

Zootechnical description of the creole goat of the Oaxaca region (Mexico)

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Summary

This paper describes the zootechnical characteristics of the *Pastoreño* creole goat, representing the caprine population of the Low Mixteca region of Oaxaca State, Mexico.

These animals characteristically produce fattened goats for traditional slaughter at Christmas, to elaborate a typical dry meat product known as *Chito*. At present the exact individual population of this breed is not known. Those registered as Creoles in the animals census in general are known. This breed however has particular productive and morphological characteristics which make them very different from other creole caprines in the rest of the state and the country. Information on their distribution, origin, morphological characteristics, handling and productive systems is presented in this paper.

Resumen

Este trabajo describe las características zootécnicas del caprino criollo *Pastoreño*, representando a la población caprina de la región Mixteca Baja del estado de Oaxaca (México).

Estos animales se caracterizan por producir caprinos de engorde para el sacrificio tradicional de fin de año, para elaborar un producto genuino a partir de carne seca conocido como *Chito*. Actualmente la población individual exacta de esta raza se desconoce. Estos animales son registrados en

los censos como Criollos en general. Esta raza sin embargo tiene características productivas y morfológicas particulares que los hace muy diferentes de otros caprinos criollos en el resto del estado y del país. Se presenta en este trabajo información sobre su distribución, origen, características morfológicas, manejo y sistema productivo.

Key Words: “*Pastoreño*” goat, Creole, Zootechnical characteristics, Traditional slaughter, Typical products, Mexico

Introduction

Rigorous scientific studies necessary for the understanding of the zootechnical potential of the creole goat are extremely scarce, in spite of the fact that Mexico has an extraordinary wealth of genetic resources from colonial times. Even more so when one considers that such animals adapted to diverse areas and ecosystems in Mexico through natural selection.

Nowadays this could be understood as “rusticity”; however this quality is not considered in stockbreeding development priorities in our country. In developed countries the present criterion for development in extensive production is use of natural resources, which means benefiting from the region’s productivity *in situ*, so that the people who exploit the livestock can remain in their own towns, using their own technology, methodology and animals. As the production is absolutely endogenous it has no

need of outside support which negatively influences our balance of trade.

Seventy percent of Mexico's territory is under adverse conditions, not only ecologically but sociologically and technologically. Therefore goats represent an important alternative in meat production, gaining greater relevance in the last few years because they can be bred in areas where other species cannot.

Dairy goats are not very common in the south of the country, meat being the main product (Mouat, 1980). This production is exploited under traditional production systems for local consumption only (Arbiza, 1986), except the Low Mixteca Oaxaqueña producers, who hold an average of 622 head of goats and have established some management criteria to prepare the animals for traditional slaughter at Christmas time to elaborate a regional product known as *Chito* (salted meat) in the town of Tehuacan (Puebla). This particular system of goat meat production is very important for the stockbreeding of this disadvantaged area.

Origin, Present Situation and Socioeconomic Context

The goats first arrived in Mexico during the conquest and later went to the north of the country where they expanded rapidly. A new biotype known as Creole, well adapted to the inhospitable environment of the area (Arbiza, 1986) was developed through the crossing of different breeds and types. These creole goats are considered the progeny of the Spanish goats, maintaining a similar morphology and handling conditions to creoles of the same origin from other parts of America like Argentina, Chile, Venezuela, Bolivia, Honduras and USA (Schcerf, 1995; FAO, 1996; Ramírez and Mellado, 1996).

According to the National Institute of Statistics, Geography and Information reports (INEGI, 1989), the national population of goats was estimated at 10 085 597 head, of which 3% were distinct populations and the rest, undefined groups. Goats are especially important in some states such as Coahuila,

Nuevo Leon, Chihuahua and Durango in the arid north; San Luis Potosi, Puebla and Michoacan in the centre; Zacatecas in the central north and Guerrero and Oaxaca in the south. Oaxaca has 1 159 653 goats and is the primary producer of goats in the country (INEGI, 1989).

At present goats are the most important option in meat production in the Mexican countryside. The Mixteca region (which covers part of the states of Puebla, Guerrero and Oaxaca) is second in caprine production despite its underprivileged socioeconomic and ecological situation which makes it one of the more difficult areas for economic development in the Mexican countryside (Mora and Silva, 1987).

The production system of the *Pastoreño* creole goat in the Low Mixteca of Oaxaca dates back to more than 100 years and it has been passed on from generation to generation, although at the beginning it was in Spanish hands. Nowadays the system described represents the most important stockbreeding activity in the area (Sierra *et al.*, 1996a) in spite of the great difficulties threatening its survival.

Distribution Area

The *Pastoreño* creole goat is mainly located in the Low Mixteca region of Oaxaca, specifically in the Juxtlahuaca district, between the 18° 39' - 15° 39' LN and 93° 52' - 98° 30' LW coordinates (INEGI, 1993, Figure 1).

Ecological Setting

The Juxtlahuaca district is mountainous and has an average annual precipitation of 1017.1 mm, 80% of which falls between July and August. The climate is classified as semiwarm-subhumid with summer rain. There are three distinct seasons; the cold season (October to March), the warm season (April to May), and the rainy season (June to September). It is 1,650 metres above sea level with a monthly mean temperature of 18.6° C (García, 1981).



Figure 1. Location of the "Pastoreño" creole goat breeding area (Juxtlahuaca District)

The most important crop is maize, the staple food for a wide sector of the population, 96% of the grains produced, and its growth depends exclusively on the rain.

Morphological characteristics

The *Pastoreño* creole probably has the largest body of all the creole caprines of the country.

Table 2 shows the characteristics of animals of this breed in four age groups, using eleven continuous morphological traits (Sierra and Hernández, 1992). The 13 month old animals are considered mature and slaughtered at short age.

The most typical exterior characteristics of the *Pastoreño* creole goat is its uniform white colour, which so easily distinguishes it from other creole goats. A straight profile, with a arched horn in the female and a spiral horn in the male, are the most distinct exterior characteristics of this animal.

A description of these and other characteristics of this breed are shown in table 1 and figure 2 .

Management System

In Mexico, the traditional semi-trashumant system dominates, followed by household rearing. *Pastoreño* goat rearing, unlike in the rest of the country, is characterized by the use of an extensive system similar to the trashumant one, which exploits the vegetation of the dry August months on commonly-held grounds and daily movement to the grazing places according to the availability of vegetation. From June to November (rainy season) the goats remain in the lowlands where plants predominate, whereas from December to May (drought season) they are transferred to southern lands where conifer woods predominate. This is a unique management system in which animals do not suffer from food scarcity at any time of the year (Hernández and Sierra, 1992). In accordance with Molina *et al.*, (1996a), this type of livestock is exploited in herds with an average size of 622 head. The producers supplement the livestock only with variable quantities of common salt during the year. Kidding occurs all year round and is significantly more intensive during spring. Kids are naturally weaned at about 5 months

Table 1. Description of some of the external characteristics of the "Pastoreño" creole goats.

Characteristics	Description
Horns	Medium, spiral type in male and arched in female
Profile	Straight
Head	Medium proportions
Eye socket	Little projection
Ears	Medium size, slightly drooping and straight ahead
Beard	Present in both sexes
Wattles	Present in both sexes
Udder	Small, with short and differentiated teats
Mucous	Clear in colour
Hoof	Medium, and clear in colour
Coat	White and uniform colour
Hair	Short and strong
Skin	Thick
Tail	Short and lifted up

Table 2. Linear measurements in "Pastoreño" creole goats.

