

CHAPTER 6

THE CONSERVATION OF ANIMAL GENETIC RESOURCES IN THE UNITED KINGDOM

by

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Summary

The current 'rare breed' movement in Great Britain which began in 1964 is based on maintaining distinct breeds of livestock rather than on the creation of gene pools.

The Rare Breeds Survival Trust is the most important organization concerned with genetic conservation in the United Kingdom. It is a charitable company which is administered by an elected Council, while the implementation of its policy is controlled by a Technical Consultant.

There are 55 'rare breeds' of large livestock in the United Kingdom, but only 45 of these breeds are recognized by the Rare Breeds Survival Trust which has instituted a strict Rare Breeds Acceptance Procedure based on two criteria, namely numerical status and genetic value.

In 1974 the Trust carried out a Survey of British breeds of livestock to establish population levels. A second Survey was carried out in 1979. When a potential problem has been identified various measures are implemented to make the threatened breed more secure: (i) financial encouragement to breeders and breed societies, (ii) semen bank and embryo bank, and (iii) creation of new breeding units.

Members of the Rare Breeds Survival Trust have access to an advisory service. The advice relates to both breeding programmes and methods of management. Publicity has played an important role in the success of endangered breeds in the United Kingdom. In May 1974 the first issue of a monthly magazine, The Ark, was published. Looking to the future a major project and research programme has been launched.

6.1 Introduction

The interest in the conservation of animal genetic resources in Great Britain made its first significant advance in the early 1960's when the Zoological Society of London established small groups of five endangered breeds in Whipsnade Park. The breeds selected were White Park Cattle, Norfolk Horn, Portland, Whitefaced Woodland (also known as Penistone) and Manx Loghtan sheep. The White Park and Portland both had fallen to very low numbers, while the last pure Norfolk Horn died in 1973. The demise of the Norfolk Horn increased the number of British breeds which have become extinct in the twentieth century to twenty-three (Table 6.1). As more than one hundred native British breeds of large livestock are extant, the loss of these breeds may not seem important, but several of them such as the Lincolnshire Curly Coat, Galloway, and Suffolk Dun, possessed characteristics which are not found in other breeds and which could have benefitted the contemporary livestock industry.

6.2 Development and organizational structure

From the early initiative of the Zoological Society of London has grown the major 'rare breed' movement in Great Britain today, and from the beginning the policy of conservation was based on maintaining distinct breeds of livestock and not on the creation

of a gene pool. Britain possesses a large number of minority breeds, many with distinctive characteristics, and the whole livestock industry, especially relating to cattle, sheep, goats and horses, is geared to the maintenance and promotion of breeds. The organizations which have become involved in the 'rare breeds' movement are concerned with breeds rather than hybrids. In the forefront of developments are the Milk Marketing Board of England and Wales, which established a semen bank from bulls of minority breeds, Countrywide Livestock Limited, a private consultancy company, which established a registration programme for those breeds which did not have a Breed Society, and the Rare Breeds Survival Trust (RBST), a specialist organization entirely devoted to the conservation of domestic breeds of livestock.

In conjunction with these organizations, each breed is supported by a Breed Society and/or individual breeders. Breeders are essential for the long term survival of a breed, and British livestock farmers are particularly sensitive to the plight of minority breeds. They are prepared to keep breeds which currently are not commercially viable. Breeds such as Gloucester cattle, Portland sheep, Bagot goats or Middle White pigs can not readily demonstrate significant commercial characteristics, yet in general there are insufficient animals available to supply farmers wishing to keep breeding units. They are equally willing to keep foreign breeds which are endangered in their country of origin. Two breeds in particular have benefitted in this way. The *Kerry breed of cattle which is declining in its native Eire, is enjoying an upsurge of support from English farmers. Caspian Miniature Horeee, following the recent unrest in Iran, are now concentrated mainly in England. The British Caspian Society is the focus of interest for the breed, and the International Stud Book is published by Countrywide Livestock Limited.*

There are dangers inherent in the activities and objectives of both Breed Societies and breeders. There is an ongoing conflict between the principles of genetic conservation and the short-term commercial considerations of those who are concerned to improve the financial returns from their particular breed. For example some Breed Societies are obsessed by points of fashion, which may reflect more the transitory whims of showring standards than the functional qualities of the breed. Individual breeders may attempt to 'improve' their animals by changing the characteristics of the breed. The Gloucester Old Spot is a breed noted for its maternal qualities, but it is being selected within breed by some breeders to excel in the official Performance Test which measures carcass quality and efficiency of production. In contrast breeders of Beef Shorthorn and Lincoln Red cattle have resorted to crossbreeding with the Maine-Anjou and Limousin respectively.

