemplo, extraen hojas *de Acantholippia deserticola* sin quebrar un tallo) y a cortar las hierbas en lugar de arrancarlas.

También la estructura de sus miembros, carentes de pezuñas y reemplazados por almohadillas elásticas, resulta importante para evitar la erosión florística por pisoteo y para adaptarse a las irregularidades del terreno (figura n" 2). Durante la estación, las falanges adoptan una posición horizontal y el peso corporal se distribuye casi uniformemente sobre los cuatro miembros, expandiéndose a través de las almnohadillas, aumnentandó la superficie de sustentación y evitando el hundimiento. Durante la carrera, en cambio, el apoyo para la propulsión sólo se produce eficazmente a partir del pequeho reborde anterior de la uña, evitando el hollamiento y minimizando la erosión. Por ello, las vicuñas prácticamente no trotan, y sus andares se suelen limitar al paso y al galope.

La presencia de sólo dos proventrículos del aparato digestivo (rumen y redecilla) también resulta signiñcativa. La posesión, en su interior, de sacos o bolsas glandulares que proveen secreciones de naturaleza tampón, explica la adaptación de estos animales al consumo de vegetales fibrosos y secos, que necesitan ser remojados, tornando así inútil la función del omaso de otros rumiantes.

3.2 Rasgos de conducta significativos

Carentes de dimorfismo sexual, los machos adultos o "relinchos" se reconocen sólo por su comportamiento agresivo (dentro del grupo familiar) y social (formando "tropillas" de machos solteros). Este rasgo de conducta permite determinar, durante los censos, la estructura del grupo y establecer la siguiente clasificación:

Familias: compuestas par el "relincho" y 4-5 hembras, "añachos" o juveniles y "tekes" o crías. Pueden tener territorios fijos o trashumantes, según la oferta ambiental.

Tropillas: formadas sólo por machos de distintas edades, son agrupaciones inestables que pueden alcanzar 80 ó más individuos. En ella, los jóvenes que se van integrando prueban sus fuerzas mediante la agresión y la contienda hasta que se independizan para buscar/ disputar hembras o territorios de asentamiento.

Individuos solitarios: son machos viejos o enfermos que vagan azarosamente. También pueden ser hembras viejas o añachos recientemente expulsados del grupo familiar.

El comportamiento agonístico intraespecífico se caracteriza por distintos niveles de agresión y lucha, que van desde una actitud postural altiva con vocalizaciones de alerta ("relinchos") hasta verdaderos enfrentamientos con manoteos y cogoteadas seguidos de mordiscos y persecuciones. Este comportamiento adquiere gran importancia en razón de la marcada territorialidad manifestada por esta especie, producto de su adaptación a un habitat con escasa oferta alimenticia. También resulta significativa la agresión durante la expulsión de los añachos del grupo famiIiar, una manera de mantener constante el número de sus integrantes en función del terntorio que ocupan. Las persecuciones y huidas no resultan prolongadas ni superan los 30/ 35 km por hora.

Si bien las vicuñas están adaptadas, en virtud de sus glóbulos rojos de forma elíptica, para un mejor aprovechamiento del escaso oxígeno que provee la atmósfera puneña, los valores hematocritos y de hemoglobina no demuestran elevadas concentraciones.

3.3 Uso del babitat

Las vicuñas se levantan media hora antes de salir el sol. Orinan y defecan en acúmulos de estiércol denominados "bosteaderos" y se dirigen hacia la aguada por senderos comunitarios. En invierno ingieren agua cada dos días, en verano lo hacen diariamente. Beben siguiendo un orden de jerarquía: primero lo hace el "relincho", que luego permanece alerta mientras las hembras y erías consumen agua.

Vicuñas del CEA INTA-Abra Pampa (Jujuy)

Modelo de "Guacheras" para cría artificial de vicuñas en confinamiento estricto

Cerca de las aguadas, cerca de las sendas comunitarias, se encuentran nuevos bosteaderos. Éstos resultan más grandes que los que se hallan en los dormideros, y no son exclusivos de grupos, sino que suelen utilizarse do manera indiscriminada después de beber, e incluso pueden ser utilizados por llamas.

Los bosteaderos de dormideros, en cambio, son exclusivos del grupo y sirven para delimitar territorios. No existe un orden de jerarquía para su uso, pudiendo ser utilizados por cualquiera según se levante más temprano y esté más cerca.

Los "revolcaderos" son áreas circulares deprimidas que las vicuñas horadan para revolcarse e higienizar, así, su vellón. Son socavados hasta que alcanzan la superficie dura y luego son abandonados. Pueden ser también utilizados por las llamas, siendo ésta una vía de contagio, especialmente de la sarna. Se sitúan cerca de los bosteaderos de las aguadas. En los revolcaderos no se suelen encontrar mechones de lana, pero sí se observa con frecuencia la presencia de pelos.

La Convención para el Comercio Internacional de Especies Amenazadas de Fauna y Flora (CITES) ubica a la vicuña en el Apéndice I, prohibiendo el comercio internacional de la especie. Sin embargo, recientemente autorizó a algunas poblaciones de Chile y Perú su ubicación en el Apéndice II, permitiendo el comercio de fibra y telas fabricadas con lana de vicuñas esquiladas vivas.

Teniendo en cuenta este antecedente, también la Provincia de Jujuy está en condiciones de incorporarse a este régimen de excepciones. Consideramos que la conservación de esta especie estará ligada a los beneficios que ella represente para los pobladores. En la actualidad, existen denuncias y fuertes presiones por la competencia que está generando la vicuña sobre la oferta alimenticia destinada a la ganadería doméstica. Es preciso, por ello, definir acciones que permitan el uso sustentable de esta especie en pro de una mejor calidad de vida de sus comunidades humanas.

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MINI-HORSES IN CHINA

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SUMARY

Chinese minihorses were discovered at the end of the 1980s during a national census and investigation on animal genetic resources. The existence of such kind of horses was supported by evidence from body measurements, historical records and bone fossils. Blood polymorphism of local breeds of minihorses has been tested. Chinese minihorses are postulated to have a separate origin from minihorses China.

RESUME

Les poneys chinois ont été découverts vers la fin des années 80 lors d'un recensement national pour la recherche sur les ressources génétiques animales. L'existence de ce type de cheval avait été remarquée par des mesures corporelles, des indications historiques et des os fossilisés. On a réalisé des tests sur le polymorphisme du sang des races locales de poney. On pense que ces poneys chinois aient eu une origine diverse de celle du reste des poney que l'on rencontre en Chine.

1.0 HISTORICAL RECORDS

Chinese minihorses were discovered at the end of the 1980s during a national census and investigation on animal genetic resources. Having discovered these small ponies in southwestern China, some ancient archives were consulted. “Under fruit-tree horses” (Guoxi Ma) seems to have been the term used to describe this kind of horses in the Han dynasty (220-25 AD). These may be the ancient Chinese minihorses. Under fruit-tree horses were a kind of articles of tribute from minority tribes in south-western part of China to the enteral emperorship. Under fruit-tree horses served one kind of the emperor court as entertainment subjects, according to the literature. Ancient records state that special barns were established to develop the minihorses. The body heights were recorded from 2.5 to 3 che, which stood for 23 cm at Han dynasty, giving mean heights of 57.5 to 69 cm. In later dynasties this kind of horses are often mentioned in the archives. Descriptions are limited, but they were bay, small, low or short. A stone carved relief of a minihorse from the Ming dynasty may demonstrate the existence of an ancient Chinese local breed of minihorses.

2.0 DISTRIBUTION OF CHINESE MINIHORSES

During thle investigation in 1986-1990 the number of minihorses was found to be no more than 1 % of the horse population in the provinces Sichuan, Guizhou, Yunnan and Guangxi, or less than ten thousand animals. The minihorses may share pasture with horses of local pony breeds, while the minihorses are more often concentrated in hilly areas of volcanic origin, with the ponies being found in areas with better grazings. Habitats for minihorses are called “stone islands” locally. These habitats are usually 500-900 meters above sea level, and higher and with lower temperatures than the surrounding land, where the ponies are kept. The main counties where minihorses are found are Debao in the province of Gualngxi, Cexiang and Zhenfeng in the province of Guizhou, Wenshan in the province of Yunnan, Jinyang and Yanyuan in the province of Sichuan and Ningqiang in the province of Shanxi.

3.0 ORIGIN

Minihorses in China are supposed to originate from several locations in certain provinces. The development of each breed was affected by the customs of different nationalities such as the nation Yi or the national Qiang of old times. Even the minihorses from the isolated and far apart “stone islands” in most of the Han counties may originate from different sources. But for supporting this kind of viewpoints, a certain amount of research is necessary.

4.0 CHARACTERISTICS

The minihorses have compact conformation, proportional structure, middle size of head, well developed neck and rump, good leg movements, coarse guard hairs and coarse hairs in mane, tail and fetlocks. Body measurements shown in Table l.

TABLE 1:
Body measurements in cm of local breeds of minihorses

Name of breed	sex	n	body height	body lenght	chest girth cm	canon circumference cm
Debao	m	42	98.3	97.3	110.9	13.2
	f	52	96.1	97.3	110.8	12.7
Guizhou	m	140	104.0	104.6	119.9	13.4
	f	65	103.3	101.1	119.0	12.6
Yunnan	m	146	102.6	101.6	119.0	13.9
	f	146	102.2	102.8	117.5	13.4
Sichuan	m	11	97.9	100.4	111.2	12.6
	f	14	100.1	99.3	111.0	11.0
Ningqiang	m	-	98.3	96.0	103.5	11.4
	f	-	99.0	98.0	105.6	11.0

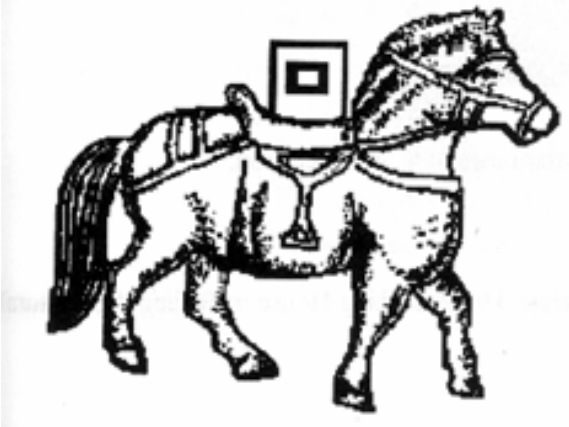
Animals are mostly bay, but some are chestnut

5.0 MAIN USE AND MANAGEMENT

The animals are used for packing goods. An individual of 100 cm height is able to carry 100 kg of goods on daily routes of 30-40 km in hilly areas, to pull a track with a 500 kg load, and is used for riding as well. No special care is taken by people locally. Usually no special stallion is used for breeding, but some males are used for 30 years for breeding and are recognized as breeding stallions. Mating is natural at pasture. Good longevity is a characteristic of the breed.

6.0 BLOOD POLYMORPHISM

Blood polymorphisms at Alb, Tf and Es loci for ponies in Guangxi (GX-D) and minihorses in Guanngxi (GX-S) were tested and some data from Shetland, Englalnd (SH), Hokkaido, Japan (HK) and Tokara, Japan (TK) are cited for comparison.



Stone carved picture in Ming Dynasty

TABLE 2:
Blood polymorphism

Loci	Factors	GX-D	GX-S	Breeds		SH
				HK	TK	
	n	32	46	105	34	105
Alb	A	0.4063	0.2826	03905	0.1324	0.3905
	B	0.5937	0.7174	0.6095	0.8676	0.6095
	A	0.0469	02935	02048	0.0735	0.0938
	B	0.5781	0.4457	0.3714	0.0735	0.3350
Tf	C	0.1094	0.0543	0.1857		
	D	0.1250	0.1087	0.0429		0.1406
	E	0.1406	0.0978	0.1952	0.8530	0.3906
	F	0.3281	03587	0.1722	0.8676	0.2655
Es	I	0.2344	0.3587	0.6278	0.1324	0.7344
	S	0.4375	0.2826	0.0143		
	O			0.1857		

Obviously the Guangxi minihorses are different from local pony and even more different from Shetland, Hokkaido and Tokara horses.

7.0 THE NATIONAL IMINIHORSES ASSOCIATION

In April 1987, The National Minihorse Association was established. In autumn 1987 the first herd book was published with 39 heads registered. In April 1988, The Guizhou minihorse association was founded. The first president of The National Minihorse Association is Professor Wang, Tiequan. This association is encouraging purifying the minihorse population and is interested in co-operation with international organisations.

8.0 ACKNOWLEDGEMENTS

The authors gratefully acknowledge the linguistic assistance of S. Adalsteinsson.

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Investigation in Guangxi province

Debao minihorse

THE MALVI CAMEL: A NEWLY DISCOVERED BREED FROM INDIA

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SUMARY

This paper describes the Malvi camel, a very distinctive breed from northern Madhya Pradesh (India), which is characterized by considerable milk production potential. Although the Malvi camel has long been recognized as a distinct population by local camel breeders, scientists were previously not aware of the existence of this breed. Information about the distribution area, estimated population size, and physical characteristics of the Malvi camel is provided and the prevailing management and production system is described. It is concluded that the Malvi camel represents a valuable genetic resource and that steps are necessary to ensure its survival as a separate gene-pool. The way in which this breed was discovered also demonstrates the need for utilizing local indigenous knowledge in the identification and documentation process of animal genetic resources.

RESUME

Cet article présente une description du chameau de Malvi, un type très particulier de la race que l'on rencontre dans la zone nord de Madya Pradesh (Inde), caractérisé par son potentiel élevé de production de lait. Bien que le chameau de Malvi ait été reconnu come un animal particu ier par les éleveurs locaux, les chercheurs ne savaient pas de son ·existence. On donne ici l'information sur la distribution géographique, la taille estimée de la population et les caractéristiques physiques de cette race, ainsi qu'une description du mode de conduite et du système de production. On conclu que le chameau de Malvi représente une ressource génétique importante et qu'il est nécessaire d'entreprendre des actions pour assurer sa survie en tant que pool génétique. Le mode par lequel cette race a été découverte nous montre également la nécessité de maintenir des contacts étroits avec les populations indigènes et leurs connaissances pour nous aider dans les processus d'identification et de documentation sur les ressources animales.

1.0 INTRODUCTION

The one-humped camel *(Camelus dromedariusj* is bred in the western part of lndia. Over 70% of India's population of 1.5 million camels is at home in Rajasthan, with the remainder being distributed over the adjoining states, including Gujarat, Haryana, Punjab, Uttar Pradesh, and Madhya Pradesh (Khanna and Rai, 1995). While isolated camels also occur in other parts of India as far east as Bengal, and in southern India, breeding is restricted to these states.

In most parts of the world, camel breeds are named after the tribal populations they are associated with; by contrast Indian camel breeds are identified according to the areas in which they have originated. The socio-historical reasons for this circumstance include the fact that earlier camel breeding was conducted on a large scale by the local Maharajahs and most existing breeds are named after their former kingdoms (Kohler-Rollefson,1992a). However, there is no consensus among authors which regional populations of camels in India should be regarded as representing discrete breeds. Only the Bikaneri and Jaisalmeri camels are universally accepted as distinct. Acharya and Bhat (1984) also recognized the Sindhi camel; Rathore (1986) referred to Mewari and Kacchi breeds, while Khanna (1988) enumerated Marwari, Mewati and Kutchi breeds, but later also included Shekhawati, Mewari, Sindhi, Riverine breeds/strains (Khanna and Rai, 1995). Camel pastoralists interviewed in the context of the Camel Husbandry Improvement Project also considered Sirohi, Jalori, Sanchori, and Malvi camels as distinct. While we are not able to phenotypically distinguish the first three "breeds", we can confirm the claim as regard the Malvi camel.

2.0 HISTORY OF DISCOVERY

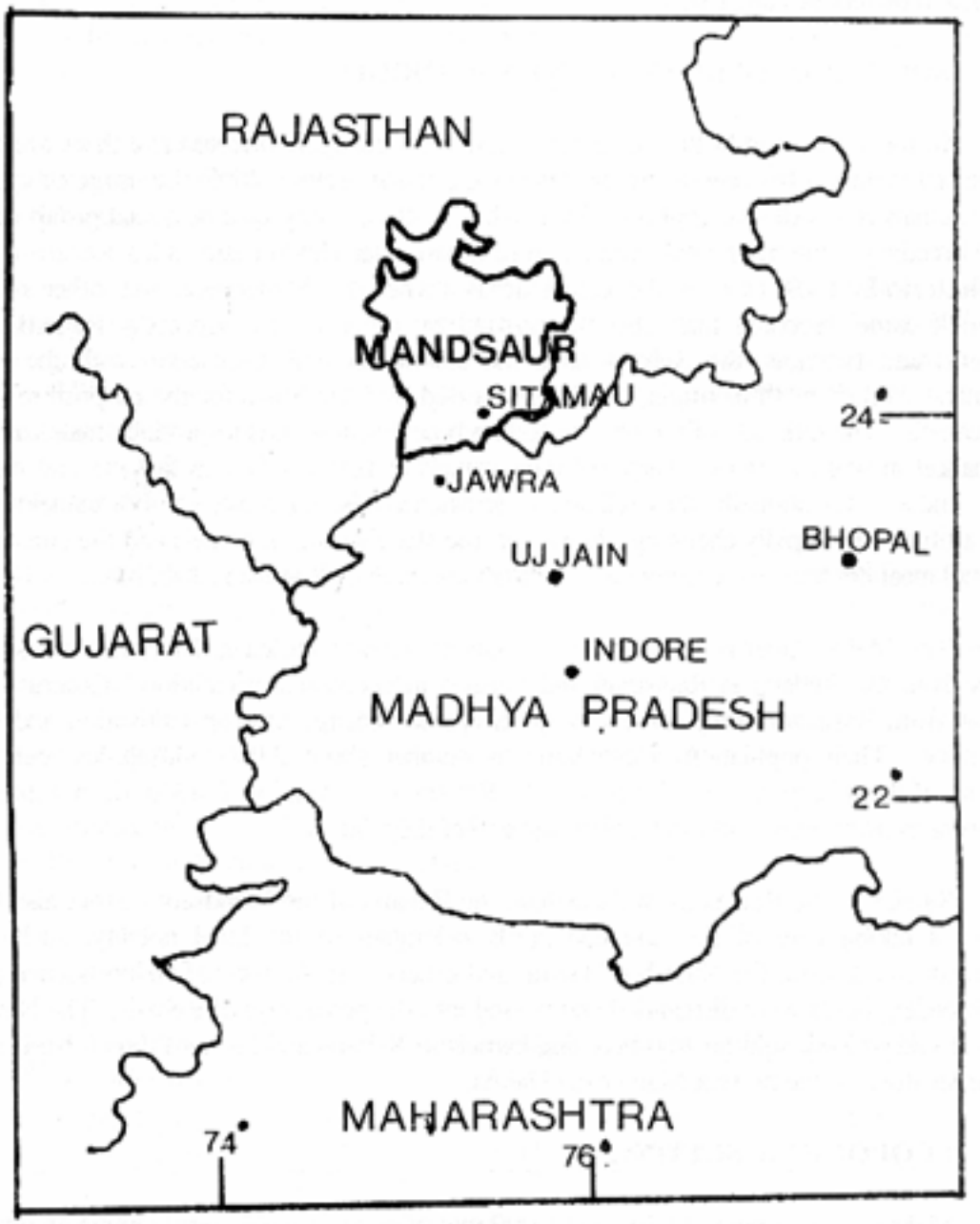
In April I994 we heard the first references by members of the local Rebari camel breeding caste from the Chittorgarh area in Rajasthan to the Malvi nasl (i.e. breed, strain in Hindi language). During a subsequent visit in May 1994 to the town of Jawra in the Mandsaur district of northern Madhya Pradesh, we encountered the first specimens of this breed. It was imediately obvious that the Malvi camel is easily distinguishable from all other Indian camel breeds by colour, height, and conformation and may represent the phenotypically most distinct group among the Indian camel population. Through interviewing Rebari camel owners we attempted to outline the breeding area and population size of the Malvi camel and collected information regarding its productivity, management and production system. In a return visit in May 1995 we visited several Malvi breeding herds and were able to take body measurements and to gather additional data.