	Age			
	Newborn	6 months	9 months	13 months
Live weight, (kg)	2.5 ± 0.394	15.4 ± 3.6	27.0 ± 4.2	29.0 ± 4.2
Length head, (cm)	17.3 ± 2.061	19.4 ± 2.6	24.0 ± 7.1	23.5 ± 0.71
Length horns, (cm)		11.6 ± 3.5	25.0	14.0 ± 1.4
Length neck, (cm)	8.0 ± 1.414	27.1 ± 4.2	30.0	32.5 ± 2.1
Trunk length, (cm)	25.5 ± 3.512	50.1 ± 2.7	53.5 ± 7.8	58.5 ± 0.7
Body length, (cm)	50.8 ± 5.123	96.6 ± 4.5	107.5 ± 0.71	114.5 ± 2.1
Height at withers, cm	32.5 ± 3	53.1 ± 4.3	67.5 ± 2.1	61.5 ± 0.7
Height at loin, (cm)	33.0 ± 2.828	55.2 ± 4.4	67.5 ± 0.71	66.0 ± 4.2
Breast perimeter, (cm)	30.8 ± 2.217	61.8 ± 4.3	71.0 ± 4.2	75.8 ± 1.1
Abdomen perimeter, (cm)	33.8 ± 1.708	69.3 ± 4.1	79.0 ± 2.8	85.5 ± 4.9
Rump width, (cm)	8 ± 0.816	12.4 ± 1.5	17.0 ± 4.2	19.0 ± 1.4



Figure 2. Young male and female "Pastoreño" creole goat adults while grazing

of age. Neither recording nor housing is used and identification of the livestock is made with traditional marks (notch in the ears).

The range of sales is between 200 and 700 animals per herd per year of 14 month old males and culled females. Neither milking nor milk consumption is common. The livestock buyers come from outside the region.

Health problems, that are most frequently faced, are (in decreasing order) intoxication by plants, internal and external parasitosis, respiratory diseases and contagious ecthyma . There is no technical advice available to herd owners and 75% of the treatments are effected by shepherds. The producers are not organized and usually they are elderly. The people living off this system are landowners,



Figure 3. A herd of "Pastoreño" creole goat in Low Mixteca Oaxaqueña (Juxtlahuaca District)

breeders, employees and shepherds, who perform herding (figure 3), fattening, slaughtering and marketing of the products and by-products (González, 1977).

Production and Productivity

Reproduction

Sierra *et al.*, (1996b) recorded 150 live births from 128 *Pastoreño* creole does that kidded over 3 periods during the year: 59%, from April to June, 23% from July to September and 17% from October to December. Single births predominate with percentages between 70% and 89.5%, whereas the twinning rate was estimated at 10%.

Body weight and growth

In a pilot study using 43 kids of this breed,

parameters for meat-producing aptitudes were studied on 11 weights taken periodically from birth to 200 days of age (Sierra *et al.*, 1996b). Results of that study are presented in table 3. Birth weight is higher for the *Pastoreño* goat than for others from the south of the country and especially from the Mixteca Region. The mean daily growth rate was 88.7 g for males and 75.4 g for females during the 200 days of the study.

Product characteristics

There is evidence that an annual slaughter of creole goats, of 13 to 15 thousand head in Tehuacan city (Puebla), has been taking place for more than 100 years. Fattening time is closely connected with the length of the rainy season, meaning that slaughtering starts at the end of October and finishes in the middle of November, during the dry season, so that

Table 3. Spring, summer and autumn weight variations in the "Pastoreño" creole kid live weight (mean ± S.D. in kg).

Mean age (days)	General	Males	Females
Birth	3.3±0.88 N=(34)	3.4±0.92 N=(27)	2.8±0.56 N=(7)
24	5.5±1.33 N=(41)	5.7±1.44 N=(30)	5±0.80 N=(11)
41	7.3±1.73 N=(42)	7.5±1.88 N=(29)	7±1.33 N=(13)
58	8.7±2.14 N=(43)	8.9±2.31 N=(30)	8.4±1.55 N=(13)
73	8.97±2.3 N=(29)	9±2.42 N=(21)	8.9±2.1 N=(8)
90	11.4±2.55 N=(36)	11.5±2.96 N=(25)	11.1±1.24 N=(11)
106	12.8±2.79 N=(35)	13.1±3.21 N=(24)	12.2±1.47 N=(11)
124	13.7±3.0 N=(34)	14.2±3.32 N=(23)	12.8±1.99 N=(11)
140	14.7±3.5 N=(34)	15.1±3.92 N=(23)	13.8±2.30 N=(11)
168	18.1±3.67 N=(34)	18.7±4.07 N=(23)	16.8±2.30 N=(11)
200	19.9±3.38 N=(18)	22.1±2.71 N=(9)	17.8±2.54 N=(9)

the meat and skin can be properly dehydrated.

The animals come from the states of Guerrero, Puebla and Oaxaca and in the latter specifically from Costa and Low Mixteca regions (González, 1977). The slaughtering infrastructures are situated in adequate geographical locations for the market, with a big uncovered yard, an enclosure, special buildings for the carcass product storage and abundant water provisions. Between 300 and 500 head are taken every day and are rested for a while before slaughter and processing. During this time entire families are hired and organized in different groups according to the activity they have to perform during slaughter and processing. An animal of 14 to 16 months of age has an average of 3.0 kg of the *Chito* (dark, firm and dry meat) 2.0 kg for 12 month old animals and more than 5.0 kg for an adult (from 4 to 6 years of age) (Lepiz *et al.*, 1992).

The *Pastoreño* creole goat carcass yield is 46.1% in newborns, 52.6% at 6 months of age and 48.5% in adult animals, in accordance

with Molina *et al.*, (1996b). As for carcass composition (lean content, bone content, fat content and carcass by-product) the trend from birth to 13 months was a progressive increase in edible meat (50.5% to 68%), carcass by-product (2.5% to 5%), fat deposition (2.4% to 8%) and a decrease in bone content (19.5% to 12.5%), as shown in table 4.

Despite the fact that the main product from slaughter is the *Chito*, every by-product of the creole goat is used, as can be observed in table 5 after Mouat (1980). These products are commercialized in the following ways:

- Fat is previously melted and semi-refined for the soap industry.
- All the following products receive a rudimentary conservation treatment and are retailed to local markets in neighbouring villages.
- Ribs: fat covering accumulated in the ribs is removed, fried and sold separately.
- *Chito* crackling: small pieces of meat residues from the melting fat.
- Skin: sold to big industries.

Table 4. Mean weights and percentages of lean, none, fat and other tissues.

	Age							
	New borns		6 mo (n = 11)		10 mo (n = 2)		13 mo (n = 2)	
No. of animals	4		11		2		2	
Warm dressing %	46.1		52.6		52.3		48.5	
<i>Carcass and tissue components</i>	kg	% carcass	kg	% carcass	kg	% carcass	kg	% carcass
Left half carcass	0.55	100.00	3.39	100.00	5.91	100.00	6.00	100.00
Lean	0.28	51.73	2.07	61.20	3.73	63.11	4.06	67.72
Bone	0.22	39.89	0.98	28.90	1.51	25.48	1.15	19.22
Total fat*	0.03	5.83	0.21	6.20	0.38	6.47	0.43	7.23
Other tissues**	0.01	2.55	0.12	3.70	0.29	4.94	0.35	5.83

* Includes subcutaneous fat, kidney, omental and pelvic

** Includes connective tissues, ligaments, and tendons

Table 5. Creole slaughter products and by-products, Mouat (1980).

