

The Sambucana sheep: a project to save a valley

S. Luparia

Slow Food Editore, Via Mendicità Istruita 45, 12042 Bra, Cuneo, Italy

Summary

At the beginning of the 1980's, Sambucana sheep, which have inhabited a valley in the northern Italian region of Cuneo since the Eighteenth century, were on the verge of extinction. In an effort to safeguard the breed, the 'Comunità Montana' and local institutes set up a consortium which includes approximately eighty breeders and has entrusted the recovery of the breed's genetic heritage, threatened by repeated cross-breeding with Biellese sheep, to a ram centre. The sales of Sambucana lamb, which is a highly prized meat guaranteed by a specific brand, have increased at the shops in the province served by the consortium, and moreover the economy of mountain communities has benefited from the protection program. A pack of wolves endangering the summer grazing of the sheep at high altitudes could in the future have a negative effect on the purity of the breed and the characteristics of the meat.

Résumé

Les brebis "Sambucane", qui peuplent depuis la fin du dix-huitième siècle l'une des vallées de la région de Cuneo dans le nord de l'Italie, ont risqué de disparaître à la fin des années '80. Grâce à la "Comunità Montana" et aux institutions locales, la sauvegarde de cette race et de son patrimoine génétique, menacé par de nombreux croisement avec des brebis de race "Biellese", a été confiée à un syndicat et aux quelque quatre-vingts éleveurs qui y adhèrent; pour rejoindre leur but, ces derniers ont mis en place un centre de sélection et d'élevage de béliers "Sambucani". Les ventes de viande d'agneau "Sambucano", dont la

qualité garantie par un label n'est plus à prouver, sont en plein essor dans toute la province, grâce à l'assidu travail du syndicat. Cet accroissement des ventes et ce programme de sauvegarde de la race font sentir leurs bienfaits sur l'économie rurale des villages de montagne. Seul la présence d'une bande de loups met en danger l'élevage en état de semi-liberté, qui a lieu en été sur des pâturages de montagne. Ce problème pourrait cependant avoir des effets négatifs sur la pureté future de la race et sur les caractéristiques de grande valeur de sa chair.

Key words: *Sambucana sheep, Conservation, Satura Valley.*

Introduction

The Stura valley (in the province of Cuneo, Piedmont, Italy) extends over 60 km, running East-West between the Maritime and Cottian Alps from Borgo San Dalmazzo (a small town near Cuneo) to the Colle della Maddalena on the French border (Figure 1). There are extensive pasture lands on the alpine plains; 94% of agricultural land in the valleys, that is 52% of the total area, is given over to fields and pastures which are used in the main for rearing sheep (Programma di filiera, 1996). The autochthonous breed is the Sambucana, which is thought to have been introduced into the valley in the Eighteenth century and which quickly became adapted to the high grazing grounds. Also known as 'Demontina' and classified by some authors among Apennine breeds that are crossed with French breeds, it is one of the most important of the so-called 'minor' breeds. (Tables 1, 2 and 3).

Twenty years ago the FAO was alerted to the fact that the number of Sambucana sheep

Table 1. Body characteristics.

Size	Average-Large
Head	without horns or wool, slightly ram-like profile
Ears	average size, pointing out sideways, horizontally
Neck	on average short and muscular
Body	long and cylindrical, straight back-lumbar line, ample diameters
Rump	wide, muscular
Abdomen	rounded, developed on the average
Thighs	well-developed
Limbs	fine, slim, solid, adapted to the environment, correct perpendicularity
Tail	fine, hanging to hocks, covered in wool
Fleece	pale yellow-white, half-closed; some black examples with stars on foreheads
Wool	fine, shiny, fiber 3-5 cm, diameter 30-40 micron
Tongue, palate	rosy color
Orifices	rosy color
Hooves	yellow-ivory color, compact, very tough
Birth wieight	5 kg only child, 4 kg twins

Source: Massimino & Brignone, 1993.



Figure 1. The Stura Valley in the province of Cuneo, Piedmont.

was diminishing. It acted by declaring the breed as 'vulnerable'. In 1981 research by the *Consiglio Nazionale delle Ricerche* revealed that there were only 1 000 animals of the breed in existence, divided among about one hundred farms located at that time (as indeed today), in the mid and high valley (Brignone *et al.*, 1998). In 1984 the number had risen to approximately 4 900 sheep, but of these only 40% were pure Sambucana, with the remaining 60% cross-breeds (Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998). In order to increase birth weight and the rate of growth, breeders had cross-bred the race with Biella rams, to the detriment not only of the adaptability of the sheep to the difficult mountainous terrain and the climate, with its cold, snow-bound winters and hot, windy summers, but also, and most notably, of the quality and yield of meat and wool.

The cross-bred lambs were indeed larger, yet the increase in weight was due to their larger bone structure and thicker skin rather than to any increase in the quantity of meat (Brignone *et al.*, 1998).

In the meantime it became evident in Stura valley that the disappearance of Sambucana sheep would harm not only the land (abandoned pastures would be overtaken by impenetrable vegetation covering the centuries' old paths within a few seasons), but also the local economy. Only a strong breed (in summer they climb to pastures above 2 000 meters and in winter they make do with hay and makeshift sheepfolds) (Figure 2) could adapt to the limited resources of a valley in which 7 of the 11 communes are highly marginal, where the breeders are also farmers who in summer cannot tend to their animals when there is hay making and other farm work to be done and who therefore only



Figure 2. Sambucana sheeps in summer pastures above 2 000 meters.

Table 2. Biometric measurements (cm) and slaughter characteristics of male Sambucana lambs (n=6).

	Height at withers	Cross height	Rump length	Rump width	Trunk length	Chest height	Chest width	Chest girth	Carcass length	Thigh length
	61	67	24	18	61	24	15	83	70	54
	60	62	25	18	76	23	15	78	69	53
	64	66	26	18.50	69	26	18	80	70	57.50
	65	67	26	21	78	25	17	78	68	60
	71	73	26	18.50	68.50	29	18	87	73	59
	62	63	26	19	74	25	15	79	69	56
Average	63.83	66.33	25.50	18.83	71.08	25.67	16.33	80.83	69.83	56.58

Source: Massimino & Brignone, 1993.

Table 3. Live weights and biometric measurements of adult Sambucana sheep.

	Rams	Ewes
Height at withers (cm)	80-86	76-80
Trunk length (cm)	85-89	77-81
Chest girth (cm)	94-106	84-104
Weight (kg)	86-94	64-78

Source: Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998

Table 4. Slaughterhouse measurements (kg) of male Sambucana lambs (n=6).

	Live weight	Carcass weight	Blood weight	Intestines stomachs	Empty intestines	Skin and fleece	Empty stomach	Intestinal contents
	39.70	23.40	1.60	10.20	4.20	4.20	0.99	6.00
	36.60	21.20	1.62	9.50	3.20	4.00	0.87	6.30
	41	25.20	1.87	8.70	3.50	4.70	0.96	5.20
	42.20	24.20	1.50	9.60	3.70	4.80	1.04	5.90
	47	26.80	1.70	10.80	3.67	5.80	1.04	7.13
	38	22.50	2.10	9	3.53	3.70	1.03	5.47
Average	40.75	23.88	1.73	9.63	3.63	4.53	0.99	6.00

rarely visit their flocks (Brignone, Martini & Musso, 1998).

The Protection Program

In 1985 the Stura valley “*Comunità Montana*”, the Piedmont Region’s “*Servizio Decentrato per l’Agricoltura*” and a group of breeders set up a project to safeguard the Sambucana breed. Three years later two associate organizations, the *L’Escaroun consortium* (in Langue d’Oc, an integral part of the local dialect, the term means ‘a group of sheep that leave the main flock to find better grazing’) and the ‘*Lou Barmaset*’ farming cooperative were set up. Experts from the “*Comunità Montana*” and “*Regione*” work with the organizations. At present the consortium numbers around eighty livestock farms, the majority of which are small, family-run concerns with no more than 30-40 sheep.

