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The last survivors of Grey cattle resisting extinction. A case study of characteristics and sustainability of traditional systems of native Grey cattle breeds

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SUMMARY – It is concluded that pure breed Grey cattle as a source of farm animal genetic resources remain only in marginal areas of the Enez and Ipsala districts of the Thrace region (Turkey) which previously had a large population. A survey aimed to provide a general panorama of Grey cattle husbandry was applied in 6 localities of the region such as the villages of Chandir, Isiklar, Hisarli, Karpuzlu and the suburbs of Enez and Ipsala. Fifteen cattle breeders were interviewed for the survey. According to the source of the pre-herd book project of the Ministry of Agriculture, the three provinces of Edirne (97%), Kirklareli (0.26%) Tekirdag (1.9%) of the Thrace region have a total Grey cattle population of 5301 head. The Enez and Ipsala district of the Edirne province have the share of 67.8% and 26.9% of the population respectively. Education levels of the cattle breeders were high school (4%), middle school (20%) and elementary school (76%). All Grey cattle breeders practised only cattle husbandry as a source of income. The herd composition was 75% female and 25% male. The average herd size was 57.88 heads. The average number of family members was 4.76. The average age of cattle breeders was 46.2. Due to adaptive advantages of Grey cattle genotypes to the poor pasture and wetland area of the regions even very particular primitive or unproductive systems are practised. Grey cattle production systems in this area have potential from the sustainability point of view. Grey cattle fattening experiences showed that at an average weight of 155 kg, two-year old males can gain 58.53 kg after three months of fattening.

Keywords: Boz Steppe cattle, Turkish Grey Cattle, animal genetic resources.

RÉSUMÉ – *"Les derniers bovins gris survivant à l'extinction. Etude de cas sur les caractéristiques et la durabilité du système traditionnel de la race autochtone de bovins gris". Il est conclu que la race pure de bovins gris, en tant que vivier de ressources génétiques animales comme animaux d'élevage, ne subsistait que dans des zones marginales des districts d'Enez et d'Ipsala dans la région de Thrace, où existait auparavant une vaste population. Une étude visant à examiner la situation générale de l'élevage de bovins gris a été menée dans six localités de la région telles que les villages de Chandir, Isiklar, Hisarli, Karpuzlu et les zones environnantes d'Enez et d'Ipsala. Une quinzaine d'éleveurs ont fait l'objet d'enquêtes pour cette étude. Selon le livre généalogique préliminaire, qui est un projet du Ministère de l'Agriculture, les trois provinces d'Edirne (97%), Kirklareli (0,26%) et Tekirdag (1,9%) de la région de Thrace présentent une population totale de bovins gris de 5301 têtes. Les districts d'Enez et d'Ipsala de la province d'Edirne représentent respectivement une part de 67,8% et 26,9% de la population. Les niveaux d'instruction des éleveurs correspondent aux études secondaires (4%), études intermédiaires (20%) et études primaires (76%). Tous les éleveurs de bovins gris ne pratiquaient que l'élevage bovin comme source de revenu. La composition des troupeaux était de 75% de femelles et 25% de mâles. La taille moyenne du troupeau était de 57,88 têtes. La famille comptait un nombre moyen de 4,76 membres. L'âge moyen des éleveurs bovins était de 46,2 ans. En raison des avantages adaptatifs des génotypes de bovins gris sur pâturages pauvres et zones humides de ces régions, il existait même des systèmes particulièrement primitifs ou improductifs. Les systèmes de production de bovins gris dans cette zone ont un bon potentiel du point de vue de la durabilité. Les expériences d'engraissement de bovins gris montrent qu'à un poids moyen de 155 kg, les mâles de deux ans peuvent gagner 58,53 kg en trois mois d'engraissement.*

Mots-clés : *Bovins de la steppe type Boz, bovins gris de Turquie, ressources génétiques animales.*

Introduction

During the last few decades modern breeding techniques have greatly improved the production potential of farm animal species. Due to pressure of crossbreeding, the number of native breeds are rapidly decreasing. These trends have led to the use of intensive crossbreeding of native breeds with exotic imported western breeds. In conclusion, while the percentage of modern breeds has increased, the percentage of native farm animal breeds has come into the danger zone of extinction. This trend

of loss of variation also narrows the genetic base of species in general. As a consequence of the development in animal husbandry on better land and climatic areas, indigenous breeds have either been completely replaced by high yielding animals or replaced by large upgraded western breeds that respond better to improved feeding and management and intensive production conditions.