	Quantity/weight
Head	1
Kidney	2
Backbone plus hip	1
Shoulders	2
Chito* (kg)	3.5
Crackling mass (g)	350
Ribs (crackling) (g)	350
Intestinal fat (g)	250
Udder (g)	200
Testicles (g)	100
Skin (kg)	1
Tallow (kg)	2.5
Horns (kg)	1

* Dark, firm and dry meat.

- Viscera: retailed to businesses; some for eating and others to make violin and guitar strings.
- Fore and hind feet and head: daily sale and wholesale are registered.
- “*Ensarto*” (backbone plus hip): have to be ordered one day in advance, highly appreciated regional meals.
- Boiled offal: local and daily wholesale trade.

Chito is the main slaughter product. Once it is dry and stored in palm matting packages of approximately 100 kg it is distributed to big consumer centres in different towns, like Puebla, Orizaba and Tehuacan.

In fact the whole animal is used, so that even the horns are commercialized for industrial use.

In this sense, the slaughter of creole goats is a management activity with good results for the monopoly that controls it, but stockbreeders remain in poverty due to their low level of education and capacity for organization. For this reason it is necessary to develop plans for this subsector based on vocational training and cooperative support.

Figure 4 shows final products included in the traditional form of preparing the carcass.

Discussion

The *Pastoreño* creole goats could be considered a valuable genetic resource, thanks to their productive behaviour and rusticity, reasons which well justify their conservation. They have a local distribution in the Low Mixteca Oaxaqueña where they feed on natural resources during all year round. Furthermore, their rusticity allows them to produce in difficult management situations where other breeds could not.

These goats are socially, culturally and economically integrated into the population where they live, and have been exploited for more than 100 years. It has always represented one of the most outstanding economic activities in the area. It is significant that the unique product they give, that is, the fattening of adult goats, continues, while the sale of kids could continue even when the mother goats do not give enough milk. Some quantity of milk could be used by the shepherds, specifically since their diet is



Figure 4. Traditional form of preparing the carcass

maize based. Nowadays, despite the fact that these goats have the best productive performance among creole goats from Oaxaca and the rest of the country under similar management and feeding situations (Molina *et al.*, 1996b), the producers are not organized and government offers no support for the market or qualified technical assistance to improve this production system. Finally, we consider it is important to highlight the importance of this type of caprine, since it is a representation of a culture (historical, social and economic), as well as a valuable genetic resource for the future.

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Characterisation of Indian Kathiawari horses

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Summary

The breeding tract of Kathiawari horses is the Saurashtra region of Gujrat, comprising of the Rajkot, Bhavnagar, Surendranagar, Junagarh and Amreli districts. Kathiawari horses are reared for carting, riding, sports and transportation. The breed is closely related with the Marwari breed of Rajasthan. The most predominant body colour is chestnut in Kathiawari horses and black in Marwari horses. The capital nags of the Kathiawari breed are from 14 to 14.5 HH, sound, sure footed and hardy, fast and decidedly good looking. The herd size at farmer level varied from 1 to 4. In the study an attempt has been made to note the physical characteristics and management practices for rearing these horses in the breeding tract. Body measurement of Kathiawari and Marwari horses were recorded. It was observed that Kathiawari horses had a smaller body, shorter height, smaller heart girth, ears and face than the Marwari horses. The performance of the Kathiawari breed under intensive management was studied. The average age at first fertile service, and at first foaling, herd life, total foals during lifetime, gestation period, service period and foaling interval were 1 658±79 days, 1 989±80 days, 6 499±650 days, 4.93±0.52 foals, 333.58±1.76 days, 257.23±46.49 days and 597.76±49.70 days, respectively.

Resumen

La zona originaria de la raza equina Kathiawari es la región de Gujart, que comprende los distritos de Rajkot, Bhavnagar, Surendranagar, Junagarh y Amreli. Los

caballos de raza Kathiawari vienen utilizados para tiro, carreras, deportes y transporte. La raza se encuentra muy próxima a la raza Marwari del Rajasthan. El color predominante es el castaño en los caballos Kathiawari y el negro en la raza Marwari. Las características principales del Kathiawari son la alteza, de 14 a 14,5 HH, la robustez, la seguridad en el trote y la resistencia, así como la agilidad y el buen aspecto general. En el presente estudio se han llevado a cabo una serie de observaciones para notar las características físicas y las prácticas de conducción de estos caballos en la zona. Se anotaron las medidas corporales de las razas Kathiawari y Marwari y se observó que los caballos Kathiawari tenían un tamaño corporal inferior, una altura más baja y una menor circunferencia abdominal, así como orejas y cabeza más pequeñas respecto a la raza Marwari. Se estudiaron los rendimientos de los caballos Kathiawari en condiciones intensivas. Los valores correspondientes a la edad media de la primera cubrición fértil y del primer parto, de la vida del rebaño, del total de partos durante la vida, el período de gestación, el período de cubrición y el intervalo entre partos, son respectivamente los siguientes: 1 658±79 días, 1 989±80 días, 6 499±650 días, 4.93±0.52 partos, 333.58±1.76 días, 257.23±46.49 días y 597.76±49.70 días.

Key words: Horse, Kathiawari, Marwari, India

Introduction

The horse is one of the earliest domesticated species of livestock adopted by farmers as pack and transport animals. India has six



Figure 1. Typical characteristics of Kathiawari horses

distinct breeds of horses viz. Kathiawari, Marwari, Spiti, Zanskari, Manipuri and Bhutia. No history is available about their domestication in India and development of these breeds. However, the Superintendent of the Gaekwar Contingent in 1880 suggested that the Kathiawari breed may have sprung from the wild horses of Kathiawar (Bombay Gazette, Kathiawari, foot note, page 97).

The breeding tract of the breed is the Saurashtra province of Gujarat which comprises the Rajkot, Bhavnagar, Surendranagar, Junagarh and Amreli districts of Gujarat. The best breeding area is Panchal in the heart of this region including Chotila, Paliad, Anandpur, Bhimora and Jasdan. All requirements of successful horse breeding are found in the Panchal area, which has favourable soil for hoof formation, hilly tracts for the development of muscles, running streams of pure water, nourishing grasses and a hot and dry climate.

The Kathiawari horses were reared in the old ages for military, transportation, sports and ceremonial functions, but at present their

use is limited only to riding, sports and transportation in the remote places with no road connection with cities. The Kathiawari Cooperative Society registered only 400 pure animals and according to their estimate there are only 1 000 pure Kathiawari horses (Personal communication, February, 1996).

The Bombay Gazette mentioned 28 distinct strains of the Kathi breed (Kathiawari Ashava Shri Bhuvneshwari Peeth, Gondal, Gujarat). In the breeding tract Kathiawari horses are mostly reared by the Kathi community (Rajput). They love it and feel proud of rearing horses, preferably mares.

