

Conservation of an equine feral breed: the Asturcón Pony

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Summary

The Asturcón Pony was on the verge of disappearing during the decade of the 1970. The creation of A.C.P.R.A (Breeder's Association of Asturcón Ponies) and the measures undertaken by this association have made possible the present population of 400 of these animals and future perspectives for them to be bred at large for agrotourism and children's training in horseback riding and other equestrian sports. In spite of the fact that the recovery of the breed is being carried out with few individuals, our results show a high genetic variability. Analysing the allelic frequencies of blood polymorphism, we have obtained an average heterozygosity of 0.3649 ± 0.1070 akin to that of other ponies such as the Dartmoor (0.3396 ± 0.1060), Shetland (0.3158 ± 0.1246) or the Connemara (0.3797 ± 0.1000) and even superior to breeds such as the P.S.I. (0.2857 ± 0.1194) and the Arabian (0.2299 ± 0.0969).

Resumen

El poney Asturcón es una raza que estuvo a punto de desaparecer en la década de los 70. La creación de A.C.P.R.A. (Asociación de criadores de Poneys de Raza Asturcón) y las medidas acometidas por esta asociación, han hecho que en la actualidad se cuente con unos 400 ejemplares y unas buenas perspectivas de futuro como animal criado en libertad y dedicado al agroturismo y la iniciación de los niños en los deportes ecuestres. A pesar de que la recuperación de la raza se está llevando a cabo a partir de muy pocos ejemplares,

nuestros resultados muestran una elevada variabilidad genética ya que analizando las frecuencias alélicas del polimorfismo sanguíneo, hemos obtenido una heterocigosidad media de $0,3649 \pm 0,1070$ semejante a la de otros ponies como el Dartmoor ($0,3396 \pm 0,1060$), Shetland ($0,3158 \pm 0,1246$) o el Connemara ($0,3797 \pm 0,1000$) e incluso superior a razas como el P.S.I. ($0,2857 \pm 0,1194$) y el Árabe ($0,2299 \pm 0,0969$).

Keywords: Genetic profile, Genetic variability conservation, Autochthonous breeds, Handling, Behaviour and environment.

Introduction

In the last 100 years a great number of horse breeders associations have been created dedicated to their protection and improvement through the characterisation of their peculiarities and the opening of their corresponding studbooks that endorse genealogy and ownership for a given breed group. This is the case of the creation of the Regional Breeders Association of the Asturcón breed in 1981, later substituted by the Breeders Association of the Asturcón Pony (ACPRA) in 1986, which looks to the recovery, safeguard and expansion of this old horse breed that was on the point of disappearing during the 70s¹.

To guarantee conservation plans and modern breed improvement, some identification mechanisms and control of efficient filiation are indispensable. The study

of genetic markers of an individual allows us to know a part of their paternity and to assure their filiation. The statistical analysis of the data at breed level may be used to define the designated genetic profile.

The objective of this work is to carry out an initial prospecting on the different alleles of blood groups and biochemical polymorphisms of the blood present in this breed, as well as to undertake a comparative study, starting with data obtained from international bibliography of their genetic profile with that corresponding to other populations.

Origin and Historical Evolution of the Asturcón Pony

The Asturcón belongs to the Celtic ponies group, which includes the Icelandic pony, the Shetland and Highland Scots, the Irish Connemara, Fell, New Forest, Exmoor and Dartmoor from Great Britain, the Pottoka and Spanish Facó, and the Garrano from Portugal (Alvarez and Alvarez, 1987).

In the Cantabrian area, before the arrival of the Celts, a people with agricultural and ranching knowledge, called the Túmulos, existed although it is unknown whether they had really tamed the horse. The oldest discovered equine fossil in Asturias was located at Mestas de Con (Cangas Onis) and it belongs to the geological era of the Superior Villafranquiense (Cromeniense) and to the cultural period of the Acheliense (García Dory, 1980). During the time of Celtic dominance there was in the North and in the West of the peninsula a short, stocky horse, good for hauling, but not very good for war. Its head was small, and orthoidal, with short ears, strong croup, abundant hair and dark coat. It was frequently shod and clearly originated from the Tarpán horse, but had already been denominated Asturcón by Itálico in the III century (Valderrábano, 1970).

The first archaeological remains found that make reference to the taming of the Asturcón horse, are posterior to the Celtic invasion, during the IX to the V centuries (B.C.). The

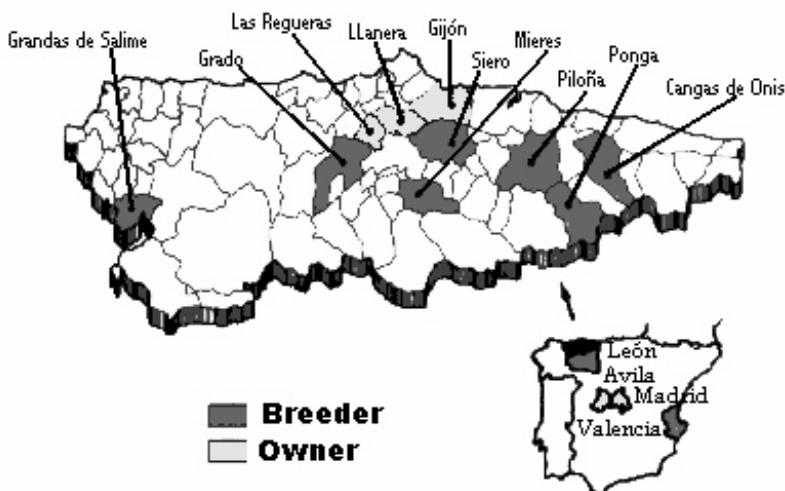


Figure 1. Main geographical areas where the Asturcón pony is currently used.



Figure 2. The Asturcón herds consist of 15 to 30 mares that remain together under the control of one stallion.

Celts were warriors that brought with them tame horses habituated to war. The taming and selection of these autochthonous horses, as well as the cross-breeding with imported breeds and the natural isolation of Asturias, gave rise to the formation of this breed.

These horses may have come from the *Equus gracilis* of Ewart from Central Europe, that gave rise to the Celtic pony, which in the Cantabrian peaks evolved into the present-day Galician, Asturcón, and Vasco-navarro ponies employed in transport, in war and in religious sacrifices (Anonymous, 1991).

Several thousand horses were used for auxiliary troops throughout the Roman empire, mainly destined to Germania, Britannia, Africa and to the East.

In the book "The History of British Native Pony" by Anthony Dent and Daphne Godall (1962), the Asturcones are extensively referred to and described minutely, affirming that they contributed to the creation of the Irish horse during the middle Ages.

Starting in the XVI century a stage of decadence for the autochthonous equine Spanish breeds begins. In the Corregidores of Oviedo's Royal Order, dated in Valladolid June 9 of 1562, the importation of large Central European horses was promoted and the castration of one year old autochthonous ponies is promulgated to stop their reproduction.

In the wars from the XVII to the XIX centuries (Succession, Demanda, Independence, Carlist) a great number of horses with defined qualities was required. However, the Asturcón pony was not considered as the most valuable in military confrontations, and therefore, new massive imports were carried out.

Nevertheless, up to 1940, in Asturias the herds or "corros" of Asturcones which presented little influence from other breeds was still very abundant, particularly in the Western area. It is calculated that there were

about 3 300 individuals roaming, to which we should add those used for agricultural labour (due to their strength and short stature they were very often used in the farming of fruit trees).

Due to the later new forests in traditional grass zones, the mechanisation of the field labour and the abandonment by the youth, this breed nearly became extinct, with only about 30 or 40 pure animals remaining at the end of the 70s'.

In the 80s' strong concern for their recuperation arose and the Regional Breeders Association of the Asturcón Pony was created in 1981 and later substituted in 1986 for the Association for the Asturcón Breed (ACPRA). Its mission is to control the Studbook in order

to recuperate, and preserve the breed using the few specimens still conserving the typical attributes.

Present distribution of Asturcón pony is shown in figure 1

Among the measures undertaken by the Association we should mention:

- Opening of the Studbook.
- Elimination of animals not adjusting to breed standard.
- Valuation and selection of stallions.
- Study of the inbreeding.
- Sanitary control of all herds.
- Prohibition of the sale of reproductive animals to non associated breeders.
- Since 1994 the formation of a DNA bank has begun.



Figure 3. In the face of danger, the group adopts a circular formation in which the young are placed on the inside.

Behaviour of the Asturcón, its Environment and Conditions of Development

The Asturcón herds live in groups of 15 to 30 mares that remain together under the control of one stallion, in charge of the guidance and protection of the group (Figure 2). In the face of danger, such as the proximity of wolf packs, the group adopts the formation of the typical “corro”, a circle in which the young are placed on the inside and the mares on the outside with heads and forequarters outward, while the sire tries to repel the possible attack (Figure 3). The male defender of the herd against other horses is however also in charge of permitting the entrance of other animals such as cows or sheep.