3.0 DISTRLBUTION AREA AND POPULATLON SIZE

The Malvi camel is named after the Malwa (Malva) region, a distinct physiographic and historic-cultural area in Central India (27° 70' - 25" 10'N and 73" 45' - 79" 14' E) that is largely located in Madhya Pradesh, but also extends into Southeastern Rajasthan and into northern Maharashtra. The Malvi camel appears to be bred only in the Mandsaur district which is located in the northwestern corner of Madhya Pradesh. The following villages were listed by Rebaris as having Malvi breeding herds (with estimated populations in brackets): Niakhera (300), Aaspura (100), Haripura (200), Parapipli (100), Raypuria (400), Bhamesar (200), Banjhad ki dhani (65),

Shahkeri (100), Eriya ki dhani (120), Aaantri (200), Bhamarkhera (400), Borkhera (I 00), Majiriya (300). If one accepts these figures provided by the Rebaris at face value, the total size of the Malvi camel breeding population can be assumed to number between 2 500 and 3 000 camels, including juveniles. In addition, a small number of female Malvi camels is in the possession of Rebaris from southem Rajasthan. Male camels used as work animals are not included in the above calculation.

Location of the Malvi camel breeding area (Mandsaur District)



4.0 SOCIOECONOMIC CONTEXT AND ORLGIN

In India, camel utilization is almost exclusively transport-oriented and therefore there is a distinct separation between camel producers and camel users. While the usage of camels as work animals is a widespread phenomenon not restricted to any specific social group or caste, camel breeding is the traditional occupation of a particular Hindu caste called Rebari or Raika, who historically took care of the camel herds owned by Maharajahs and other nobility. Although camel breeding may also be pursued by other castes, especially Rajputs, Sindhi Muslims, and Bishnois, the Rebaris have the closest cultural association with the camel. According to their myth of origin, they were created by Lord Shiva for the purpose of looking after camels. The rationale of the present Rebari breeding system is to produce male camels for the market in work animals. They sell their camels at fairs *(melas) to* farmers and transport entrepreneurs. Traditionally, they sell neither female camels, nor camel wool or camel milk, but these attitudes are rapidly changing. However, the slaughtering of camels and the consumption of camel meat continue to represent absolute taboos (Kohler-Rollefson,1992b).

The Malvi camel is bred by a subgroup of Rebaris settled in Madhya Pradesh which differs from the Rebaris in Rajasthan and Gujarat in economic orientation. Contrary to the Rebaris from Rajasthan, they do not keep sheep, but engage in crop cultivation and buffalo husbandry. Their population is estimated to number about 2 000 households, but only a minority of them keep camels. Currently, the Rebaris from Madhya Pradesh do not intermany with Rebaris from outside the state, although earlier they did.

Similar to the Raikas from Rajasthan, the Rebaris of the Mandsaur district also have a history of taking care of the breeding herds belonging to the local nobility, such as the Maharajah of Sitarmau, the Nawab of Jawra, and others. At the timne of Independence (1947) these breeding herds were dismantled and passed into the possession of Rebaris. The Nawab of Jawra is said to have sold his 900 breeding camels to Rebaris and his herd thus formed part of the parent stock of the present Malvi camel herds.

5.0 ECOLOGLCAL SETTING

Malwa receives between 800 and 1000 m of annual rainfall, representing an unusually humid habitat for camels, and 90^{a}/o of the rainfall occurs between July and September. The climate is classified as the tropical monsoon type and there are tlree characteristic seasons, the cold season (October to February), hot season (March until June), and the rainy season (July until September). Apart from the monsoon months, the atmosphere is dry, with relative humidity amounting to 20-40% during the winter and 10-15% in the sumer. Winds can be strong in the sumer and duststorms occasionally occur (Singh,1971).

The countryside is undulating, scattered with low hills and intersected by numerous streams (Hunter,1886). Most of the region is covered by black soil which is loamy to clayey in texture, and poor in phosphate, nitrogen and organic matter, but has sufficient potash and lime contents (Singh, I 971).

The area is agriculturally very productive and the majority of the population is engaged in cultivation. In the early 1970s, 44% of the land was cultivated with scope for another 10% to be brought under the plough (Singh,1971).

The most imnportant crop *is jowar* (sorghum), others are wheat, chickpea, mustard, opium, and fenugreek. The majority of the crops are *kharif,* i.e. grown during the rainy season, with a smaller percentage being *rabi,* i.e. irrigated during the spring season.

Besides harvested fields, extensive wastelands are available for camel grazing. Camels feed *on Acacia nilotica* (babul), *Prosopis cineraria* (khejri), *Capparis decidua* (ker), *Balanites aegyptiaca (higont)* and *Zizvphus glabrata* (bor). One particular tree that grows in the vicinity of rivers and appears to be known only in Madhya Pradesh, is the *mimar,* an Acacia species, regarded as galactogenic by the camel pastoralists.

6.0 PHYSICAL CHARACTERISTICS

The most typical external characteristic of the Malvi camel is its very light or off- white colour. Malvi breeding herds show virtually none of the colour variation that can be observed in other breeds. Another typical phenomenon is its small body size and it is probably the smallest of all Indian camel breeds. The Rebaris describe it as *hatta-katta* (sturdy, with short legs). The facial profile is also distinct, with a pronounced convex forehead, Roman nose and an extremely pendulous lower lip that is longer and protrudes further than the upper lip.

Measurements of shoulder height, chest girth, and hump girth, according to Schwartz and Dioli (1992) are presented in Tables 1 and 2.

TABLE 1:

Body measurements (after Schwartz and Dioli, 1992) in cm of female Malvi camels (n=16)

	mean	std deviation	minimum	maximum
shoulder height	194.94	±6.77	175	202
chest girth	206.38	±6.00	196	215
hump girt	235.19	±16.04	229	278

TABLE 2:

Body measurements (after Schwartz and Dioli, I992) in cm of male Malvi camels (n=2)

	mean	std deviation	minimum	maximum
shoulder height	197.50	±3.54	195	200
chest girth	214.00	±0.00	214	214
hump girth	261.00	±12.73	252	270

7.0 MANAGEMENT SYSTEM

Malvi breeding camels are kept exclusively in extensive management systems and fed on natural graze only. Herd sizes range between 50 and 100 camels. Breeding herds are composed almost entirely of female camels, each herd containing only one male camel for reproduction. In addition, there may be one or two young male camels serving as mounts or beasts of burden for the herdsmen.

Malvi breeding herds migrate between three locations. From April to June they graze in the vicinity of their home villages in Mandsaur district. With the onset of the rainy season in July, they migrate to the area around Kotah and Jhalawar Patan in southeastern Rajasthan. In September they start moving into the vicinity of cities in Madhya Pradesh, including Bhopal, Indore, and Ujjain, to take advantage of opportunities for selling milk.

8.0 PRODUCTION SYSTEM AND PRODUCTIVITY

The Malvi camel is a dual purpose breed. The male camels are utilized as work animals, usually for carrying loads. The female camels are used as milk animals. Owners of breeding herds thus have two sources of income. They sell their male calves and they market milk.

8.1. Milk Production

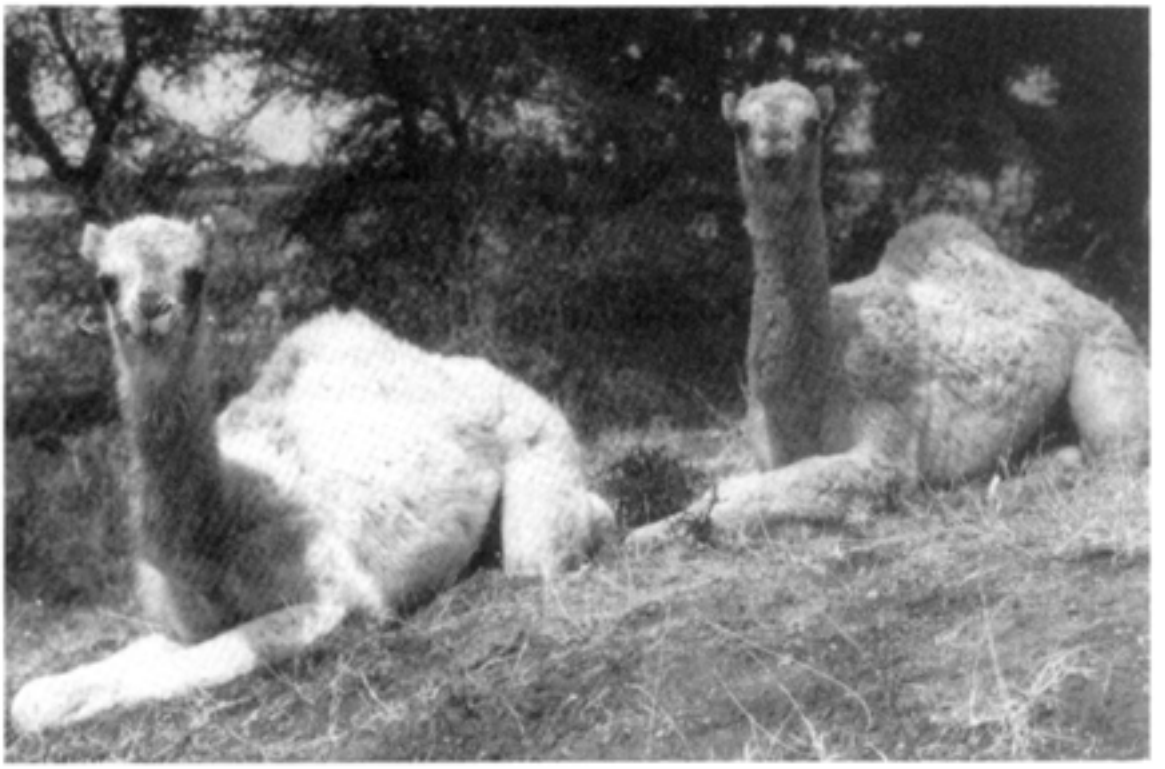
The Malvi camel is famous in the region for its high milk yields and owners point out that it gives milk “even if it is hungry”. According to Malvi camel breeders, their animals can give top yields of 5-6 kg per day, if provided with adequate forage. Camels are milked twice or thrice per day, usually at nighttime and in the early morning hours. One herd we observed was milked at 9 p.m., 2 a.m., and 6 a.m. The suckling calves are together with their mothers during the whole

Malvi female camel photographed in the vicinity of Jawra

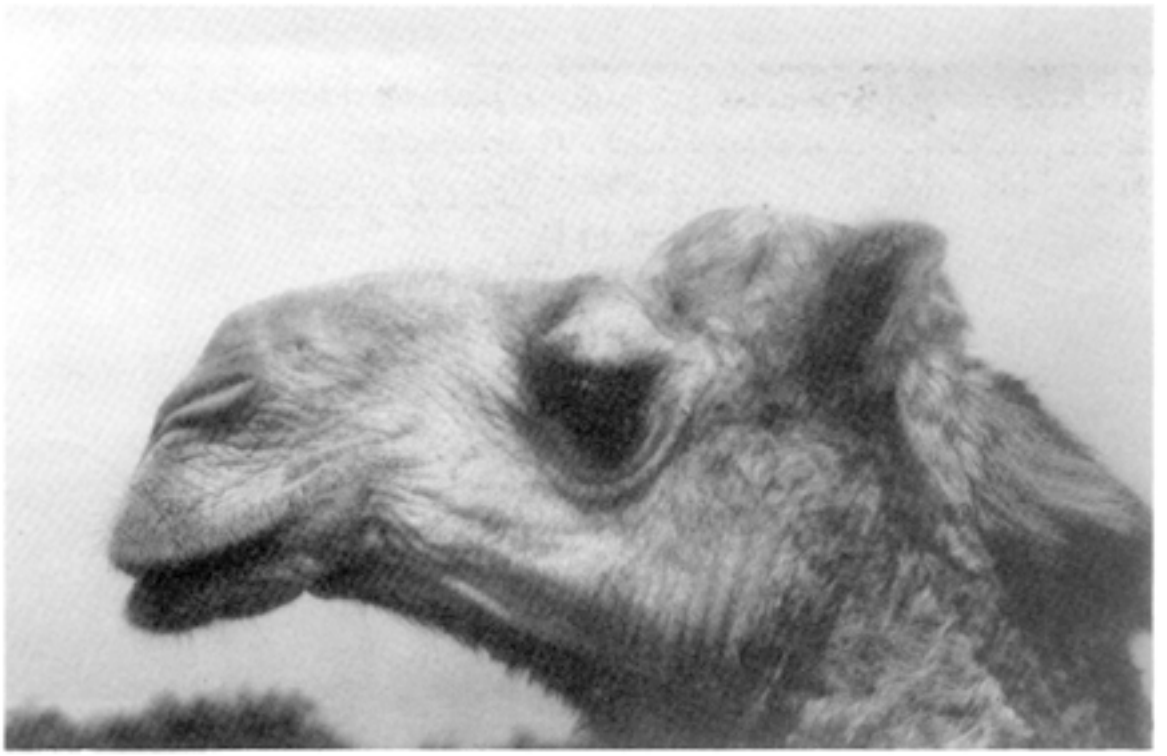
Female Malvi camels grazing near Sitamau in Mandsaur District

Female Malvi camels near Sitamau

Malvi breeding bull near Sitamau



Young Malvi camels near Sitamau



Profile of Malvi camel (male)

course of the day, however at night they are asleep and therefore not interfering with the milking routine. The average daily milk yield is around 2 kg. Lactation lengths average one year and calving intervals approximate two years. Hence, on average, 50%/o of the animals of a herd are lactating at any given time. During the rainy season, camels are not milked.

The milk is marketed mainly to tea stall owners and to dairies (Mohnot et al. 1994). While government dairies officially refuse to accept camel milk, at least one private dairy in the area has decided to buy camel milk, after conducting some experiments on its keeping properties. This private dairy mixes the camel milk with that from other species, camel milk composing about 5% of the total milk intake (6001 camel milk of a total of 12 0001 per day). Prices paid to the producer range between five and six Rupees.

8.2 Work animals

The Malvi camel breeders usually sell their male offspring at the annual mela.s in Jhalawar Patan, Batesar, and Mukanpura. These fairs are mostly attended by buyers from Bihar, Bengal, and even South India who apparently prefer to purchase camels here rather than at the bigger and better known *rrrela* in Pushkar. Being from a fairly humid area, the Malvi camel may be better suited for export to the higher rainfall areas of India than the camels native to Rajasthan. The notion that the Malvi camel has a higher resistance to infection with trypanosomiasis is worth investigating.

9.0 THREATS TO THE BREED

Data about the population dynamics of the Malvi camel are missing and it was not possible to determine whether the holdings of the Madhya Pradesh Rebaris have been increasing or declining. However, there is some reason for concern.

Over the last 12 years, Rebaris whose home villages are in Chittorgarh district of Rajasthan, have moved their camel herds into Mandsaur district. They are attracted by the combination of two circumstances, i.e. the milk marketing opportunities in several of the towns and the relatively abundant grazing resources in their close vicinity. Furthermore, the grazing tax charged by the government of Madhya Pradesh for access to wastelands is regarded as reasonable. The Rebaris from Rajasthan station their herds near the Muslim pilgrimage town of Jawra for nine months out of the year and return to Rajasthan only during the three months of the rainy season from July until September. Because of the good profits to be made from milk sales, their number increases from year to year (Mohnot et al. 1994).

Profile of Malvi camel (female)

These Rajasthani Rebaris originally owned camels belonging to the Mewari and Marwari breeds. Recognizing the superior milk potential of the Malvi camels, they are attempting to upgrade the milk productivity of their herds by purchasing female Malvi camels. But they continue to use Marwari male camels for breeding, for the purpose of obtaining higher prices for the male calves. Because of their smaller body size, pure Malvi camels fetch lower prices as work animals.

If this process of systematic cross-breeding continues unchecked, the already small nucleus of pure-bred Malvi camels will eventually erode.

10.0 DISCUSSION

The Malvi camel should be considered as an extremely important genetic resource. As is demonstrated by the breeding strategies of the Rebaris from the Chittorgarh area, it can be used to upgrade the milk production potential of other Indian camel breeds. This is a significant attribute, since research on the economics of camel pastoralism in Rajasthan indicates that the still prevailing traditional single-purpose system in which income is derived only from the sale of male-camels is no longer economically viable. Camel pastoralism is economically sound only if additional income can be generated from camel milk sales (Kohler-Rollefson,1995; Mohnot er al.1994).

If the inference that the Malvi camel is equipped with a higher degree of trypanotolerance is confirmed, this would render it additional importance.

Since the Rebaris have already recognized these positive aspects of the Malvi camel and some of them are engaging in indiscriminate cross-breeding, an effort should be made to ensure the survival of a sufficiently large pure-bred Malvi camel population.

The fact that the Malvi camel had so far escaped the attention of the scientific comunity is somewhat puzzling, but can be attributed to the fact that it occurs in a rather remote area not normally regarded as part of the Indian "camel belt". However, the circumstances of its "discovery" highlight the need for making an effort to establish better channels of comunication and a comprehensive dialogue with pastoralists if a reasonably complete documentation of existing animal genetic resources is to be achieved, as is the aim of the FAO's Global Genetic Data Bank. Information about the existence of particular strains and breeds and their respective qualities is vested exclusively with local animal breeders scattered in isolated areas and so far only a small percentage of this practical knowledge has filtered into the cognizance of animal scientists in the central research institutes. This indigenous experience and wisdom is an important resource that should be tapped and its value acknowledged to a greater extent than has been the case!

11.0 ACKNOWLEDGEMENTS

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MITHUN - AN IMPORTANT BOVINE SPECIES OF INDIAN ORIGIN

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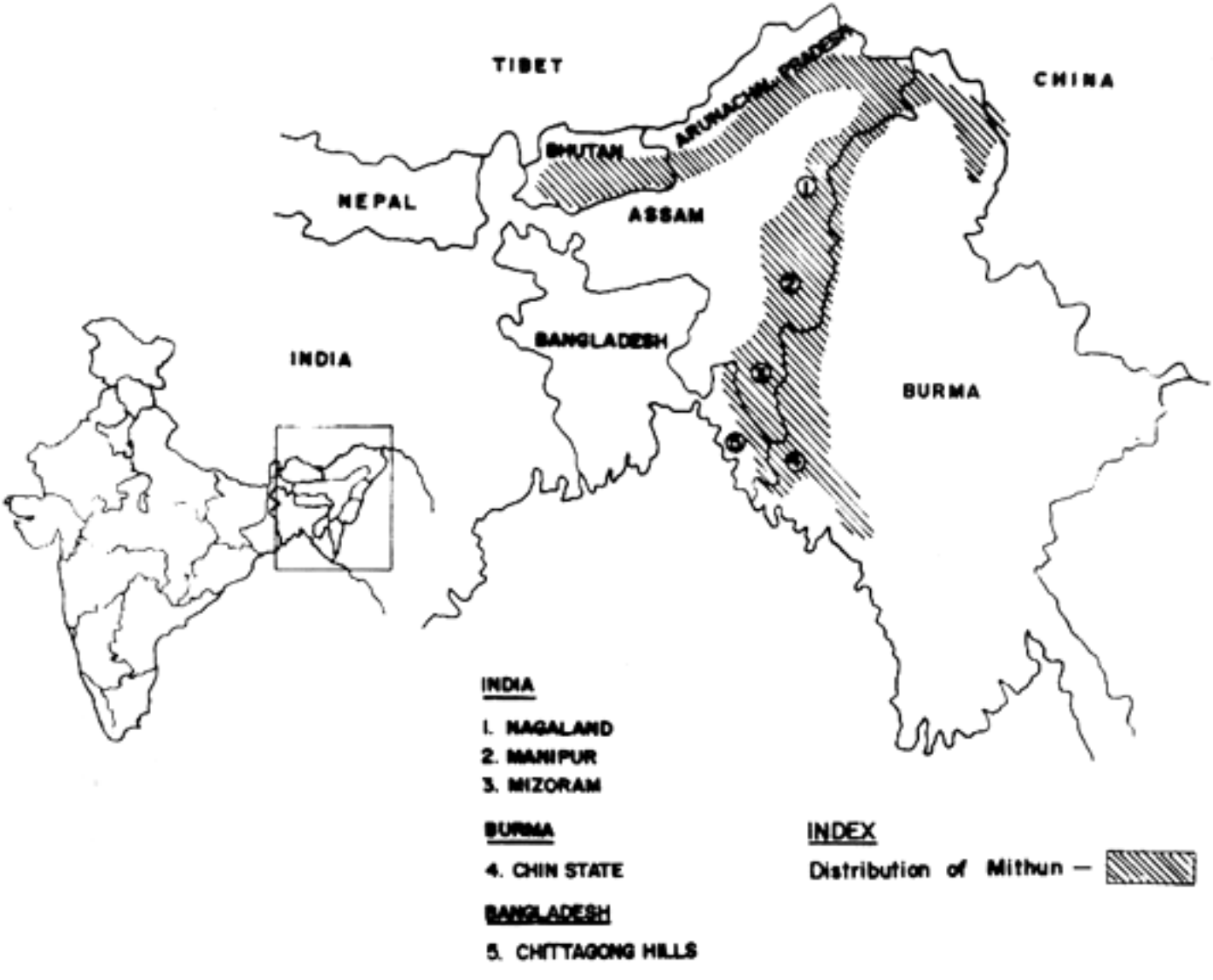
SUMMARY

The Mithun *(Bos frontalis)* is a heavily built semi domesticated bovine species originated in north eastern hill region of India. In some folklore, Mithun have been referred to as the descendent of the Sun. There are interesting and divergent legends about the orig in of mithun among different tribes. Even today, mithun is used as a holy sacrificial animal to appease the Gods by the tribesman. It is a woodland animal found at an elevation of between 2 000 and 9 000 feet. The habitat of mithun extends like a long curved belt of hills from the Akasan hill and Chin Hills of Burma through the Chittagong hill tracts of Bangladesh and the Lushai (Mizo) hills of Manipur and Naga hills of India. The geographic zone is covered with tropical evergreen rain forests. At higher elevations mithun territories are also shared by yak *(Poephagus grunniens),* while at lower altitudes domestic cattle and mithun co-habit. The information contained in the article is primarily based on a field survey carried out on mithun of Porba village of Nagaland. Some data collated and published by other departments is also included.