As a case study, this text will present one of the cattle breeds called Grey cattle (or Boz Steppe cattle), believed to be the ancestor or relative of the same European Grey cattle living in Italy, Bulgaria and Hungary, which is in danger of extinction. The Grey Steppe originated in the steppe of the Ukraine from where it moved west and south into Italy, Hungary, the Balkans and Turkey in ancient times. There it formed many local breeds such as the Podolian cattle, Dalmatian Grey (which is improved by the Tyrol Grey), the former Yugoslavian Istrian from Croatia (improved by Romognola). Another grey cattle in the Balkans in the same group is named Sykia and it is a smaller variety of the Grey Steppe type. Hungarian steppe grey is crossed with Maremmana and Yugoslavian Podolian. Maremmana is crossed with Chianna and Chaoralley. Romagnola is improved with Chianna, Reggianna and Maremmana, etc. Iskar Grey (Bulgaria), Istrian (Croatia), Dalmatian Grey (Croatia), Slovenian podolian (Croatia), Katerin (Greece), Sykia (Greece), Hungarian Grey (Hungary), Cinisara (Italy), MareManna (Italy), Podolicia (Italy), Romanian steppe (Romania), Turkish Grey, Boz Steppe or Plevne (Turkey), Ukrainian Grey (Ukraine), Istrian (Yugoslavia) are a groups of similar breeds according to the EAAP-AGDB resources.

This breed was in danger of extinction due to the mechanization of agriculture and the spread of upgraded breeds which had almost completely replaced it. Turkish Grey cattle were widely distributed in the Marmara region of Turkey, the Grey cattle having emerged as an important breed as it dominated stocks in the Balkan and Marmara regions of Turkey during the Ottoman period and at the beginning of the republican period in the location mentioned. Its dramatic decline brought this breed to the point of extinction.

The remaining 500 head of the Grey Steppe cattle breed were recently put under a conservation programme by the Government. There were a few animal breeders who still continued to use these animals as breeding stock in the same village of the Keşan district in the Edirne province, located in the Thrace (European) part of Turkey. The present breeding conditions were analysed and will be presented.

According to the data of the pre-herd book of the Ministry of Agriculture, the number of Grey cattle all over Turkey was 30,643. This figure far from reflects the real conditions since no census was kept by the specialists and, especially in the case of native animal genetic resources, there was misjudgement about the origin of the breed. Besides, this figure includes both the pure breed Grey cattle and the cross breeds. Most probably this figure only considers the grey coloured cattle which include Grey cattle of our interest. Some cross breeds of cattle whose grey colour (named Kultak) can be obtained from (native black*native grey cattle) crosses.

The biggest disadvantages for this breed before was that it was not able to obtain any support measures from Government funds. Any encouragement measures of support policies excluded these breeds due to their low body weight (lower than 200 kg), since the policy aimed at increasing meat production by producing heavy carcasses targeting over 200 kg of body weight.

This kind of policy forced them to cross their native breeds with heavier exotic breeds. Table 1 shows the population structure of Grey cattle in the İpsala and Enez region.

Recently a conservation scheme was introduced and a production system for this rare but genetically valuable breed was discussed. After a public awareness campaign aiming to boost the concept of animal genetic resource conservation, the Government decided to pay an extra 150 € per year/per animal for a total of 200 head of Grey cattle in the area within the framework of *in situ* conservation projects. Of the fifteen breeders who donated the data, three were selected for the programme.