Traditionally it has been the western area of Asturias that presented more suitable conditions for the maintenance of the roving Asturcón (Fig. 1). This area, which hosts the mountains of Bovia, San Isidro, Illano, San Marín de Oscos, Vegadeo, Gargalois, Franfaraón, the Puerto del Palo, the Panchón and the Tineo, is characterised by soft mountainsides and abundant pasture practically all year round. Numerous mares existed in these zones up to 1940.

Another less important nucleus was the central east area by the coast, in the Mountain ranges of the Winds, the Pumar, and the Sueve. In these the Asturcón was raised in altitudes of between 1250 and 1400 metres. The frequent snowfalls made the Asturcones descend in search of food to inhabited areas, competing with cows, sheep and goats.

At the moment two types of management are known:

- One traditional, in which the Asturcón herd stays all year round in the mountains, coming down to the grasslands only in times of extreme climatic conditions (Figure 8). This breed lives in the mountains of Pedroriu and the Sueve.

- The second form of management began to develop when the association of ACPRA breeders was founded. It consists of breeders, with a small number of animals without rights to the communal grasses, who maintain the Asturcón ponies all year on their own grasslands (Figure 9).

Breed Standard and Genetic Profile of the Asturcón Pony

Breed standard

The Asturcón Pony presents some unique anatomical features, such as the short prominence of the occipital bone with regard to other non Celtic breeds, or the existence of canines in the inferior mandible in 90% of females, which gives us an idea of the breed’s archaism (Alvarez and Alvarez, 1987).

It is considered a ellipometric, subconcave horse, varying from longitudinal to sublongitudinal (Figure 6).

General aspect: strong, with admissible general conformation, and in pony-type proportions.

Coat: black, in different shades or dark bay or brown, with only the presence of a small star (Figure 7).

Wither height: in free breeding conditions it hardly surpasses 1.30 m. ranging between 1.20 and 1.35 m. according to the system of breeding. Animals over 1.48 m high are not inscribed in the Genealogical Animal Book (A.C.P.R.A., Record Regulation in the studbook).

Head: middle or small size, very defined and with straight to subconcave profile. The forelock is very thick, falling over the eyes mainly in males. Small ears, high set. Big eyes, black and expressive. Wide and extensive nostrils.

Neck: average length, strong, moderately fine in the females. Abundant and long manes.

Trunk: well arched ribs.

Chest: wide and moderate musculature, with a notable depth.

Back and loin: muscular and very tight. Slightly saddled back. Short flanks and kidneys.

Shoulder and withers: long shoulders, not very inclined. Noticeable withers and moderately light.

Forelegs: thin but strong, without large muscular masses, tendons are the same as the forelegs and ergots are short. Small black hoofs.

Croup: inclined, sometimes sunken. Of proportionate length and double width. Very thick tail that reaches the floor and sprouting at the height of the sacrum.

Hindlegs: short and very stocky. Marked clean hocks. Chestnut very small or null.

Genetic profile of the breed

In order to determine the genetic profile of the Asturcón horse, we have analysed an aleatory sample taken from 34 ponies inscribed in the Genealogical Book. The small number of horses studied allows little more than preliminary considerations.

The allele frequencies of the antigen factors of the erythrocyte membrane and of the biochemical polymorphism systems are shown in table 1. The existence of the allele *Dcfcgkm*, is indicated, considered so far as a marker of PRE breed. No antigen factor of the *Q* system of blood groups is detected.

The comparison of the results obtained in this breed has been carried out with allele frequencies from another 6 equine breeds from international bibliography: three breeds of European ponies such as the Dartmoor, Shetland and Connemara (Kaminski 1979), the Pure Spanish Breed Horse (Rodríguez-Gallardo *et al*, 1992), Arabian (Ouragh *et al*, 1994) and English Thoroughbred (Bowling *et al.*, 1975). The great coincidence in the drawing of the profiles can be appreciated, with the exception of punctual differences such as the case of the *Transferrin TF-F1* and the *Glucose phosphate isomerase GPI-F* and *GPI-S* (Figure 4).

In figure 5, the gene frequencies for these same systems are represented in comparison to the Asturcón pony, the Pure Spanish Breed (P.R.E.), the Arabian and Thoroughbred English (P.S.I.) horses, appreciating the breed

individuality of the Asturian horse. Likewise the characteristic profile of the *GPI system* is also highlighted.

In table 2 the Nei genetic distance (Nei, 1972, 1976) and the average heterozygosity (Lacadena, 1981) is shown among the seven breeds using five systems of biochemical polymorphisms, while table 3 shows the Nei genetic distance and the average heterozygosity to seventeen loci in four breeds; the Asturcón, Pure Spanish Breed, Arabian and P.S.I., being a reference of those obtained with only five loci, and confirming that the distances and heterozygosities are proportional.

In spite of the fact that the Asturcón population is very small and recuperated from very few specimens, it presents a high variability, since, using 17 loci, the median of the heterozygosities (Jx) possesses a value superior to that corresponding to the P.S.I. and Arabian horses and practically equal to that of the PRE horse (Table 3).

As for the values obtained of Nei genetic distance (Table 2 and 3), we observed that the Asturcón Pony has a high genetic similarity firstly, with the P.R.E. and immediately after with the Shetland and Dartmoor Ponies. This could corroborate the hypothesis that this breed had its origin in the trunk of the Celtic Central European pony and that later on there was a great isolation and breed differentiation where there were less and less frequent cross-breedings. This is not the case with the P.R.E. breed, which, because of its geographical proximity, could easily have been used several times to enhance this pony's breed.

Current Situation and Future Perspectives

A utilisation of the pony as a recreational animal has not existed traditionally in Spain and this has also contributed decisively to the precarious situation in which the Asturcón is found along with the rest of the

Table 1. Allele frequencies obtained in the analysed sample.

Systems of Blood Groups		Electrophoretics Systems		
<i>System A</i>		<i>System A1B</i>		
	A ^{adf}	0.4074	K	0.7500
	A ^{adg}	0.0253	S	0.2500
	A ^b	0.0789	<i>System ALB</i>	
	A ⁽⁻⁾	0.4883	A	0.5875
<i>System C</i>			B	0.4125
	C ^a	0.3675	<i>System ES</i>	
	C ⁽⁻⁾	0.6325	G	0.2125
<i>System D</i>			I	0.7875
	D ^{bcmq}	0.0500	<i>System GC</i>	
	D ^{cegimnq}	0.0375	F	0.9750
	D ^{cfgkm}	0.0375	S	0.0250
	D ^{degmp}	0.0625	<i>System GPI</i>	
	D ^{degmq}	0.0875	F	0.2875
	D ^{deloq}	0.4625	I	0.7125
	D ^{dfkl}	0.1750	<i>System HBA</i>	
	D ^{dghmq}	0.0500	BI	0.8250
	D ^{dkl}	0.0375	BII	0.1750
<i>System K</i>			<i>System PGD</i>	
	K ^a	0.0382	F	1.0000
	K ⁽⁻⁾	0.9618	<i>System PGM</i>	
<i>System P</i>			F	0.1000
	P ^a	0.4137	S	0.9000
	P ^b	0.0250	<i>System PI</i>	
	P ⁽⁻⁾	0.5612	G	0.0375
<i>System Q</i>			I	0.0125
	Q ⁽⁻⁾	1.0000	L	0.2625
<i>System U</i>			N	0.2500
	U ^a	0.4299	S	0.2875
	U ⁽⁻⁾	0.5701	T	0.1375
			U	0.0125
			<i>System TF</i>	
			D	0.3250
			F ₂	0.2000
			H	0.1125
			O	0.0750
			R	0.2875

Figure 4. Comparative graphic of frequencies of five systems of biochemical polymorphisms of four breeds of European ponies.