The most pressing of the project’s objectives was, however, the recovery of the Sambucana sheep’s genetic heritage. This task was entrusted to the ram center in Pietraporzio, the penultimate commune in the valley before reaching the border. Each year the center buys 80 male lambs aged 3-4 months from the member breeders, following careful examination and ensuring that they were bred from pedigreed ewes and rams. Employees at the center check weight gains and hearth girth in the younger lambs by means of repeated periodic measurements. They also carry out food hygiene checks (including testing blood samples). Once they have reached sexual maturity, the animals are lent to the breeders free of charge during the breeding season which begins in May-June. In late autumn they return to the center for the winter, during which their growth is



Figure 3. A Sambucana ewe with two lambs.

monitored and they are appraised genetically by means of examining their descendants. The rams which have succeeded in passing on hereditary characteristics remain at the center and are redistributed during the following mating season to members, in rotation, to avoid inbreeding (Programma di filiera, 1996; Massimino & Brignone, 1993). Since 1996 a group of Sambucana hoggets has been sent to the Regional Ram Center in Sauze d'Oulx (Province of Turin) where they are performance tested before being returned.

A Register, managed in collaboration with the Breeders' Association of the Province of Cuneo, has been set up to fill the gap before the breed's Genealogical Book is drawn up. In 1997, the register recorded 3 200 Sambucana specimens (100 rams and 3 100 ewes) not only from the Stura valley but also from nearby Grana and Gesso, and from the Maira valley (Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998).

Another important step in the promotion campaign was the creation (1992) of the 'Agnello Sambucano garantito' brand, which was recognized by the Italian Industry Ministry in 1996. The brand certifies the origin of the lamb and guarantees the quality and authenticity of the meat. (Figure 3). It also extends to assistance in butchering, the organization of distribution and the provision of marketing checks so that lambs that are not of the Sambucana breed are not marketed with the brand in the selected distribution outlets, particularly in peak periods (Easter and Christmas). In the Stura valley, however, lamb is traditionally eaten before Christmas, from the end of October onwards, when butchers sell hoggets (*tardoùn*) (Table 4). This is also the period when the *Fiera dei Santi* (Feast of Saints), attended by all breeders, is held in Vinadio. In the past, breeders would



Figure 4. A shelter with the enclosure in an alpine pasture.

arrive in the village on foot, after walking through the night with their flocks which they collected from their high pastures. During the fair, the show of reproductive ewes, although not an official review of the breed, brings together at least 300 animals each year which are judged by a jury.

Characteristics of the Meat

Sambucana sheep, with their light bone framework and fine skin, boast yields of meat at slaughter varying between 55 and 65% (Table 4). The compact meat is an attractive, bright red color, has a low fat content (5.4% in dried meat) and a high protein content (84% in dried meat), according to analyses carried out by the Agricultural Faculty at the University of Turin (Massimino & Brignone, 1993). These results, coupled with the breed's high prolificacy, which varies between 135 and 150%, with an average of three deliveries every two years, 51% of twin births, and first delivery at the age of 12-13 months, make the Sambucana one of the most interesting sheep breeds for meat (Massimino and Brignone, 1993; Regione Piemonte e Regione Autonoma Valle d'Aosta, 1998).

To enjoy Sambucana meat to the full, the consortium experts recommend lambs which weigh over 20 kilos as well as older animals, whose meat must be carefully cut by expert butchers (Luparia, 1999).

A New Threat

For some years breeders have been reporting attacks on their flocks by wild dogs and wolves. Attacks have become so frequent that the feasibility of raising sheep in the semi-wild, so important for the quality of the meat and the protection of the land, has been brought into question. Breeders have been forced to organize rotas for staying with their flocks in alpine pastures, to protect them using sheep dogs and to construct enclosures in which to keep the sheep, at least at night (Figure 4). Since 1996 the raids of at least 12 wolves, which have been counted in a

census, have increased. It is uncertain whether the wolves come from the Apennines or whether they crossed the border from the Parc de Mercantour, where they were reintroduced a few years ago (Luparia, 1999).

The Region has already set up a commission to deal with compensation for sheep killed by wolves, but the 'wolf problem' must be tackled at its roots. Why should sheep, which have always grazed freely in the valleys, plains and grassy ridges, be forced into enclosed areas? Putting them in pens would be a little like losing the breed a second time, precisely at the time when their numbers have risen, the results of the protection and promotion campaign have started to be seen and the Stura valley has made a step forward in safeguarding biodiversity.

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The productivity of Polish Wrzosówka sheep in conditions of preservation*

W. Kiec

National Research Institute of Animal Production, Department of Sheep and Goat Breeding, *Balice near Cracow, Poland*

Summary

The Polish Wrzosówka is an old breed of sheep native to Poland. The Wrzosówka sheep restoration programme was begun in Poland in the 1970s. A total of 160 ewes and 27 rams, characterised by great variation, formed the foundation stock. Currently, a total of 1 400 sheep are bred in 8 flocks. The Polish Wrzosówka is an aseasonal breed (3 lambings per year are possible) and is characterised by very high prolificacy of 175-180%. It is a furcoat sheep and its high-quality pelts are mainly used for velour production. The breed has very well developed maternal ability and is well adjusted to harsh environments conditions

Résumé

La brebis Wrzosówka est une vieille race de brebis native de la Pologne. Le programme pour la récupération de cette race a commencé en Pologne dans les années 70. Le stock de départ, caractérisé par une grande variation, était formé par 160 brebis et 27 mâles. Actuellement un total de 1 400 brebis sont élevées dans huit troupeaux. La race Wrzosówka est une race non saisonnière (il est possible d'avoir trois mises-bas par an) et se caractérise par sa haute prolificité, environ 175-180%. C'est une brebis à poils et la haute qualité de sa fourrure fait qu'elle soit souvent utilisée dans la production de velour. La race a très bien développé la capacité maternelle et est très

bien adaptée aussi aux environnements à conditions difficiles.

Key words: *Wrzosowka sheep, Poland, Conservation, Pelt, Skin, Nucleus*

Origins

Polish Wrzosówka sheep descended from northern short-tailed sheep (*Ovis brachyura borealis*). They are native to the north-eastern borderlands of Poland. The breed enjoyed considerable popularity during the Second World War. With 120 000 head, Wrzosówka constituted three percent of the sheep population in 1955 (Jelowicki, 1960).

Breeding Programme

The breeding programmes introduced during that period did not promote small-sized coloured-coat sheep. As a result the population of Wrzosowka sheep became dramatically reduced. When the breed became threatened with extinction, the National Research Institute of Animal Production purchased 130 ewes and ten rams in north-eastern Poland in 1972-1973. These were supplemented with 30 ewes and 17 rams from the Zootechnical Experimental Station of

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the National Research Institute of Animal Production in Balice. The foundation stock, located at the Zootechnical Experimental Station of the National Research Institute of Animal Production in Czechnica near Wrocław, thus consisted of a total of 160 ewes and 27 rams (Zalewska & A. Folta, 1982). The breeding material showed great variation with regard to the appearance, prolificacy, hair coat and coat colour. The main goal accomplished within the first few years of the recreation programme was to increase the population despite its low reproductive performance (flock prolificacy ranging from 135 to 150 percent).

Characteristics

According to data collected before the Second World War (Czaja, 1937), Wrzosówka was an aseasonal breed, with most of the sheep lambing twice a year giving 70 percent of twins and six percent of triplets and quadruplets. These data were confirmed on a small private farm located in north-eastern Poland (Krupiński *et al.*, 1988). However, the breeding material of the National Research Institute of Animal Production in Balice was very diversified and partly mixed with the other breeds, which had a clear effect on decreased prolificacy.