The Kathiawari horse seems to be closely related with the Marwari horse. There are several common features which necessitate simultaneous study of Marwari and Kathiawari horses for proper characterisation and comparison.

The Marwari breed is derived from the Marwar region of the Rajasthan - the natural habitat of the breed. The Marwar region includes Udaipur, Jhalor, Jodhpur and Rajasamand districts of Rajasthan and some adjoining areas of Gujrat. The Marwari horses are reared mainly for riding and sports and very few are reared for race purposes.

Materials and Methods

Information on the various management practices adopted by farmers for rearing Kathiawari horses in their breeding tract was generated by interviewing the farmers using a structured questionnaire at the Horse show that Jasdan, Rajkot, Gujarat held from 23-25 Feb., 1996. Information on coat colour (Kathiawari, 44 and Marwari, 12), Physical characteristics (Kathiawari - 44) and body measurements (Kathiawari-48 and Marwari-12) of adult horses were generated from the horse show. The body measurements included body length, height, heart girth, paunch girth, tail without switch, hip width, height at hocks, height at knee, ear length, face length and face width. Data on management practices, body colour and physical characteristics were analysed as percentages. The data on body measurements was analysed by least square maximum

Table 1. Body colour of Kathiawari and Marwari horses

Colour	No.	%
Kathiawari (44)		
Chestnut	21	47.73
Bay	14	31.82
body chestnut, foreleg up to knee and fetlock are black		
Keshwali black Hairs on tail and neck are black		
Dun	3	6.82
light chestnut		
Gray	6	13.63
complete white		
Marwari (12)		
Black	8	66.67
Brown		
(i) Black flay bone. White body with black patches	-	0.00
(II) Red flay bone. White body with red patches	4	33.33

likelihood method, using a fixed model which incorporated breed, sex and their interaction effects.

155 foalings of 31 horses from 1966 to 1995 kept on the Gujarat Government Horse Breeding Farm, Junagarh, Gujrat were analysed in order to determine the performance of the breed under intensive management. The traits included were; age at first fertile service (AFFS), age at first foaling (AFF), herd life (HL), productive life (PL), total foals during lifetime (TFLT), male foals during life time (MFLT), female foals during lifetime (FFLT), gestation period (GP), service period (SP) and foaling interval (FI). The herd life and productive life were defined from the date of birth and date of first foaling to disposal/death respectively. The SP, GP and FI were analysed by least square maximum likelihood procedure by assuming a fixed model containing parity, foaling season and period effects. The means, standard error and ranges were obtained for remaining traits due to the smaller number of observations. The total period of 30 years was divided into six periods of five years each. The year was further divided into three foaling seasons i.e. season-1 (October-January), season-2

(February-May) and season-3 (June-September) based on climatic variation during the year.

Results and Discussions

Body colour

The distribution of body colour of Kathiawari and Marwari horses in percentages are presented in table 1. The most prominent body colour in Kathiawari horses was chestnut, followed by bay, grey and dun. It was also observed that the colour black is not available in Kathiawari horses.

The predominant colour in Marwari horses was black, whereas other body colours were brown, black flay bone, red flay bone and chestnut. In the show only two colours; black and red flay bone were observed (table 1).

Physical characteristics

The physical characteristics of Kathiawari horses as revealed through discussions held with the farmers at the show and cited from literature (Bombay Gazette) are as follows

Concave profile, upright ear on 90 degree axis and can rotate at 180 degrees, if ear is

Table 2. Management practices in the breeding tract of Kathiawari horses

Practices	% of respondents
1. Utility	
Riding only	10
Carting only	35
Sports only	15
Transport	10
Riding & Sports	10
Riding & Ceremonials	20
2. Type of management	
A. System of management	
Confinement	50
Grazing	20
Both	30
B. Kind of farm where data recorded	
Regional farm	00
State farm	00
Backyard farm	100
C. Number of animals in each stud	
1-4	100
More than 5	00
3. Type of rearing	
Stall feeding	80
Range Management	00
Stall mixes	20
4. Working pattern	
1-3 hrs daily	40
4-6 hrs daily	50
More than 6 hrs daily	10
5. Watering	
Once in a day	10
Twice in a day	50
Three times in a day	30
Four times in a day	10
6. Stabling	
A. Construction of stable	
Pacca	80
Kachha	20
B. Roof of the stable	
With roof	100
Without roof	00
C. Type of housing	
Individual	100

(Cont.)

Practices	% of respondents
9. Breeding	
Natural	80
AI	20
10. Disposal	
A. Mode	
Sold	80
Death	20
B. Age	
4-5 years	60
10-15years	40
C. Reasons	
Higher prices	60
Old age	40

pricked horse is alert, ears are small, fine and curved. Broad forehead. Large expressive sensitive eyes - toad-like. Face is dry and short, triangular from pale to forehead.

Muzzle is small - can drink water from a palm, big nostrils, edge of nostril is thin. Neck is long like a cock's, short leg, squared quarters. Tail is long, not bushy, curved well and touching the ground. Foot is round and broad, wall of foot is strong. Gait - Raval chal. height is 13.5 to 14.5 hands high (HH) and should not exceed 15 HH.

The capital nags of the breed are from 14 to 14.5 HH, sound, sure footed and hardy, fast and decidedly good looking.

The Kathiawari horses can be easily characterised by 22 features as follows:

Broad	Back, Hoof, Chest and Forehead
Long	Tail, Neck, Forelock, Mane
Short	Pastern, Face, Ears, Back
Fine	Tail, Coat, Ears, Mane
Curved	Concave face, Ears, Neck, Back
Gait	Raval chal
Body colour	Black colour is a disqualification for the Kathiawari breed

Information on physical characteristics of Kathiawari horses (44) was generated from the horse show and is presented in table 2 in percentage form. The appearance was observed as alert (86%) and dull (14%). All the

Table 3. Physical characteristics of Kathiawari horses

Trait (44 horses)	No.	% observed
1. Appearance		
Alert	38	86
Dull	6	14
2. Face		
Convex		00
Concave		100
Dish type		00
3. Ear		
Erect		100
Drooping		00
4. Eyes		
Black	25	57
Brown	12	27
Black & Brown	7	16
5. Size		
Small		00
Medium		100
Large		00
6. Gait		
Raval Chal		100
Other		00
7. Back		
Straight		100
Concave		00
Convex		00
8. Tail		
A. Length		
Short		00
Medium	9	20
Long	35	80
B. Shape		
Curled		100
Straight		00
9. Structure		
Dwarf (140-150 cm)		100
Tall (More than 150 cm)		00
10. Temperament		
Docile	39	89
Nervous	5	11

horses had a concave face, erect ears, medium size and straight back. The eyes were black (57%), brown (27%) and black and brown (16%). The tail was longer in 35 horses and medium in 9 horses. The structure (height) of all the horses was between 140-150 cm. The majority of horses (89%) had a docile temperament and few (11%) were observed nervous. All the owners were asked to exhibit the gait of their horses and a distinct Raval chal was exhibited, which means if a glass of water was put on their back, while running, water should not spill out. The Kathiawari and Marwari horse are shown in Figs. 1 and 2. The typical characteristics are shown in Figs. 3 and 4.

Management practices

The farmers from the breeding tract of Kathiawari horses were interviewed, the percentage of different practices being presented in table 3.