First of all we would like to introduce the area where the Boz Steppe bovine population lives. The Ipsala and Enez district in the Edirne province is located in the Thrace part of Turkey at an altitude between 10 and 200 meters above sea level next to the Greek border, of the South easternmost part of the EU. Lake Gala, Lake Pamuklu Göl and the Hisar mountain, now classified as a natural region, covers an area of about 6090 hectares.

Table 1. Number of pure breed Grey cattle & cross breed Grey cattle raised in the Thrace region of Turkey

Provinces (% of total Grey cattle population)	District (% of total Grey cattle population)	Number of Grey cattle (head, %)	Village name	Head
Edirne (% 97.8) (5187 heads)	Enez (% 67.8)	2609 Female(72.5%) 988 Male (27.5%) 3597 Total (100%)	Hisarli	1566
			işikli	801
			Çandir	419
			Merkez	383
			Çataltepe	349
			Karaincirli	27
			Yenice	22
	İpsala (%26.9)	1170 Female (82.1%) 255 Male (17.9%) 1425 Total (100%)	Yeni Karpuzlu	1048
			Merkez	165
			Saricaali	99
			Kumdere	40
			Paşaköy	36
	Keşan (%2.99)	97 Female (61%) 62 Male (39%) 159 Total (100%)	Kizkapan	17
			Maltepe	48
			Sazlidere	15
			Yayla	51
	Havsa	2		
	Lalapaşa	2		
	Uzunköprü	2		
Tekirdağ (%1.9) (100 head)	Malkara	76 head= 48 Female,28 Male	Karacahalil	46
	Şarköy	18 Female	Mursalli	11
	Çorlu	1 Male		
	Kofçaz	2 Female		
	Lüleburgaz	1 Male		
	Pinarhisar	1 Female		
	Vize	1 Female		
	Saray	5 head= 4 Female,1 Male		
Kirklareli (0.26%) (14 head)	Demirköy	9 head= 8 Female,1 Male		

Species	Cattle (*Bos taurus*).
Breed	Boz Irk.
International names	Anatolian Grey, Turkish Grey.
Local names	Boz, Step Siğiri, Plevne Siğiri.
Area of distribution	Trakya, South Marmara, North Aegea. West of Central Anatolia
Production purpose	Meat, milk

Ipsala and Enez are far from the industrial centre, thus guaranteeing unpolluted air and a clean environment. There are a lot of natural pastures and woods which represent the most important sources of animal nutrition. This area is well known for rice cultivation, so plenty of rice stalks are available for animal nutrition free of charge. Nowadays the trends show that the Turkish countryside is often characterized by the exclusion and neglection of the outlying territories which also suffer

progressive depopulation, especially of young people. The Grey cattle is sturdy, of medium size silver-grey in colour and with crescent-shaped horns

Material and methods

A total of 15 breeders provided data for the survey. A questionnaire regarding activities, land structure, animal nutrition and productive traits was used for all (15) breeders who represented the Grey cattle breeders region, and data from the pre-herd book from the Ministry of Agriculture were also used.

The only relatively medium scale farmers (who had at least 15 head of Grey cattle), family enterprises, were included in our survey material. Those who only had 1-2 head of Grey cattle were not included in this survey.

The aim of this work was to evaluate the present production characteristics of Grey cattle from the point of view of animal genetic resource conservation. The breeding techniques, productivity parameters and visual morphological characteristics were presented.

The survey area mainly consisted of the Candir village on the Hisarli mountain of the Enez district and nearby villages such as Karpuzlu and Çandir. This village is located near Mount Hisar alongside the Maritsa river which follows the Greece-Turkey border.

Results and discussion

Physical characteristics and genetic resources

This breed has alternatively been called Boz Irk (grey breed) or Boz Steppe (Grey Steppe). While light coats are not liked by new breeders, animal coats occur in all shades of grey. The muzzle, eyelashes and claws are black. Calves are born reddish and turn grey at six months of age. The skin colour is generally dark grey. The horns have a characteristic crescent shape. The inside of the ears is covered by black hair. In the adults the horn tips are black and their lower portion is yellowish white. Cows generally have a lighter colour than males. Generally sexual dimorphism is pronounced in both size and body proportions. Bulls have stronger forequarters, larger dewlaps and are more robust than cows. Grey cattle mature late and deposit relatively little yellow fat under the skin. Only sporadic data are available on fattening characteristics. Visual inspection shows that the meat itself is dark and not particularly marbled since most suet forms subcutaneous and intestinal fat deposits (Table 2).