In order to increase the population size, three lambings were carried out at a Wrzosówka farm belonging to the National Research Institute of Animal Production, with

the last two being performed within one year (Zalewska & Folta, 1982) (Table 1).

Analysis of the last two lambings showed that on average a ewe produced 2.86 lambs and reared 2.62. Average fertility of the flock was 74 percent, which in terms of one ewe in the flock was 2.13 lambs born and 1.95 lambs reared within a year. The results clearly indicate that selection should be carried out for at least twin births and for aseasuality of oestrus.

The Wrzosówka breed standard was elaborated in 1982 (Zalewska, 1982), largely on the basis of a breed description provided by Czaja (1937). Principles of the breeding work were also defined (Radomska, 1982). This programme, with slight changes, is still implemented to date. Currently the nucleus flock, located in north-eastern Poland (Zootechnical Experimental Station of the National Research Institute of Animal Production in Siejnik) produces rams for eight filial flocks. Filial (cooperating) and nucleus flocks produce ewes for replacements in the nucleus flock.

Due to the rapid development of the Wrzosówka population in the late 1990s, one of the cooperating flocks (Prof. Adam Skoczylas Experimental Sheep Farm in Zelazna, belonging to the Warsaw Agricultural University) also initiated the production of rams. These were intended mainly for cooperating and commercial flocks and to a small extent for the nucleus flock. Consistent implementation of the Wrzosówka

Table 1. Reproductive indices in a flock of Wrzosówka sheep during two lambings in one year.

Lambing	Date of mating	Fertility (%)	Prolificacy (%)	Type of birth (%)		
				Single	Twins	Triplets
I	22.6 - 7.8.76	87.9	121.2	80.1	19.5	0.4
II	14.2 - 28.3.77	67.4	132.1	64.7	34.5	0.8
III	15.10 - 20.11.77	80.3	154.0	45.3	53.0	1.7

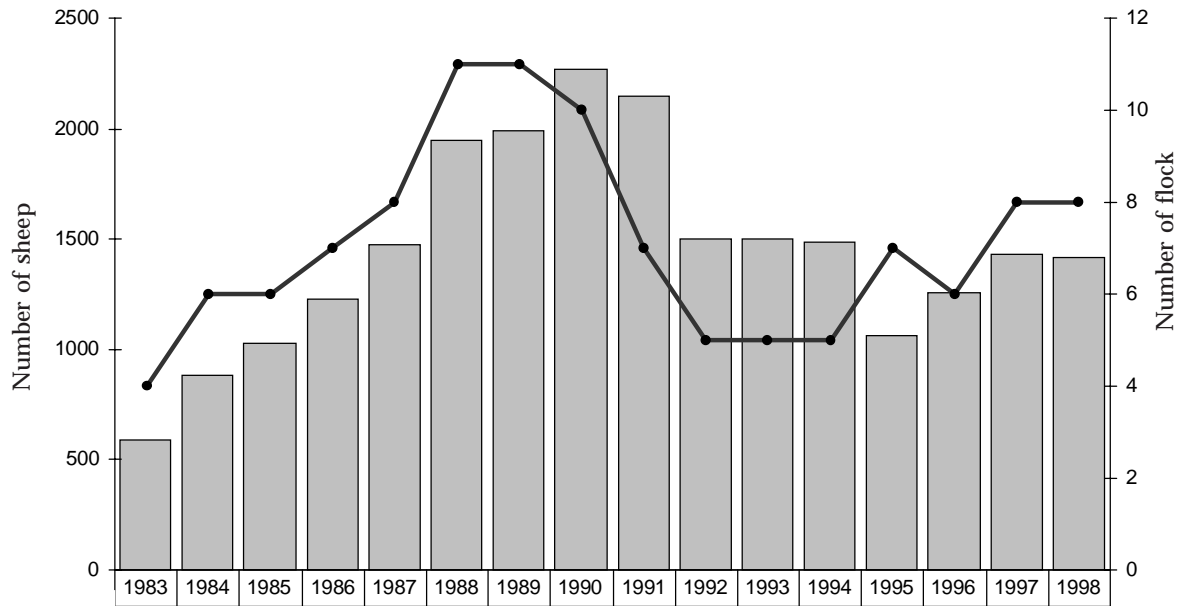


Figure 1. Number of flock and sheep recorded to the flock book entered in the years 1983-1998

Table 2. The analysis of colour distribution of ewes from nucleus flock in Siejnik.

Years	No.	Black		Black greying		Dark-grey		Grey		Light grey	
		No.	%	No.	%	No.	%	No.	%	No.	%
1992	280	4	1.4	8	2.9	120	42.8	138	49.3	10	3.6
1993	173	-	-	7	4.1	72	41.6	91	52.6	3	1.7
1994	173	3	1.7	6	3.5	70	40.5	91	52.6	3	1.7
1995	144	4	2.8	4	2.8	58	40.3	77	53.4	1	0.7
1996	146	6	4.1	2	1.4	45	30.8	92	63.0	1	0.7
1997	146	7	4.8	-	-	31	21.2	104	71.2	4	2.8
1998	156	-	-	8	5.1	27	17.3	105	67.3	16	10.2

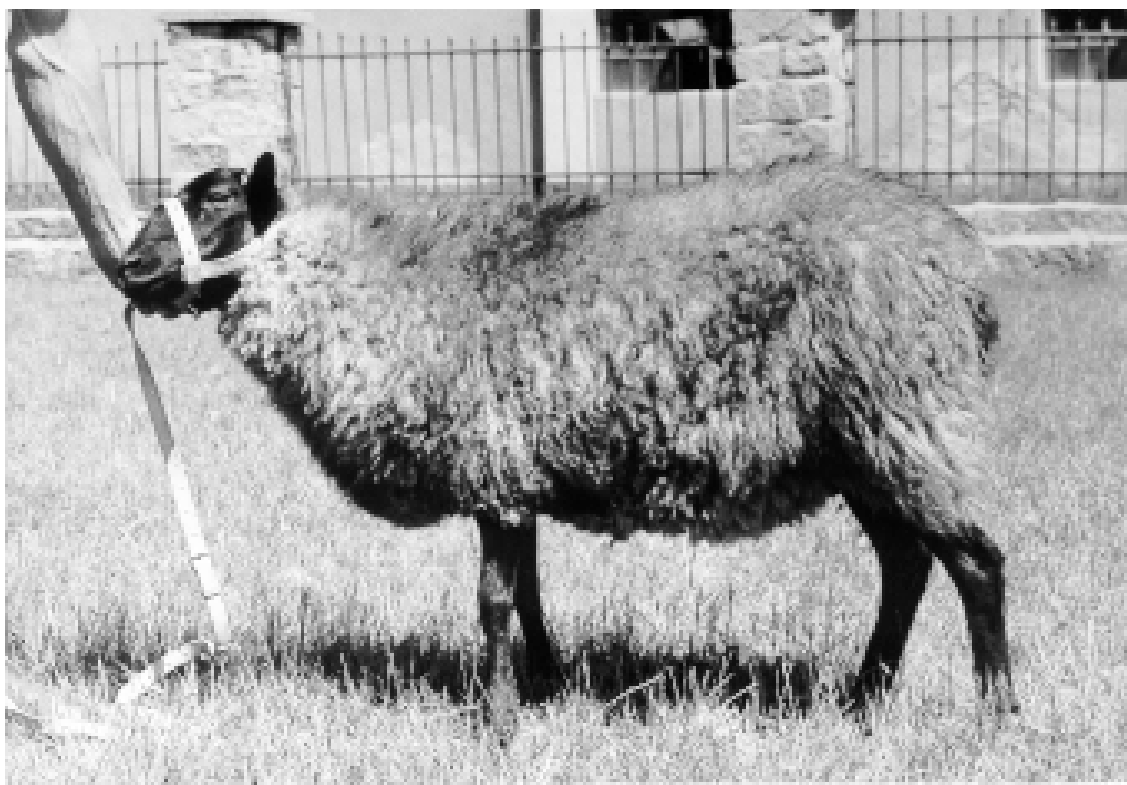


Figure 2. Wrzosówka ewe.

saving programme increased the population considerably to 2 270 sheep. The year 1991 witnessed a clear backward tendency in the breeding of both Wrzosówka sheep and the sheep population as a whole. This resulted from the liquidation of many state farms, reducing the number of cooperating flocks to four and clearly decreasing the population (to below 1 500 head) (figure 1).