Body measurements

The least square means of different body measurements are presented in table 4.

Breed differences were significant for all the body measurements except hip width, height at knee and face width. Kathiawari horses had a smaller body, were shorter in height and had a smaller heart girth as compared to Marwari horses. The corresponding estimates for these measurements of Marwari horses were within the range obtained by Vij *et al.* (1996) and lower than the report of Milic *et al.* (1992) for thoroughbred horses. The average paunch girth was 159.37 ± 1.68 and 173.27 ± 3.22 cm for Kathiawari and Marwari horses respectively. Kathiawari horses had a smaller tail (without switch) as compared to Marwari horses. Hip width was larger in the Kathiawari than the Marwari horses. However, the corresponding estimate for Marwari horses were smaller than the reports of Vij *et al.* (1996). Hock and knee heights were smaller in Kathiawari horses than the Marwari horses but the



Figure 2. Kathiawari horse

differences were non-significant for knee height. Kathiawari horses had shorter ears and not such a long face as the Marwari horses. The means of face length for Marwari horses were similar to those reported by Vij *et al.* (1996). Face width was similar in both breeds. Sex effects were only significant for ear length, indicating that the stallions had longer ears than the mares. The breed x sex interaction was only significant in

hock-height. The Marwari males were higher at the hock as compared to the other three groups.

Performance of Kathiawari horse under intensive management

The averages of different traits of Kathiawari horses, their range and number of



Figure 3. Marwari horse

Table 4. Body measurements of Kathiawari and Marwari horses (means \pm S.E. cm)

Effect	No. of obs	Body length	Height	Heart girth	Paunch girth	Tail without switch	Hip width at hock	Height at knee	Height length	Ear length
Overall	60	129.2 \pm 1.61	154.0 \pm 1.13	165.9 \pm 1.54	166.3 \pm 1.82	45.0 \pm 0.63	35.9 \pm 1.31	55.5 \pm 0.58	44.3 \pm 0.46	16.7 \pm 0.
<i>Breed</i>										
Kathiawari (K)	48	119.8 \pm 1.49	147.9 \pm 1.05	160.6 \pm 1.43	159.4 \pm 1.68	42.1 \pm 0.59	38.3 \pm 1.21	54.1 \pm 0.54	43.5 \pm 0.43	15.4 \pm 0.
Marwari (M)	12	138.6 \pm 2.85	160.1 \pm 2.01	171.1 \pm 2.73	173.3 \pm 3.22	48.0 \pm 1.13	33.5 \pm 2.32	56.9 \pm 1.03	45.2 \pm 0.82	18.0 \pm 0.
<i>Sex</i>										
male (m)	21	126.7 \pm 2.50	154.7 \pm 1.76	163.0 \pm 2.39	165.7 \pm 2.82	44.5 \pm 0.99	35.4 \pm 2.03	56.5 \pm 0.90	45.1 \pm 0.72	15.9 \pm 0.
female (f)	39	131.6 \pm 2.03	153.2 \pm 1.43	168.7 \pm 1.95	167.0 \pm 2.30	45.5 \pm 0.80	36.4 \pm 1.65	54.5 \pm 0.73	43.6 \pm 0.58	17.5 \pm 0.
<i>Breedxsex</i>										
K-m	16	118.0 \pm 2.44	149.0 \pm 1.72	159.4 \pm 2.33	159.0 \pm 2.75	41.9 \pm 0.96	38.5 \pm 1.98	53.8 \pm 0.88	43.9 \pm 0.70	18.8 \pm 0.
K-f	32	121.5 \pm 1.72	146.8 \pm 1.21	161.9 \pm 1.65	159.6 \pm 1.94	42.3 \pm 0.68	38.0 \pm 1.40	54.6 \pm 0.62	43.1 \pm 0.49	15.9 \pm 0.
M-m	5	135.4 \pm 4.36	160.6 \pm 3.07	166.6 \pm 4.18	172.4 \pm 4.93	47.2 \pm 1.73	32.2 \pm 3.55	59.2 \pm 1.58	46.2 \pm 1.25	17.0 \pm 0.
M-f	7	141.7 \pm 3.69	159.6 \pm 2.60	175.6 \pm 3.53	174.1 \pm 4.16	48.7 \pm 1.46	34.9 \pm 3.00	54.6 \pm 1.33	44.1 \pm 1.14	19.0 \pm 0.

Table 5. Performance of Kathiawari horses

Traits	No. of obs.	Mean±SE	Range
Age at first fertile service (days)	25	1 658±79	1 110-2480
Age at first foaling (days)	26	1 989±80	1 193-2315
Herd life (days)	11	6 499±650	2 307-9512
Productive life (days)	12	4 546±596	850-7353
Total foals given during lifetime	31	4.93±0.52	1-11
Male foals given during lifetime	31	2.29±0.37	1-7
Female foals given during lifetime	31	2.61±0.27	1-5

Table 6. Reproductive performance of Kathiawari horses

Effects	No.	Gestation period	No.	Service period	Foaling interval
Overall	155	333.58±1.76	127	257±46.49	597±49.70
<i>Parity</i>					
1	32	333.5±2.62	29	288±69.77	629±77.36
2	29	330.3±2.69	23	281±72.36	655±77.36
3	23	333.0±2.91	21	235±74.91	566±80.09
4	20	329.2±3.29	17	258±86.54	543±92.52
5	15	325.8±3.69	11	195±104.01	523±111.20
6	11	327.0±4.24	10	225±109.12	558±116.66
7	9	329.5±4.83	5	391±153.43	752±164.03
8	5	343.3±6.10	4	412±166.47	753±177.98
9	4	330.9±6.93	4	181±169.01	536±180.69
10	4	338.1±6.86	3	101±196.70	457±210.30
11	3	338.6±8.04	-	-	-
<i>Foaling season</i>					
Oct-Jan	22	332.1±3.39	17	226±93.89	559±100.38
Feb-May	68	333.1±2.02	56	266±93.89	601±54.48
June-Sep	65	335.5±2.14	54	277±58.50	632±62.54
<i>Foaling period</i>					
1966-70	14	332.4±4.00	14	286±98.27	661±105.06
1971-75	19	332.0±3.36	17	243±89.22	592±95.39
1976-80	14	337.5±4.09	13	352±103.59	699±110.75
1981-85	26	336.5±2.91	23	261±75.35	563±80.56
1986-90	30	331.4±2.69	28	249±68.48	572±73.21
1991-95	52	331.6±2.34	32	149±71.72	496±76.15



Figure 4. Typical characteristics of Kathiawari horse

observations are given in table 5. The average age at first fertile service and age at first foaling were 1658 ± 79 and 1989 ± 80 days, respectively, and both estimates had similar ranges (1110-2480 days). These findings were similar to the reports of Panchal *et al.* (1995) for Kathiawari horses. The estimate of age at first foaling was lower than the reports of Hevia *et al.* (1995) for thoroughbred horses. The means of herd life and productive life were 6499 ± 650 and 4546 ± 596 days respectively, however both observations were based on small sample size. The mean of total foals during lifetime was 4.93 ± 0.52 ranging from 1 to 11, lower than that reported by Hevia *et al.* (1995). The means of male and female foals during lifetime were 2.29 ± 0.37 and 2.61 ± 0.27 , respectively. Male foals ranged from 1 to 7 and female foals from 1 to 5. The estimate of male foals during a lifetime were higher than the reports of Hevia *et al.* (1995).