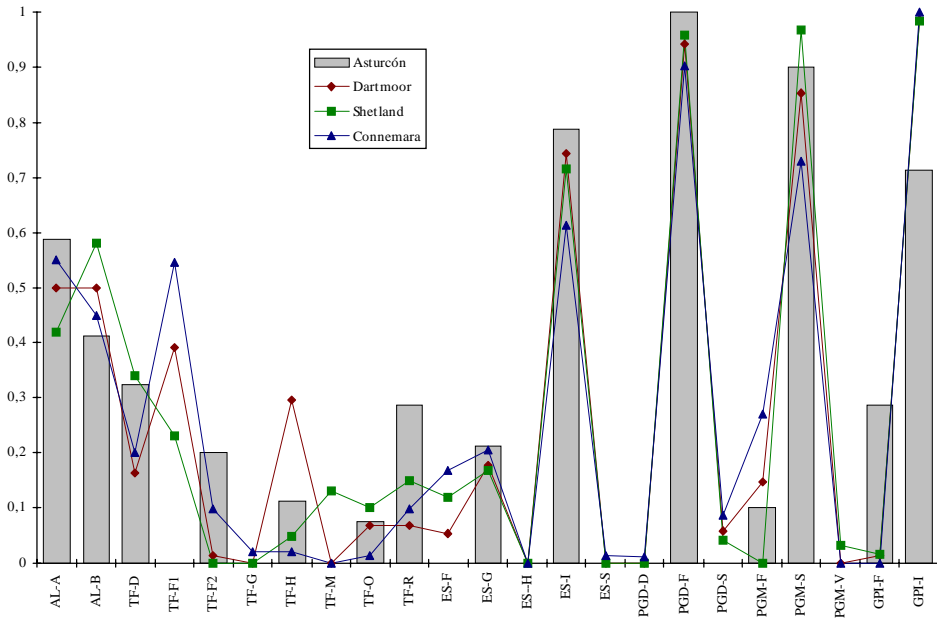
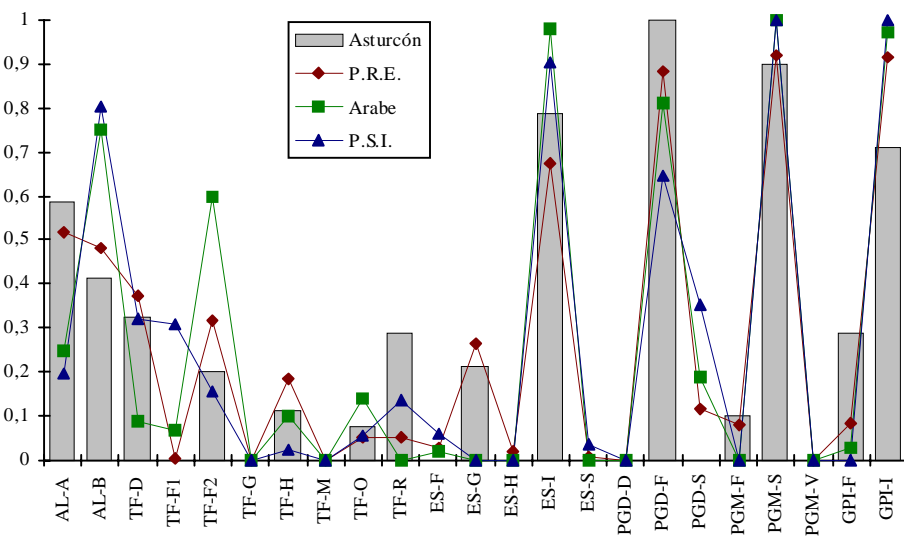


Figure 5. Comparative graphic of frequencies of five systems of biochemical polymorphisms of four equine breeds.



autochthonous ponies of the Iberian Peninsula. The traditional uses during the development of the Asturcón as a war horse and for traction in agriculture do not justify their conservation. Therefore the uses for which this breed presents advantages over the foreign horse should be promoted.

Between the measures undertaken by the ACPRA for the promotion of this breed we can point out:

- The periodic publication of pamphlets financed by various public as well private (Savings-bank of Asturias, Education Councils,, Culture, Sports and Youth of the Principality of Asturias, Patronage of Tourism...etc.) institutions with the aim of spreading the knowledge of this breed to breeders and riding fans.

Table 2. Genetic Distance D (up) and average heterozygosity J_x (diagonal) with their respective standard errors for the seven breeds at five loci.

Race	Asturcón	Dartmoor	Shetland	Connemara	PRE	Arabian	P.S.I.
Asturcón	0.3649± 0.1070	0.0582± 0.0488	0.0434± 0.0290	0.0879± 0.0606	0.0233± 0.0205	0.0968± 0.0486	0.1158± 0.0487
Dartmoor		0.3396± 0.1060	0.0222± 0.0237	0.0208± 0.0201	0.0418± 0.0021	0.0924± 0.0697	0.0708± 0.0351
Shetland			0.3158± 0.1246	0.0407± 0.0294	0.0312± 0.0316	0.0807± 0.0672	0.0481± 0.0288
Connemara				0.3797± 0.1000	0.0685± 0.0632	0.1294± 0.0773	0.0927± 0.0359
PRE					0.3680± 0.0959	0.0575± 0.0314	0.0763± 0.0378
Arabian						0.2299± 0.0969	0.0450± 0.0446
P.S.I.							0.2857± 0.1194

Table 3. Genetic Distance D (up) and average heterozygosity J_x (diagonal) with their respective standard errors for the 4 breeds at 17 loci.

Races	Asturcón	PRE	Arabian	P.S.I.
Asturcón	0.3936± 0.0577	0.1157± 0.0663	0.1630± 0.05953	0.2062± 0.0657
PRE		0.4039± 0.0629	0.0804± 0.0294	0.1484± 0.0623
Arabian			0.3340± 0.06314	0.0733± 0.0315
P.S.I.				0.3299± 0.06403

Table 4. Evolution of the number of associated breeders and of the animals registered in the Genealogical Book of the Race.

	1981	1983	1985	1990	1992	1993	1994
No. of breeders	3	5	6	16	26	36	40
No. of reproductive animals	21	38	68	168	241	284	343
No of castrated animals (Section C)	-	-	3	25	26	28	48
Total number of animals	21	38	71	193	267	312	391

(from ACPRA)

- The promotion of their use in various Spanish Pony Clubs. ACPRA is trying to guide the breeding of this pony toward children's horseback riding and equestrian sports, given their great resistance, their safety for riding and their magnificent temperament.
 - Periodical demonstrations, morphological and sports contests.
 - The favouring of scientific investigation of this breed (Ethnology, Biochemistry, Genetics etc.).
 - The presentation of the animals to all livestock fairs that the economic means of the Association have permitted.
- One of the main priorities of this association is to reach a sufficient ranch



Figure 6. The Asturcón Pony is considered a ellipometric, subconcave horse, varying from longitudinal to sublongitudinal.



Figure 7. The Asturcon coat is different shades of black, dark bay or brown.

population for the recovery of the breed, maintaining as much of their genetic variability as possible. Table 4 shows the evolution of the number of breeders and of animals registered in the Association since 1981. It emphasises the extreme gravity of the initial situation of this breed, and the slow but sure evolution in the number of breeders (from 3 in 1981 to 46 at the present time) and of registered animals (from 21 in 1981 to 391 around the end of 94). Therefore, at the end of 1994 the number of Asturcones registered in Asturias was 391 animals, divided between two main groups, one in the Principality of Asturias, located in the Cayón Mountains (town of Piloña) and the other in the Mountains of "The Pedroriu" (town of Grado) privately owned. In the Sueve, only 20 animals were found, the remainder being widely disseminated all over the region of Asturias, though individuals can be found in other points of Spanish geography such as León, Zamora, Cuenca, Cáceres, Alicante, Madrid, Castellón and Seville (Figure 1). The distribution by ages and sexes appears in table 5, the population of males representing

41.6% of the total compared to 58.4% of the females. Of 45 head unable to reproduce, 7 are devoted to agricultural tasks and 33 dedicated to children's horseback riding or equestrian tourism.

The expansion that this breed is currently experiencing, not only responds to the initiative of the national government for the conservation of the genetic patrimony, but is also due to the fact that its capacities satisfy some of the equestrian demands of society today. Its recognised nobility and quiet character makes it a saddle pony ideal for children to enter the world of horses and to initiate them in equestrian sports. The Pony Clubs of Madrid, Seville and Valencia are good proof of this. It has also had a great acceptance in educational activities such as Nature Classrooms. Finally, in rural tourism programmes, which are so popular nowadays, the Asturcones assume an added tourist attraction for the area.

Nor can we forget the importance of the genetic reserve that this autochthonous breed represents, with the advantage of its development on open ranges and on high



Figure 8. Traditional management system in which the Asturcón herd stays all year round in the mountains.



Figure 9. Second management system of the Asturcón pony. It consists of using breeders who keep the Asturcón ponies all year on their own grasslands.

Table 5. Distribution of the Asturcón population around the end of 1994 for ages and sex.

	Males	Females	Total
Reproductive animals	65	118	183
2 year old progeny	17	20	37
1 year old progeny	21	25	46
Weaned progeny	44	33	77
Castrated	45	3	48
Total	192	199	391

(from ACPRA)

mountain meadows, otherwise useless for agriculture. The Asturian ranching structure is currently undergoing a serious reconversion process, where milk production is being restricted to flat and fertile zones, while remaining grasslands and pastures are being abandoned due to the low profitability obtained by the traditional systems of bovine development and to the advanced age of the livestock farmers. In this way, the recovery of this breed may be used to support a pastoral economy that permits a demographic balance in these depressed zones, contributing in turn to the maintenance of the ecosystem in which it is developed (Alvarez and Alvarez, 1989).