A slow increase in the population of breeding sheep has been observed since then. This was accompanied by the establishment of a separate population of commercial sheep of about 600 head.

The breed standard specifies that Polish Wrzosówka sheep should be of small and harmonious build (Figures 2 and 3). The trunk should be short and moderately deep, the rump sloping, the chest fairly well developed, with a forward brisket. A weak conjugation and narrowing behind the shoulders are permissible. The muscles

should be smooth, the tail flattened and covered with hair, just as the head and legs. In rams, the horns should be widely spaced apart, resembling a spiral. Ewes should be preferably hornless, the head black and straight-profiled with short, thin and mobile ears. White colouring in the form of a star or arrow is permissible on the frontal bone of the head. The legs should be black, moderately long, thin boned, with few or no posture defects.

The wool cover should be grey or dark-grey. Black and light-grey cover is permissible in sheep characterised by high lifetime prolificacy if they produce greying progeny (Table 2). The lambs are born black. Their wool cover becomes grey from between two to three to eight to nine months of age (Table 3).

As a result of selection, newly born lambs are slightly heavier than specified by the breed standard (Tables 4 and 5). Wool should

Table 3. Analysis of lambs' coat distribution on the 2nd day after birth in nucleus flock of Siejnik. Lambing 1998.

Ram no.	Coat colour	Proportion of coat colour (%) within different paternal groups						Total	
		Black		Black - grey		Spotted and red-haired		No.	%
		No.	%	No.	%	No.	%		
O565	CS	40	100	-	-	-	-	40	100
2619	CS	48	100	-	-	-	-	48	100
2709	S	37	86	-	-	6	14	43	100
2837	CS	39	100	-	-	-	-	39	100
1112	JS	31	100	-	-	-	-	31	100
1188	CS	33	100	-	-	-	-	33	100
1624	S	50	96.2	-	-	2	3.8	52	100
		\bar{X}	97.2%	\bar{X}	-	\bar{X}	2.8	\bar{X}	100
		No.	278	No.	-	No.	8	No.	286

CS - Black grey; S - Grey; JS - Light grey.

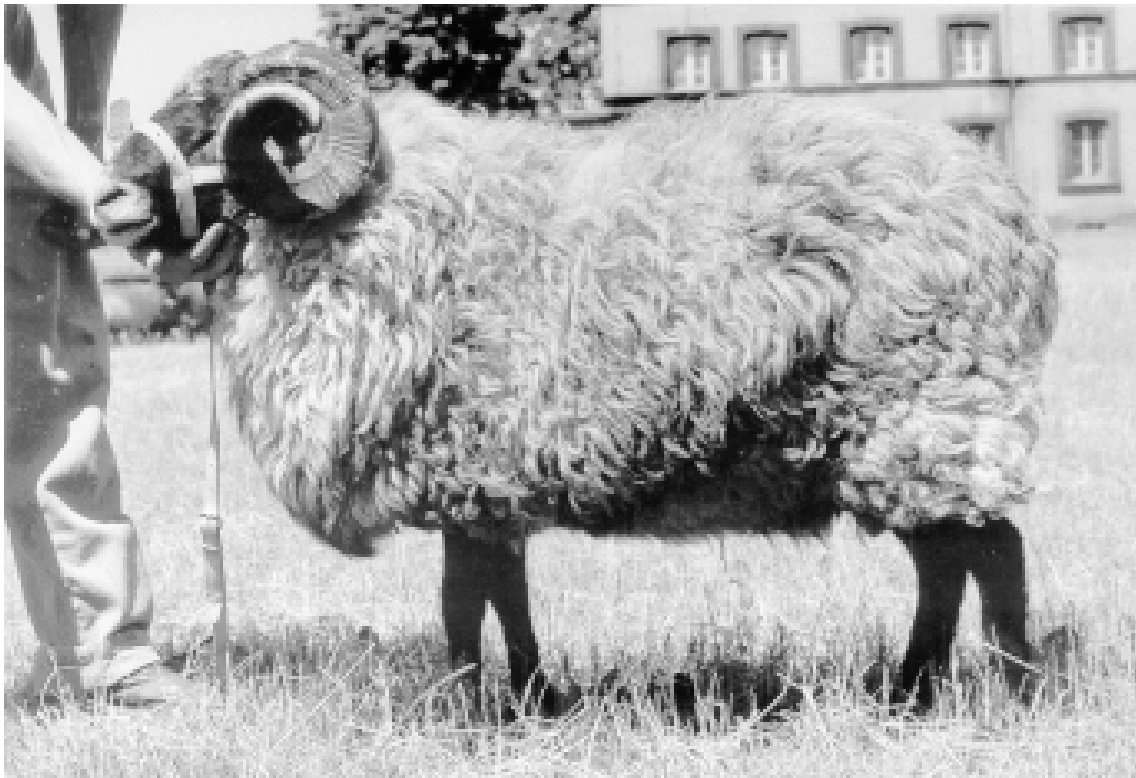


Figure 3. Wrzosówka ram.

Table 4. Average live weight of lambs in nucleus flock in Siejnik on the 2nd day after birth (kg).

		1997		1998	
		Single births	Multiple births	Single births	Multiple births
Males	No.	15	85	22	133
	\bar{X}	3.0	2.6	3.7	3.1
Females	N	22	72	22	109
	\bar{X}	2.8	2.5	3.4	2.9

		1994		1995		1996		1997		1998	
		Single births	Multiple births	Single births	Multiple births	Single births	Multiple births	Single births	Multiple births	Single births	Multiple births
Males	No.	26	54	23	39	23	54	15	81	22	133
	\bar{X}	11.3	11.1	11.7	11.4	9.9	9.1	8.0	6.9	9.0	6.9
Females	No.	40	75	35	35	9	52	22	71	22	109
	\bar{X}	11.8	10.7	10.6	9.2	9.7	9.3	7.5	6.4	7.9	6.3

be 31-32 μ thick (C). With double-fraction wool, it should be 18-25 μ thick (AA - AB) for down and 45-60 μ thick (E - EE) for medullated hair. Wool curliness at 1/3 the height of lock is a characteristic trait. After a six-month regrowth, staple length should be 8-12 cm for the medullated fraction and 6-9 cm for the downy fraction. Black coarse hair is admissible on the scrag, dewlap and brisket in ewes and on the back in rams. Shearing is twice yearly due to the possibility of wool felting and seasonal hair replacement. Annual greasy wool weight is 3 kg for rams and 2 kg for ewes.

In addition to Romanov pelts, Wrzosówka pelts are ranked among the best in the world, both for the production of velour sheepskins and nappa jackets which are in fashion today. They can also be used for the production of furs and coats of the doubleface type. Skins obtained at the optimum period, i.e. from lambs aged six to eight months, distinguish themselves among other pelts by low total weight (320 g) and low 1 dm² weight (8.9 g), small thickness in the sacral region (1.2 mm) and on the side (0.80 mm), but their area is small (36 dm²). They are exceptionally flexible and have great tensile strength (longitudinal

Table 6. Reproductive performance of dams (O-M) and replacement ewes (P) in nucleus flock in Siejnik.