The reproductive performance of Kathiawari horses are shown in table 6. The

least square mean of the gestation period was 333.58 ± 1.76 days which varied from 325.82 to 343.27 days from 5th to 8th parity and were similar to the findings of Hevia *et al.* (1995) and Panchal *et al.* (1995). The parity, foaling season and periods did not influence the gestation period significantly.

The least square means of service period (SP) were 257.23 ± 46.49 days and ranged from 101 in 10th to 412 days in 8th foaling. The average FI was 597.76 ± 49.70 days and ranged from 457 in 10th to 753 days in 8th foaling. These estimates were higher than the reports of Panchal *et al.* (1995). The SP and FI were lowest in season 1 as compared to others but differences were not significant.

Trends among the SP and FI due to the foaling period were similar, both were lowest in the last period (1991-95), maximum in 3rd period and then declined as the period advanced which may be due to better management practices and availability of feeds and fodders during these periods.

Differences Between Kathiawari and Marwari Horses

The Kathiawari and Marwari horses can be easily differentiated by the following traits.

<i>Trait</i>	<i>Kathiawari</i>	<i>Marwari</i>
1. Length of ear	Shorter	Longer
2. Gap between two ears	< 3"	> 3"
3. Height	Lower < 60"	Higher > 60"
4. Eyes	Oval and predominant (toad-like)	Oval
5. Nostrils	Rounded	Oval

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Hevia, M.L., Quilas, A.J., Fuentes, F. & Gonzalo C. 1995. Reproductive performance of Thoroughbred horses in Spain. *Journal of Equine Veterinary Science*, 14 (2): 89-92.

Milic, M., Nenadovic, M., Zlatanovic, S., Cukovic, S. & Kolarovic S. 1992. The Confirmation of fully grown Thoroughbred horses. *Animal Breeding Abstract*, 60: 2727.

Panchal, M.T., Gujrati, M.L. & Kavani F.S. 1995. Study of some of the reproductive traits of Kathi mares in Gujrat state. *Indian Journal of Animal Reproduction*, 63: 47-49.

Vij, P.K., Malik, R.K., Govekar, S. & Nivsarkar A. E. 1996. Characterisation of Marwari horses. *Centaur* 12 (4): 73-78.

Short note: Laying hens may have lost important genes

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The intensive genetic improvement of laying hens has created a hen with an enormous laying capacity when producing in cage systems. In later years, however, it has been obvious that genes or gene combinations which facilitate the birds' ability to interact with other hens in a flock are lost or suppressed due to the narrow breeding goal which has been maximum egg yield in cage systems.

Up to 1950 breeding schemes for egg laying hens were based worldwide on selection of progeny tested males, the daughters of whom were kept in pens on the floor. At that time the cage system was introduced, and the selection strategy of the international breeding companies was changed to performance testing of females kept in individual cages. As the cage system was forbidden in Denmark, the floor testing schemes continued for another 25 years, and a very productive floor adapted hybrid, the Skalborg hybrid, was developed. As soon as the the Danish ban on cage systems was lifted the Danish egg producers began to use them.

Soon it became obvious that when kept in cages the Skalborg hybrid with the excellent performance on the floor was inferior to the birds which were bred in cages by international breeding companies. The

consequences were that Danish breeding with floor laying type hens came to an end, and the Skalborg hybrid soon became extinct.

Today the Danish consumers want eggs from hens kept on the floor and consequently the producers are forced to go back to floor production systems. Obviously, however, the birds, which for 3 040 generations have been selected under cage conditions, are considerably less fit for floor conditions. Big problems with feather pecking and cannibalism are clearly observed as a lack of social ability. Moreover the genetic drive for nesting behaviour seems to be poor (Sørensen, 1992). This means that the frequency of eggs laid on the floor is rather high. Unfortunately the excellent Skalborg hybrid has gone. The egg producers are serviced with genetic material from very few specialised international breeding companies which still carry out most selection for yield efficiency under individual cage systems.

Reference

Sørensen P. 1992. Selection, environment of layers and response on nesting behaviour. Proceedings of XVX World's Poultry Congress. Amsterdam. Vol. 2. 409412.

International Symposium on Buffalo Products

Eds.: S. Gigli, D. Chupin, S. Galal, F. Grasso, J. Boyazoglu and D. Matassino
Proceedings of Symposium in Paestum, Italy, 1-4 December 1994
Wageningen Pers., P.O. Box 42, 6700 AA Wageningen, The Netherlands
EAAP Publication No. 82, 1996, pp. 272. ISBN 90-74134-37-8.

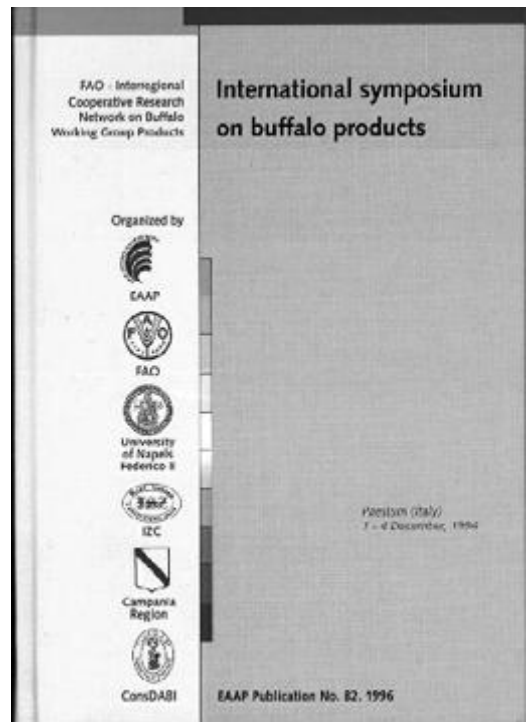
The Symposium at Paestum is the first of three Symposia planned by the Network. To follow are "Reproduction" and "Systems of Production and Resources". Publication of the proceedings by EAAP makes a valuable contribution to scientific buffalo literature and is a stimulus to production research.

This Symposium falls within the activities of the FAO Interregional "Europe/Near East" Cooperative Research Network on Buffalo.

This scientific meeting was organized by the Working Group on Products to review the difficult problems related to the assessment of quality and the improvement of the marketing of the products derived from the buffalo reared in the Mediterranean countries.

This scientific meeting enabled making the comparison between different realities at international level, and seeking the more opportune solutions to optimize the production systems and increase the profitability of buffalo raising.

EAAP Publication No. 82 is commended as an interesting review of current buffalo activity in the Mediterranean area and as a useful source of reference on international buffalo production.