Some of the short term objectives of this association are to reach a figure of 500 registered head and before the end of the century, have enough annual births to maintain a population of 1 000 mares (Technical Report of ACPRA, July 1995). This would mean that this breed, instead of being "in danger of imminent extinction", could be catalogued as "threatened" and "on the way to recovery".

In order to achieve these objectives institutional help will be needed. At the end of 1994 the European Commission agreed to finance through the European Agricultural Guidance and Guarantee Fund, a five year Spanish Programme on agro-environmental measures. The main proceeding lines of this

programme are to promote ecological agriculture, to preserve autochthonous breeds in danger of extinction and to maintain traditional extensive management systems (Decision of the Commission of the European Communities, 19 January 1995). The financial assistance to conservation effort of 55 autochthonous breeds in danger of extinction amounted to more than 2 000 million PTAs (\$ 16 000 000). The Asturcón is among these, together with another 7 Spanish equine autochthonous breeds.

Most recently, the Agriculture and Livestock farming Council of the Autonomous Community of Castilla and León, regulated the application of this assistance in this community (Official Bulletin of the Community of Castilla and León, number 127, Order of the Agriculture and Livestock farming Council of 28 June 1995). In this way assistance is being regulated to farmers committed to encouraging the conservation of genetic diversity, by raising animals of the autochthonous breeds of this Community (represented by the Asturcón and the Losino), with the set amount of the assistance which can be obtained to maintain, to increase and improve the census and to register these animals in the Genealogical Book of the breed.

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References

Anonymous 1996. Reglamento de Registro en el Libro Genealógico. A.C.P.R.A.

Aguilar, P., De Andrés Cara D.F. & Mériaux J.C. 1987. The Spanish Pure Breed Horse: a new combination of factors in the D blood group system. *Anim. Genet.* 18 (Suppl.1), 126-127.

Alvarez, A. & Alvarez, X. 1987. El Poney Asturcón. Ed. ACPRA. Imprenta Mercantil. Oviedo.

Alvarez, A. & Alvarez, X. 1989. El renacimiento del caballo Asturcón. *Quercus*, 3, 14-19.

Bowling, A.T. & Clark, R.S. 1985. Blood group and protein polymorphism gene frequencies for seven breeds of horses in the United States. *Anim. Blood Grps Biochem. Genet.* 16, 93-108.

Dent, A. & Godall, D. 1962. A history of British native pony. Cited in: Valderrábano 1970.

García Dory, J.M. 1980. Asturcón. El caballo de los Astures. Ed. Caja de Ahorros de Asturias. Oviedo.

Itálico, S. III, (CCCXXXV), Cited in Valderrábano 1970.

Kaminski, M. & Urbhanska-Nicolas, H. 1979. Electrophoretic polymorphism of proteins in the blood of horses. *Bioch. Sys. Ecol.* 7, 229-237.

Lacadena, J.R. 1981. *Genética*, 3ª Edición. A.G.E.S.A. Madrid.

Nei, M. 1972. Genetic distance between populations. *American Naturalist.* 106, 283-92.

Nei, M. 1976. Mathematical models of speciation and genetic distance. *Populations Genetics and Ecology.* Ed. Academic Press, New York, 723-765.

Ouragh, L., Mériaux, J.C. & Braun, J.P. 1994. Genetic blood markers in Arabian, Barb, and Arab-Barb horses in Morocco. *Animal Genetics* 25, 45-47.

Rodríguez-Gallardo, P.P., Aguilar, P., Vega, J.L. & De Andrés, D.F. 1992. Blood group and protein polymorphism gene frequencies for the Andalusian horse breed. A comparison with four American horse breeds. *Arch. Zoot.* 41, 433-442.

Valderrábano, R.L. 1970. El caballo y su origen. Introducción a la Historia de la Caballería. Ed. Institución Cultural de Cantabria. Santander.

The Criollo Horse in Uruguay

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Summary

The Criollo horse bred in Uruguay is a direct descendant of the Andalusian horses that were brought to America by the Spanish conquerors. It is not an isolated population. Ever since its coming into existence it has been related to the other populations of the southern countries of South America (Chile, Argentina and Uruguay). It is adapted to the most divergent regions of the continent, evolving through natural selection into a versatile breed, suited in particular for farm work because of its endurance, courage and capacity for recuperation.

At the beginning of this century, its existence was endangered because of the tendency of crossing with European breeds. Around this time, breeder organisations appeared in various countries and with them the standardisation of the Criollo horse as a breed. From this moment on, its growth was well maintained and constant, and today it is also being bred in Germany and Italy.

Resumen

El caballo Criollo criado en Uruguay es un descendiente directo de los caballos andaluces llevados a América por los conquistadores españoles. No es una población aislada, está emparentada, desde su formación, con las poblaciones de los demás países del Cono Sur Sudamericano (Chile, Argentina y Uruguay). Se fue adaptando a las más diversas regiones del continente, formándose por selección natural una raza de gran versatilidad, destacándose especialmente en las faenas de campo por su resistencia, valor y capacidad de recuperación.

A comienzo de siglo, con la tendencia a los cruces con razas europeas, se vio amenazada su existencia y en ese momento comienza a surgir en los diferentes países las agrupaciones de criadores y su estandarización como raza. Desde este momento su crecimiento es sostenido y constante. Actualmente también se cria en otros países como Alemania e Italia.

Key words: *Criollo horse, Animal genetic resources, Characteristics, Uruguay.*

Origin of the Criollo Horse

The American horse came into the New World through the island "La Española" (presently Santo Domingo) during the second voyage of Columbus in 1493. The island became a breeding centre, supplying the horses that were used for expeditions and conquests that followed. The breeding zone passed on to the continent 15 to 20 years after (del Río, 1990), and was later replaced by breeding centres in Colombia and Panama. Later still, in 1532, Pizarro took horses to Charcas (Peru), which became an important centre of horse production. From here, horses spread to Chile and Tucuman (Argentina). Around the same time Don Pedro Mendoza (in 1535) and Alvar Nuñez Cabeza de Vaca (in 1541) introduced horses directly from Spain to the Rio de la Plata region (Argentina and Uruguay), and to Paraguay respectively (Cabrera, 1945).

Horses were brought to the Southern countries of South America, from Peru, and also directly from Spain (Cabrera, 1945 and Tocagni, 1985). The base population for the

horse presently called Criollo did not descend from these two blood lines alone, because new blood (also of Spanish origin) was permanently introduced in the constant crossing of horses in the continent. Many horses were abandoned or lost in expeditions and battles, establishing themselves in the wild. These wild or untamed horses were also called “baguales” and could be seen in massive herds. In the year 1600, governor Diego Valdés wrote to Felipe III, referring to these “baguales”: *“They outnumber the amounts that, according to tradition, were present in those pasture lands of the province that were used by the Persian kings, and of which it is said that there were one hundred and fifty thousand horses. And here, if we would say that Your Highness possesses one and a half million, we would be underestimating the number”*.

The crossing and later fusing of these tame (owned by the colonists) and wild herds, originated the population today called Criollo. This population was often subject to

cross-breeding as a consequence of the rapid movements of the Indian and Gaucho mounts that followed the conquests and the colonial period. The Indians also had a great influence on the spreading of horses, exchanging them between different tribes and with the white men. In one of his works on the Criollo horse, Dr. Angel Cabrera confirms that this moving around of herds for three centuries resulted in an almost complete natural selection. This severe natural selection already played its part during the very long and hard journeys of those times, when a great percentage of the horses died before even reaching America. The ones which did survive had to endure rough environmental conditions and permanent danger. Thus, for all these years, only the stallions that were dominant because of their physical condition, could bring forth mares that were suited for reproduction under these circumstances. All these qualities presently make up the genetic heritage of the breed.



Figure 1. Three years-old male during Montevideo exposition, Uruguay.

Crossbreeding and Recuperation of the Criollo Horse

At the end of the last century and at the beginning of the present, other horse breeds were imported. At this time, the Criollo horse was indiscriminately crossed with mainly English breeds. Some breeders refused this cross-breeding and kept their animals pure. In order to maintain this "breed purity", there was an exchange of studs between the breeders who followed this genetic lineage. In Uruguay, ranchers broadened their spectrum when they thought it was convenient, exchanging products with Brazilian and Argentinean breeders (Anonymous, 1945).

After many years of crossbreeding the ranchers started noticing the lack of working horses for the herding of cattle. As a consequence, they returned to the origins of the breed through the herds that had been kept pure. Chile was the first country in this matter to ensure the preservation of its horses and to start with an official register. After a failed attempt in 1893, the register was successfully expressed in concrete terms in 1910 (Cabrera, 1945).