		1 9 9 3		1 9 9 4		1 9 9 5		1 9 9 6		1 9 9 7		1 9 9 8	
		O-M	P	O-M	P	O-M	P	O-M	P	O-M	P	O-M	P
Total	(No.)	165	20	154	19	102	31	95	50	96	44	149	23
Number of lambing ewes	(No.)	133	14	135	10	84	20	75	35	86	41	140	21
Fertility	(%)	80.6	70.0	87.8	52.6	82.4	64.5	78.9	70.0	89.6	93.2	94.0	91.3
Number of dry ewes	(No.)	32	6	19	9	18	11	20	15	10	3	9	2
Dry ewes percentage	(%)	19.4	30.0	12.3	47.4	17.7	35.5	26.7	42.8	10.4	6.8	6.0	8.7
Number of lambs born	(No.)	181	20	203	15	125	28	122	61	140	59	250	36
Prolificacy percentage	(%)	136.1	142.8	150.4	150.0	148.8	140.0	162.7	174.3	163.0	144.0	178.6	171.4
Number of lambs reared	(No.)	175	18	174	15	104	28	89	53	125	56	245	34
Lambs' rearing percentage	(%)	96.7	90.0	85.4	100.0	83.2	100.0	72.9	86.9	89.3	95.0	98.0	94.4
Reproductive performance ¹	(%)	106.0	90.0	113.0	78.9	102.0	90.3	93.7	106.0	130.2	127.3	164.4	147.8

¹No. of lambs reared per 100 lambs born.

strength 14 MPa, lateral strength 12 MPa) and have normal extensibility of 66 and 75 percent. Their skin is compact and has smooth and homogeneous structure on the rough side.

Mixed hair cover of six to eight months old Wrzosówka lambs has a density of 14 fibres per 1 mm² and average hair cover thickness of 31.5 μ (CV = 40%) (Janik *et al.*, 1994). The characteristics of fleece and the many hues of its natural grey cover make it splendid material for handcrafted and artistic products.

In addition, to the advantages given above, Polish Wrzosówka sheep are, as already mentioned, an aseasonal breed and are characterised by high-quality meat, good health, longevity and the ability to survive in extreme environmental and climatic conditions.

As a result of long and systematic selection, reproductive performance was largely improved. This especially concerns the nucleus flock (Kiec, 1998) (Table 6).

As part of an *ex situ* genetic reserve recreation programme, the National Research Institute of Animal Production in Balice has in its Semen Bank (located at the Zootechnical Experimental Station in Balice near Cracow) 840 semen doses from four Wrzosówka rams.

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Characterisation of Jamunapari goats in their home tract

*P.K. Rout, V.K. Saxena, B.U. Khan, R. Roy, A. Mandal,
S.K. Singh & L.B. Singh*

*Genetics and Breeding Division, Central Institute for Research
on Goats, Makhdoom Farah, Mathura 281 122, U.P, India*

Summary

The improvement programme in Jamunapari goats was started with the active participation of farmers in two adopted villages and efforts have been made to characterise the performance of Jamunapari goats in their home tract in relation to production, reproduction performance and field conditions relating to socio-economic status of farmers. The phenotypic measurements are also described in the breed in its habitat. Jamunapari is a tall, white and large size milch goat breed of India and their numbers have been reducing over the years for various reasons. The description in relation to housing, feeding, management, growth parameters, milk yield, parasitic load, blood polymorphism and constraints in field conditions has been made in detail. Body weights at birth, three, six and nine months were 2.75 kg, 12.3 kg, 16 kg and 22 kg, respectively. Milk yield at 90 and 150 days was 102 and 145 litres, respectively. The peak breeding season of this goat in field conditions is in May-June and twinning percentage is about 52 percent. The overall mortality in village conditions is about 3.7 percent and is mostly due to diarrhoea and pneumonia. The mortality was 3.7 percent, 1.9 percent, 9.8 percent and 2.0 percent in 0-3, 3-6, and 6-12 months, and adult goats, respectively over the years. The native goat in its home tract is endangered for several reasons and utmost care is needed from all angles to save this germplasm.

Résumé

Le programme d'amélioration de la race caprine Jamunapari a commencé avec la participation active des éleveurs de deux villages désignés et des efforts ont été fait pour caractériser la performance des chèvres Jamunapari dans leur environnement en relation avec la production, la performance de reproduction et les conditions de terrain vis-à-vis du niveau socio-économique des éleveurs. On décrit également les mesures phénotypiques de la race dans son habitat. La chèvre Jamunapari est basse et blanche et c'est la race à lait caprine plus grande aux Indes, bien que son nombre ait été réduit ces dernières années pour différentes raisons. On présente en détail la description de la conduite, l'alimentation, la gestion, les paramètres de croissance, le rendement en lait, la charge parasitaire, le polymorphisme du sang et les contraintes sur le terrain. Le poids corporel respectivement à la naissance, à trois, à six et à neuf mois était de 2,75 kg; 12,3 kg; 16 kg; et 22 kg. Le rendement en lait à 90 et 150 jours était de 102 et 145 litres, respectivement. Le pic saisonnier de mise-bas de cette race caprine dans des conditions de champs se situe entre mai et juin, et le pourcentage de jumeaux est d'environ 52%. La mortalité globale dans les conditions villageoise est d'environ 3,7% et est due principalement à la diarrhée et à la pneumonie. La mortalité pendant l'année était de 3,7%; 1,9%; 9,8% et 2% respectivement pour les âges de 0-3; 3-6 et 6-12 mois, et chez les chèvres adultes. La chèvre native dans son environnement se

trouve en danger pour différentes raisons et il est nécessaire de réaliser un effort supplémentaire de tout côté pour sauver ce germoplasme.

Key words: Jamunapari goat, Conservation, Characterisation, Management, Phenotypic measurements.

Introduction

The Chakarnagar Region of Uttar Pradesh (U.P) is an isolated pocket with a distinct locally adapted breed, the Jamunapari goat, popularly known as Chambal Queen or locally known as Chakarnagar Pari. Chakarnagar is bordered by three rivers, Jamuna, Chambal and Kwari and is a very arid and sandy area where the temperature varies from 2-3°C to 40-50°C in this ravenous

delta. Jamunapari is a majestic, tall, white and large sized breed and is famous for its milk yield all over the country. White in colour, its Roman nose, long ears and short horn characterise this breed. The neck is long, thick and well set. The loin is thick and the tail is short and curved upward. The ear length in 3-6 and 6-12 months, and adult is about 20 cm, 25 cm and 29 cm, respectively. The horn length is about 11.35 cm and 23.75 cm in 6-12 months and adult goats, respectively, and projects backwards. The udder is capacious, extends forwards and is mainly globular and oval shape. Teats are long and measure up to 12-14 cm in length. The survey of the last years revealed that this breed of goat is reducing fast in number as well as declining in breed characters. The population of the Jamunapari goat was 8 040 in 1988 and again decreased to 7 350 in 1991 (survey report of the institute). The goats have now