Although there are no big differences in the colour by visual observation of the breed; the Grey cattle group can be separated according to farmers' explanations.

In general the Grey cattle population in the Thrace region is 5301 head (Table 1), according to the pre herdbook data from the Ministry of Agriculture. These figures were obtained from the National Register projects for ear-tagging the cattle. The figures include cross breeds derived from Grey cattle.

No system to resurrect pedigrees has been put into practice. The Edirne province has the biggest share of the Trakya Bozstep (Grey Cattle) population with 97% (5187 heads). The other two provinces only have 114 head which represent 3% of the Thrace population. The Boz Steppe population in Thrace consisted of 75% female and 25% male.

It is argued that especially small-scale breeders have been forced to cross their pure breed Grey cattle by Brown Swiss or black and white (Holstein) cattle for productivity reasons.

Fortunately it seems that the regulation regarding *in situ* conservation and support programmes for animal genetic resources acted by the governmental decisions 25737/2005 had managed to stop this inconvenient decline in time.

A total of three farmers, each having 50 head of Boz Steppe cattle, were selected from the Çandir village of the Enez district of the Edirne province, to receive 150 euro per year per animal in the

framework of an *in situ* conservation programme. These herds were the most protected pure Grey cattle populations. The remaining population was under threat of genetic erosion by means of crossbreeding (F1) or (Gn) level.

Table 2. Morphological traits of Grey Steppe cattle

Description of body conformation		Robust structure. The rump structure in the tail head is extremely narrow, hence the triangular view from above. The back of the body is narrower than the front especially in males. The rump is higher than the withers						
Colour	Colour of skin	Dark grey						
	Colour of hair	Varied from light silver to dark ash in colour. Black colour around the eyes in bulls, black coloured upper limit of muzzle of bulls. Inside of ear covered with black hair. Cows are lighter in colour than bulls. Generally neck breast, chest lower part of shoulder are darker in colour						
	Colour of claw	Black						
	Colour of horn	Bottoms are yellowish white, black tips						
	Colour of calf	Born light brown then gradually turn grey						
Head characteristics	Structure of head	Head narrow and long, square shaped forehead, face has rectangular shape						
	Structure of horn	Circled cross-section, non nodulated						
	Head measurements (cm)		Male			Female		
			Min.	Max.	mean	Min.	Max.	Mean
		Length				35.0	56.0	45.38
		Width				18.0	27.0	20.23
	Horn measurements (cm)	Length				8.0	46.0	28.61
		Circumference				10.0	24.0	15.35
		Distance between the roots				11.00	21.0	12.43
	Ear	Structure	Elipsoid, large ear.					
		Length (cm)				15.0	22.0	18.95
		Width (cm)				9.5	17.0	13.99
	Colour of eye	Black.						
Adult body measurements	Wither height (cm)		122.0	130.0	126.0	103.0	136.0	117.98
	Rump height (cm)		126.0	133.5	130.10	104.0	186.0	126.22
	Body length (cm)		113.0	134.0	123.0	111.0	165.0	137.94
	Chest girth (cm)		182.0	191.0	186.80	112.0	195.0	165.89
	Chest height (cm)		66.0	73.0	68.80	53.0	72.0	62.66
	Shin girth front (cm)					13.0	28.0	17.01

Systems of production

Generally the Boz Steppe population of Thrace is reared in two different production systems, according to the number of animals per farm.

Small-scale family enterprises

In this type of Grey cattle raising system, some of the village inhabitants have 1-2 head each. This type of production is heavily dependent on pasture. Late spring, summer, autumn, winter and early

spring flocks are kept in the barn with a limited amount of supplementary concentrates without moving to the pasture due to the snow and rainy conditions.