RESUME

Le Mithun est une espèce bovine bien structurée, semi domestiquée et qui a son origine dans les régions de collines nordorientales de l'Inde. Dans certaines etes traditionnelles, le Mithun est considéré comme descendant direct du Soleil. Parmi les différentes tribus il existe des légendes intéressantes et contraposées au sujet de Porigine du Mithun. Encore aujourd'hui, le Mithun est utilisé dans les tribus comme animal de sacrifice en remerciement aux Dieux. C'est un animal de forêt qui vit dans les zones d'une altitude de 2 000 à 9 000 pieds. L'habitat du Mïthun s'étend tout au long d'une longue franche qui va des collines de l'Akasan et de Chin, dans la région de Burma, à travers les collines du Chittagong du Bangladesh et celles de Lushai (Mizo), Manipur, et des Naga en Inde. La zone géographique est couverte de forêt pluviale tropicale toujours verte. A des altitudes plus élevées le Mithun partage son territoire avec le yak *(Poephagus grunniens),* par contre, aux altitudes plus basses il cohabite avec des animaux domestiques. L'information recueillie dans cet article se base principalement sur une enquête de terrain menée dans le village de Porba au Nagaland. En outre, on a inclus des données recueillies et publiées par d'autres sources.



Geographic Habitat of Mithun

1.0 INTRODUCTION

In morphological characteristics, the Mithun appears somewhat similar to that of Gaur, also known as Indian bison (a wild variety), but are distinctly smaller in size. Moreover, the mithun is a far more amenable and docile animal, unlike the gaur which could not be tamed. They prefer to roam about in the forest for browsing on shrubs and seldom forage grasses. Mithun do not wallow in mud like buffaloes. The most conspicuous feature of the mithun is a prominent dorsal ridge. The other distinguishing features are a small and double dewlap and white stockings. Mithun fascinated the archaeologists and zoologists for centuries but had hardly gathered the interests of farm scientists to harness the economic potential of this bovine until recently, when Indian Council of Agricultural Research established a National Research Contre on Mithun at Iharnapani in: Nagaland to undertake systematic studies on the husbandry and breeding of mithun.

2.0 HISTORY AND ORIGIN

Mithun is considered to have originated on the Assam-Burna border, however, it cannot be said with certainty when they were domesticated. Tribal communities living in the north of Brahmaputra River area, particularly in tracts between the borders of Burma and Bhutan, rear mithuns in great numbers. Mithun is still considered as semi wild animals yet many of its characters are typical of domestication. It is not known whether mithun originated from the gaur or these two are different species of wild oxen. It has also been postulated by some workers that mithun has resulted from a cross between a gaur and domestic cattle with banteng blood, or Zebu's in ancient times. Backcrosses with the wild gaur bulls do occur occasionally. They are made purposely by some breeders to improve the race in Bhutan and the adjoining area of Arunachal Pradesh i1l India. In some areas, crossbreds of mithun and Zebu cattle are produced, owing to the economically valuable characteristics of hybrids. The male hybrid is called Jatsa which is always sterile. The female hybrid is known as Jatsamin and is usually fertile.

3.0 POPULATION DYNAMICS

The domesticated mithun were widespread particularly throughout the hilly tract of North Eastem Region in the not too distant past. At present, their habitat has shrunk to Arunachal Pradesh, Manipur, Nagaland and Mizoram. According to the 1987 census report, the mithun population is highest in Arunachal Pradesh, followed by Manipur and Nagaland (Table 1). The mithun population decreased in 1977 in Arunachal Pradesh and Nagaland by I U. By and 40.18 per cent respectively from that in 1972. In Arunachal Pradesh, the declining trend continued untill the 1982 census. Between 1982 to 1987 the mithun population increased in all the states and this increase ranged between 1422 per cent in Nagaland and 187.00 per cent in Mizoram. Although during 1972 to 1987, the country's mithun population showed fluctuations in different states in the NEH region, the overall population in 1987 remained almost static as compared to 1972. However, a marked increase in the mithun population was noticed in Manipur and Mizoram during this period. Small mithun herds have also been reared for display by Zoological parks in India.

The age wise and sex wise distribution in different state indicated that in younger stock (< 3 years), the male: female ratios ranged between 43.06 to 48.0 in different states. In adults (3 years) it varied from 34.55 to 37.56 amongst mithun rearing states (Table 2). It is probable that about 10 per cent of males which are surplus from breeding, are slaughtered by the tribesmen after 3 years of age for meat purpose.

Table 1: *Mithun population and percent increase or decrease in different census*

State	1972	1977	% change over 1972	1982	% change over 1977	1987	% change over 1982	Average growth rate (1972-1987)
Nagaland	16 539	9 892	- 40.14	11 378	+ 15.02	12 896	(+) 14.22	(-) 1.46
Arunachal Pradesh	95 000	84 655	- 10.89	76 000	- 10.22	97 444	(+) 28.21	(+) 0.17
Manipur	8 528	8 528	0.00	12 825	+ 50.38	19 895	(+) 55.12	(+) 8.88
Mizoram	529	493	- 6.80	500	+ 1.41	1 435	(+) 187.00	(+) 11.41

Source: Based on National Livestock Census Reports (1972,1977, 1982,1987).

Table 2: *Age and sex wise Mithun population in different states*

State	< 3 years			> 3 years			Total male	Total female
	Male	Female	Total	Male	Female	Total		
Arunachal Pradesh	18 191	24 047	42 238	19 046	36 029	55 075	37 237	60 076
	(43.06)	(56.93)	(34.58)	(65.41)	(38.26)	(61.73)		
Manipur	4 062	4 382	8 444	4 301	7 150	11 451	8 363	11 532
	(48.10)	(51.89)	(37.56)	(62.43)	(42.03)	(57.96)		
Mizoram	315	353	668	265	502	767	580	855
	(47.15)	(52.84)	(34.55)	(65.44)	(40.41)	(59.58)		

Figures in parenthesis are percentage value
Source : National Livestock Census Report (1987)

4.0 FEEDING AND MANAGEMENT

The mithun forage on forest grasses, shnubs and tree leaves available in the jungle. They nibble like goats.Animals move considerable distances in search of suitable food and do not stay for long at the same place of grazing. 'They prefer deep and dense forest to avoid bright sunshine. Herds of mithun are encountered on the road side during the night. Owners let their animals loose in the forest for most of the time and no stall feeding is practised. They are collected for periodical salt feeding at an interval of 15 to 20 days. During the cropping season animals are kept in earmarked areas in the jungle to protect destruction of crops. The mithun of a village are recognized by the specific ear notch while individual owners have their own method of identification of their animals. It was observed that the water requirement of mithun is quite high, which they meet from the streams in the jungle. Some owners have now started getting their animals vaccinated with FMD or RP vaccines.

5.0 PHYSICAL CHARACTERISTICS

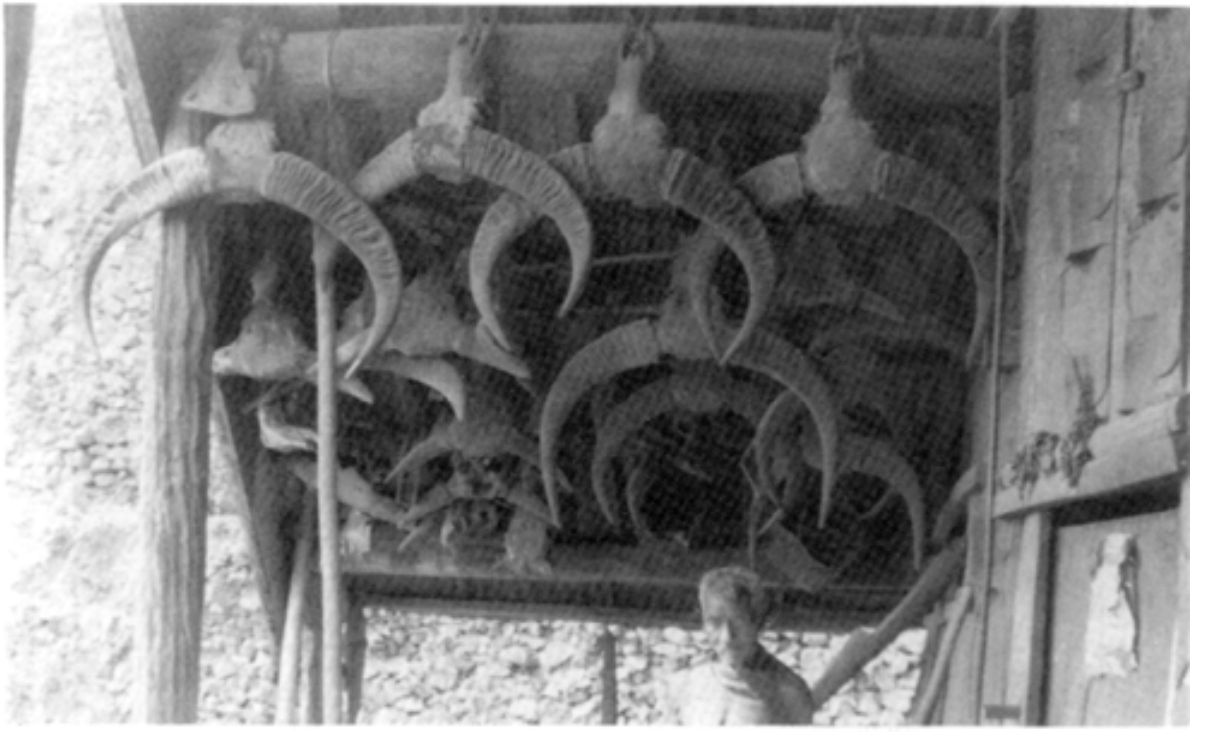
Mithun has a compact and sturdy build with well developed shoulders. The animals have medium to large body size (400-500 kg). It is smaller than the gaur. The heart girth were 187.5U cm and 176.UU cm in male and females respectively. The paunch girth was higher than heart girth (216.90 and 201.50 cm) in both the sexes. The body length were 138.75 and 128.75 cm and height at withers were 134.4U and I 13.75 cm in male and female animals respectively. The other body measurement like hip width, pin width, head length, tail length and hom length were also higher in males than in females (Table 3).

TABLE 3:
Average Body Measurements on Mithun

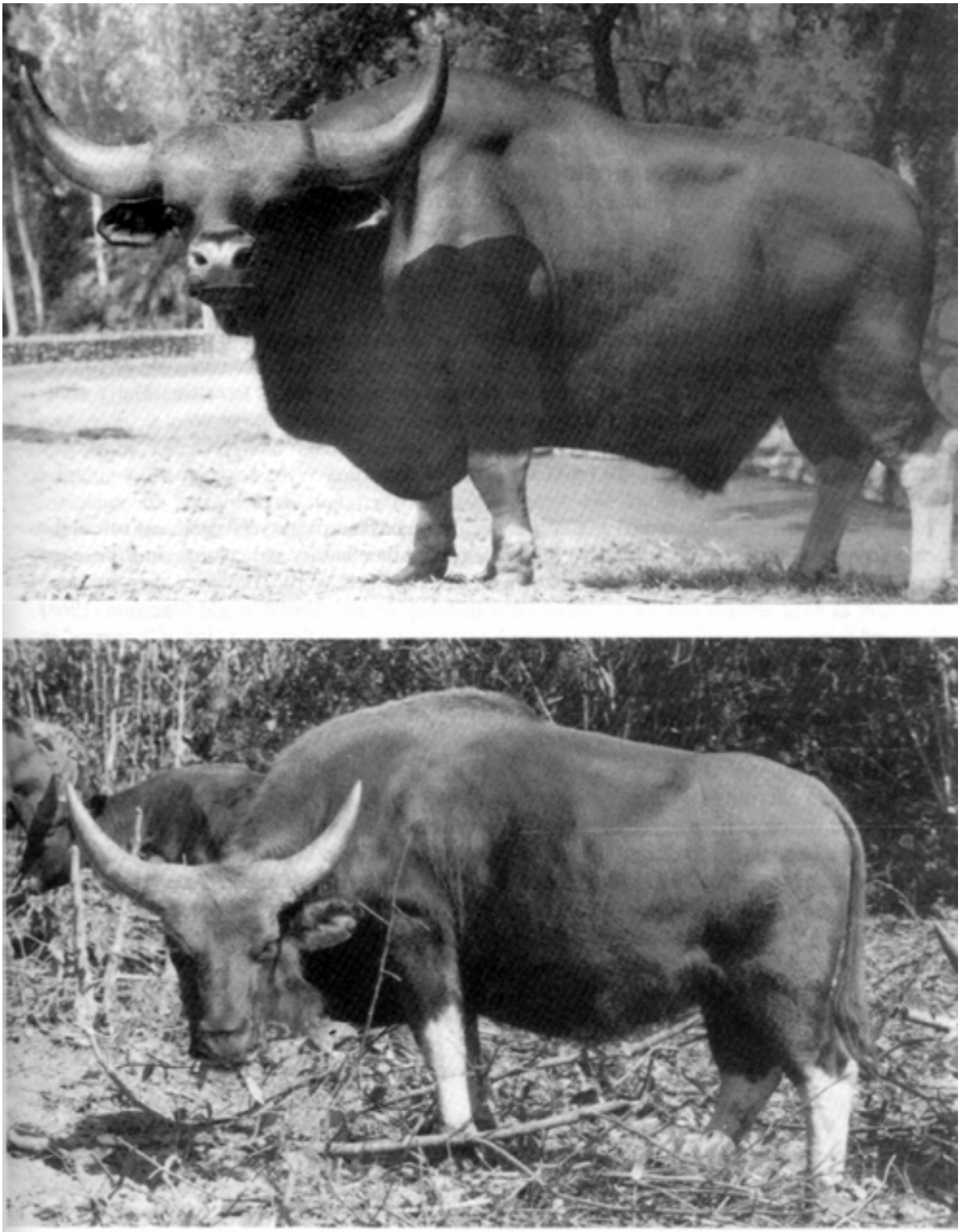
Trait	Measurement (cm)	
	Male	Female
Heart girth	187.50	176.00
Paunch girth	216.90	201.50
Body length	138.75	126.75
Height at withers	134.40	113.75
Hip width	41.90	40.00
Pin width	20.00	17.75
Taillength	78.75	72.50
Head length	44.40	40.00
Head width	29.40	27.25
Horn length	34.40	33.00

The mithun has much wrder and a flatter forehead. The horns are shorter, plumper, conical and without bends and protrude from the sides of the forehead. The horns are distant at the base and rise directly out and up in a gentle curve. The neck is thick and muscular and the double dewlap comences in place of a hump. They have a sharp ridge starting from back of the neck, tapering on the shoulder and extending up to the middle of the back approximately up to 7th thoracic vertebrae. The forelegs are thick and clumpy but the hind legs are relatively longer. The tail is covered with short hair except the tip where it ends with a tuft of hair and hardly extends up to the hock joints but never cross the joint. Adult males are generally black. White stockings on all the four legs is another contrasting feature of mithun similar ta gaur and banteng. Piebald and even white animals are encountered.

A herd of Mithun in Nagaland



Decoration of Mithun skull with other hunts in Naga houses



Males in zoo (upper photo) and natural habitat (lower photo)

6.0 GENETIC CHARACTERISTLCS

The karyotype of mithun consists of 58 chromosomes in comparison to 60 in domestic cattle (Gupta et al. 1995). The first pair of autosome is of submetacentric type while remaining 27 pairs of autosomes are acrocentric. X chromosomes are submetacentric and similar to cattle. The Y chromosomes are of a small metacentric type like *Bos tauru.*

7.0 SOCIO-ECONOMIC IMPORTANCE

Although mithun is not reputed as a farm animal, these bovines play a very significant role in the socio-economic life of the tribes and have become a part of their history and culture. In some areas especially in Arunachal Pradesh they are often used for some field work. However, they are more important as meat animals and are sacrificed for comunity feasts. Simoon and Simoon (1968) described them as the sacrificial ox of India. The Nagas tribes also use them as a kind of "currency" in exchange for trading goods, objects of value and paying penalties. The ownership of the mithun herd is considered a position of high social status. After their sacrifice, the tribesmen keep the heads of mithun with that of other hunts as decorative material.

8.0 CONCLUSION

Mithun is an important bovine of the hilly mountainous region of India, Burma and Bangladesh. It is mainly a free-ranging forest dweller and some animals have been kept in zoological gardens. In their natural habitat, mithun thrives on tender grass and leaf vegetation of forests. Due to shrinkage of forest land, the mithun population has shrunk in its distribution. Moreover, it has not yet been developed as a farm animal. Under the changing socio-economic scenario, mithun warrants greater attention for being improved and preserved as an important farm animal. The meat production potential and other productive attributes can be harnessed by adopting the improved husbandry and feeding practices.

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HARIANA - AN INDIAN CATTLE BREED IN ITS NATIVE ECOLOGY

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SUMMARY

The fast changing socio-economic levels of inhabitants, ecological profile and agricultural scenario in the native breeding.tract of Hariana cattle breed reveal several factors resulting in consistently a declining trend in the population as well as genetic deterioration in performance traits of the breed. The breed, once occupying pre eminent position in Indian farming throughout the entire rural households of North India for both draught power and milk production, isnow being gradually neglected and becoming economically non-remunerative because of intensive and more mechanized agriculture replacing draught animal power, shrinking grazing areas, over emphasis on crossbreeding with exotic cattle inheritance and emergence of buffalo as a commercial dairy animal. The authors emphasize the need to develop suitable strategies for planned genetic improvement and conservation programmes of the breed to resurrect it as an economical viable cattle breed for the posterity.

RESUME

Les transformations rapides des niveaux socio-économiques des populations, du profil écologique et du milieu agricole dans les caractéristiques de la race bovine Hariana révèle différents facteurs qui sont à 1'origine de la tendance à la diminution de la population, ainsi que de la détérioration génétique des performance de la race. Cette race occupait dans le passé une position importante dans le système agricole de la zone nord de l'Inde, aussi bien comme animal de trait que pour sa production de lait; actuellement, la race a perdu une grande partie de son importance et par conséquence n'est plus intéressante du point de vue économique à cause de l'agriculture intensive et plus mécanisée qui a remplacé les animaux de trait, la réduction des zones de pâturage, l'importance excessive du croisement avec des animaux exotiques et la tendance à utiliser le buffle comme animal pour la production de lait et dérivés Les auteurs soulignes la nécessité de développer des stratégies adaptées pour l'amélioration génétique et des programmes de conservation de la race pour lui assurer un futur intéressant du point de vue économique.

1.0 INTRODUCTION

The hariana is a prominent dual purpose cattle breed of North India. It has been exterisively used in grading up the non-descript cattle, particularly to improve their draughtability, in the almost entire Indo-Gangetic plains. The Hariana cattle, primarily reared for draught bullock power, were quite abundant in number in the not too distant past. However, over the years with increasingly intensive and mechanized agriculture, shrinking of per capita farm land holding and grazing areas, lack of planned breeding policies for indigenous cattle breed improvement and over emphasized c,ossbreeding programe, the Hariana cattle ‘ and many other indigenous cattle breeds consistently followed a declining trend in population as well as genetic deterioration in performance. lt is, therefore, logical to infer that at present, the Hariana cattle breed no longer occupies a place of eminence, in spite of possessing remarkable attributes such as a better thriving in harsh and semi arid environments, wide resistance to withstand endemic diseases and ability to subsist on impoverished local feed and fodder resources. Thus, there is utmost need to reverse the declining trends of population of breed as well as to refurbish the economically viable and remunerative ones. In this paper, information on socio-economic levels of the farmers/breeders as well as physical conditions of the native breeding tract, collected through conducting a survey, are collated to determine the present breed status of Hariana cattle in its native ecology.