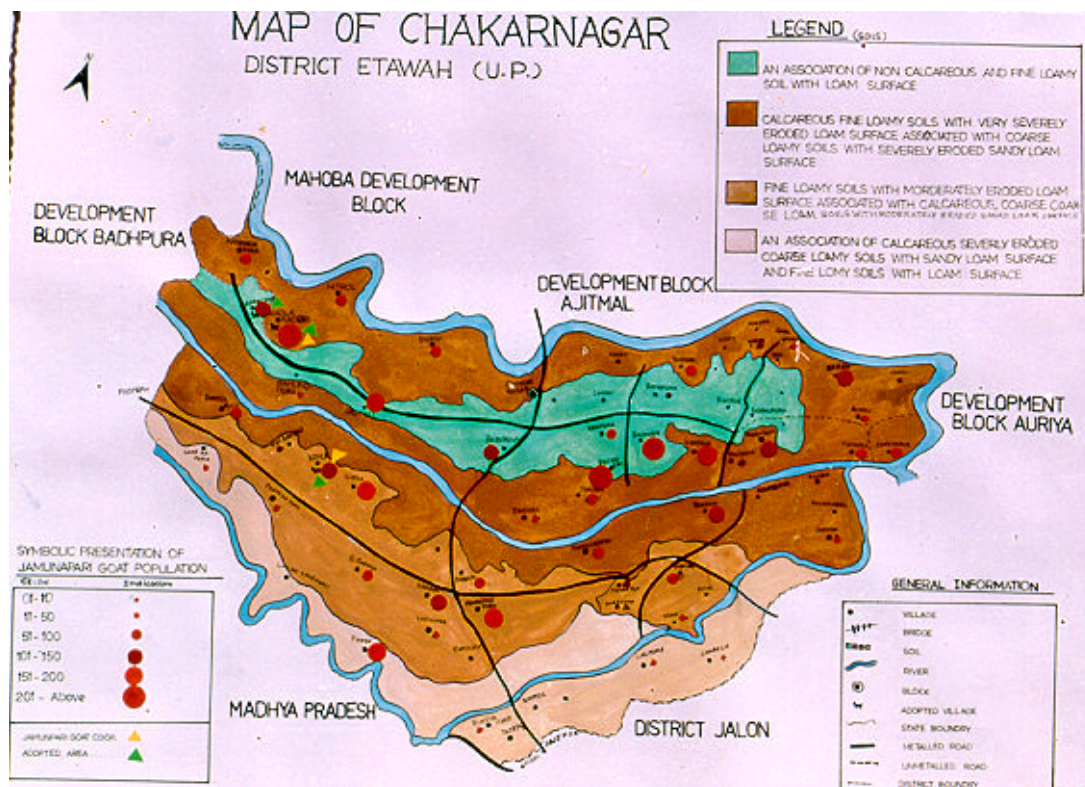


Figure 1. The highly eroded nature of soil in Chakarnagar.



Figure 2. The ravines of Chambal.

reduced in number and size and are mostly off colour, i.e. black with red coloured spots in the region of the shoulder. A research and development programme was started to study the physical characterisation of the breed in its home tract and the production and reproduction traits of this goat in its own habitat. In addition, a full characterisation of the conditions in the field, availability for feed and management would also be made. Finally, the programme would develop an improvement project using the research farm herd as a nucleus and the village herds for test mating and data collection. The Central Institute for Research on Goats has established a research and development herd of Jamunapari goats in two villages in its home tract for conservation and improvement of this breed. The breed improvement programme was launched in 1993 under the All India Coordinated Research Project on goats and the unit started functioning in the villages of Chakarnagar, Jagtoli and Nagla Kadhori (NK), situated about 10 km from Chakarnagar (Bhattacharya, 1990; FAO and UNEP, 1992).

Habitat

The home tract of Jamunapari goats is in the Chakarnagar Block of the Etawah district of U.P between 26.8°N latitude and 79.3°E longitude. The Chakarnagar Block is situated in the ravenous delta made by rivers Jamuna and Chambal and extends up to ravines of Kwari in the District Bhind of M.P. It lies 40 km southeast from Etawah town across river Yamuna and spreads over an area of 37 725 hectares. Due to the highly eroded nature of soil the ground surface is unevenly undulating forming gullies of 10-150 ft deep (Figure 1). The summers are dry and hot with highest temperatures reaching up to 48°C. During winter the temperature drops to 2-3°C. Annual rainfall is about 70 cm scattered throughout the rainy season. The gullies and ditches are covered with dense vegetation of *P. juliflora* and other drought resistant trees like Plum (*Z. jujuba*), Babool (*A. nilotica*), Chhonkra (*P. spicigera*), Hingota (*B. aegyptica*) etc. The main cereal crops are Arhar (*C. cajan*), Gram (*C. arietinum*) and Bajara (*P. typhoidium*). The main crop is Rabi. There are no proper irrigation facilities in this area.

Management Practices in the Home Tract

Goat rearing is the traditional occupation of the farmers in this area. There are about 49 families in Nagla Kadhori and 35 in Jagtoli villages. Yadavs are a predominant caste in Nagla Kadhori, while Jagtoli has a mixed population. The family size varies from one to 29 with an average of 9.4 and 10.9 in NK and Jagtoli, respectively. In NK about 33 percent of families have land holding of more than five acres and 51 percent in the range of one to five acres. In Jagtoli 60 percent of families have in the range of one to five acres and five percent more than five acres. All are Hindus by caste and no other religions exist in either village.

The Jamunapari goat population in both villages is higher in comparison to other livestock and local goats. In addition to Jamunapari goats, other livestock such as Barbari and local goats, buffaloes, cattle and camels also exist in the villages. About 34 percent of the Jamunapari goats are with

the richer farmers, i.e. farmers having more than five acres of land in NK. In Jagtoli 77 percent of Jamunapari goats are found with medium class farmers (one to five acres of land holding) and no goats are observed with richer farmers, i.e. more than five acres of land holding. The highest population of Jamunapari goats was associated with one to five acres of land farmers in NK and Jagtoli village. The goat keeping has a major contribution for the villagers' livelihood and it represents about half of the income from cropping per annum.

Flock size

Goat keepers prefer to keep small flocks due to less space available to individual farmer. Herds include one to 16 adult females. The small herds are also preferred due to limited feeding resources and for security purposes. The average herd size is 7.0. Goat herds are maintained in an extensive system with eight to 12 hour/day grazing in different seasons in the ravines of Chambal (Figure 2).



Figure 3. Covered accommodation are covered with thorny bushes and used for keeping the goats. Some times this structure may be made of mud or bricks.



Figure 4. A grazing flock.

Housing

In general, covered accommodation of 10-12' x 6-8' area made of wooden poles and thatches and covered with thorny bushes are used for keeping the goats. Some times this structure may be made of mud or bricks depending on the economic status of farmers and modified seasonally to suit prevailing weather (Figure 3). Kids and adults are housed separately. Breeding bucks are kept with special care and reared in brick houses (Figures 4 and 5).

Feeding

The goats are kept on grazing in ravines of river Chambal during day light for a total of eight to 12 hours a day in different seasons. However, pregnant does and goats which are to be used for show purposes are given some special diet comprised of bajra, barley, jowar and wheat as such or in the form of gruel. The concentrate mixture is provided to goats in the morning prior to sending them for grazing. Newly born kids or sucklings below three months of age are allowed to suckle their mother throughout the period. Before suckling or milking each doe is provided with

some boiled bajra or cooked bread. In addition to concentrate mixture, the pods (succulent or dry) of bajra unripe Rajma, Kairy and leaves in abundance are also given to the goats.

Registration of farmer and recording

Initially, the farmers/goat breeders of the two villages of Nagla Kadhori and Jagtoli in Chakarnagar Block were registered. The Jamunapari goat population in these two villages was nearly 500 out of which 350 were adult breedable females (Figure 6). All the goats in the villages were given a number according to owner and numbering was repeated three times in a year. The data recording and registration were maintained by research officers living in that village area. The health coverage for the herds was provided by project workers and veterinary officers in addition to local help. Body weights at different ages (birth, three, six and nine months) were recorded. Milk yield was recorded in two villages in the morning and evening at fortnightly intervals up to 12 fortnights.

Table 1. Production and reproduction traits of Jamunapari goats in field conditions.