In Argentina, before the initiation of the official registers, Dr. Emilio Solanet kept his own registers of Criollo horses (Solanet, 1943, 1980). The majority of these horses was obtained from indigenous tribes (Dowdall,

1979). In a similar way, ranchers from Uruguay and the south of Brazil were exchanging studs, seeking the purity of their herds, before opening official registers (Anonymous, 1945). A movement in favour of the recuperation of the breed originated. Genealogical registers were opened, starting from the purest herds kept by those breeders who had refused cross-breeding. Every country that is presently a member of the Interamerican Federation for the Criollo Horse, started with the recovery of the breed by means of a system of inspection in order to incorporate the animal in the official registers (Table 1).

Every country upheld a similar inspection system in order to achieve a correct identification of the Criollo horses. In this way, all the "base" animals are incorporated and branded. These "base" animals are considered Criollo because of their type, shape and measurements, not to mention being of a known descent. A system of "preparatory register" is created, where every animal derived from two "base" animals is listed as "preparatory II", Leading to "preparatory III", until the definitive registered animal is derived from two prep. III. Animals derived from two definitives need not be submitted to inspection.

The objective of this inspection system is to control the production in such a way that at least 5 control generations, are always needed before a definitive registration is achieved, and a most thorough purification is made possible, so the carriers of inappropriate genes can be detected. The Tobian coat is accepted in some countries (Uruguay, Brazil and Paraguay) but not in others (Argentina and Chile), because subsequently it was considered that this coat had been introduced through horses from the north of Brazil, maybe of Dutch origin, which were brought to the Rio de la Plata by Tobias (Dowdall, 1979). The suspicion of a later incorporation of this colour, is due to the fact that it is not described in any chronicle of the expeditions of the conquests, but the entire range of the presently existing coats does exist in writings of the 16th century (Cabrera, 1945).

Table 1. Year of opening of Registers and Breeder Associations in some South-American countries.

Country	Opening of Registers	Breeder Association
Chile	1910	1946
Argentina	1918	1923
Uruguay	1929	1941
Brazil	1931	1932
Paraguay	----	1977



Figure 2. Typical head of the Criollo race.

Nowadays, animals with a preliminary register still exist, partly due to the longevity of the breed, and partly to the short reopening of the registers in countries where more base animals were incorporated. The last reopening occurred in Argentina in the fifties (Dowdall, 1979). In Uruguay, the last reopening occurred in the forties (Anonymous, 1945). The animals submitted to inspection can be classified as accepted, postponed or eliminated from the registers:

- *Accepted*: conform to the breed biotype and biometrics characteristics.

- *Postponed*: because of development failure and/or bad condition impeding a good morphological evaluation, or because of excessive development for its age. Submission to inspection can be repeated three times, and if not accepted the third time, the animal is eliminated from the registers.
- *Eliminated*: not conforming to the breed biotype and/or biometrics characteristics. The southern South American countries

have worked together for many years. They established a common breed standard in 1941 and founded the Interamerican Federation for the Criollo Horse (FICC) on 18th of July 1972, as well as organising expositions and international contests (Figure 1). The present members are Argentina, Brazil, Paraguay and Uruguay. Chile has not been a member since September 1996.

The Criollo Horse at Present

At present, all countries have kept their registers closed for many years. The present stage is one of evolution, where functional perfection and morphology, to respond the highest physical demands, are pursued. Nowadays, the same morphology, created by nature during more than 300 years, gives the Criollo horse its characteristic biotype, which

makes it the most suited riding horse for farm and ranching work (Ibarra, 1945 and Gallinal, 1948).

This evolutionary stage is marked by an increasingly fluent integration between the member countries of the FICC, with a tendency to standardise the selection criteria and functional trials. This selection methodology in which morphology and functionality are united is called “integral selection” and the most complete trial is the Golden Bridle, presented in Brazil, but preliminary trials for the finals in Brazil, are nowadays also being held in Uruguay. The advantage of these trials is that the animals are being judged on their morphology and functional abilities in a very complete way. The disadvantage is that not all of them are evaluated under all of these trials because it is not considered a stallion evaluation.

Concerning breed selection, a population



Figure 3. Mares during resistance competition. “Marcha funcional”.

improvement programme still does not exist. Its implementation would by no means be easy because the total breed population is the one existing in the member states of the FICC. In Uruguay alone, there are 2 774 inscriptions per year, representing 72.8 % of the total of all breeds. Brazil has a total population of 93 528 animals and every year 10 000 are registered. Updated numbers could not be obtained from the other member countries of the FICC.

Presently there is an intensive control of the population, thanks to the inspections, but estimations are that within 15 years all the Criollos in Uruguay will be definitive, so that inspections will no longer be necessary and control over the population will be lost. The future situation obviously requires the implementation of an Improvement Programme.

The Criollo horse is mainly fit for farm and ranching work, since stockbreeding in the

countries is totally extensive. In this system the horse plays a fundamental part in the herding and handling of the cattle and also in the transport between the “haciendas”. So, the objective of the improvement of the breed is very clear.

The importance of the physical qualities of the Criollo horse, fundamental for the ranchers, was considered by the breeders associations as a fundamental point, together with its morphological qualification, in the perspective of their selection and improvement programme.

The functionality trails have an ever-increasing relevance, and the most important ones can be classified into three groups:

1. *Functional or resistance course*: these are run over a course of 750 km divided into 14 stages. The robustness, resistance to exhaustion and capacity for recuperation are manifested. This trial is very popular in Uruguay, where it is being proposed as a functional trial (Figure 3 and 7).



Figure 4. Pair of mares pair during “paleteadas” competition.



Figure 5. "Jalones" competition.

2. *Rein trial or rein course*: the objective is to test the agility, co-ordination, temperament, docility, natural worker instinct and innate ability to exert diverse marching patterns (Figure 5, 6 and 8). There are different trials in this group:

- a) Common rein trial.
- b) Course with vertical stakes of approx. 3 m height, with a different name according to the country.
- c) Criollos of America: trial with barrels.
- d) "Paleteadas en juntas" or the ability of a ridden horse with another to draft a steer into a barn or a pen (Figure 4).
- e) Tail catching: the calf has to be rolled over by catching its tail.

3. *Golden Bridle*: at present the most complete trial, in which the competitors are judged by their morphology. Later on, for several

days there are rein and mobility trials with cattle in corrals and in the open field. The final takes place in Esteio (Brazil). Prado (Uruguay) is one of the classification locations.

The breeders associations from the different countries are aware that these trials are fundamental for selection, since morphological qualities without the corresponding functional abilities are not sufficient for the breeding of the breed.

The trials are becoming increasingly important, consolidating and assuring constant growth, and revalorisation of the cultural inheritance of the Criollo horse.



Figure 6. Figure trial during “Freno de Oro” competition.



Figure 7. Physical condition after covering 750 km. In 14 days. “Marcha funcional”.

Standard of the American Criollo breed

In the Extraordinary General Assembly of the 4th Interamerican Reunion of Criollo Horse Breeders, convened in 1959, the Criollo Breed Standards were updated, although every country maintains its own profile within the limits of the following standards (Anonymous, 1959):

- Eumetric, mesomorph, with straight or subconvex profile.
- *Type*: pronounced musculation and modelled in strength, but also agile and swift in its movements.
- *Temperament*: active and docile.
- *Height*: ideal at 1.44 m, with fluctuations between 1.38 and 1.55 m, but heights not

exceeding 1.48 m are advisable (mares 2 cm less). The breeders associations from different countries can, within these limits, impose their own maximum and minimum limits, according to their interests.

- *Thorax circumference*: ideal at 1.78 m (mares 2 cm less).
- *Cannon circumference*: ideal at 0.19 m (mares 1 cm less). The fluctuations of this measurement must follow those of the stature.
- *Coat colour*: with the exception of “pintado”, all colours are accepted.
- *Head*: altogether short, broad base, fine crown and broad front (proportionally big crown and little face). Little ears are best, intelligent and expressive eyes, and dilated nostrils (Figure 2).



Figure 8. Corral trial during “Freno de Oro” competition.