2.0 NATIVE HABITAT QF THE BREED

The native breeding tract of Hariana cattle lies between 28^{o} 30' and 30° north latitude and 75° 45' and 76^{o} 80' east longitude. The area encompasses largely parts of Rohtak, Bhiwani, Sonepat, Jind and the Hisar districts of Haryana. the Jhajjar, Beri and Jahajgarh blocks of the Rohtak district had been quite famous for rearing a good number of purebred quality Hariana cattle and were leading trading centres particularly for Hariana bullocks. Besides the traditional breeding tract, the Hariana cattle also spread in the adjoining areas of the states of Punjab, Uttar Pradesh and Rajasthan (see map).

3.0 PLAN OF BREED SURVEY IN THE NATIVE HABITAT

Five random clusters each comprising of a minimum of 5 villages in the central breeding tract spreading over an area of about 5 000 sq.km were chosen for conducting the survey. A total of 7 929 rural households, spread over these elusters were surveyed. The information generated through a survey questionnaire pertaining to socio-economic and ecological profile of the tract i.e. size of land holding, family size, level of literacy, feed and fodder resources, contribution of men and women in animal husbandry, animal management practices as well as population distribution of farm animal genetic resources, were analyzed to determine tllt status of Hariana cattle in the tract.

4.0 SOCIO-ECONOMIC PROFILE OF RURAL HOUSEHOLDS

Of the total rural households surveyed, about 30 percent were landless and the remaining 70 percent had farmland holdings ranging upto 36.5 hectares. Amongst the farming households, the proportion of different categories of farmers were as follows:

Categories of Farmers	Land Holdings	Proportions
Marginal	Less than 1.0 ha	25.1 %
Small	1.0-2.0 ha	23.1%
Lower-medium	2.0-4.0 ha	14.1%
Upper-medium	4.0-8.0 ha	5.7%
Large More	han 8.0 ha	1.6%

The average land holding size per household was 1.52 hectares and nearly 55 percent of the cultivated land was irrigated. The major sources for irrigation were canals and electric tube-wells.

The average number of family members per household was 6.92. However, under a joint family system, a family with 40 members was also found. Nearly 27 percent of the total household members were literate. The rural household women were prominently involved in managing their cattle and buffalo herds. They are practically very well conversed with herd management practices particularly in feeding, milking and general cleanliness of the animals and their premises, whereas male members of the family looked after the breeding and health aspects of the animals and their marketing. Sale-purchase of animals was usually made directly among farmers in the village or nearby villages. Besides the cattle fairs/markets organized by State Animal Husbandry Departments, commission agents and local animal traders are also prominently dealing in the marketing of animals.

The majority of cattle owners (64.5%) reared cattle primarily for milk production, followed by the generation of animal draught power for agricultural operations. However, general belief of rearing cows only on religious sentiments belied, since very few (3.6‘%) households responded their rearing cattle on religious grounds alone. For breeding cows, the villages possessed common breeding bulls usually procured from Government cattle breeding organizations and charitable institutions. Practically none of the households maintained its own breeding bull for breeding cows. On the contrary, the Murrah buffalo which also predominantly share the common breeding tract with Hariana cattle, are primarily reared as dairy animals (94.4%) and male buffaloes are used both for draught and breeding purposes.

5.0 HERD MANAGEMENT PRACTICES

Intensive agriculture with increased auto-mechanization has reduced the role of draught animals substantially in the central breeding tract. As a result, permanent grazing and pasture lands have shrunk considerably. Only very little fallow land, area along canal embankments, roadsides and field bands provide area for animal grazing. This amount of grazing does not provide sufficient nutrients. So, the cattle and buffaloes are usually stall fed. Cattle and buffaloes are kept together under a closed housing system. On an average 54 percent of animal houses were pucca and well ventilated. Nearly three-quarters of animal houses have a kucha floor and without any drainage facilities. More than half of farmers (51.2%) kept their animals in sheds separate from their own dwellings and the remainder kept them within the vicinity of their own living premises. The majority of the progressive farmers housed the animals in pucca and well ventilated sheds preferably separate from their own living places. Hariana cows have a high level of motherly instinct, so the new born calves are usually unweaned. The calves suckle their mothers and gradually start feeding on green fodders and concentrates. Comon breeding bulls usually procured by village Panchayats from State Government organized cattle herds, charitable institutions and promising cow breeders from the region are used as breeding cows. In spite of a vast network of A.I. centres existing in the state, natural service is largely adopted for breeding Hariana cattle because of inadequate availability of frozen semen doses of progeny tested or good pedigreed purebred Hariana cattle bulls.

6.0 FEED AND FODDER RESOURCES

Nearly 5-10% area of cultivated land is used for growing fodder crops in the breeding tract. Berseem *(Trifolium alexandrium),* oats *(Avena sativa)* and mustard *(Brassica compestris)* as green fodder crops are grown in the winter season wherever irrigation facilities exist. Bajara *(Penniselum typhoides),* Jowar *(Sorghum* vulgare) and Guar *(Cyamopsis tetragandodra)* are the sumer season crops grown both for grain as well as fodder production. Local grasses and weeds

collected from the cultivated fields as fodder are also supplemented in animal feeding particularly by weaker sections of the rural society i.e. landless and marginal farmers. In general there is scarcity of green fodder round the year. Nearly 3/4 of responding farmers (73.9%) cultivate fodder crops for feeding their animals. The landless, marginal and small farmers usually feed animals by purchasing fodder from the medium and large farmers. Wheat straw (stored after Rabi harvest) and dry stalks of Bajara and Jowar are the main dry fodders for animal feeding. The majority of animal keepers (91%) feed chaffed green and dry fodders and for better palatability, the chaffed green fodder are mixed with dry fodder. Cattle owners often supplement concentrate feed ingredients i.e. wheat *(Triticum vulgare),* bajara, jowar, guar, methi *(Trigonella foenum graecum),* cotton seeds, oil seed cakes as well as comercially formulated balanced feeds, particularly to high yielding cows and elite working bullocks. The majority of the respondents (76.4^{a}/o) feed food grains after cooking followed by grains soaked in water (22.1%) and very few (1.5%) feed raw. The concentrate feeds are usually fed by mixing with wheat straw or chaffed dry fodders. Nearly one quarter of responding cattle owners feed concentrates at the time of milking. The cattle keepers generally do not give proper attention to feeding balanced rations to indigenous cattle and are quite ignorant as the optimum formulation of feed ingredients as well as mineral mixture etc.

7.0 LIVESTOCK POPULATION STRUCTURE

The total number of farm animals per 100 households in the survey area were estimated as 313. The buffaloes were the major component constituting 74.4% of the total farm animal population followed by cattle (15.4%), goats (3.2%), sheep (2.6%), camels (1.8%), equines (1.3%) and pigs (13%). Livestock distribution among different categories of farmer (Table 1) reveals that the number of cattle (34.2) and buffaloes (136.4) per 100 households possessed by landless respondents was minimum and the corresponding number of cattle (71.7) and buffaloes (426.0) was maximum with large farmers. Goats, sheep, horses and pigs were traditionally reared by landless farmers. Their number per hundred households were maximum amongst land less households followed by marginal farmers. Medium and large farmers usually do not rear these farm animal species. Camels were also possessed by different categories of the farming comunity for conducting agricultural operations particularly in the Bhiwani district and its adjoining areas.

Main breeding tract of Hariana cattle

A herd of Hariana Cattle

Hariana Bullocks ploughing the agriculture land

Traditionally cooked food grains for feeding

Stacks of wheat straw and dry stalks of bajara and jawar for animal feeding

TABLE 1:
Livestock distribution amongst different categories of farmers

Categories of farmers	No. of respondents	Cattle	Buffalo	Goat	Sheep	Camel	Equines	Pigs
Landless	2385	815	3252	757	644	26	218	278
		(34.2)	(136.4)	(31.7)	(27.0)	(l.l)	(9.1)	(11.7)
Marginal	1993	908	4416	32	-	70	112	20
		(45.6)	(221.6)	(1.6)		(3.5)	(5.6)	(1.0)
Small	1830	962	4857	4	-	175	2	11
		(52.6)	(265.4)	(0.2)		(9.6)	(O.1)	(0.6)
Lower-medium	1141	765	3589	9	1	135	1	-
		(67.0)	(314.5)	(0.8)	(0.09)	(11.8)	(0.09)	
Upper-medium	453	282	1789	2	-	27	1	-
		(62.2)	(394.5)	(0.4)		(6.0)	(0.2)	
Large	127	91	541	-	-	5	-	-
		(71.7)	(426.0)			(3.4)		
TOTAL	7929	3823	18444	804	645	438	334	309
	(313)	(48.2)	(232.6)	(10.1)	(8.1)	(5.5)	(4.2)	(3.9)

Figures in parenthesis are number of animals per 100 household.

A young calf suckling the mother cow

Buffaloes and cattle constitute nearly 83% and 17% of the total bovine population. The total cattle population comprised of the Hariana cattle breed (90.1 %) followed by crossbred cattle (5.1 %) and non-descript or other breeds (4.8%). Amongst the total buffaloes the proportion of Murrah, Nili Ravi and non-descript type were 84.6%, 1.8% and 13.6%, respectively. The distribution of Hariana cattle and Murrah buffalo followed an almost similar pattern to that of the total cattle and buffalo population in different categories of households. Different category of Hariana cattle were enumerated with the following proportions of the total Hariana cattle population (Table 2).

TABLE 2:
Proportions of total Hariana cattle population

Classes of Hariana population	Percentage
Lactating cows	26.9%
Female calves (0-1 yr)	14.8%
Male calves (0-1 yr)	12.8%
Heifers (1-3 yrs)	11.3%
Young bulls (1-3 yrs)	4.9%
Dry cows	13.1%
Bullocks	12.0%
Bulls	1.3%
Adult females not yet calved	2.8%

The lactating cows constitute more than a quarter of the total Hariana cattle population, followed by young female calves (14.8%) and dry cows (13.1%). The proportion of female calves up to 1 year of age was higher than that of male calves. However, the number of heifers (1-3 years) was more than double that of young males (1-3 years). A very small number of breeding bulls (1.3%) was kept by the farmers for breeding purpose.

8.0 CONCLUSIONS

The recently conducted breed survey on Hariana cattle in the native habitat revealed that the cattle breed once considered as a premier dual purpose breed, both for milk production and draughtability and almost reared free of cost through grazing on pasture lands, is now gradually slipping down from its prominent position because of intensive and mechanized agriculture, shrinking pasture land area, over-emphasis on crossbreeding and emergence of the buffalo as a dairy animal. Thus, with increasing costs of feeding, housing and managing the Hariana cattle under stall-fed conditions, declining utility of bullock draughtability and poor marketing of animals, were found to be responsible for overall neglect in rearing Hariana cattle by their traditional breeders. Thus, the need to develop strategies for planning programes on genetic improvement and conservation of the breed as well as to resurrect the Hariana cattle breed as an economically remunerative animal assumes considerable significance.

THE VECHUR CATTLE OF KERALA

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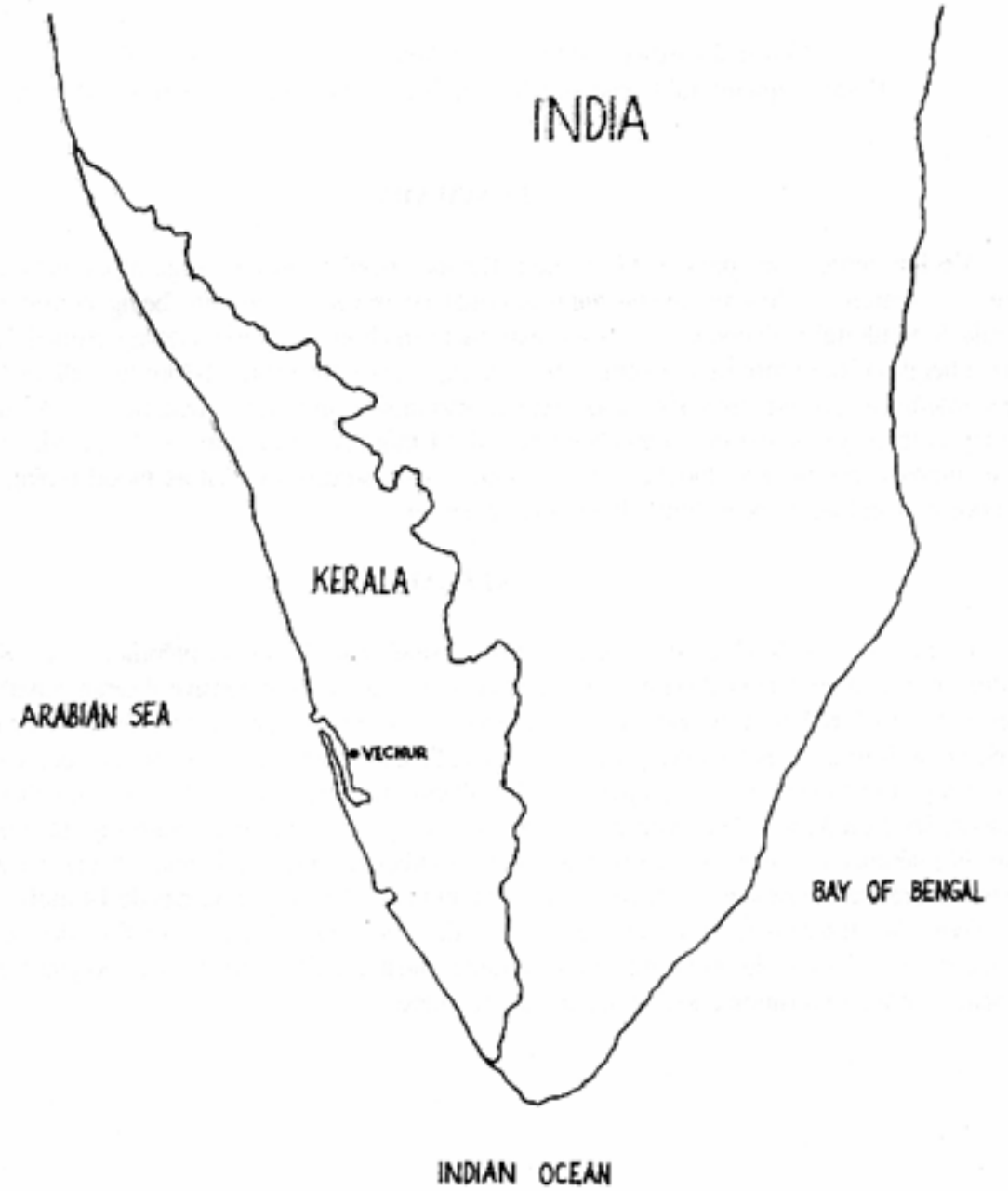
SUMMARY

Vechur cattle, once popular in southern Kerala (India) is on the verge of extinction. By extensive search the few remaining animals could be traced. They are being conserved by Kerala Agricultural University. Cows are extremely sma.ll in size, i.e. weighing around 125 kg with a height of not more than 90 cm They are capable of producing 2-3 kg fat milk per day. Heat tolerance, disease resistance and general adaptability are added qualities. Age at first calving is three years and the intercalving period 14 months. As a part of characterization of these animals, cytogenetic, biochemical, immunogenetic studies as well as blood typing, milk composition and fat globule studies have been taken up.

RESUME

La race bovine Vechur, très dffuse dans le passé dans la région méridionale de Kerala (Inde), se trouve en danger d'extinction. A travers une recherche extensive il serait possible de décrire l'effectif réduit d'animaux existants encore. Ceux-ci sont conservés à 1'Université Agricole de Kerala. Les femelles présentent une taille très réduite, avec un poids aux alentours de 125 kg, et une hauteur qui ne dépasse pas les 9U cm I.e niveau de productionjournalier peut atteindre les 2 ou 3 kg de lait, avec une haute teneur en graisse. Parmi les autres atouts on peut noter la tolérance à la chaleur, la résistance aux maladies, et une bonne adaptabilité générale. L'âge à la première mise-bas est de trois ans, avec un intervalle entre mise-bas de 14 mois. Pour co$_{m}$pléter la description des caractéristiques de cet animnal, on a réalisé des études cytogénétiques, biochimiques et immunogénétiques, ainsi que des études sur le polymorphisme du sang, sur la composition du lait et de la matière grasse.

Map of south India depicting the location of origin of Vechur cattle



1.0 INTRODUCTION

Kerala is the southern-most state in India, a narrow strip of land bordered by western ghats in the east and the Arabian Sea in the west. The cattle originated in the land are dwarf cattle and generally referred to as the local cattle or non-descript cattle of Kerala. But of these, there has been a variety with characters distinguishing the individuals from others and known by a local name i.e. the Vechur cattle.

The people of the locality, especially those above 50 years old, are able to give a good description of the cow. They may that the cow is small, less than 3 ft high. The shape of the horn is such that the rain water from the tip of the horn falls into the eyes of the cow. The extremely small size of the cows, low feed requirement, good adaptation to the locally and high disease resistance are also traits very much favoured by the farmers. Here it is interesting to recollect the metre-tall cow breed in Mexico and thought to be capable of producing around three litres of milk per day. The popularity of the Vechur cattle lay in the fact that the milk production of these cows was relatively high compared to other local cows. This has been recorded in the Trivancore State Manual. It used to be an interesting sight to see these dwarf cattle almost imersed in the water of the paddy fields of the area and moving forward to reach the greens seen above the water. The cows swiming swiftly across the canals and rivers was also a comon sight in earlier days.

2.0 ORIGIN AND DISTRIBUTION

Vechur, a small place near Vaikom in the Kottayam District of Kerala is the place of origin of these animals. In earlier days this area was isolated from other places by rivers and canals and backwaters. The isolation of the animals in the area, coupled with probable selection by farmers, would have resulted in the evolution of the Vechur animals.

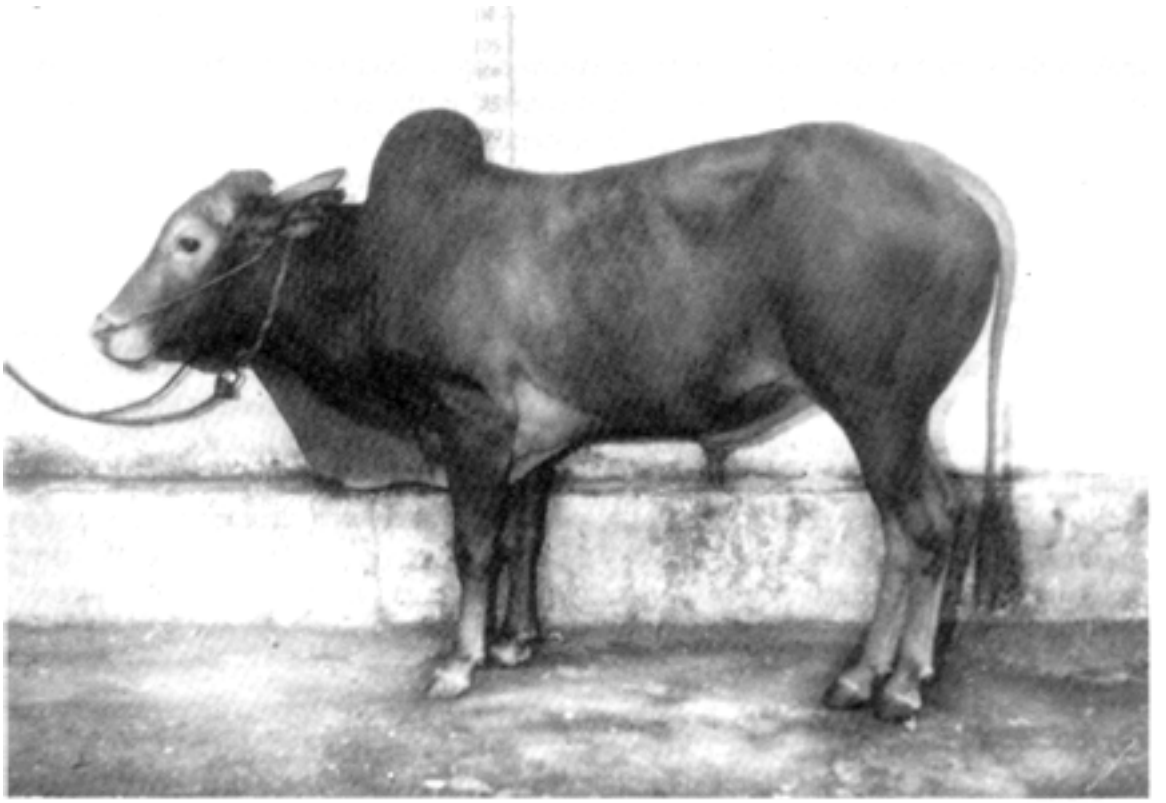
It used to be a custom to give Vechur cows as a gift to the named daughters of the family which added in the spread of these animals to other places. There are no previous recorded statistics about Vechur cattle. Vechur cattle were available in large number and were very popular in Vaikom and nearby areas.