Parameter/Number	Mean	±SE	No of observations
<i>Body weight (kg) at</i>			
Birth	2.7	±0.03	240
3 Months	12.3	±0.20	233
6 Months	16	±0.27	127
9 Months	22	±0.52	65
12 Months	28	±0.30	20
<i>Milk production (litre)</i>			
90 days	102	±0.34	197
150 days	146	±0.71	115
<i>Reproduction performance</i>			
Kidding interval (days)	335	±6.1	36
Breeding season	May-June		
Age at 1 st kidding (days)	700	±9.1	26
Service period (days)	187	±8.1	41
Kidding rate	1.61		
Age at first conception (days)	559	±20.1	26

Numbers in the parenthesis indicate the number of observations.



Figure 5. A grazing flock.

Table 2. Means of body measurements \pm SE (cm) of Jamunapari goats at different ages in field conditions.

Trait	2 Teeth		4 Teeth		6 Teeth		Full mouth	
	Male	Female	Male	Female	Male	Female	Male	Female
Body Length	83 \pm 4.0 (2)	71 \pm 0.6 (54)	86 (1)	76 \pm 1.2 (10)	94 (1)	77 \pm 1.2 (25)	96 (1)	79 \pm 1.4 (7)
Body Height	87 \pm 3.0 (2)	75 \pm 0.6 (54)	80 (1)	78 \pm 1.0 (10)	94 (1)	81 \pm 0.9 (25)	98 (1)	80 \pm 1.1 (7)
Body Girth	80 \pm 4.5 (2)	69 \pm 0.6 (54)	84 (1)	74 \pm 1.3 (10)	92 (1)	76 \pm 1.1 (25)	91 (1)	77 \pm 1.3 (7)
Paunch Girth	76 \pm 6.0 (2)	67 \pm 0.7 (54)	84 (1)	74 \pm 1.0 (10)	85 (1)	78 \pm 1.6 (25)	83 (1)	79 \pm 2.7 (7)
Leg Length	54 \pm 0.5 (2)	47 \pm 0.3 (54)	57 (1)	48 \pm 0.8 (10)	58 (1)	50 \pm 0.5 (25)	59 (1)	49 \pm 0.4 (7)
Ear Length	33 \pm 3.0 (2)	25 \pm 3.3 (54)	31 (1)	26 \pm 4.9 (10)	33 (1)	27 \pm 7.0 (25)	32 (1)	28 \pm 1.4 (7)
Ear Width	10 (2)	12 \pm 1.4 (54)	12 (1)	10 \pm 3.4 (10)	12 (1)	10 \pm 3.4 (25)	11 (1)	10 \pm 5.1 (7)

Numbers in the parenthesis indicate the number of observations.



Figure 6. The Jamunapari goat.

Production Performance

Body weight

The overall least-square means for body weight at birth, three months, six months, nine months and 12 months are presented in table 1. The physical measurements of Jamunapari goats in relation to different ages are presented in table 2. Analysis of variance revealed significant effects of sex on body weight at all ages whereas type of birth significantly influenced weights up to six months of age. The location had a significant effect on all body weight groups except birth. The month of kidding also had a significant effect on nine months body weight whereas year of kidding significantly affected body weight at all ages in the present study. Dams with single kids could provide more nutrition to their kids during the prenatal and suckling period as compared to those with multiple births. This would have led to higher weights lasting up to six months only.

Milk yield

The overall mean of milk yield was 0.90 l/day. The milk yield increased up to the fourth fortnight and thereafter starts decreasing. The mean of yield in 90 and 150 days were 102 and 146 litres respectively (Table 1). No difference in milk yield was observed due to the month of kidding from September to November.

Reproductive performance

Conception rate, kidding percentage (number of does kidded/does available for kidding), kidding rate (number of kids born/number of does kidded) and twinning percentage were 88 percent (422), 77.4 percent (369), 1.61 (593) and 52.2 percent (593), respectively, over the years. Male to female ratio was 51:49 among kids born. The age at first, inter-kidding interval, service period and age at first conception was 700 ± 9.1 , 335 ± 6.1 , 187 ± 8.1 and 559 ± 20.1 days, respectively. Most of the kids



Figure 7. Role of women in feeding, milking and reproduction management.

(73 percent) were born in October-November which shows that the peak breeding season of Jamunapari in field conditions is between May-June. However, a few goats were also bred in April, August and September.

Blood protein polymorphism

Haemoglobin polymorphism was conducted in 50 Jamunapari goats using starch gel electrophoresis with Tris-EDTA buffer. Hb-AA frequency was 1.00 and no other phenotype observed in this sample. However three different phenotypes namely AA, AB and BB were observed in this sample and the frequency was 0.09, 0.81 and 0.11, respectively.

Disease Incidence and Health Coverage

Vaccination of the entire animal against FMD was carried out regularly in all the animals. Treatment to all ailing animals was provided free of charge and regularly by project workers. Faecal samples were screened regularly in both the villages by collecting

samples from the field. The overall mortality over the years was 3.7 percent in village conditions. Mortality was 3.7 percent, 1.9 percent, 9.8 percent and 2.0 percent in 0-3 months, 3-6 months, 6-12 months and adult goats, respectively over the years. Diarrhea in kids, pneumonia, abscess and mastitis are the diseases observed in village conditions. The coccidiosis is the major problem in kids and nematode burden is less in adult goats in this area.

Role of Women in Goat Rearing

The women help in goat rearing in every step and they also have adequate knowledge of goat rearing as has been the traditional occupation of people for a long time. However, a particular person in a family is responsible for herd management, grazing and feeding, etc. As it is a heavy breed, so the male members of the family are mainly responsible for their well being. However, the role of women in feeding, milking and reproduction management is observed in a regular manner (Figure 7).

Conclusion

The conservation and improvement programme is facing a lot of problems in the breed home tract. Presently, shortage of grazing land and marketing of goats are of major concern to the farmers. The role of the Government and policy towards animal genetic resources need to be critically evaluated for the conservation of this breed. The admixture of this breed with other goats is a major problem as the breed is losing its genetic architecture. Therefore, it can be concluded that conservation of the Jamunapari goat is of paramount importance and efforts to conserve the breed in an integrated manner should be taken up.

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The Majorcan Black pig

J. Jaume¹ & L. Alfonso^{2*}

¹*Institut de Biologia Animal de Balears, S.A., 07630 Campos, Spain*

²*Departamento de Producción Agraria, Universidad Pública de Navarra, 31006 Pamplona, Spain*

Summary

The Majorcan Black Pig is the only autochthonous pig breed from the island of Majorca (Spain). It is characterised by a medium size body (160 kg), slate-grey skin colour, and concave profile of the nose, large pendulous ears and tassels on the bottom neck. It is well adapted to the low-level breeding and feeding conditions of the traditional extensive management on the island. It is the base of some traditional high quality products such as the “sobrasada”, sort of red highly seasoned sausage that can be spread over bread, for which there is a good demand in the Spanish market. The Majorcan Black Pig breed played an important social and economic role until the 1960s, which then declined with the introduction of the intensive production systems and foreign breeds. The Majorcan Black Pig Association was founded in the early 1980s by a group of private farmers to recover and conserve the breed. Recently, this association has been officially recognised and the official Majorcan Black Pig Herd Book set up. At present, there are more than 600 animals registered.

Resumen

El Cerdo Negro de Mallorca es la única raza de cerdos autóctona de Mallorca (España). Se caracteriza por ser de tamaño medio (160 kg), color de la piel gris pizarra, perfil cóncavo del hocico, orejas grandes y caídas, y la presencia de mamellas en la base del cuello. Esta raza está bien adaptada a las condiciones pobres de cría y alimentación propias del manejo extensivo tradicional. Por otra parte, es la

base de productos tradicionales de alta calidad como por ejemplo la “sobrasada”, muy apreciada en el mercado español. El Cerdo Negro de Mallorca jugó un importante papel social y económico hasta los años 60. Su declive se inició con la introducción de los sistemas intensivos de producción y las razas extranjeras. Al inicio de los años 80 se fundó la Asociación del Cerdo Negro de Mallorca con los objetivos fundamentales de recuperar y conservar la raza. Recientemente se ha reconocido oficialmente esta asociación y se ha puesto en marcha el Libro Genealógico de la raza. En este momento hay más de 600 animales registrados.