The Optimal Exploitation of Marginal Mediterranean Areas by Extensive Ruminant Production Systems

Eds.: N.P. Zervas and J. Hatziminaoglou

Proceedings of an International Symposium organised by HSAP and EAAP and sponsored by EU (DGVI), FAO and CIHEAM, Thessaloniki, Greece, June 18-20, 1994
Hellenic Society of Animal Production (HSAP), Agricultural University of Athens
75 Iera Odos, GR-188 55 Athens, Greece
EAAP Publication No. 83, 1996, pp. 408 ISSN 1105-2651

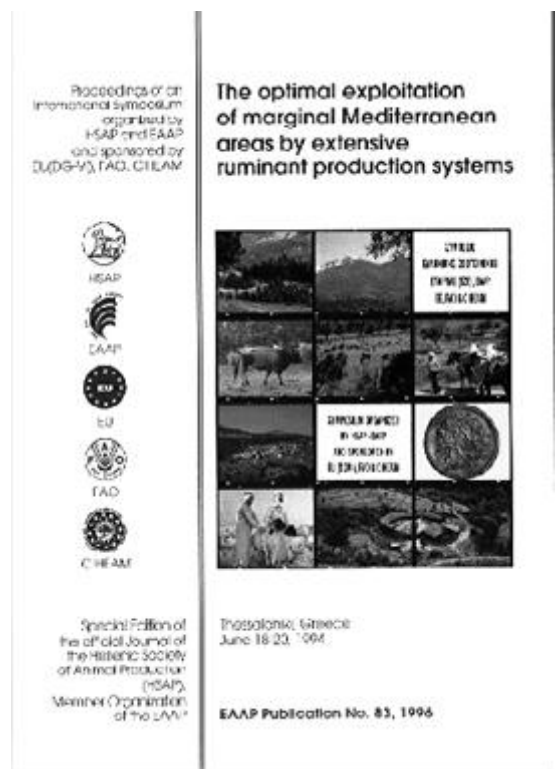
This book contains 66 papers presented at the HSAP-EAAP Mediterranean Symposium dedicated to "The optimal exploitation of marginal Mediterranean areas by extensive ruminant production systems".

The symposium was held at a very appropriate time given the challenges facing the marginal extensive grazing areas and confirms the important role of indigenous livestock in the basin's sustainable agricultural development.

Focusing attention on the problems of the marginal lands in the Mediterranean region and particularly on their ecological evolution in relation to ruminant production systems, the sessions were organized on the basis of the following topics:

- The animal sector as a factor of socio-economic stability in marginal and problematic areas.
- The challenge of extensive ruminant milk and meat production.
- The extensive grazing systems as a factor of good management and environmental conservation practices.
- Quality products, appellations of origin and regional specificity.

Readers of these proceedings are introduced to the intricate problems of regional stability in marginal areas and become acquainted with current research projects aimed at evaluating forage resources, extensive grazing systems and locally produced by-products utilized in the feeding of indigenous ruminant livestock. They are also brought up-to-date concerning the types of breeding and management of animal production systems at the farm level as well



as the producer and consumer attitudes in the evolution of high quality animal products.

The central theme of the symposium clearly demonstrates the urgent need for a strengthening of the optimal use of the extensive animal agriculture and the preservation of locally prevailing natural resources for the welfare of the Mediterranean people.

Cattle in the Mediterranean Area

Eds.: J.C. Flamant, J. Boyazoglu and A. Nardone
Proceedings of a special session of the Cattle Commission, Madrid, Spain, 1992
Wageningen Pers., P.O. Box 42, 6700 AA Wageningen, The Netherlands
EAAP Publication No. 86, 1996, pp. 123 ISBN 90-74134-38-6

This book is a valuable source of information on the production and management aspects of the cattle sector in the Mediterranean basin.

It gives a broad view of the state of the art and of the perspectives as it was measured through a major survey in the early 90's. It evolves into a prospective of possibilities and future potential changes.

Following a major paper based on the data collected through the survey, a number of papers are presented as case-studies of the various situations of the cattle sector in the region.

An important part of the information and discussions relates to the changing production systems, influences of new technology applications and the introduction of more specialized genetic material: the interaction and interrelation of the factors involved.



Performance recording of animals

Proceedings of the 30th Biennial Session of the International Committee for Animal Recording (ICAR), Veldhoven, The Netherlands, 23-28 June 1996
Wageningen Pers., P.O. Box 42, 6700 AA Wageningen, The Netherlands
EAAP Publication No. 87, 1996, pp. 271 ISBN 90-74134-42-4

This publication contains the proceedings of the 30th Biennial Session of the International Committee for Animal Recording (ICAR) held 23-28 June 1996, Veldhoven, The Netherlands.

During the session, progress reports were presented by the Sub-committees, Task Forces and Working Groups of ICAR.

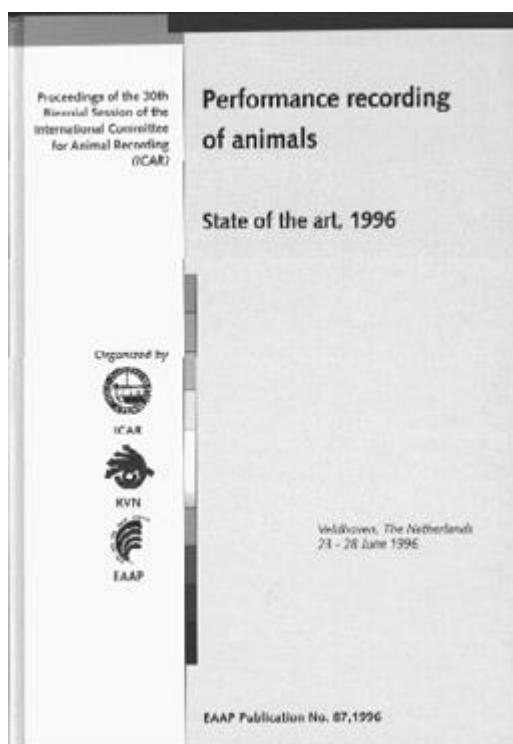
An added feature of the 1996 ICAR Session was a special session on milk recording in developing countries with small recorded animal populations. Several papers prepared concerning this subject are included in these proceedings.

Sessions were held on performance recording of dairy cattle, beef, sheep, goats and buffaloes as well as on genetic evaluation. A working Group on Buffalo was created; the results of a world survey on milk performance in these species was presented and is reported upon in the proceedings.

A number of interesting papers were also presented in other areas such as the use of new technologies like Internet and the experiences of different countries in several fields, like electronic data interchange, fax and multi-user systems.

In addition three papers were presented by new member countries. A session was devoted to Board meetings, held in a spirit of co-operation with the A.I. industry and the World Dairy and Beef Breeds Associations.

In all, over 60 technical papers and reports were presented during the sessions.