3.0 REASONS FOR NEAR EXTINCTLON

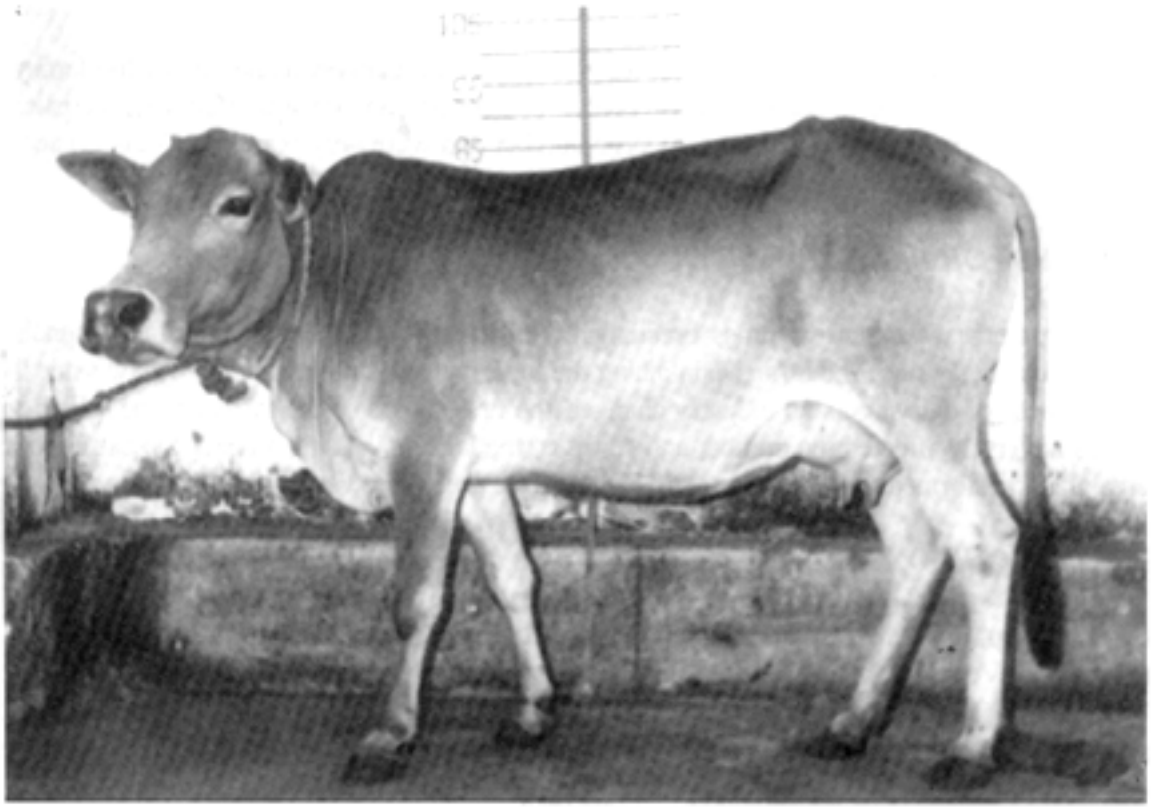
The programe of extensive cross breeding of local cattle with exotic bulls was launched and implemented vigorously since the 60's. Maintaining the local bulls was not permitted by law since the 50's. The development of dairying as an industry changed the first choice of the farmer to be a high yielding cow and this adversely affected the number and status of the local cows. As a result the cattle population of the area was transformed to crossbreds and Vechur cattle are on the verge of extinction now.

4.0 EFFORTS ON CONSERVATION

Kerala Agricultural University has taken up a project under the leadership of the author to conserve the germplasm of Vechur cattle. The speciality of the projects is the intense involvement of the students of the Veterinary college, especially in searching for and spotting the animals. After extensive search and selection a small beginning to conserve the Vechur animals was made on 26-7-1989, by purchasing 4 cows, a heifer, one bull, and 2 calves. Gradually, two dozen animals were purchased and added to the group. At present the strength is about 100, including followers. The stock is being multiplied and genetic studies are being carried out on these animals.



Vechur Cow



Vechur bull

5.0 GENERAL DESCRIPTION OF THE APPEARANCE OF THE ANIMAL

Colour : Light, red, black, fawn or white
Head : Long with somewhat narrow face
Horns : Small thin and curved forward, downward in most cases and very small and only just protruding in certain cases for cows, small and stout for bulls
Hump : Present. Vezy prominent for bulls
Legs : Short
Tail : Long and almost touching the ground
Udder : Well attached, with squarely placed small teats
Milk veins : Well developed
Skin : Smooth and glossy

5.1 Main observations

The birth weight of the calves have been only one third of that of the crossbred calves. One year weight was less than 75 kg. Peak milk production recorded was 3.67 kg/day. But the cows purchased had been very old, over 10 years as younger ones or calves were not available due to the use of exotic or crossbred bull semen in the locality and hence the recorded production cannot be taken as their full potential.

Quite contrary to the expectations, age at first calving was found to be comparable with the crossbred cows of Kerala. The intercalving period of 14 months also had been satisfactory though the animals were old.

The work started at Mannuthy has been appreciated at different levels and at present the project is financed by Indian Council of agriculture. The animals purchased, as well as the progenies born in the farm are under observation and studied for various traits. Cytogenetic, biochemical and imunogenetic work as well as blood typing are in progress. Twenty two animals were blood typed at the University of Bern, which has helped in correcting the record of parentage in two cases. This work is now taken up as a routine in the Centre. Milk composition, milk protein polymorphism and size of fat globules are being studied.

A breeding programe is planned and implemented to avoid inbreeding as far as possible. Maximum care is taken in bull selection. Embryo transfer has been sta ted as a tool for obtaining more progenies from the females with good breed characteristics.

Mortality had been almost nil for growing calves under farm conditions. Under *ad libitum* feeding, the size of the animal is small and heat tolerance and adaptability are as good as expected.

It was seen that these animals are quite resistant to foot and mouth disease. On hot days when panting was observed in exotic animals and their crossbreds, Vechur cattle never showed any sign of distress. In general, the Vechur cow is suitable for a farmer who cannot provide sophisticated management, but wants milk just for home consumption. No research work has previously been done on these animals. No description or characterisation has been made.

Considering all this, it is to be concluded that conserving this small cow for the future generation is a duty of the present generation.

CONSERVATION AND UTILIZATION OF BEEF CATTLE GENETIC RESOURCES IN JAPAN

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SUMMARY

There are four cattle beef breeds in Japan: Japanese Black, Japanese Brawn, Japanese Poll and Japanese Shorthorn. These breeds were crossed with European breeds in the early 1900's. As a result of introducing European blood, Japanese beef cattle have an expanded and more diverse gene pool. Furthermore, both the breed used for crossing and the selection criteria employed varied significantly from prefecture to prefecture Consequently, a number of distinct strains have been established. At present, however, the genetic diversity is becoming increasingly concentrated around a limited number of strains noted for their superior meat quality. From the genetic conservation view point, it is necessary to stock minor strains by frozen semen and embryos for future domands of genetic resources. This paper discusses the conservation and current utilization of beef cattle genetic resources in Japan.

RESUME

Au Japon il existe 4 races de bovins. Ces races ont été croisées avec des races européennes au début de ce siècle. Avec l'introduction des races européennes, les races bovines à viande japonaises présentent un pool génétique plus diversifié et étendu. En outre, les races utilisées pour les.croisements et les critères de sélection appliqués étaient différents d'une région à l'autre. Par conséquent" on a obtenu nombreuses souches différentes. Actuellement, cependant, la diversité génétique se centre principalement autour d'un nombre limité de souches, connues par la qualité supérieure de leur viande. Du point de vue de la conservation génétique, il est nécessaire de conserver, à travers la congélation de semence et d'embryons, les lignes moins intéressantes du point de vue commercial mais utiles pour une future demande de ressources génétiques. Cet article analyse la conservation et l'utilisation courante des ressources génétiques des bovins à viande au Japon.

1.0 BACKGROUND OF BEEF CATTLE PRODUCTION

1.1 Historical features influencing cattle production

The history of the raising of beef cattle in Japan is extremely short compared to that of Europe. This fact seemed to arise due to the following two reasons. Firstly, the climatic conditions of Japan are suitable for the cultivation of grain and the only purpose for cattle raising was to assist in rice cultivation. And secondly, for a long time Buddhism was predominant in Japan and prohibited the eating of meats, especially of four legged animals. Though meat has been consumed in Japan only for about 130 years which was the beginning of the Meiji era, it has only reached widespread popularity in the last 30 years. Therefore, Japanese beef cattle were not subject to improvement techniques for meat production before the mid 1950's.

In the Meiji era, many foreign cattle were introduced to Japan and initially extensively crossbred with the native cattle under the leadership of the government. Through this, the gene pools of Japanese beef cattle were diluted and greatly expanded. After the initial frenzy of crossbreeding was over, each cattle breeder began to work to improve their breeds without such crossbreeding. These were promoted by each prefecture, so the unique characteristics of Japanese cattle remains today.

1.2 Description of Japanese beef cattle breeds

In 1994 there was a total of 2 971000 beef cattle in Japan. These can be classified into two basic types. One of 1879 000 indigenous Japanese beef cattle and the other of 1093 000 non indigenous fattening dairy cattle and crossbreeds. The category of crossbreed are of a small but expanding part of the total due to a current enthusiasm for crossbreeding Japanese Black with Holstein cattle. The indigenous beef cattle breed is called Wagyu. There are four breeds, Japanese Black (90.2%), Japanese Brown (7.6%) Japanese Poll (0.1 %), and Japanese Shorthorn cattle (2.1 %). Each breed has its own history and distinct characteristics which are detailed in the next paragraph.

1.2.1 Japanese Black

Most Japanese Black were crossbred giving a modern type of this breed, but the original type of Japanese Black cattle can still be found in Mishima cattle designated as a natural treasure in Japan. They are a late maturing breed with a narrower body compared to the modern Japanese Black.

In the Chugoku district, several pre-crossbreed strains (Tsuru) had been developed during the Edo era (1600-1876) and were the primary means of carrying firewood to fuse the iron sand for steel production. They were used as draft animals. After the Meiji restoration in 1867, the government encouraged the introduction of foreign cattle breeds for crossbreeding with native cattle in order to improve body size and milk production. As shown in Table I, various kinds of breed were introduced and crossbred with each regional native cattle. In consequence of this, the genetic diversity of the indigenous cattle was greatly expanded.

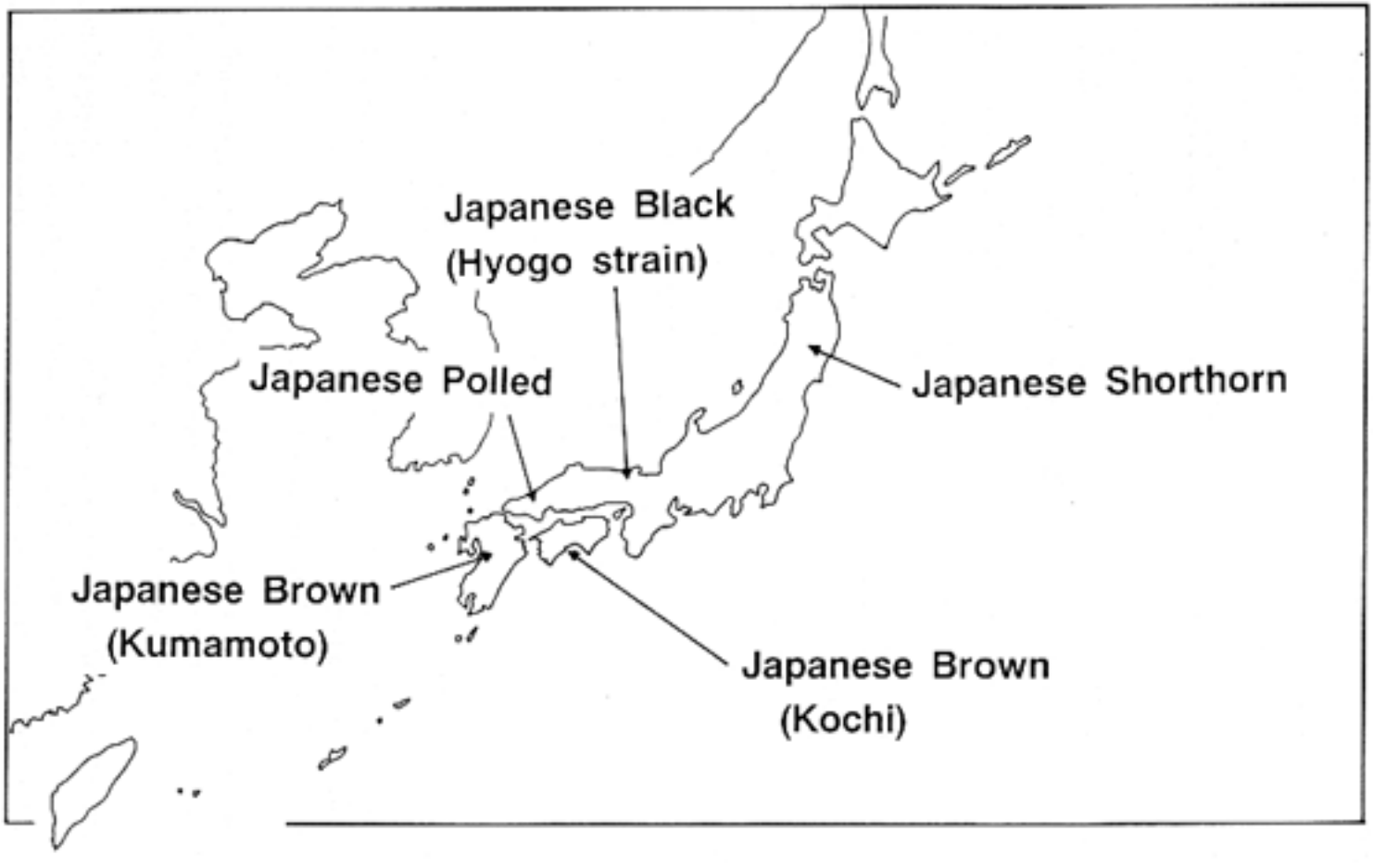


Figure 1: *Geographic Distribution of Japanese Beef Cattle*

TABLE 1:
Foreign breeds crossed with native cattle in each Prefecture

Name of modern breed	Prefecture	Crossed foreign breeds
Japanese Black	Kyoto	Brown Swiss
	Hyogo	Shorthorn, Devon, Brown, Swiss
	Okayama	Shorthorn, Devon
	Hiroshima	Simental, Brown Swiss, Shorthorn, Ayrshire
	Tottori	Brown Swiss, Shorthorn
	Shimane	Devon, Brown, Swiss, Simental, Ayrshire
	Yamaguchi	Devon, Ayrshire, Brown Swiss
	Ehime	Shorthorn
	Ohita	Brown Swiss, Simmental
	Kagoshima	Brown Swiss, Devon, Holstein
Japanese Brown	Kochi	Simental, Korean Cattle
	Kumamoto	Simental, Korean Cattle, Devon
Japanese Poll	Yamaguchi	Aberdeen-Angus
Japanese Shorthorn	Aomori	Shorthorn
	Iwate	Shorthorn
	Akita	Shorthorn, Devon, Ayrshire

After the mid 195U's, agricultural machinery predominated and chemical fertilizer was more popular in agriculture supplanting and reducing the draft cattle. This forced a shift in the reason for raising this cattle to that of beef production.

Japanese Black is now to be found in all regions of Japan. Recently, the number of this breed has been increasing in the Kyushu and Hokkaido regions. In contrast, in the Chugoku region, which was once the mnain production region for this breed, it has been decreasing.

Overall this breed has a dull black coat and skin. This breed has horns, though they do not have humps. Their body size is small to medium. The withers height and body weight of the mature female and male are 129 em, 512 kg and 145 em, 8U9 kg respectively. The milk yield for 180 days is about 1000 kg. The records of the performance and progeny tests are shown in Tables 2 and 3. Compared to the other Japanese indigenous breeds, Japanese Black are noted for their capacity to produce beef with a high degree of fat marbling but with thin fat layer beneath the skin and surrounding the internal organs.

TABLE 2:
*Performance testing records of Japanese beef eattle (1992) **

Items Number of tested	Japanese Black	Japanese Brown	Japanese Shorthorn
Bull calves (nos.)	397	34	90
Birth weight (kg)	31.5	34.9	39.7
initial weight (kg)	263.4	309.8	294.5
Final weight (kg)	399.3	468.9	475.8
365-day weight (kg)	424.1	455.8	437.8
Daily gain (kg)	1.21	1.42	1.30
Concentrates intake (kg)	616.8	767.1	747.5
Forage intake** (kg)	339.0	330.0	562.8
TDN/kg gain	4.58	4.62	4.56

TABLE 3:
Progeny testing records of Japanese beef cattle (1992)

Items Number of tested	Japanese Black	Japanese Brown+	Japanese Shorthorn
Bulls* (nos.)	76	5	7
Testing period (day)	364	329	308
Initial age (day)	265.2	302.8	265.1
Initial weight (kg)	259.6	317.7	247.6
Final weight (kg)	586.0	684.1	585.9
Daily gain (kg)	0.9	1.12	1.10
Concentrates intakes (kg)	2571.7	3365.4	2203.9
Forage intake** (kg)	733.9	-	1187.6
Carcass weight (kg)	353.3	415.3	346.1
Dressing weight (%)	73.1	64.3	62.0
Marbling score***	7.1	4.9	3.0
Rib eye area*** (cm)	45.1	45.1	43.1

** Eight to ten steer progenies per bull were used*

*** Air dry basis*

**** Carcass measurements are on the 6th to 7th rib section*

+ Kumamoto strain

The Japanese Brown breed has two distinct strains. One is mainty reared in the Kumamoto prefecture and the other in the Kochi prefecture. The developmental processes of these strains are quite different, so that they are usually described separately:

a) Kumamoto strain

Originally in the Kumamoto prefecture, a strain of red coloured cattle was reared. This strain was developed from imported Korean cattle. After the late 1900's, many foreign breeds such as Simental and Devon were importeti and crosseri with this breed. When this crossing was made with Simental cattle, in particular, a large body size cattle was produced. The features of this breed are their high rate of body-weight gain and a large rib eye area.

b) Kochi strain

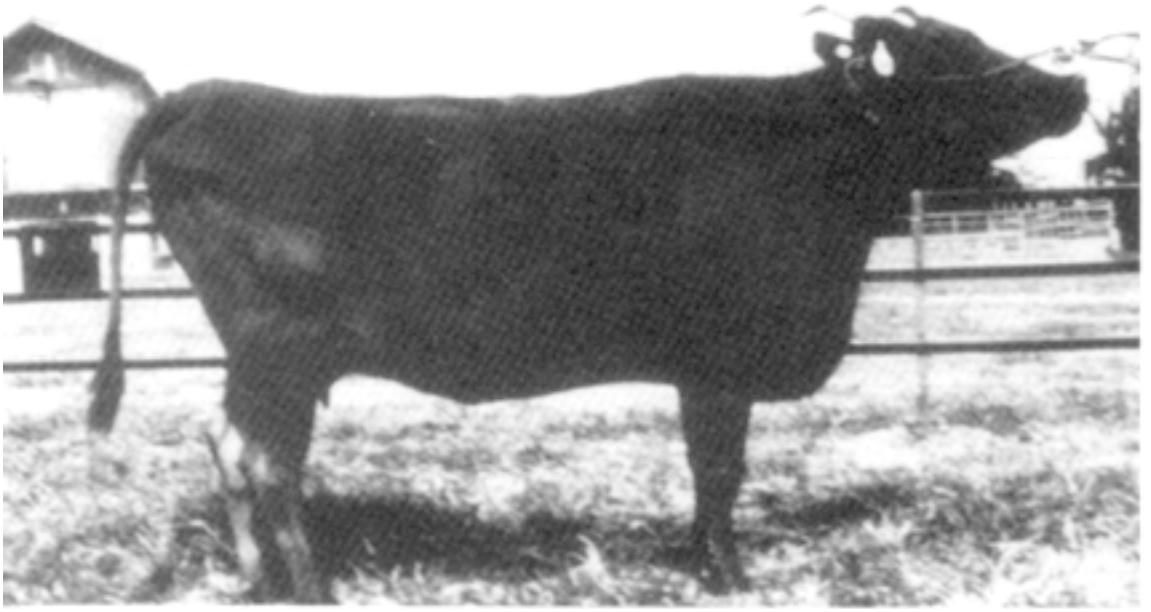
The kochi strain was developed from crossing Simental with Korean cattle introduced from Kyushu island. The period in which. this crossing was practised was substantially shorter than that for the Kumamoto strain. This reduced the dilution of the original breed's characteristics, retaining important differences. They also have a yellow-brown coat, which is much lighter than the Kumamoto strain. The cattle that have black skin at their horns, hoofs, eyelids, muzzle, tongue, switch and anus was valued more highly because it was typical of the original Korean breed. The beef production performance of this strain is closely similar to the Kumamoto strain.