The position of those breeds which were not controlled by a Breed Society permitted the development of a programme based on the principles of genetic conservation. The Combined Flock Book, which is administered by Countrywide Livestock Limited for ten breeds of sheep (Castlemilk Shetland, Cotswold, Hebridean, Manx Loghtan, New Norfolk Horn, North Ronaldsay, Portland, Shetland, Soay and Whitefaced Woodland) gives the following advice: 'The breed standards are designed as guidelines, and are not intended to impose rigid type specifications which can only act to the detriment of each breed'. Similarly the function of the Bank of Genetic Variability maintained by the Milk Marketing Board, is to ensure that semen from a wide cross-section of bulls in each breed is put into long-term storage. The minority breeds are well represented in the Bank.

However, in the United Kingdom, the RBST is the most important organization concerned with genetic conservation. It originated as a working party in 1968 and became a Charitable Trust in 1973. It is administered by an elected Council through several specialist subcommittees. The Standing Sub-Committee is responsible for routine administration, the Technical Committee for the formulation of conservation strategy, the Breed Liaison Committee for ascertaining the current status of each breed, and the Fund-Raising and Promotion Committee for publicity and the procurement of extra funds. The preparation and implementation of the Trust's policy (Appendix) is controlled by the Technical Consultant, who maintains a central information bank, promotes the creation of new breeding units, provides advice on livestock breeding and management, and coordinates the Trust's major project programmes.

6.3 Philosophy of conservation

There are fifty-five 'rare breeds' of large livestock in the United Kingdom (Table 6.2). The BBST has instituted a strict Rare Breeds Acceptance Procedure (Table 6.3), based on two criteria, namely numerical status and genetic value. An alternative system of demonstrating the priority rating of endangered breeds has been suggested by Alderson (Figure 6.1). Using this Acceptance Procedure the BBST recognises only forty-five of the breeds listed in Table 2. Ten breeds are excluded and the reasons for their exclusion illustrates the basic philosophy of RBST policies. The White Galloway and Bolian Qwynion are merely colour variants of popular breeds. The NDS and Whitebred Shorthorn are varieties of the Shorthorn breed and are not sufficiently distinct to be given separate breed status. The Blue Albion and the Oxford Sandy and Black are no longer true breeds because of crossbreeding policies. The Caspian is a foreign breed and the Old English is a feral animal. The Castlemilk has not yet been established for 75 years and the New Norfolk Horn is a bred-back reconstruction of an extinct breed. These are the arguments advanced by the RBST/are not necessarily accepted by other organizations or individuals.

The priority lists are updated regularly. Recently two breeds of sheep, the BWM and the Jacob have been removed from the lists as a result of dramatic increases in population size. At the same time other breeds are becoming more seriously endangered. Some breeds lose popularity because they are unfashionable. Middle White pigs are a prime example, while among sheep breeds it was fashion rather than productivity which determined that the Wensleydale was superseded by the Teeswater, which in turn was ousted by the Bluefaced Leicester. Other breeds decline because they are unproductive in current systems of production. Gloucester Cattle, Portland sheep and Bagot Goats can be included in this category. Finally some breeds become endangered because they are crossed with other breeds. This may be done to introduce new characteristics. The crossing of Beef Shorthorn cows with Maine-rAnjou bulls and Lincoln Red cows with Limousin bulls has been mentioned above, while the NDS is now being crossed with the Dairy Shorthorn as it is absorbed into Coates Herd Book. This latter case can be attributed largely to the lack of interest and lethargy of the breeders. The case of Shetland cattle is different. The cows possess excellent maternal qualities and were crossed with Aberdeen-Angus and Shorthorn bulls because they produced valuable crossbred calves - an example of a breed's good points proving a disadvantage.