Generally calving occurs in late winter or mostly at the beginning of spring. In fact this kind of small flock shows that they are managed as a traditional extensive cattle production system and also the primary income of farmers is not obtained from cattle husbandry.

Each day early in the morning all flocks of the farmers in the same village are unified and moved under the management of one herdman in order to utilize the common pasture in the village. In the evening all the herds return back from the common pastures of the village and animals are distributed to their owners. This kind of Grey cattle are milked before and after pasture. Additional supplementary feeding is also practised.

Milk production is comparatively lower than in the other exotic breeds.

The pastures consist of common lands and rice stubble areas. Milk production is generally for families' own consumption and amounts to around 1-1.5 ton/ha

Medium- and large-scale Grey cattle population

This kind of farmer aims only at meat production. The animals are kept on pasture continuously, including winter. They never return to the village even during the cold winter season. Very simple barns of fences are located at the edge of the pastures or near the village, and are built with marshy grass and reed. In some cases cattle were housed in this kind of barn during the winter period and fed a small amount of feed supplement consisting of straw and stalks.

Cattle shows seasonal oestrus signs in May and June. Generally then calving occurs in March and April. Calves are kept together with cows during a 7-8 month period. No milking is practised 4-5 months prior to calving; calves are separated from their mothers. No navel disinfection is practised

Age at puberty is regarded as 2-2.5 years. In general steers are kept together with the herd at pasture. But one of them is chosen as bull at the age of 3 years. Free martinism occurs when different villages use the same public pasture leading to some genetic mixing.

Generally cows are grazed on one common pasture or rice stubble area. Male grey cattle are generally sold at 2-2.5 years of age for meat production. Females are used for replacement. Older females over 10 years are also sold for meat production.

Big herds are kept 365 days in pasture in very inconvenient snowy conditions. Rice stalk and straw are given as supplementary feed. Rice stalk can easily be found free of charge due to the considerable amount of rice plantations in the region. Rock salt was also given as the only source of minerals.

No extra workers are employed. All manpower is provided by family members. The average age for the breeders is 48.25 (SE=9.04) in Enez and 42.56 (SE=8.53) in the İpsala region. The average number of family members in Enez and Ipsala is 4.31x1.5 and 5.56x2.19 respectively. The average number of family members for both is 4.76.

In some cases so as to meet the demand for sacrificial animals some farmers with big herds fatten cattle once a year. Generally animals over 2 years old are used for such fattening application. Fattening barns are generally semi open or fenced simple primitive places. These barns are generally located near the owners' houses in the village or on the edge of the pasture and used if needed in very cold snowy winters as temporarily protective places for the animals at pasture. These places are also used as fattening barns once a year.

The survey showed that the average space was 433.3 m^2 (SS=57.5) and consisted of 166.7m^2 (SS=76.4) for the covered part and 516.7 m^2;(SS=28.9 m^2) of open field.

Generally fattening is practised in an average group size of 15 (SE=5).The fattening animals were

brought from the farmers' own herd raised freely in pasture. At the starting period, average weight was 127 (SE= 22.17).The finishing average weight was found as 150 (SE= 24) kg. The difference or cumulative weight for the 2-3 month period was 58.35 kg (SE=17.22). 67% of farmers practised a medication programme for external parasites. Concentrated supplement feeding and dry grass are given for fattening. Most farmers are ignorant of roughage feeding such as silage and hay and of their impact on the general performance of animals.

Tables 2 to 7 show different traits of the Grey Steppe cattle.