c) Japanese Poll

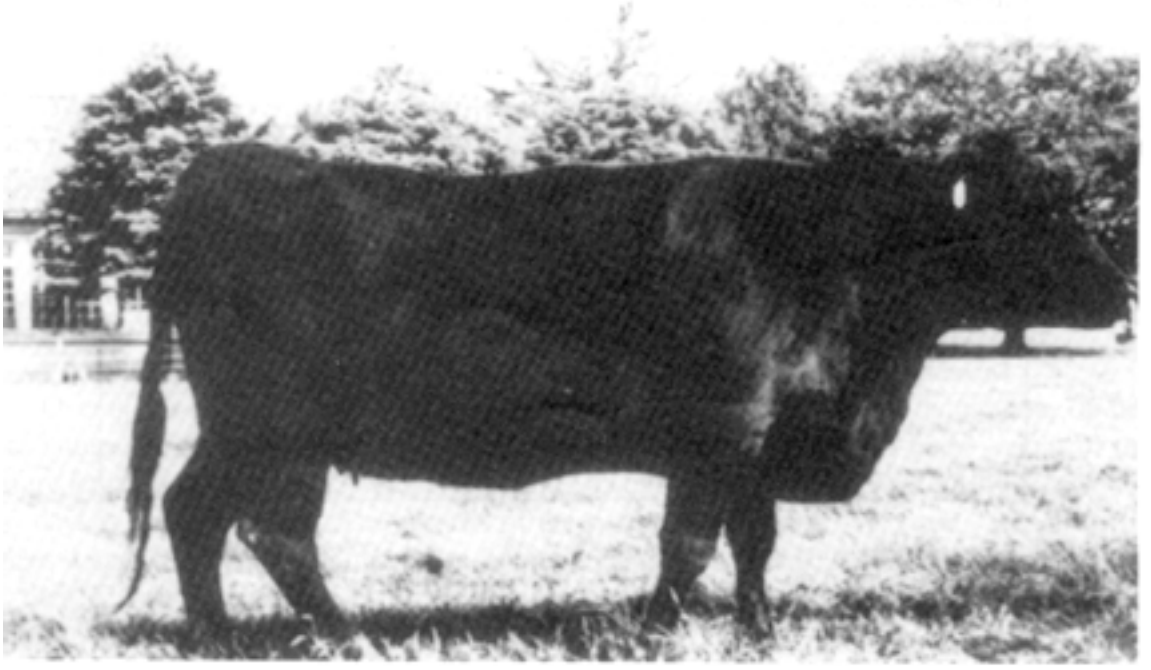
This breed has been developed since 1916 from a cross between the indigenous cattle with Aberdeen Angus bulls imported from England. Japanese Black bulls were crossed with those females in order to improve their meat quality in 1975, and it is likely that there are not many pure bred Japanese Poll cattle left. 'Their coat colour is black and they have no horns. Neither performance nor progeny tests have been practised since 1986.

d) Japanese Shorthorn

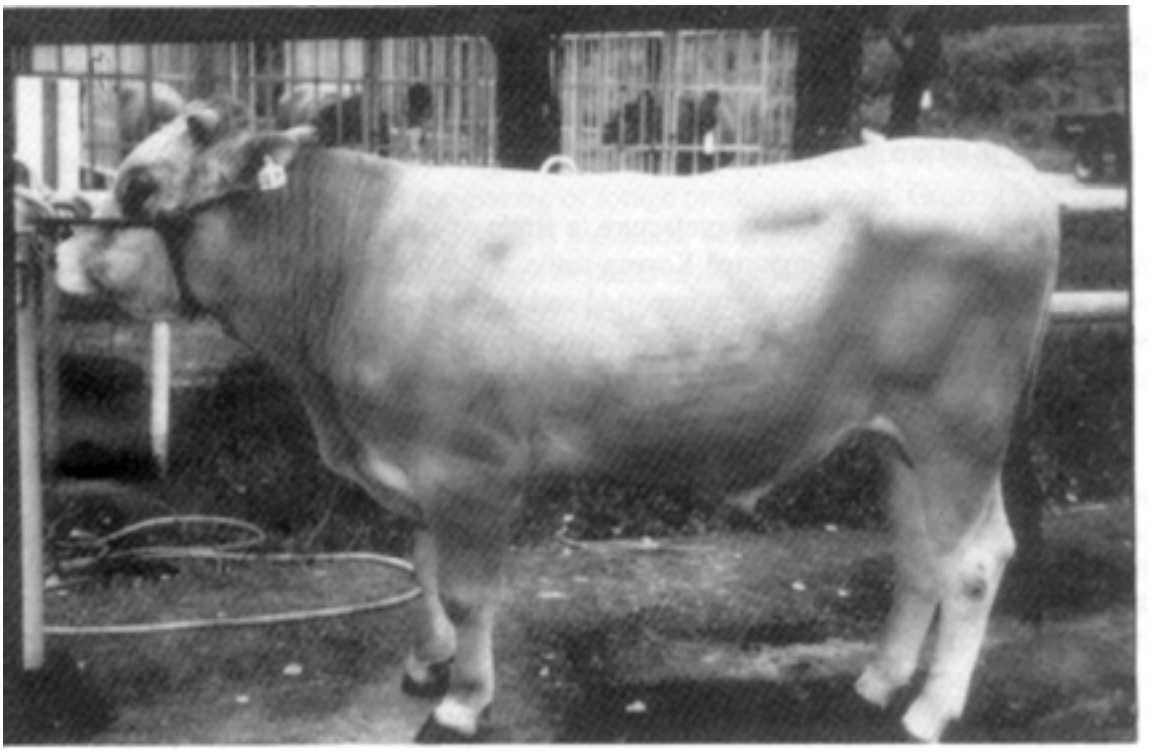
This breed is the result of crossbreeding, begun in 1871, between the indigenous cattle in the northern parts of Honshu Island (Tohoku region) and the imported dairy Shorthorn cattle. It is



Japanese Black



Japanese Poll



Japanese Brown (Kochi strain)

Japanese Brown (Kumamoto strain)

claimed that this breed can utilize the rough snmer grazing, which is available in the mountainous parts of this region, better than other breeds. They are mainly distributed in the Tohoku and Hokkaido regions.

The coat colour of this breed is deep red-brown, which is darker than the Japanese Brown. The Japanese shorthorn seem to be superior to the Japanese Black for milk production, forage intake and growth rate.

2.0 CURRENT REARING STTUATION AND AVERAGE PERFORMANCE

2.1 Rearing situation

On-farm cattle rearing, for calf production, is a small operation, with 4.6 head on average, due to the lack of productive bases for grazing or forage production areas. Grazing is generally limited to mountainous areas, hilly regions and highlands, where rice production is impossible. Cattle are grazed rotationally on fenced ranges or pastures in the summer from May to October, but they are usually kept in barns in the winter. This is because foliage is unavailable in most of the grazing areas, due to withering or heavy snow in the winter. In the south-western region of Japan, where all year round the temperature is higher than in the northem region, yearlong grazing is possible.

All bull calves except those retained for breeding purposes are castrated during the suckling period, because castrated calves are marketed as feeders for fattening. Castration is carred out before the calves are 3 months old. Almost all calves are fed on supplements from the age of 2 or 3 months to weaning age of 6 or 7 months. The average number of calves on fattening farms is larger than on calf production farms, at 24.7 head per farm.

2.2 Reproduction

In Japan, about 94 percent of cows are artificially inseminated and about 99 percent of the inseminated cows are served with frozen semen. As only selected superior males are used in the system, the ratio of males to females is extremely low. The semen of young bulls is cotlected first at about 18 months of age, and periodically thereafter.

Heifers have their first service when they are 13 to 16 months old. The first parturition is expected when they are about two years old without any calving diffculties. In order to shorten the calving interval, cows have the next service within 40 to 60 days after calving. The conception rate was about 88 percent in 1994 and the calf crop rate was 84 percent. The natural rate of twinning is very low, accounting for 0.11 percent for Japanese Black. The average calving interval is estimated at about 13.5 months. The management of cattle is so intensive that the mortality of cattle is fairly low.

2.3 Meat production

Japanese beef cattle fattening methods are quite different from those common in other countries. Steers are finished at 696 kg live weight and 29.8 months of age on average, after spending about 20.2 months fattening from weaning. During this time, they consuzne about 3 tons of concentrate rations and gain 0.68 kg a day. Such a fattening system is too long and not reasonable, but can be profitable at present, as a result of the strong demand for high quality beef.

There are many cattle strains based on their genetic background. One typical cattle line is found in the Hyogo Prefecture. These cattle are characterized by the excellence of meat quality. Their finely marbled beef is famous under the name of “Kobe-beef’ or “Matsuzaka-beef’ lt is a general misconception that high quality beef is produced by special feeding and management techniques. Since these animals have a unique genetic resource, they deserve to be conserved and made the best of.

3.0 REVOLUTLON IN BEEF CATTLE BREEDING

Since 1968, two-stage selection, based on gerformance and progeny testing, is practised on a station testing system. Fig. 2 shows an outline of the two-stage selection programme.

3.1 On-station beef bull testing programme

In the performance testing programme, male progeny from the planned matings are chosen at weaning and transferred to the breeding station within each prefecture and/or Livestock Improvement Association (LIS). The performance testing period is I 12 days (16 weeks). The selection criteria are growth rate, 365-day weight, feed efficiency, semen quality, type score, etc., and the election intensity is 1 (l to 20'%%. Selected growing bulls can proceed to the progeny testing programme.

In the progeny testing programme, half sib steer calves sired by particular bulls are fattened (the prefectural stations use 8 paternal half sib steer calves and the LIA stations 15). The progeny testing period is 364 days (52 weeks). The selection criteria are marbling score at the eye muscle at 6-7th rib section, rib eye areas, fat thickness, growth rate, etc., and the selection intensity is about 30%. Marbling score at the eye muscle are given priority over all else in the assessment of performance. In all breeds, about 500 animals were performance tested and about 100 animals were progeny tested yearly at 21 offciaI stations in 1994.

These testing programmes have been playing a very important role in beef cattle breeding, however, it is pointed out that there are at least three important defects in such programmes. Firstly, at the initial selection stage, the performance of carcass quality traits, especially those of marbling score, were not evaluated in the test. Secondly, more money is required to practise the performance and progeny tests in a station testing system. Thirdly, only males are tested.

3.2 Changes in the circumstances of testing programme

There are four influential factors which have changed the circumstances of the testing programme. These are, (a) new reproductive technologies, (b) innovation in computer technology, (c) standardization of carcass grading, and (d) how ta make most of Japanese beef cattle.

Recently, many reproductive technologies, e.g. multiple ovulation, embryo transfer, cloning, in vitro embryo production, embryo sexing, etc., have been proposed for advancing genetic improvement. Such reproductive technologies, especially those of multiple ovulation and embryo transfer (MOET), require that data on the performance of females be known. Whereas before, data on the genetic potential of bulls only was necessary, now that for the carcass performance, etc., of cows is required.

As BLUP (Best Linear Unbiased Prediction) procedure has become widely used for estimating breeding values, technical innovations in computers enable the calculation of large size equations on personal computers that were impossible 10 years ago. Advances in computer technology have recently greatly increased the power of personal computers and equally reduced the cost. Such advances have brought about the widespread use of BLUP for beef cattle improvement. It is now very possible to undertake multiple factor calculations that provide more accurate predictions of breeding values through using cattle pedigree data and that make suitable correction for environmental factors. Moreover, such calculations can now easily be carned out on the personal computers.

In 1988, the beef carcass grading standard was revised. The separation of carcasses between the 6th and the 7th ribs was standardized throughout Japan. Standardized evaluation systems were also introduced, e.g., meat yield grade is classified in three ranks (A,B,C) based on the numerical value, meat quality grade is classified in 5 ranks (1-5) with the standard marbling and colour figures.

The rearing system of Japanese beef cattle is very different from other countries: (a) more than 90% of cattle are pure breeds; (b) more than 95o/a of matings have been practised through artificial insemination; (c) more than N8% of cattle are registered and their pedigre records are kept; and (d) more than 80o/o of slaughter cattle are graded at the meat markets by the standardized carcass grading systems. To fit these changes and to znake the most of these features, the field progeny testing programme was introduced.

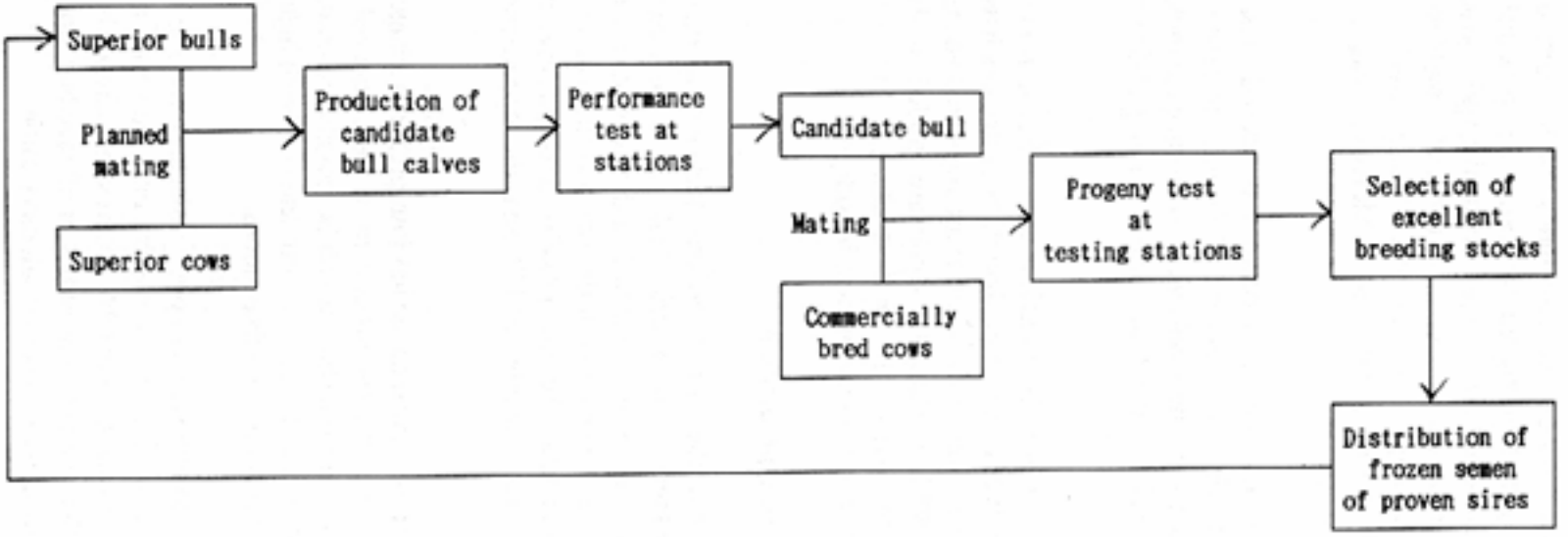


Figure 2: *Outline of the on-station beef bull progeny testing programme*

3.3 On-farm progeny testing programme

Fig. 3 shows an outline of the on-farm progeny testing programme. All feeder calves that joined in this plan were ear-tagged with an individual code at the weaning age. And when they are slaughtered at the meat markets, the identified field carcass data was collected. This data is used to estimate the breeding values on both the sire and the dam by matching with pedigree information. This type of estimation became possible through development of the calculation procedure that is called Animal Model BLUP and the application systems for personal computers.

The on-farm progeny testing programme has four great advantages: (a) more cattle can be tested, and a higher selection pressure and faster improvement achieved; (b) the cost of testing is reduced; (c) before the performance testing, it will be possible to evaluate the performance of young bulls; and (d) by planned mating between sire and cow with high breeding value ranking, it will be possible to produce excellent breeding stocks.

Until recently, various conditions were not satisfactory and the on-farm progeny testing programme was not used nationwide. At the present time, however, more than 20 prefectures are trying to introduce this plan alnd considerable progress has already been achieved. In the near future, it may be expected that the breeding values of all breeding stocks of beef cattle will be calculated on a nationwide scale, as in the case with dairy cattle.

4.0 DISCUSSION

Four beef cattle breeds, Japanese Black, Japanese Brown, Japanese Poll and Japanese Shorthorn are reared in Japan. These breeds are considered to be indigenous to Japan, but many foreign cattle were introduced to Japan and initially extensively crossed with the native breeds in the early 1900's. Through this, the genetic diversity of Japanese beef cattle was greatly expanded. Furthermore, both the breed used for crossing and the selection criteria employed varied significantly from prefecture to prefecture. Consequently, a number of distinct strains have been established. At present, however, the genetic diversity is decreasing due to the concentration around a limited number of strains noted for their superior meat quality. From the genetic conservation point of view, the systematic conservation of minor strains using frozen semen and embryos for future demands of genetic resources is recommended.

Considerable genetic improvement of Japanese beef cattle has been obtained using traditional on-station testing schemes. To make full use of Japanese beef cattle features, however, it is more appropriate to carry on-farm progeny testing programmes, based on the Animal Model BLUP. The introduction of multiple ovulation and embryo transfer (MOET) could lead to dramatic changes in conventional beef cattle improvement schemes, rather than replacing conventional breeding schemes. In the near future, biotechnology will make such assessments easier and more accurate through allowing the specific DNA portion responsible for the desired phenotypic feature to be detrmined. This will have a sigrificant impact on cattle improvement. Until now, the use of molecular genetics has been mostly confined to the laboratory research stage and only a few techniques have spread beyond this to practical application for cattle breeding. Further basic studies are required to make it more readily available and practical for everyday use in the field.

All of this indicates that a new era in beef cattle breeding has been entered. To approach the goals of beef cattle improvement, it is strongly recommended that a combination of the new breeding techniques and the conventional breeding procedures be simultaneously pursued.