Keywords: *Pig breeds, Majorcan Black pig, Quality pork products.*

Introduction

The Majorcan Black Pig is the only autochthonous pig breed from the island of Majorca (Spain) and one of the few autochthonous pig breeds in Spain. The Majorcan Black Pig breed played an important social and economic role until the 1960s when its decline started with the introduction of the intensive production systems and foreign breeds. The Majorcan Black Pig Association was founded in the early 80s by a group of private farmers. The main Association’s objective was the recovery

*Correspondence and reprints

and conservation of the breed. Recently this Association has been officially recognised and now is the responsible for the official Majorcan Black Pig Herd Book which was started in 1997. The *Institut de Biologia Animal de Balears, S.A.*, a service of the Balear Government for the conservation of autochthonous breeds, is now the institution responsible for the initiatives needed to preserve the breed.

Origin and Morphological Characteristics

The origin of this breed is uncertain. It seems probable that it came from the Iberian Peninsula with the influence of different pig populations introduced by the several civilisations that have dominated the island of Majorca (Torrens, 1947; Payeras, 1988). The breed has two main characteristics in common with other Western Mediterranean

breeds, black colour of skin and the high production of fat tissue.

The standard morphological characteristics were recently established to set up the herd book. This standard was established as a description of the present morphology of available animals. The main characteristics considered were body size (medium size, 160 kg), the skin colour (slate-grey), the profile of the nose (concave), the ear characteristics (large and pendulous) and the presence of tassels on the bottom of the neck (Figure 1). This latter trait is a characteristic of the Majorcan Black Pig, and found in 96% of the present population.

Population and Distribution

The total number of animals of the Majorcan Black breed is estimated, at present, as approximately 700, and the number officially recognised and registered in the herd book is 610 (554 sows and 56 boars).



Figure 1. Majorcan Black boar.

These 610 animals are distributed in a total of 48 farms. A sample survey was conducted to collect information on population structure, management practices and performances under field conditions for describing the breed. Thirty-nine farms, with 380 sows and 46 boars, were recorded and analysed. The distribution of animals in the recorded farms is shown in table 1.

The theoretical effective population size (N_e) of Majorcan Black Pig derived from figures in table 1 is approximately 200. Following Simon and Buchenauer (1993) this value implies that this breed is only potentially endangered. The real N_e may, however, be lower. First because population is fragmented in very small herds. There is some degree of connection between herds as a result of movement of males between herds, but the number of herds that supply males is small. The second reason why the N_e may be lower than the theoretical value is the accumulated inbreeding. The population size has increased significantly in the last 20 years

after a bottleneck that occurred in the 1960s. There is little information of how this increase occurred, but it is known that a rapid, unbalanced growth occurred in some herds. No pedigree information is available and thus it is difficult to have even an approximate value of the average inbreeding coefficient of the population, but it seems unrealistic to think that it is very small.

Management Systems

The Majorcan Black Pig is well adapted to the traditional extensive management, characterised by low-level breeding and feeding conditions (see Figure 2). Although a lot of present farms have recently introduced animals of this breed, the farms' production and social structures are very old as shown in table 2. Furthermore, the Majorcan Black pig is always managed in an extensive way and a pig enterprise is never the main activity of the farm.

Table 1. Distribution of animals in the farms presently controlled.

Sex		Breeding stock farms (n=12)	Breeding stock farms with growing pigs (n=27)	All
Females	Mean	10.5	9.4	9.7
	Range	3-31	4-29	3-31
	N	126	254	380
Males	Mean	1.3	1.1	1.2
	Range	1-4	1-2	1-4
	N	16	30	46

Table 2. Some characteristics of the structure of the management system.

Characteristic	Percentage of farms
Family farms	83%
Owner of the farm	48%
Farms with new buildings	35%
Farmers older than 40 years	98%
Farms with other activities	100%
Farms with more than 25 ha	85%



Figure 2. Traditional management system of the Majorcan Black pig.

The management of reproduction is very simple and there is no controlled mating with the males and females kept together except during the lactation period. The feeding system was traditionally based on pastures. Only sows and fattening pigs used to receive some supplementary feeding during lactation and final growing period. This supplement was based on household refusals, bran, legume seeds and cereals, and figs. Now the feeding system is still based on pastures but with an important supplement of concentrates. All of the farms feed the sows with commercial diets during lactation, 62% during pregnancy and 21% during the weaning-mating period.

Production Characteristics and Uses

At present the population is being characterised only for reproductive traits. In the near future, traits related to meat and fat production and quality will be also recorded. The only reproductive data available so far

are the number of live (NBA) and weaned (NW) piglets per litter, the number of litters per sow and year (farrowing index) and the number of teats of the sows. Preliminary estimates of the NBA and NW are 6.8 and 5.2 respectively. The number of litters produced per sow per year has not been accurately estimated, but it appears to be less than 2. From these figures it can be deduced that the number of Majorcan Black pigs produced for slaughter is less than 6 000 per year. The number of teats is highly concentrated around a modal value of 10 teats as observed in other pig breeds such the Iberian (Dobao *et al.*, 1988). It is unusual to find sows with less than 10 teats and only 19% have more than 10.

Some traditional high quality products are based on the Majorcan Black pig. The most important of these products is the “sobrasada”, a red, highly seasoned sausage that can be spread over bread (see Figure 3). This “sobrasada” is very popular and highly priced in the Spanish market. It is made of lean meat (50%), fat (50%), and seasoned with paprika, pepper and salt, using all the lean meat and some fat of the slaughter pigs. Pigs



Figure 3. “Sobrasada”, a red sausage highly seasoned with paprika produced from the Majorcan Black Pig.

are slaughtered between 12 and 18 months of age when they weigh between 120 and 140 kg. The killing out percentage is approximately 50%. With heavier pigs, weighing 200 kg or more, the quality of product is maintained but the killing out percentage is reduced to about 40%. Another less important product of the Majorcan system is the “lechona”, piglets of about 8 kg of live weight which are whole roasted, as in other regions of Spain.

Breed Preservation

The starting of the Majorcan Black Pig Herd Book in 1997 was the first initiative to promote the preservation of this domestic pig population. In the Western Europe, as in other developed countries, the conservation of domestic animal genetic resources may be solely for social or cultural reasons. However, in general it is not clear what genetic resources should be preserved. A sustainable

and coherent conservation program must be able to coexist and interact with a program for livestock improvement. This is more viable when the animal population occupies a secure niche in the commercial livestock industry, and when its productive role is widely understood and accepted (Notter *et al.*, 1994).

Arising from these ideas a further initiative to preserve the breed was to promote the traditional products manufactured from it, basically the “sobrasada”. The production of “sobrasada” is an important activity for the meat industry in the Balearic Islands. However, only a small amount, about 50 t, is produced from Majorcan Black pigs (Mora & Palou, 1993), and it was necessary to label the “sobrasada” made from Majorcan Black pigs as such. A registered trademark was created by the Spanish Government in 1994. This defines a role for the Majorcan Black Pig in the livestock industry.

It is clear that these two initiatives, i.e. breed preservation and production of special

products, play an important role but further initiatives are needed. At present, a third initiative has started to improve the veterinary infrastructure and develop a disease control programme. The next initiative will be to set up a management information system. This will permit the improvement of the management of farms, but will also collect more accurate information about the production system. Once the results of this information system and from the herd book are available, it would be interesting to assess the possibilities of starting a programme for the genetic improvement of the breed.

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