- *Neck*: of intermediate length, well united in its two extremes, slightly convex in its superior line and almost straight in its inferior line. Abundant manes.
- *Withers*: muscled and not very pronounced.
- *Back*: broad and with proportioned extension to complement a broad thorax.
- *Loins*: short, broad, muscular, well joined to the back and the croup. Altogether there must be perfect harmony between the different parts.
- *Croup*: of intermediate length and width, very muscular, well developed.
- *Tail*: with an insertion that follows the superior line of the croup. Short and thick root of tail with abundant hairs.
- *Chest*: broad and muscular.
- *Trunk*: very well developed, ribs well arched, deep and empty stomach.
- *Hip*: short and full.
- *Shoulder*: properly inclined, with the elbow well separated from the thorax, and both very muscular.
- *Foreleg*: perpendicular, long and very muscular, becoming more refined near the knees.
- *Knees*: broad, strong, of intermediate length and bright.
- *Hindquarters*: thigh is muscular, buttock must be long. Gaskin, broad and muscular. Hock joint very pronounced.
- *Bulb of heel*: broad, strong and muscular, well standed. They must also be parallel with the medium level of the body. The anterior angle of the bulb of the heel will be slightly open.
- *Cannon*: short, strong and well defined.
- *Pastern*: rounded, medium length, wide, and slightly inclined.
- *Hoof*: its volume is proportionate to the body, hard, solid, and well trod. They are usually black.

References

- Anonymous.** 1945. Reseñas sobre orígenes de nuestras manadas criollas. Anales de la Sociedad de Criadores de Caballos Criollos, Uruguay, Año II Número II, 71-84.
- Anonymous.** 1959. IV Reunión Interamericana de Criadores de Caballos Criollos. Asamblea General Extraordinaria, 21 de Julio de 1959.
- Cabrera, A.** 1945. Caballos de América. Ed. Sudamericana. Argentina, pp. 405.
- Del Rio, J.** 1990. La propagación del Caballo en América. El Caballo Español No. 5: 36-37
- Dowdall, R.** 1979. Criando Caballos. Ed. Hemisferio Sur. Argentina, pp. 409.
- Gallinal, A.** 1948. Consideraciones sobre la evolución del Caballo Criollo. Anales de la Sociedad de Criadores de Caballos Criollos 1947/48, Uruguay, Año V, 4: 31-39
- Ibarra, E.** 1945. Acotaciones sobre el caballo Criollo. Anales Sociedad de Criadores de Caballos Criollos, Uruguay, Año II. No. 2: 39-41.
- Solanet, E.** 1943. Hipotecnia. Ed. Morata. Bueno Aires (Argentina), pp.110.
- Solanet, E.** 1980. La alzada del Caballo Criollo. Anuario Criollos, Agosto, Uruguay, Año VIII: 1, 31-51.
- Tocagni, H.** 1985. El Caballo Criollo. Ed. Albatros, Argentina, pp. 114.

Le Zébu Gobra: caractères ethniques et performances zootechniques

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Résumé

Dans cette étude, les auteurs font le point sur les principaux résultats obtenus chez le zébu Gobra. La croissance est de 280 g/j dans les conditions d'élevage du C.R.Z de Dahra. Elle peut atteindre cependant 736 g chez des mâles recevant dès la naissance une alimentation équilibrée et 1 080 g dans des unités d'embouche. Les caractéristiques de carcasse sont bonnes et comparables à celles de la plupart des races à viande spécialisées. L'âge à la 1ère mise-bas (1 365,6±24 j) et l'intervalle entre mise-bas (15,5 mois) sont élevés mais sont susceptibles de diminuer lorsque les conditions d'élevage sont améliorées.

Summary

This paper reviews the main results obtained in zebu Gobra cattle. Under the breeding conditions of C.R.Z. of Dahra, the average daily growth is 280 g but can reach 736 g in well fed males and 1 080 g in feed lots. Carcass traits are also good and compare favourably with those of specialized meat breeds. Age at first calving (1 365.6±24 days) and intervals between calvings (15.5 months) are high but can be reduced by improving breeding conditions.

Key words: *Reproduction, Production, Physical characteristics*

Introduction

Malgré les efforts consentis à ce jour dans le secteur de l'élevage, l'Afrique continue de faire face à une insuffisance en protéines d'origine animale. L'une des causes principales de ce déficit alimentaire est la faible productivité du cheptel. En effet, les pays du Sud disposent de 70% du cheptel bovin et de buffles du monde mais ne produisent que 29% de la viande et 23% du lait (Janhke *et al.* 1988). Pour accroître la productivité du cheptel, très tôt des programmes d'importation de race exotique ont été mis en place. Mais face au manque de rusticité de la plupart des races introduites, les races locales se positionnent de plus en plus comme des alternatives durables vers l'autosuffisance alimentaire. C'est ainsi que, par exemple, sur l'échiquier régional, la grande rusticité de la race taurine Ndama est de plus en plus reconnue, ce qui explique le grand engouement que suscite la race (Shaw et Hoste, 1991).

Au Sénégal se rencontre le zébu Peul ou zébu Gobra décrit par différents auteurs comme l'une des meilleures races de boucherie d'Afrique de l'Ouest (Doutressole, 1947; Ndiaye et Balam, 1977). Pour cette raison sans doute, l'IEMVT (Institut d'Élevage et de Médecine Vétérinaire des Pays tropicaux) relayé ensuite par l'ISRA (Institut Sénégalais de Recherche Agronomique) se sont très tôt attelés à une meilleure connaissance de la race. Toutefois, les résultats obtenus chez le zébu Gobra restent disparates puisque la seule étude bibliographique existant sur cette race ne

traite que de ses caractères ethniques (Ndiaye et Balam, 1977).

Cette étude vise à faire le point sur les performances de reproduction et de croissance du Zébu Peul du Sénégal.

Le Berceau et l'Aire de Répartition

D'après Doutressole (1947), le zébu Gobra vit à l'Ouest du Sénégal, dans les provinces du Baol, du Djoloff et du Cayor et au Nord, dans la province du Sine Saloum et le long du fleuve Sénégal. On le trouve également en Mauritanie (Epstein, 1971) et dans le Sahel Malien qu'il aurait atteint à la suite des guerres de El hadji Oumar (Ndiaye et Balam, 1977). Son aire de répartition, qui est comprise

entre le 12° et le 16° longitude Ouest et le 13,5° et le 16,6° latitude Nord, est caractérisée par une faible pluviométrie (340 mm entre Juillet et Septembre) et une température moyenne annuelle de 28°C.

Au Sénégal, trois variétés de Zébu Gobra sont décrites: les variétés Djoloff, Baol et Dagana (Doutressole, 1947). A cela s'ajoute dans le bassin arachidier et en haute Casamance une population métisse plus ou moins stabilisée issue du croisement entre le Gobra et la race taurine Ndama appelée Djakoré.

Caractères Ethniques

C'est un animal sub-convexiligne, eumétrique et médioligne. Chez l'animal adulte, la hauteur au garrot varie de 1,35 m à 1,40 m



Figure 1. Zébu Gobra à robe blanche

chez le mâle et de 1,25 à 1,35 m chez la femelle. Le poids est compris entre 300 et 400 kg chez le mâle et entre 250 et 350 kg chez la femelle. Toutefois, chez la variété Djoloff qui est la plus grande, la hauteur au garrot peut atteindre 1,54 m.

La tête est fine et longue, le front bombé, les yeux gros, le chignon saillant, le chanfrein rectiligne et les oreilles longues et dressées. Les cornes qui peuvent atteindre jusqu'à 80 cm de longueur sont portées en lyre haute. Elles sont plus développées chez les mâles que chez les femelles. Le fanon est large et plissé surtout près des membres antérieurs. La bosse, thoraco-cervicale est bien développée chez le mâle alors qu'elle est petite chez la femelle. La poitrine et les reins sont étroits, le bassin large, les fesses sont garnies et globuleuses chez les animaux préparés pour la boucherie. La queue qui dépasse la pointe du jarret de quelques cm est terminée par un toupillon important. La robe est généralement blanche (Figure 1) mais quelquefois blanc rayée de noir (Figures 2 et 3), rouge-pie et froment.

Les Paramètres de Reproduction

L'âge au premier vêlage

Selon Fayolle (1974) cité par Mime (1981), en milieu traditionnel l'âge à la première mise bas est compris entre 4 et 5 ans. Au Centre de Recherche Zootechnique (C.R.Z.) de Dahra, dans des conditions semi extensives d'élevage, les femelles sont mises à la reproduction vers l'âge de 24-27 mois, qui correspond au moment où elles atteignent 75-80% de leur maturité (Abassa, 1987). Dans cette station, l'âge au 1er vêlage est de $1365,6 \pm 24$ j, soit 44,8 mois (Denis et Thiongane, 1973). Ceci traduit une absence de précocité sexuelle de la vache Gobra qui serait due aux conditions d'élevage en général et à l'alimentation en particulier. En effet, Denis et Valenza (1970) ont montré qu'on pouvait ramener l'âge au premier vêlage à 31 mois en soumettant les animaux dès la naissance à une supplémentation appropriée.