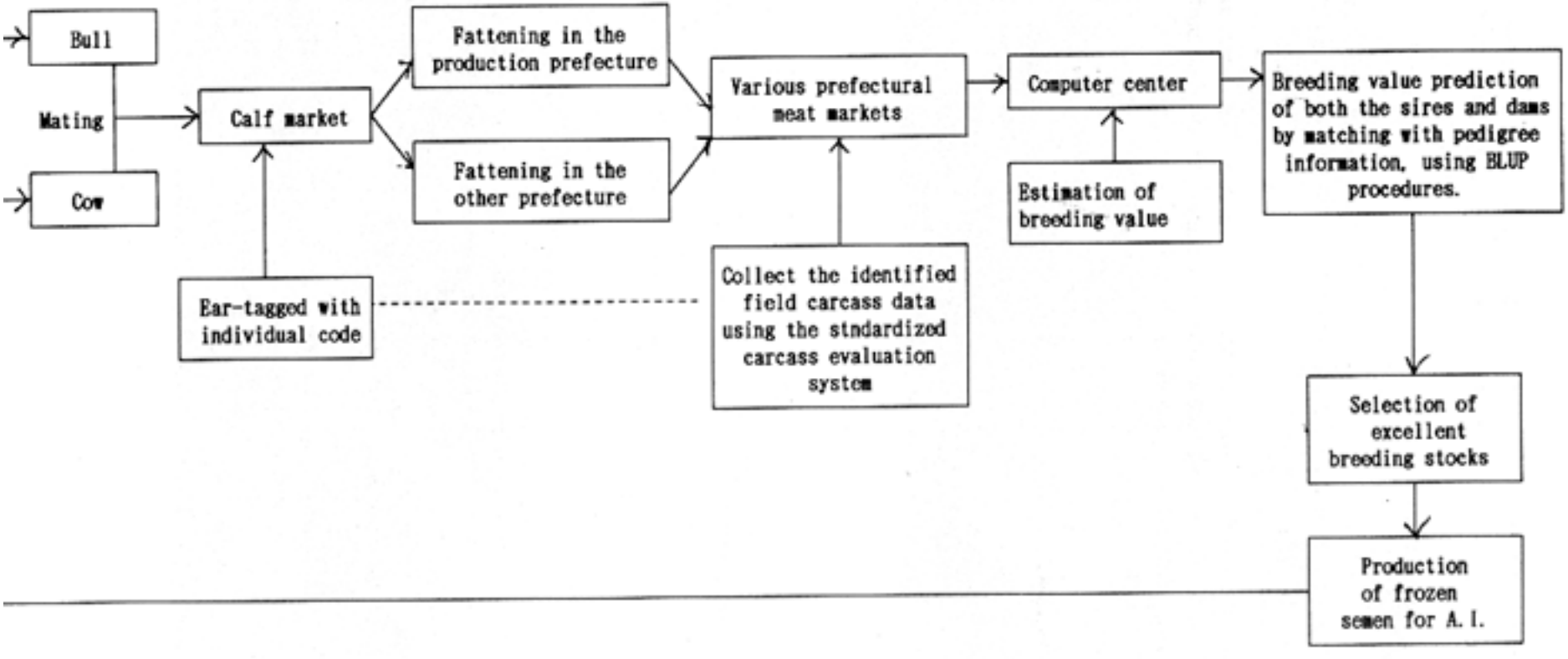
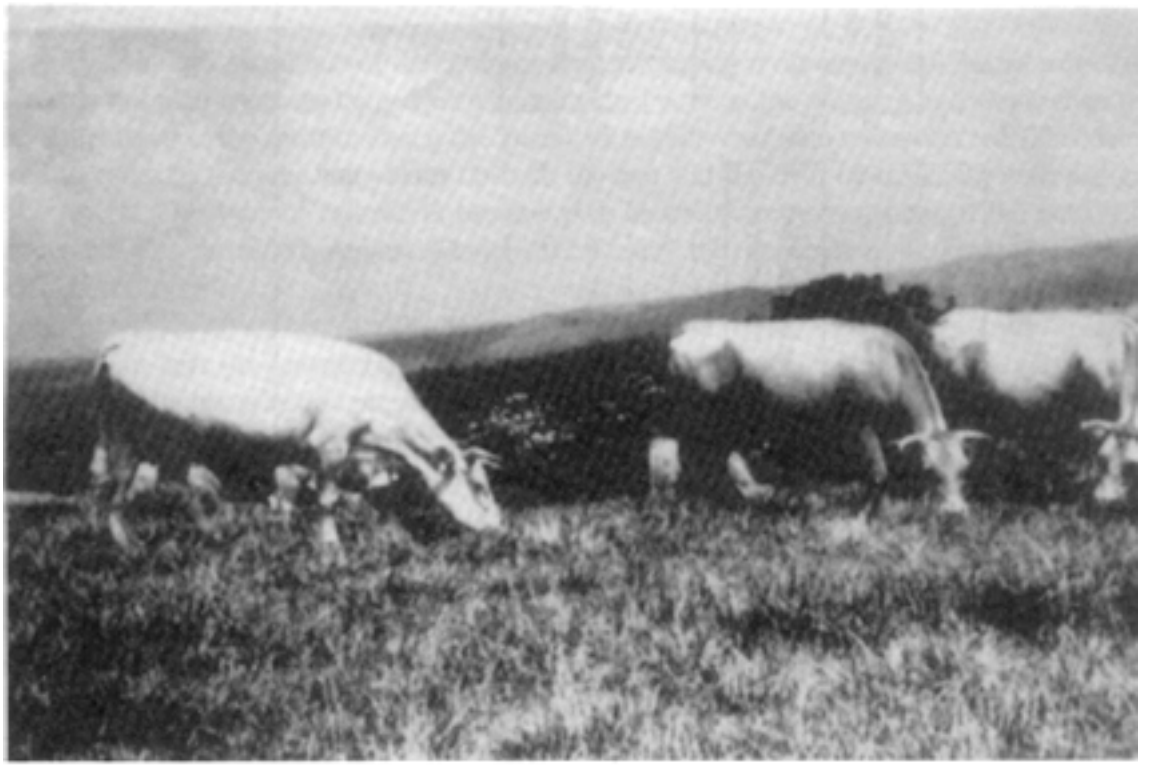


Figure 3: *Outline of the on-farm beef bull progeny testing programme*

Japanese shorthorn



Japanese Brown (Kumamoto strain)

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CONSERVATION OF GENETIC STOCK OF CATTLE BREEDS IN THE UKRAINE

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SUMMARY

The dynamics of cattle breeds from 1935 to 1990 has been analysed in the paper. It was found out that some breeds such as the Grey Llkrainian and the White-Headed Ukrainian, were on the verge of disappearing, even certain breeds introduced in the early fifties a d well adapted since (Pinzgau, Red Polled and Brown Carpathian). Some forms and methods of conservation of cattle breeds in the Ukraine were considered. Urgent measures of conservation are required, even the number of cattle of the Simmental type was greatly reduced. The group of more recently introduced beef breeds is unstable and small. Methods of cattle breeding for 100 years have been analysed. It was stated that it was necessary to raise the importance of pedigree breeding, to change the selection index principle for cows developed by crossing related breeds of cattle. Methods and forms to conserve valuable genotypes of breeds were discussed. They will help to conserve genetic stock of cattle. It has been suggested to evolve a new type of beef Simmental cattle as well as to use the double purpose type. In order to conserve genetic stock of cattle breeds, thé theory on symmetry of Vernadsky was used. It could allow determining the interrelation "genotype-environment". The importance of continuous on-farm inspection programmes as a means of monitoring numbers and husbandry conditions is underlined.

RESUME

Ce travail analyse la dynamique des races bovines de 1935 à 1990. On a trouvé que certaines races étaient sur le point de disparaître, telles que la Grey L1krainian et la White-Headed LTkrainian, ainsi que d'autres races introduites dans les années 80, qui cependant étaient bien adaptées; par exemple, la Pinzgau, la Red Polled et la Brown Carpathian. En outre, on analyse certaines formes et méthodes de conservation des races bovines. Il est urgent d'établir des mesures de conservation, étant donné que même des races comme celles du type Simznental présentent actuellement une forte réduction. Le groupe de races à viande introduites récemment est instable et peu nombreux. On a analysé les méthodes d'amélioration du dernier siècle. On conclu qu'il est nécessaire de redonner de l'importance à l'amélioration génétique à travers la méthode de pedigree, ainsi que de changer les principes de l'index de sélection pour les bovins avec des croisements avec des races bovines apparentées. On présente également les méthodes et formes de conservation de génotypes de races intéressants, ce qui contribuera à préserver le stock génétique bovin. On suggère de développer un nouveau type de race Simmental à viande, ainsi que d'utiliser des types à double propos. Afin de conserver les stocks génétiques des races bovines, on a utilisé la théorie sur la symétrie de Vernadsky; ce qui nous permet de déterminer la relation "génotype-environnement". On souligne l'importance des programmes de suivi dans les élevages afin de contrôler l'effectif et les conditions de la conduite.

1.0 INTRODUCTION

The importance of forms and methods of breed conservation as a means of cattle breed selection has been increasing in recent years. The use of numerous imported breeds for crossing, greatly reduced the number of native cattle; today even exotic breeds of cattle such as Simmental and Red Steppe, imported and widely used since before the war, are in danger. Others, such as the Swiss Brown and Pinzgau, are on the verge of disappearing under the pressure of crossbreeding with the Black and White. It is necessary to take urgent measures to conserve this animal genetic stock. Therefore, the state plan of area distribution, new methods of purebred selection and various forms of genetic stock conservation are of great importance. In order to conserve breed genotypes the teaching of V.I. Vernadsky on symmetry could be used and continuous monitoring by herd inspection must be done by highly qualified specialists in the field of animal science. Processes that take place in selection are not simple.

On the other hand, in recent years a new Red and White milk breed type was developed in the Ukraine (1992), evolving from the local Simmental cattle. In 1993 a new Ukrainian beef breed was approved; the result of erossbreeding between the indigenous Grey Ukrainian and Simmental, Charolais and Chianina breeds. These developments encouraged the author to examine fizrther this problem.

2.0 DATA COLLECTION AND POPULATLON CHANGES

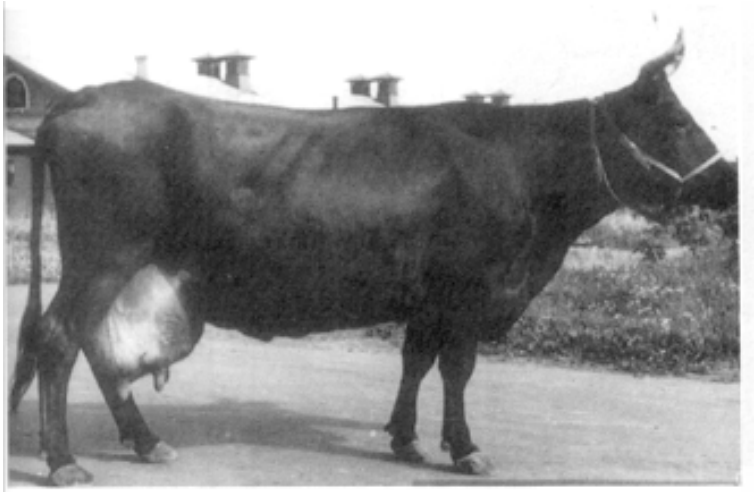
The dynamics of cattle breeds in the Ukraine from 1935 to 1990 were studied in detail. Note can be taken of the methods of breed selection and the different trends according to breed productivity for the period of more than 100 years.

From 1935 and up to 1990 cattle breeds in the Ukraine were only analysed according to their productivity. The population changes of dairy, dual purpose and beef breeds of cattle were estimated and are given in Tables l, 2 and 3. There are today in all 32 breeds of cattle in the Ukraine ineluding 17 dairy breeds, 7 dual purpose breeds and 8 beef breeds. The number of dairy breed cattle was increased from 69.54% in 1935 to 73.06% in 1990. In particular, the numbers of the so-called Red dairy type breeds were reduced from 56.07% in 1935 to 38.38% in 1990 (Table 1). At the same time, the numnbers of Black and White dairy cattle have greatly inereased from 0.80% in 1935 to nearly 35% in 1990. The reduction of the number of other breeds of dairy cattle was spectacular, from 12.6% in 1935 to 0.29% in 1990.

The oldest major dairy breeds of cattle in the Ukraine is the Red Steppe (37.44% in 1990), while the Black and White (32.05%) is a later arrival. The numbers of the indigenous White Headed Ukrainian dairy cattle were reduced from 12.53%(1935) to 0.04% (1990). If an etivrt is not made urgently to preserve this breed, it will certainly be past history by the end of the century.

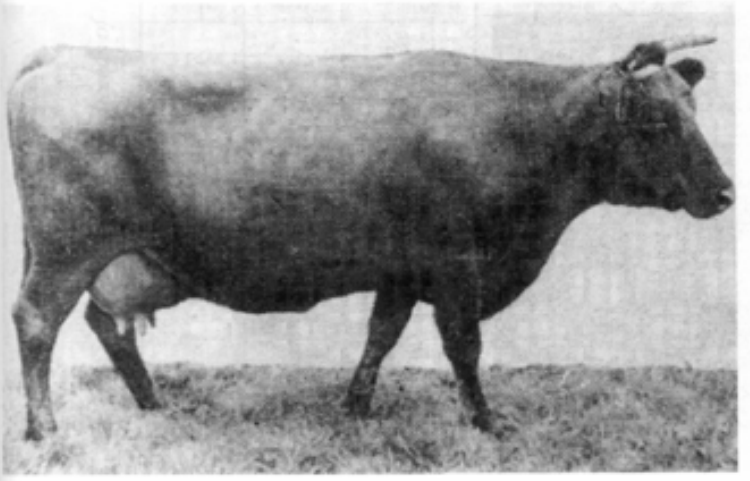
There was a reduction in the number of dual purpose breed cattle from 30.13% in 19 35, up to 45.67% in 1955, and down still further to 26.79% in 1990. The indigenous Grey Ukrainian is totally endangered; from 6.45% at all cattle i1 1935 to (0.01%) in 1990. The numbers of cows of the “regional” imported breeds were slightly reduced the I.ebedin breed from 3.24o/o in 1935 to 2.93% in 1990, and the Brown Carpathian breed from 0.98% in 19 35 to 0.86% in 1990, the Pinzgau follows the same trend (0.27% in 1935-0.09% in 1990). Simmental breed cattle went from 21.52% in 1935 up to 39.34% in 1964 and 22.90% in 1990.

There is no truly indigenous beef breed in the Ukraine; there exists a small population of improved beef cattle:14.09% in 1935; 2.79% in 1955; 21.36% in 1990. In 1993 the Chernigov beef type and Prednieper beef types were united and formed one group, the Ukrainian beef breed with a population making up for half of all beef cattle. Today the most important breeds in the Ukraine are the Black and Whites, the Red Steppe and Simmental. Then, the Red Poll, the Lebedinskaya, and the Brown Carpathian. The indigenous Grey Ukrainian and the White Headed Ukrainian are in serious danger of disappearing. State protection is urgently required to conserve them.

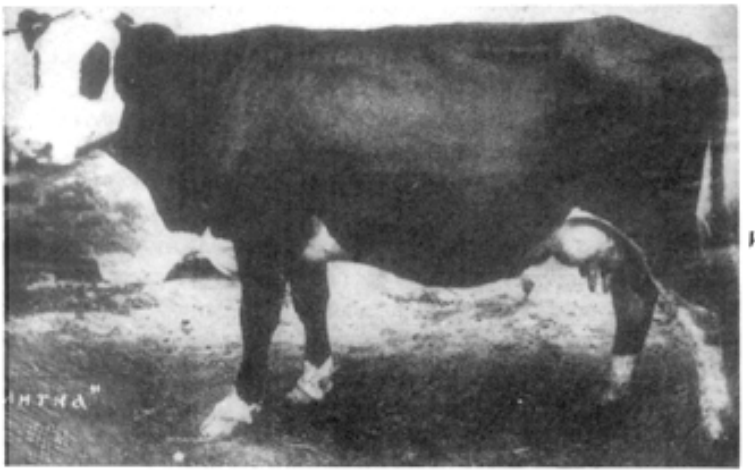


Red Steppe: the Cow Kama

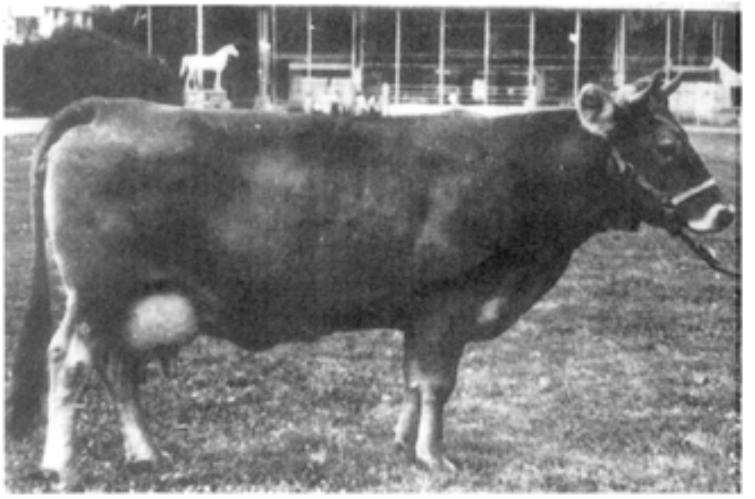
Red Steppe: the Bull Asket



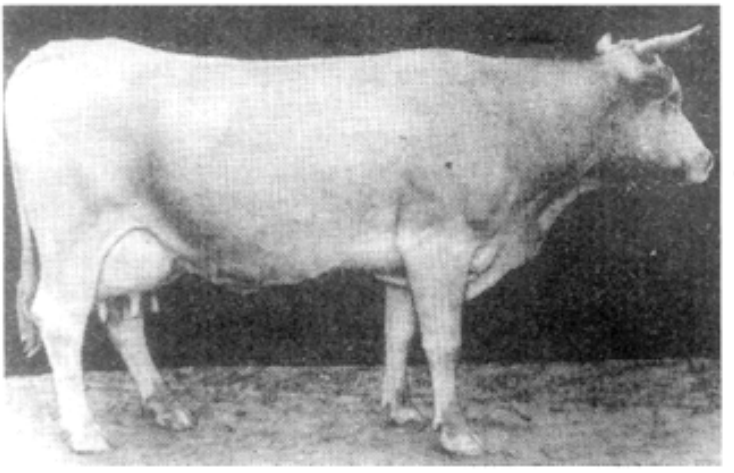
Red Polled: the Cow Shruba



White Headet Ukrainian: the Cow Ulitka



Labedinskaya: the Cow Mereshka



Brown Carpathian: the Cow Yuvileyna

Table 1: *Dynamics of dairy breeds of cattle in the Ukraine (%)*

Breeds	Year								
	1935	1939	1955	1960	1964	1969	1974	1985	1990
Red Steppe	56.01	58.18	38.63	40.16	40.03	39.57	39.62	38.35	37.44
Brown Lathvian	-	-	0.02	0.22	0.16	0.17	0.13	"-"	-
Red Estonian	-	-	"-"	0.10	0.02	0.04	0.05	"-"	"-"
Red Polled	-	-	2.31	2.25	1.86	1.96	1.54	1.02	0.86
Red Danish	-	0.03	-	-	"-"	"-"	"-"	0.08	0.02
Angler	0.06	"-"	0.04	0.01	"-"	"-"	"-"	0.11	0.06
Red Lithuanian	-	-	-	0.02	"-"	"-"	-	-	-
Total number of red breed	56.07	58.21	41.00	42.76	42.07	41.74	41.34	39.56	38.38
Black and White	-	-	6.04	6.91	7.44	9.17	11.93	28.32	32.05
Dutch	-	0.80	-	-	"-"	0.01	0.01	0.03	0.02
Black and White Estonian	-	-	-	-	"-"	"-"	0.01	"-"	0.01
Black and White Lithuanian	-	-	-	0.02	-	-	-	"-"	0.01
Ostfriesian, Black and White German	0.50	-	-	-	-	-	-	"-"	0.02
Holstein Black and White, Red-White	-	-	-	-	"-"	-	-	0.40	2.26
Friesland	-	-	-	-	"-"	-	-	-	-
Oldenburg	0.30	0.57	-	-	-	-	-	-	-
Black and White Danish	-	-	-	-	-	-	-	"-"	0.01
Britain-Friesian	-	-	-	-	-	-	-	"-"	0.01
Total number of Black and White breeds	0.80	0.65	6.04	6.93	7.44	9.18	11.95	28.75	34.39
White Headed Ukrainian	12.53	11.98	7.28	6.42	5.58	4.58	4.12	0.35	0.04
Kholmogor	0.03	0.02	-	0.02	0.03	0.02	0.01	-	-
Yaroslavl	0.11	0.03	-	-	-	-	-	-	-
Tagil	"-"	"-"	-	-	-	-	-	-	-
Jersey	-	-	-	"-"	0.09	0.01	"-"	"-"	"-"
Ayrshire	-	-	-	-	-	"-"	"-"	0.48	0.25
Other dairy breeds	12.67	12.03	7.28	6.44	5.70	4.61	4.13	0.83	0.29
Total number of dairy breeds	69.54	70.89	54.32	56.13	55.21	55.53	57.42	69.14	73.06

Note: "-" specific weight of breeds below 0,01% is designated.