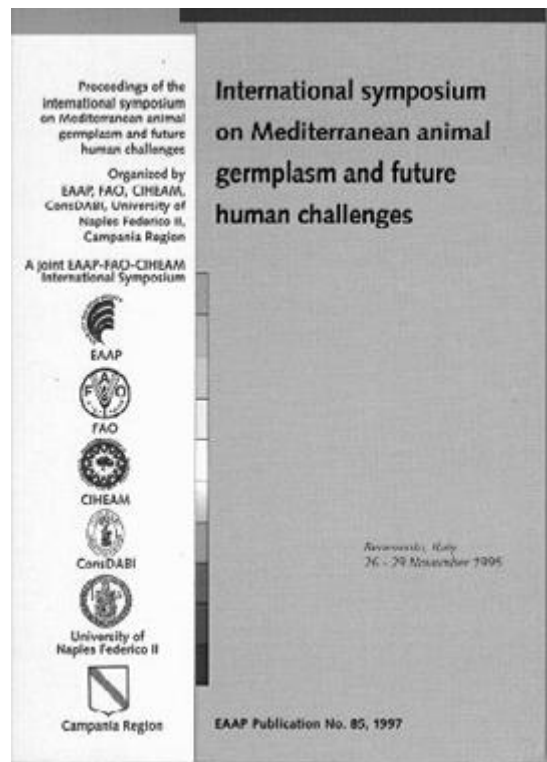
International Symposium on Mediterranean Animal Germplasm and Future Human Challenges

Eds.: D. Matassino, J. Boyazoglu and A. Cappuccio
 A joint EAAP, FAO, CIHEAM International Symposium
 Benevento, Italy, 26-29 November 1995
 Wageningen Pers., P.O. Box 42, 6700 AA Wageningen, The Netherlands
 EAAP publication No. 85, 1997, pp. 319 ISBN 90-74134-46-7

This publication is the compilation of the papers and keynote lectures presented at the International Symposium on "Mediterranean Animal Germplasm and Future Human Challenges". A symposium which is part of the series of the EAAP-FAO-CIHEAM annual international sessions on animal production which, since 1980, expressed a constant interest for the original animal germplasm involved in the Mediterranean animal production systems. It is based also on the attainments of FAO-CIHEAM Research Network in the field of sheep and goat production and on the large survey organized under the EAAP auspices on the cattle Mediterranean systems.

The Mediterranean area is particularly rich genetically due to the variety of breeds which can be found, to the experience in the field of intra-species biodiversity, to the numerous references to the procedures of performance recording for the prospects of rare breeds and their conservation. The main lesson is the importance of the know-how in combining national and local approaches, state and private initiatives.

Integrated management of the genetic variability of Mediterranean livestock is essential to meet the increasing demand for meat and milk, to adjust the genetic material and the production systems to contrasted natural resources in the region and to avoid the irresistible disappearance of original genetic association of local breeds.



The Symposium enabled taking stock of the situation of Mediterranean germplasm at world level, taking into account the challenges for quantitative needs for feed, for the sustainable development of agriculture and the socio-economic evolution and issues in the region. The research for economic and social valorization of original germplasm is a new step for the conservation of farm animal biodiversity.

Atlante Etnografico delle Popolazioni Equine e Asinine Italiane per la Salvaguardia delle Risorse Genetiche [An Ethnographic Atlas of Italian Horse and Ass Populations for the Conservation of Genetic Resources]

Editors : Gustavo Gandini and Giuseppe Rognoni
CittàStudiEdizioni, di UTET Libreria srl, P. Leonardo da Vinci 7, Milano
Istituto per la Difesa e la Valorizzazione del Germoplasma Animale
Consiglio Nazionale delle Ricerche, P.F. Raisa, 1997, pp. 142, ISBN 88-251-0115-5

After the decline linked to the mechanisation of agriculture and transport, since the end of the seventies, in Italy, horse populations show positive demographic trends. The reduction and the extinction of populations after the World War II caused a great loss of genetic variability. The resumption of horse breeding offers the opportunity to save and promote the remaining autochthonous breeds. The first steps at this regard are those to improve the knowledge on the populations, to provide access to information and to make available the basic data for a monitoring system.

This atlas describes seventeen horse and five ass Italian autochthonous breeds. There are three sections for each breed or population: a file with all the essential information, a short text and some illustrations. The file provides demographic details, morphological and attitudinal characteristics and some information on the genetic and herd management of the population. The text is useful for an accurate understanding of the complexities involved in certain populations, which are not easily summarised in the files. The illustrations include photographs and topographic maps which describes the original and current distribution area.

Some information of this Atlas will be soon available on the EAAP Animal Genetic Data Bank (<http://www.tiho-hannover.de>) and on the DAD-IS of FAO (<http://www.fao-arg/dad-is/>).

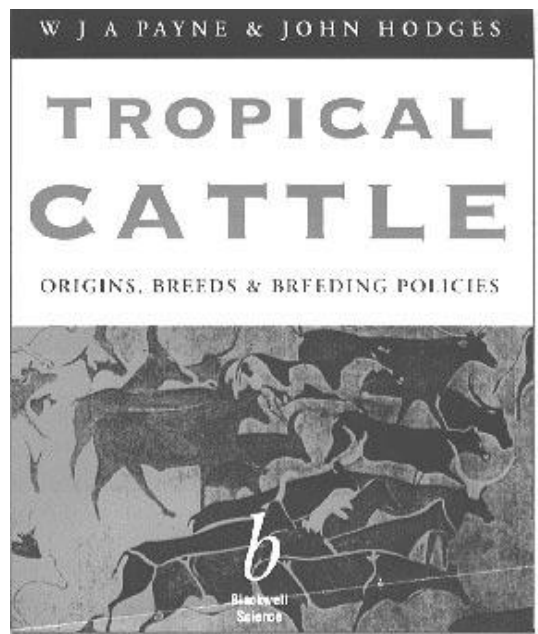


Tropical Cattle - Origins, Breeds and Breeding Policies

Eds.: W.J.A. Payne and J. Hodges
Blackwell Science, Osney Mead
Oxford OX2 OEL, UK, 1997, pp. 336, ISBN 0-632-04048-3

This work comprises three distinct but closely integrated parts. First an account of the origin and subsequent distribution of cattle throughout the tropical and sub-tropical regions of the World, citing contemporary evidence from anthropological, archaeological, historical, linguistic, socio-economic animal agriculture and genetic studies.

It is an original approach attempting to provide a comprehensive account of the origin and subsequent distributions of these cattle populations. In the second part, the cattle breeds of Africa, the Americas, Asia and Oceania are classified and described. In part three is shown that there were few genetic improvements in tropical cattle during the second half of the twentieth century. The reasons for this are examined and new and more realistic breeding strategies are proposed that are better adapted to the socio-economic conditions in the tropical regions. Current developments in biotechnology pertaining to animal genetic improvement in cattle production are reviewed, and their future potential for tropical conditions is assessed. In a nutshell this book gives a detailed perspective of cattle in the tropics from earliest times to an assessment of the potential future effects of molecular genetics. The book should appeal equally to professionals and academics as also students and technicians.



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Formaggi d'Europa: Storia, Modi di Produzione, Caratteristiche [European Cheeses: History, Production, Characteristics]

Ed.: P. Sardo
Slow Food Agricola Editors srl, V. della MendicITÀ Istruita 14-45 12042 Bra (CN), Italy
1997, pp.288, ISBN 88-86283-45-8

Few typical regional products of animal origin link so well the territory soil and climate with the local animal genetic material, the feed resources specific systems of production and transformation technologies, as do the cheeses and other specialised dairy products of Europe.

Today we can count with 127 cheeses that have the recognition of origin of the European Union, either Denomination of Origin or Geographic Indication: 38 are French, 30 Italian, 20 Greek, 11 Spanish, 10 Portuguese, 8 British, 3 German, 2 Austrian, 2 Danish, 2 Dutch and 1 Belgian.

This book tells in a clear and scientific but easily understandable way this story. The reader finds the physical descriptions, the systems and technologies of production, the defined geographic region, many historico-anthropological and socio-economic data and a useful reference glossary. One can also find in this book information of how to buy, cut, degustate, preserve and handle cheese.

This is a *vademecum* of interest to both students and professionals. It leads one through the European roads of quality dairy products and can be equally useful to gastronomy amateurs and interested tourists.