L'intervalle entre vêlages

Il comprend la durée de gestation et l'intervalle entre la parturition et la nouvelle fécondation appelée période de service. L'intervalle entre vêlages est de 15,5 mois chez la vache Gobra (Denis, 1971) ce qui correspond à 2 naissances en un peu plus de 3 ans. La durée de gestation étant peu variable dans cette race (293 ± 2 j) (Denis et Thiongane, 1973), c'est donc la période de service qui rend compte de la variation observée. Ce délai dans la fécondation serait dû à la présence permanente des taureaux dans les troupeaux, au déficit alimentaire et à l'allaitement prolongé des produits (Denis, 1971). C'est ainsi qu'une amélioration d'un mois de l'intervalle entre mise-bas a été obtenue lorsque les conditions d'alimentation ont été améliorées (Denis et Thiongane, 1973).

La fécondité

La fécondité, c'est à dire le nombre de naissances annuelles ramené au nombre de femelles en âge de se reproduire, est de l'ordre de 53-55% en milieu traditionnel (Meyer, 1981). Elle est fortement tributaire des conditions de milieu puisque dans la zone d'encadrement de la SODESP (Société de Développement de l'Élevage dans la Zone Sylvopastorale), elle a pu être portée à 67%. Chez la vache extériorisée, Denis (1971) a rapporté un taux de fécondité de 86%. Cette forte influence des conditions d'élevage sur la fécondité explique sans doute les fortes variations saisonnières observées. En effet, comme le montre la figure 4, plus de 50% des naissances ont lieu entre Mars et Août, ce qui situe la période de fécondité favorable entre Juin et Novembre (Denis et Thiongane, 1975). Mais pour Cuq *et al.* (1974), près du 2/3 des fécondations ont lieu entre Septembre et Novembre, qui est la période au cours de laquelle le disponible fourrager atteint son maximum et les vaches leur meilleure forme (Denis et Valenza, 1970).

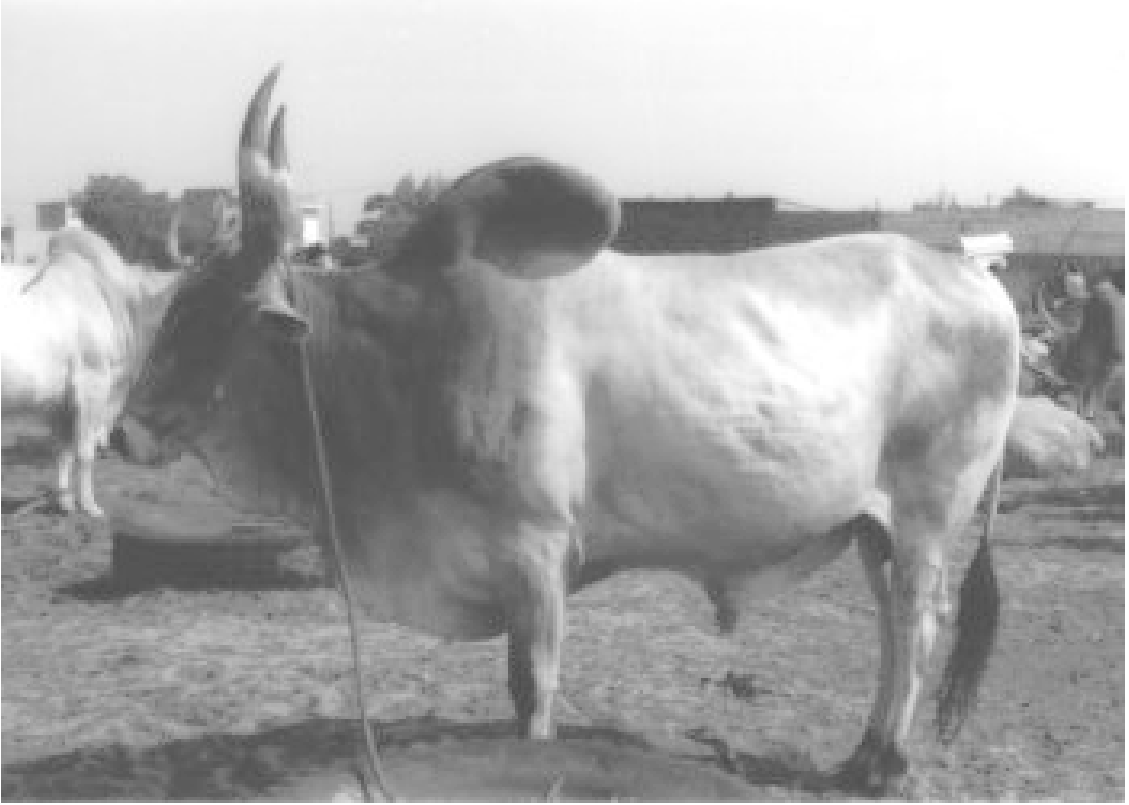


Figure 2. Zébu Gobra à robe blanche et noire

Les Paramètres de Production

La croissance et les caractéristiques de carcasse

La croissance

Le Gain Moyen Quotidien (GMQ) est de 280 g de la naissance à 36 mois d'âge (Sow *et al.*, 1988). Ainsi le poids passe de 25,5 kg à la naissance à 328,5 kg à 3 ans (Figure 5). En réalité, la croissance est bonne avant sevrage (429 g) et ne se détériore qu'après (249 g). De plus, chez les animaux ayant reçu dès leur naissance un régime tenant compte de leurs besoins, des GMQ de 736g et de 546 g ont été relevés respectivement chez les mâles et les femelles. C'est en particulier en embouche que les excellentes aptitudes bouchères du Zébu Gobra sont révélées. En effet, chez des zébus soumis à une ration à base de coques

d'arachide melassées ou de paille de riz, complétée avec différents sous produits agricoles, des GMQ de 586 à 1080 g ont été obtenus; les meilleurs résultats ayant été observés chez les mâles entiers de 3-5 ans.

Les différentes parties du corps du Zébu Gobra n'ont pas la même vitesse de croissance. Celle-ci se fait essentiellement en longueur et en profondeur, comme le montre l'augmentation régulière des ratio LSI/PT et LSI/HG, d'une part, et PT/HG, d'autre part (Tableau 1).

Les caractéristiques de carcasse

Le tableau 2 présente les caractéristiques de carcasse de zébu Gobra. Chez les animaux tout venants âgés de 3-5 ans, le poids de la carcasse est de 128,7 kg pour un rendement d'abattage de 56,7%. Le poids de la carcasse atteint 373 kg et le rendement d'abattage 66,5% chez les animaux extériorisés d'âge

Tableau 1. Evolution en fonction de l'âge de quelques mensurations chez le Zébu Gobra

	Age			
	Naissance	6 mois	1an	36 mois
Périmètre thoracique (PT, cm)	68,6	109,4	124,4	163,4
Hauteur au garrot (HG, cm)	66,1	92,6	101,4	121,2
Longueur scapulo-ischiale (LSI, cm)	54,1	88,5	108,7	142,6
LSI/PT	0,79	0,81	0,87	0,87
PT/HG	1,04	1,18	1,23	1,35
LSI/HG	0,82	0,96	1,07	1,18

Tableau 2. Caractéristiques de carcasse chez le Zébu gobra.

	Zebu Gobra ¹		Charolaise ²
	Taurillons tout venant (3-5 ans)	Taurillons extériorisés (54 mois)	
Poids d'abattage (kg)	254	605,5	654
Poids de la carcasse froide (kg)	128,7	373	392
Rendement vrai (%)	56,7	66,5	68
Longueur de la carcasse (cm)	107,8	133,3	132
Épaisseur de la cuisse (cm)	19,4	29,7	32
% muscle	-	63,3	73
% os	-	15,67	15
% gras	-	19,98	13

Sources: ¹Mime P. 1981; ²Missohou A. 1991

analogue. Ce bon rendement, de même que les autres caractéristiques de carcasse (longueur de la carcasse, épaisseur de la cuisse) sont particulièrement proches de ceux rapportés en race Charolaise (Tableau 2), race à viande par excellence, et confirment les aptitudes bouchères remarquables du Zébu Gobra. Les pourcentages de muscle et de gras sont moins bons que ceux de la race Charolaise mais ils sont comparables voire meilleurs à ceux rapportés par Cole *et al.* (1964) (Cités par Valenza *et al.*, 1971) chez d'autres races à viande spécialisées.

La production laitière

La production laitière du Zébu Gobra est très faible. Estimée de façon directe par pesée du veau avant et après la tétée, la quantité de lait produite sur 11 mois de lactation dans un troupeau tout venant est de 675 l (environ 2 l/j) (Thiongane et Denis, 1969). En milieu traditionnel Diaw (1974) utilisant la même technique d'estimation a obtenu 1,3 l/j sur 6 mois de suivi.