Table 2: *Dynamics of dual purpose breeds of cattle in the Ukraine (%)*

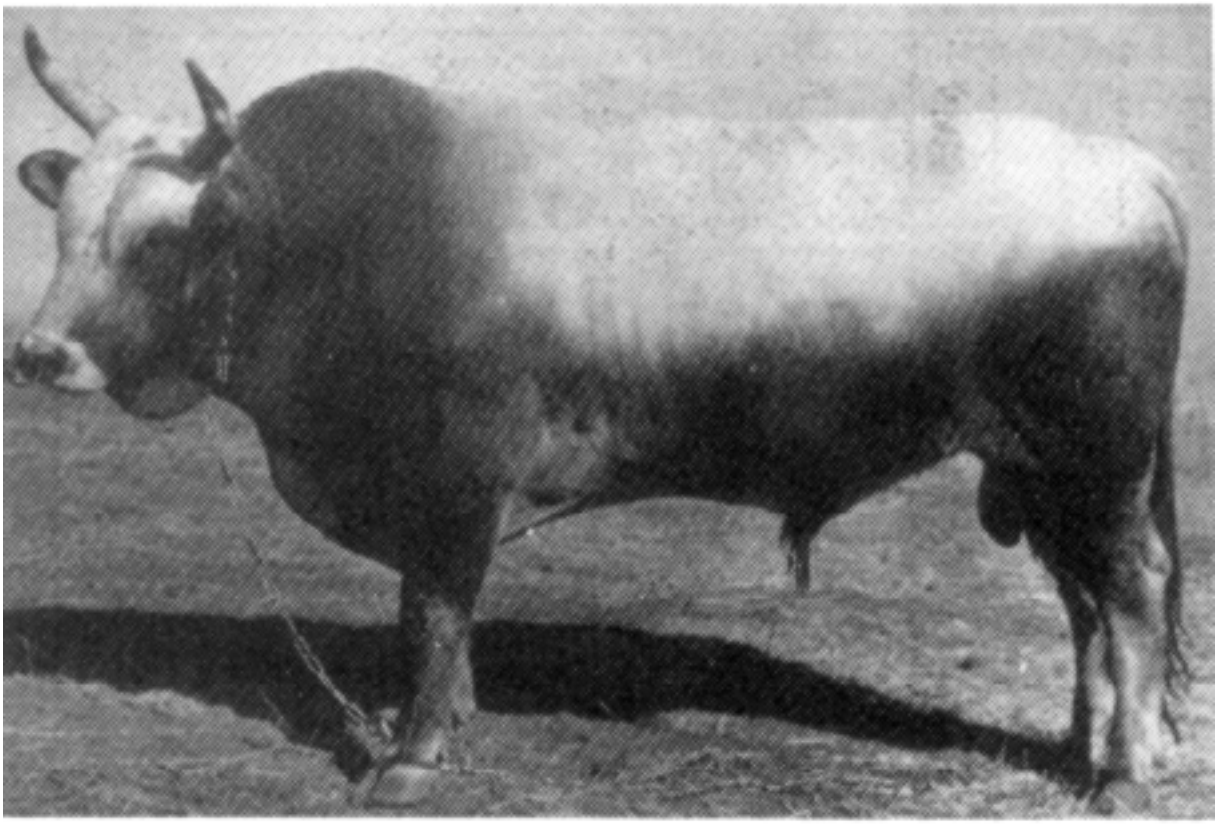
Breeds	Year								
	1935	1939	1955	1960	1964	1969	1974	1985	1990
Simmental	21.52	22.82	37.49	37.30	39.34	39.18	37.38	26.19	22.90
Sichevsk	-	-	-	-	-	"-"	"-"	-	-
Monbeliard	-	-	-	-	-	-	-	0.03	"-"
Total number of "red spotted"	21.52	22.82	37.49	37.30	39.34	39.18	37.38	26.19	22.90
Swiss	2.18	1.88	-	-	"-"	0.01	"-"	0.01	"-"
Lebedinskaya	-	-	3.24	3.47	3.61	3.91	3.91	3.38	2.93
Kostromskaya	-	-	0.01	0.01	0.01	-	-	-	-
Brown Carpathian	-	-	0.98	0.93	0.93	1.05	1.00	0.97	0.86
Total number of "brown" breeds	2.18	1.88	4.23	4.41	4.55	4.97	4.91	4.36	3.79
Pintsgau	-	-	0.27	0.20	0.17	0.15	0.10	0.10	0.09
Grey Ukrainian	6.43	4.19	3.68	1.96	0.72	0.15	0.03	"-"	0.01
Shorthorn dairy type	-	-	-	-	"-"	"-"	-	-	-
Bestuzhev	"-"	"-"	-	-	-	-	-	-	-
Red Gorbatovskaya	"-"	"-"	-	-	-	-	-	-	-
Kurganskaya	-	-	-	"-"	"-"	-	-	-	-
Total number of other dual purpose breeds	6.43	4.19	3.95	2.16	0.89	0.30	0.13	0.10	0.10
Total number of dual purpose breeds	30.13	28.89	45.67	43.87	44.78	44.45	42.42	30.68	26.79

Table 3: *Dynamics of beef breeds of cattle in the Ukraine (%)*

Breeds	Year								
	1935	1939	1955	1960	1964	1969	1974	1985	1990
Hereford	-	-	"-"	"-"	0.01	0.01	0.02	0.04	0.02
Aberdeen - Angus	-	"-"	-	"-"	"-"	0.01	0.04	0.01	0.03
Santa - Gertrude	-	-	-	-	"-"	"-"	"-"	"-"	"-"
Charolais	-	-	-	-	"-"	"-"	0.10	0.02	"-"
Limousin	-	-	-	-	"-"	"-"	-	"-"	"-"
Shorthorn beef type	0.14	0.21	0.01	"-"	"-"	-	"-"	-	-
Kazakh White Headed	-	-	-	"-"	"-"	-	"-"	-	-
Holloway	-	-	-	-	-	-	"-"	-	-
Kalmitskaya	0.19	0.01	-	-	-	-	-	-	-
Chernigov beef type	-	-	-	-	-	-	-	0.07	0.08
Prednieper beef type	-	-	-	-	-	-	-	0.04	0.02
Kian	-	-	-	-	-	-	"-"	"-"	"-"
Aquitaine Light	-	-	-	-	-	-	-	"-"	"-"
Men - Anjou	-	-	-	-	-	-	-	"-"	"-"
Total number of beef breed	0.33	0.22	0.01	"-"	0.01	0.02	0.16	0.18	0.15

Breeds have both Iocal and world-wide distribution and significance. The evolution and economic adaptability of cattle breeds are due to the history of their development. Cattle of the Simmental, Swiss, Red, Black and White and some breeds of beef type belong to the ones having world-wide significance. Local breeds have, in general, dwindling numbers despite their valuable peculiarities, adaptability to local conditions and specialized high quality of products.

To obtain more exact information on the area distribution and distance evolution in a country such as Ukraine, it is necessary to take into account the regional situation: Steppes, Forest Steppes, woodlands, and the Highlands and Foothills of the Carpathian mountains. From the so-called "new" breeds the Red Steppe has ben well acclimatéd in the Steppe region: the Simmental and Lebedinskayain the Forest Steppes, the Black and White breed in the Lowlands and Woodlands, the SimmentaI and Brown Carpathian breeds adapted better in the Highlands and Foothills of the Carpathians.

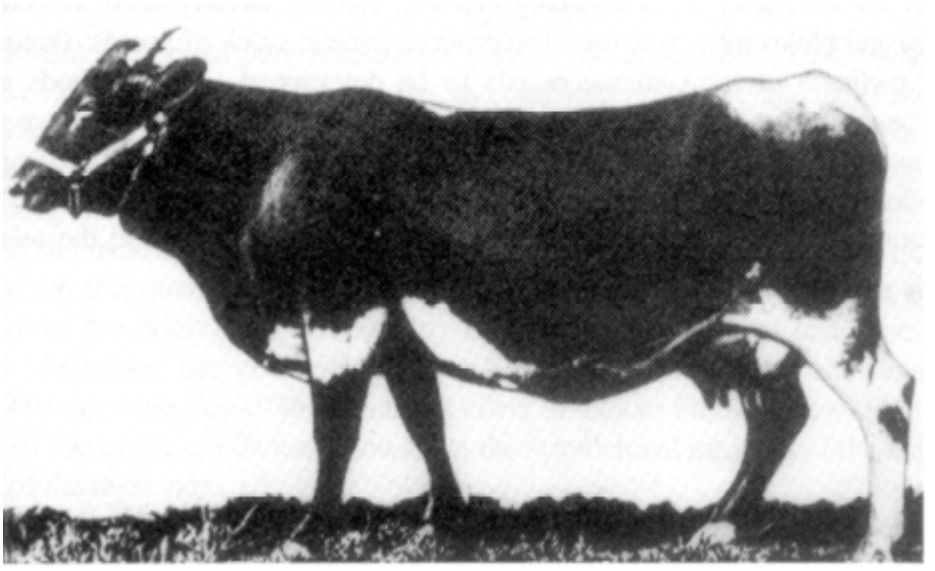


Grey Ukrainian: the Bull Glif

3.0 METHODS OF SELECTION

As for the methods of breeding and selection, it is possible to follow the changes that have taken place for the period of more than 100 years. The evolution of breeding methods has been gradually changed. It is now associated with the rate of breed improvement. Crossbreeding is widespread in the Ukraine. Purebred is not often used nowadays. Crossing of different breeds has led to the reduction of local breeds of cattle despite the fact that the latter are characterized by their strong constitution adaptability and other useful qualities. The problem of related breed mixing should be a1so clarified. At a certain stage of breed improvement this method played a very important role in the Ukraine. However, in spite of the relationship between breeds they are in fact different, not only in the qualities but in adaptation for climatic conditions. The relationship is conditional: the breeds used were separated from their ancestors by decades. During that period different methods of selection and breeding were used. It concerns the group of SimmentaIized breeds (Simmental, Monbeliard, etc.), the group of Black and White breeds (Black and White, Holstein, Dutch, etc.), the group of Brown breeds (Lebedinskaya, Brown Carpathian, Swiss of American type, etc.). Under such conditions it is necessary to understand and raise the importance of such notions as breed type, constitution, resistance to different diseases, the strength of adaptability, etc. That is why it is necessary to give a more precise definition to the practice of pedigree selection in the Ukraine, taking into account correct methods of breeding and selection:

Method	Requirements for breedmg methods
Pure breed	Evolving of pure breed parents of one and the same breed. In absorbing crossing, beginning with hybrids of the third generation if the type of the breed is well defined. In introductory crossing, begrinning with hybrids of the third generation if the aim to evolve a desirable type of cattle breed is achieved.
Crossing	Crossing of different breeds (related and unrelated/distant) as well as breeding of hybrids “in itself’.



Cow Pinzgay

The pure breed method will promote the development of animals of strong constitution. The number of regions where there are externa conditions of cattle breeding has been increased in the Ilkraine. It is connected with the disastrous effects of the explosion in the Chernobil atomic power station.

Purebred animals with strong constitution will meet the requirements of cattle breeding in the conditions mentioned above. To conserve valuable genotypes, methods and forms of conservation of genetic stock of cattle have been worked out:

Forms of genetic stock	Methods of breed genetic
conservation of breed	stock conservatïon
Client for breed	Conservation of selection main body of breed and improvement by methods of intrabred selection (pedigree; seection)
Genetic stock depot of produccers' sperm and frozen embryo ot different breeds	Long-time maintenance of producers' sperm of all to use in the selection
Relic farm	Genetic resere of sharply reducing native breeds, pedigree selection with outbred type of selection
Genetic stock-farm	Genetic reserve of sharply reducing native breeds, pedigree selection with outbred type of selection
Genetic stock-pedigree farm	Rearing of valuable pedigree producers for pedigree farms. Method of pure breed in Liniars together with inbreeding is used

The reserve of producers' sperm of different breeds in special depositories is one of the forms that is widely used in the Ukraine and in many other countries of the world. But this form of genetic stock conservation of breeds does not solve all the problems. The genetic stock of local breeds is to be used now when intensification of production is taking place, as the. strength of their constitution and the resistance to different diseases are the necessary conditions ofcattle selection.

Urgent measures including the ones at the State level must be taken to conserve valuable breeds of cattle in the Ukraine. For example Simmental breed is a dual purpose breed. But it has become a dairy breed due to crossing with Red and White Holstein and other dairy breeds. Breeding for beef characters has also become important. To solve this problem is necessary to evolve beef types and breeds of cattle, to introduce intensive methods of beef production as well as to use genetic stock of Simnmental mixed and other breeds of this type, to develop Simmental cattle of beef type.

The method on symmetry by Vernadsky (1988a, 1988b), already used in geology, physics ,

chemistry, biology and philosophy, was used to conserve genetic. stock of breeds. Population genetics allows the main methods of farm animal breeds to be determined. The methods of isolation of morphologically "average" and "extreme" phenotypes on the basis of total quantitative signs has been suggested by Zhivotovsky and Altuchov (1980), Altuchova (1989). The basic teaching on symmetry consists in the following: the animal should be considered only in interrelation with the environmental conditions. The question is that the popu.Iation of breeds must be resistant and the selection must be purposeful.

Experiments were carried out at the breeding farm “Pervuhin-sky”, Bogoduhov district, Kharkov region. Purebred Simmental cows were used. To determine principles of selection of thoroughbred cattle, the method of symmetry was used. There are 2177 head of cattle on tho farm, including 680 cows of Simmental and Red and White breeds. The farm has 2 904 ha of land of which 2 664 ha is of arable land including 2 457 ha of field. 924 ha of la.nd are under forage crops, 34.7% of the total number. For the last three years the amount of fodder units per hectare was 473 double centner; 65.8 d.centner of fodder units per cow were spent on average. The milk yield per cow for the 1ast three years was 4 550 kg; gross milk yield - 3 094 tons, per 100 ha of arable land -1120 d.centners. It was necessary to spend 1.44 centner of fodder units to produce 1 centner of milk.

Purebred cows of the Simmental breed were selected (taken) for the experiment. Special methods were used to select the cows.15 measurements were taken and the fatness of cows was estimated in numbers. To define the effect of the milk yield on the indices under review, all the cows were divided into three groups depending on the yield; the first group - cows having the average milk yield per group the second group - above average and the third one - below average. The coefficient values of yield regression as compared to the effect of 17 signs (measurements, fatness, fat content) were determined. To give more detailed characteristics of the cows’ index of conformation and other sig_ns that influence the yield of milk, fat content, live weight, the development of bone tissue have been adduced (table 4).

TABLE 4:

Characteristics of dairy qualities of cows of the Simmental breed depending on the level of productivity

Indications	Average per group	Above average	Below average
Dairy qualities (kg)	4 422.3	5 345.8	3 650.0
Fat content of milk (%)	3.78	3.77	3.79
Milk fat (kg)	167.2	201.5	138.3
Live weight (kg)	503.5	505.2	502.6
Yield per 100 kg of live weight (kg)	878	1058	726
1kg of milk per 1cm of grasp off metacarpus(kg)	225.0	270.5	187.2
1 kg of milk per 1 cm of height at withers (kg)	33.84	41.06	27.84
1 kg of milk per 1 cm of grasp of ehest (kg)	21.73	26.08	18.04
1 kg of milk per 1 cm of the grasp of belly kg)	19.04	22.67	15.90

Cows of the Simmental pure breed were used in the experiment. They were divided into three groups (above the average, below the average, as compared to the average data) according to the yield of milk (Tables 5 and 6). One can see that there is 1 % inerease in fat content of milk, the yield decreasing accordingly in all 3 groups (R). On the basis of measurements, the dependence of milk yield on the changing of 1 cm of sign dimension has been stated. If the index has the sign /-/, the yield decreases and the measurement increases in 1 cm or visa versa. If there is 1 cm increase in index, the yield increases in this quantity. If the standard deviation exceeds the coefficient of regression for all cases the indices are doubtfizl. Unauthenticity of indices of some sign underlines the fact that it is necessary to determine the coefficient of regression of yield on the combined effect of all 17 indications. The determination of the combined effect of indices on the milk yield in cows expressed in the meaning of regression coefficient, shows that the symmetrical meaning of the indication depends on the quantity of the main index.

Table 5: *Division of Sinmental cows into three groups according to milk yield (average yield per herd; above average, below average)*

No.	Index	Average per group (n=101)				Above the average (n=46)				Below the average (n=55)			
		M	m	G	Cv	M	m	G	Cv	M	m	G	Cv
1	Milk yield (kg)	4 422.3	104.0	104.0	23.50	5 345.8	108.0	724.9	13.56	3 650.0	66.2	486.8	13.30
2	Fat content (%)	3.78	0.01	0.11	3.08	3.77	0.02	0.16	4.29	3.79	0.01	0.05	1.41
3	Height at withers (cm)	130.7	0.46	4.69	3.59	130.2	0.67	4.51	3.46	131.1	0.65	4.80	3.66
4	Height at sacrum (cm)	138.2	0.51	5.17	3.74	138.3	0.77	5.19	3.75	138.1	0.70	5.16	3.74
5	Breadth of chest (cm)	69.3	0.61	6.17	8.90	69.34	0.84	5.63	8.13	69.27	0.89	6.58	9.50
6	Depth of chest (cm)	49.8	0.76	7.67	15.39	49.69	1.03	6.91	13.91	49.92	1.12	8.24	16.52
7	Slanting length of body (cm)	153.5	0.74	7.40	4.82	154.4	1.24	8.34	5.40	152.7	0.87	6.41	4.19
8	Breadth at hip-joints (cm)	48.8	0.44	4.42	9.04	49.26	0.73	4.92	10.0	48.58	0.53	3.92	8.07
9	Length of hindquarters (cm)	53.0	0.57	5.71	10.77	53.65	0.48	3.25	6.06	52.60	0.96	7.12	13.50
10	The grasp of chest behind the shoulderblades	203.5	1.22	12.26	6.02	205.0	1.24	8.53	4.16	202.3	1.98	14.5	7.19
11	The grasp of metacarpus (cm)	19.65	0.07	0.75	3.82	19.76	0.10	0.68	3.48	19.50	0.10	0.78	4.02
12	Breadth of paunch (belly) (cm)	60.57	0.74	7.42	12.25	60.73	1.02	6.85	11.20	60.4	1.06	7.86	13.0
13	Depth of paunch (cm)	72.03	0.58	5.82	8.08	72.82	0.90	6.04	8.29	71.3	0.75	5.55	7.78
14	The grasp of paunch (cm)	232.3	1.49	14.91	6.41	235.8	2.04	13.7	5.85	229.5	2.07	15.25	6.64
15	Length of paunch (cm)	79.2	0.59	5.95	7.51	80.0	0.77	5.18	6.47	78.6	0.87	6.44	8.20
16	Straight length of body (cm)	133.2	0.71	7.19	5.39	134.0	1.02	6.89	5.14	132.6	1.00	7.37	5.55
17	Fatness, number	3.78	0.01	0.11	3.08	3.77	0.02	0.16	4.29	3.79	0.01	0.05	1.41

TABLE 6:
Dependence of yields of cows of the Simmental breed on dimensions, received with the help of the regression method

No	Index	Average per herd (n=101)		Above th average (n=46)		Below the average	
		R	Standard deviation	R	Standard deviation	R	Standard deviation
1	Fat content in milk	-1008.1	990.48	-175.94	747.42	-759.44	1452.18
2	Height at withers	-30.18	35.76	36.91	38.01	22.53	22.43
3	Height at sacrum	26.68	32.52	37.22	35.2.9	17.18	20.59
4	Breadth of chest	-30.61	-8.89	30.04	-32.69	14.73	24.39
5	Depth of chest	-10.55	15.19	-2.96	21.41	-4.81	9.57
6	Slanting length of body	25.60	18.50	10.01	17.98	12.63	14.45
7	Breadth at hip joints	11.80	27.07	-5.60	23.23	-3.84	23.63
8	Length of hindquarters	9.63	41.03	59.31	44.41	-14.06	25.10
9	The grasp of chest	-7.49	13.30	-39.39	25.23	3.64	7.46
10	The grasp vemetacarpus	-39.55	162.96	-283.59	194.01	-75.66	99.99
11	Breadth ofpaunch	-4.75	19.51	10.52	19.69	0.17	14.65
12	Depth of paunch	2.49	27.67	16.92	34.91	-1.34	21.76
13	The grasp of paunch	4.88	11.98	-4.78	12.49	-14.16	8.48
14	Length of paunch	40.80	31.37	30.26	35.33	-8.53	18.25
15	Straight length of body	-16.73	27.91	-19.96	27.28	15.25	18.42
16	Fatness	164.13	1026.19	-775.7	1362.3	299.30	631.38

4.0 CONCLUSIONS

The use of the method on symmetry by Vernadsky V.I. can explain the state of breed population and give the ground for the breed population to cozrespond with the aims of genetic stock conservation and to show the connection of milk yield with different indications that characterize the constitutional index of a.nimals.

The method of herd inspection by experts who are well aware of the cattle breeds and methods of their impro vement and conservation is of great importance under such conditions.

The method mentioned above can grive the answer to the major problems touching on such trends in breeding programmes as:

- determination of desirable type of cattle in breed;
- studying of breed state and its common reactions to the environmental conditions;
- determination of further improvement of selection progress in breed and breed conservation.

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