Table 3. Reproduction traits of the Grey Steppe cattle breed

	Min.	Max.	mean
Age at first calving, month			30-36
Calving ease	Usually easy, no need for help.		
Calving interval, month			
Birth ratio, %		100.0	86.54
Survival rate (up to 6 month), %		100.0	99.0

Table 4. Milk production traits of the Grey Steppe cattle breed

Lactation length day	78.0	350.0	220.13
Lactation yield, kg	157.0	2965.0	1095.63
Milk fat, %	2.5	6.12	3.93

Table 5. Growth traits of the Grey Steppe cattle breed

	Male			Female		
	Min.	Max.	mean	Min.	Max.	mean
Birth weight (kg)	13.0	37.0	24.04	13.0	29.0	22.37
Live weight at 6 months (kg)	112.0	196.0	158.32	81.0	145.0	117.0
Live weight at 12 months (kg)	160.0	370.0	291.99	140.0	190.0	167.0
Live weight at 24 months (kg)	224.0	410.0	307.0	210.0	290.0	252.0
Adult live weight (kg)	449.0	490.0	470.0	247.0	550.0	375.07
Average daily gain (g)			1062			
Carcass yield (%)			57.39			

Table 6. Behavioural characteristics of the Grey Steppe cattle breed

Handling management ease as flock	Very well
Maternal insight	Very well
Grazing ability	Very well
Ability to be milked	Very difficult to milk. No milk let down without presence of calves.

Table 6. (cont.) Behavioural characteristics of the Grey Steppe cattle breed

Temperament	Managing is very difficult due to ill tempered and irritable nature. Only an experienced person can manage the herd.
Other	Very ill tempered and nervous temperament make handling difficult. Interaction between the herd members is very powerful. Any interference to the herd leads to the formation of a circle.
Unique capacity of breed (resistance to disease, & environmental conditions)	Resistance to rapid food change. Very well developed digestive tract. Very good feed conversion ratio. Utilizing very poor diet consisted mainly of straw. High tolerance for extremely harsh environmental climatic conditions. Very resistant to disease and external parasites, very fast recovery if infected. Hard and robust claw. High acclimatization capability. Natural capacity in raising in wild and semi wild conditions
Special requirements for raising habitat	Natural habitats are forests. wetlands, rough ground, marshy places

Table 7. Genetic traits of the Grey Steppe cattle breed

Typical gene markers

Major Genes

Other	System/loci	Allele	Frequencies, %		
			Min.	Max.	mean
	F-V	F			0.66
	F-V	V			0.34
	J	J			0.31
	J	İ			0.69
	L	L			0.27
	L	I			0.73
	M	M			0.00
	M	m			1.00
	Z	Z			0.56
	Z	z			0.44
	R'-S	R'			0.21
	R'-S	S'			0.79
	Hb	A			0.95
	Hb	B			0.04
	Hb	C			0.01
	Pa	A			0.32
	Pa	B			0.68
	Am-I	B			0.79
	Am-I	C			0.21
	Tf	A	0.21	0.43	
	Tf	B	0.02	0.05	
	Tf	D			0.27
	Tf	D1			0.32
	Tf	D2			0.27
	Tf	E			0.09
	Tf	F			0.06

Other traits

Conclusions

In conclusion we can affirm that native Grey cattle represent the most interesting cattle breed in Turkey. It has moved from post endangered status and now seems to be making a comeback.

However assistance and cooperation are still required to maintain the Grey cattle special population. We confirm our interest in the development of this native cattle breed especially recording the careful utilization of the resistance to the external parasites and ability to utilize the wetland pasture alongside the Maritza river and Lake Gala in the name of proficient and sustainable utilisation of marginal territories.

According to the questionnaire's results the reasons for farmers still continuing to raise the Grey cattle populations in spite of numerous negative factors were:

(i) The production system they practised was the only system they knew and had learnt from their parents.
(ii) Relatively economical housing with almost zero cost.
(iii) No supplementation feeding cost in summer and only in very cold winters a little supplement such as rice straw, also stalk is given.
(iv) Almost 365 days keeping range and pasture consisting of evergreen oaks.
(v) As no milking is practised, low cost for raising the Grey cattle.
(vi) Comparative advantages of high level adaptability to the rocky and wetland area of the region.

The results confirm our findings that almost all the farmers practise semi-wild raising systems.

The original traditional breeding purpose of Grey cattle in Turkey was meat, and draught power. Nowadays the main breeding purpose was meat production.