Figure 3. Taureau Gobra "blanc rayé de noir"

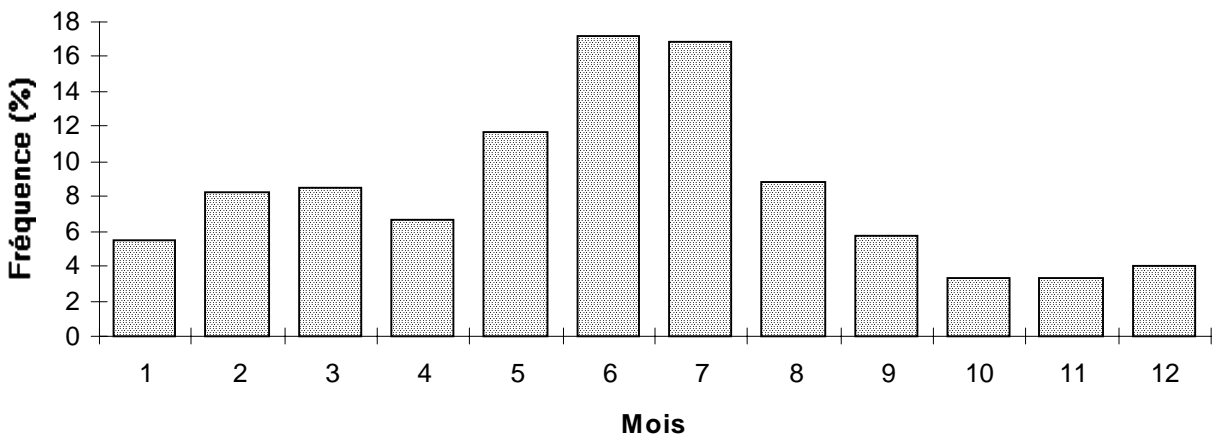


Figure 4. Répartition des naissances de zébus Gobra. Source: Denis et Thiongane, 1975.

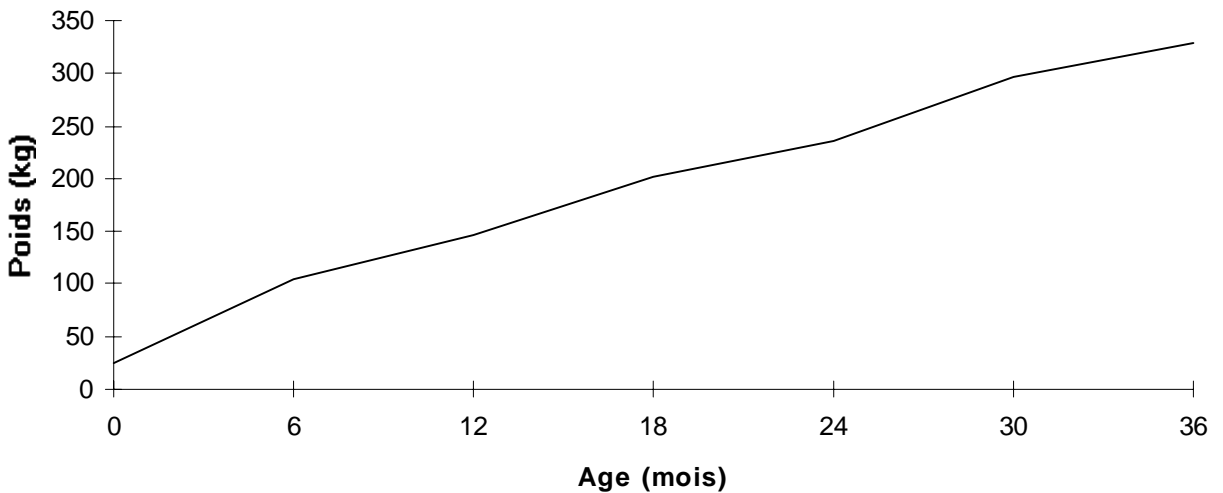


Figure 5. Croissance pondérale chez le zébu Gobra. Source: SOW et al., 1988.

Conclusion

Le Zébu Gobra possède des potentialités bouchères remarquables dont l'extériorisation est cependant limitée par des conditions de milieu défavorables. Une amélioration des conditions d'élevage, en particulier une supplémentation stratégique pendant les périodes de soudure, doit permettre d'accroître sa productivité numérique et pondérale. Ce faisant, on se dote de moyens de faire face aux lourds déficits en viande qui menacent le continent noir à l'horizon de l'an 2000.

Références bibliographiques

Abassa, K.P. 1987. Analysis of growth curve parameters of Gobra Zebu females in Senegal. *Trop. Anim. Hlth. Prod.* (19) p223-228.

Cuq, P., Ferney, J. & Vancrafynfs, P. Le cycle génital de la femelle Zébu (*Bos indicus*) en zone soudano-sahélienne du Sénégal. *Rev. Méd. Vet.* (37) 147-173.

Denis, J. & Thiongane, A.I. 1973.

Caractéristiques de reproduction chez le Zébu étudiées au Centre de recherches Zootechniques de Dahra. *Rev. Elev. Med. Vet. Pays trop.* (26) 49a-60a.

Denis, J.P. & Thiongane, A.I. 1975.

Note sur les facteurs conduisant au choix d'une saison de monte au CRZ de Dahra. *Rev. Elev. Méd. Vét. Pays Trop.* (28) 491-497.

Denis, J.P. & Thiongane, A.I. 1973.

Caractéristiques de reproduction chez le zébu Gobra étudiées au CRZ de Dahra. *Rev. Méd. Vét. Pays Trop.* (26) 49a-60a.

Denis, J.P. & Valenza, J. 1970.

Comportement pondéral des femelles adultes de race Gobra: comparaison avec les races importées Pakistanais et Guzerat. *Rev. Elev. Med. Vet. Pays Trop* (23) 229-241.

Denis, J.P. & Valenza, J. 1971.

Extériorisation des potentialités génétiques du zébu Peulh Sénégalais (Gobra). *Rev. Elev. Méd. Vet. Pays Trop.* (24) 409-418.

- Denis, J.P.** 1971. Bilan de 15 années de Recherches Zootechniques sur le zébu Peulh Sénégalais au C.R.Z. de Dahra. Communications personnelles, Addis-Abéba.
- Denis, J.P.** 1971. L'intervalle entre les vèlages chez le zébu Gobra. Rev. Elev. Méd. Vét. Pays Trop. (24) 635- 641.
- Denis, J.P.** 1971. Note sur l'âge au premier vèlage chez le zébu Gobra. Communication présentée à la conférence Internationale de Zootechnie, Versailles.
- Diaw, A.** 1994. Impact des étables fumières dans la mise en place d'une ceinture laitière urbaine: l'exemple de Tambacounda (Sénégal). Thèse de Doctorat Vétérinaire, N° 29, Dakar.
- Doutressole, G.** 1947. L'Élevage en Afrique Occidentale Française. Paris.
- Epstein, H.** 1971. The origin of the domestic animals of Africa I. Munich Germany.
- Janhke, H.E., Tacher, G., Keil, P. & Rojat, D.** 1988. Livestock production in tropical Africa with special reference to the tse-tse affected zone. In: Livestock production in tsé-tsé affected areas of Africa. Proc. Meeting of 23-27 nov. 1987, Nairobi, Kenya.
- Meyer, J.F.** 1981. Lutte contre l'aridité en milieu tropical. «Etudes des systèmes de production d'élevage au Sénégal. Volet Zoo-economie, -IEMVT - Paris.
- Mime, P.** 1981. Aptitude du Zébu Peulh (Gobra) pour la production de viande. Thèse de Doctorat Vétérinaire, No. 21, Dakar.
- Missohou, A.** 1991. Relation entre les composantes de la croissance et la qualité de la viande chez les bovins. Mémoire de fin d'étude. ENSA, Rennes.
- Ndiaye, A.L. & Balaam, F.** 1977. Zébu du Sénégal. Bulletin AASNS Octobre 1977 No. 59, 15-19.
- Shaw, A.P.M. & Hoste, C.H.** 1991. Les échanges internationaux de bovins trypanotolérants. I. Historique et synthèse. Rev. Elev. Méd. Vét. Pays Trop. 44, 221-228.
- Sow, R.Z., Denis, J.P., Trail, JCM., Thiongane, P.I., Mbaye, M. & Diallo I.** 1988. Productivité du Zébu Gobra au centre de Recherche Zootechnique de Dahra (Sénégal). Etude et document Vol. 1. N° 2 p. 45.
- Thiongane, A. & Denis, J.P.** 1969. L'amélioration du Zébu peulh Sénégalais par la sélection et le croisement. Colloque sur l'élevage. Fort Lamy, Tchad. 8-13 décembre 1969.
- Valenza, J., Calvet, H.O. & Rue, J.** 1971. Engraissement intensif des zébus Peulhs Sénégalais. I, II, et III Mâles entiers 3 - 5 ans et boeufs de 7 - 9 ans. Rev. Elev. Med. Vet. Pays Trop. (24) 597-634.