The philosophy of conservation in the United Kingdom, which pre-supposes that the functional genetic units are recognised breeds of livestock, requires that each breed must remain free from significant crossing with other breeds and that it must possess reasonably distinct characteristics. If the genotype of the breed has been diluted by crossbreeding so that the introduction of other breeds constitutes more than 20% of its genetic make-up, it is no longer recognised as a breed by the RBST. This factor excludes the Blue Albion (reconstituted from Friesian and Shorthorn animals following decimation of the breed by the policy of slaughter to control foot-and-mouth disease); the Oxford Sandy and Black, which was revived by extensive crossing with other pig breeds, notably the Tamworth; and the New Norfolk Horn, which currently is undertaking planned breeding programme with the intention of obtaining recognition as the Norfolk Horn.

Distinctiveness is a difficult quality to define. A breed can be defined as a population which conforms to stipulated standards, which breeds true to type, and which is distinct from other breeds. But there are no recognised measures of distinctiveness and the conflicting philosophies are illustrated by the RBST's attitude to Shorthorn cattle and longwool sheep. The RBST now regards both the NDS and the Whitebred Shorthorn as variants of the Dairy Shorthorn and does not consider that they are worth conserving as separate breeds, despite the fact that they qualify under the Acceptance Procedure. On the other hand, the three longwool sheep breeds, the Cotswold, Leicester and Lincoln are given full support as separate breeds although they are more closely related and phenotypically similar than the various Shorthorn breeds.

6.4 Methodology

6.4.1 Conservation

Since 1974 genetic conservation in the United Kingdom has been achieved on an ever-widening front. In that year the RBST carried out a Survey of British breeds of livestock to determine population levels. A second Survey was begun in 1979 and will be repeated triennially to identify changes in population and to give early warning of potential trouble areas. For the purpose of the Survey population size is defined as the number of females of breeding age which are mated to a bull of the same breed. Non-breeding stock and females used for crossbreeding are not making any contribution to the survival of the breed. The results of the Survey (Table 6.4) are fed into the Information Bank which is maintained by the Technical Consultant. In addition a computer at Reading University has been programmed to analyse the structure of endangered breeds, and to perform the following functions:

1. Production of a 4-generation full pedigree for any specified animal.
2. Computation of inbreeding coefficients for that animal.
3. Computation of coefficients of coancestry.
4. Computation of coefficients of relationship between any specified animal and the rest of the breed.
5. Production of a print-out for Herd/Flock/Stud Books.

When a potential problem has been identified three main measures are implemented to make the threatened breed more secure, namely the provision of immediate financial incentives, the long-term storage of semen and embryos, and the creation of new breeding units.

Financial incentives are provided through the Breed Incentives Project and the variety of projects for which support has been approved is shown in Table 6.5. The incentives broadly fall into two categories. Those such as the A.I. service, the importation or other support for keeping boars, and the registration programmes, are designed to prevent genetic wastage. Other incentives, such as performance testing, milk recording and publicity, are designed to promote the breed and bring its qualities to the notice of a wider audience.

The second phase in the process of securing the future of cattle breeds is an extension of the A.I. service. When semen is collected from bulls of minority breeds, 100 straws are put into long-term storage in the Bank of Genetic Variability. Hopefully in the future, the Bank will be extended to include frozen embryos, and in this way it will be possible to maintain a representative sample of the breed at any point in time. All breeds change all the time, and even the implementation of the most precise and carefully planned conservation measures will not prevent genetic drift and genetic wastage. Thus frozen semen and frozen embryos are a vital ingredient of the strategy of conservation. The RBST's Semen Bank is based on the concept of storing semen from three unrelated bulls from each breed. This limit is totally inadequate and was imposed originally because of financial restrictions and the unavailability of suitable bulls. The bulls of minority breeds which are included in the Semen Bank are shown in Table 6.6. Currently an intensive effort is being made to store semen from all available Irish Moyle, NDS and Shetland bulls, three breeds which are acutely endangered.

In the absence of positive policies to maintain genetic variability it is likely that the level of inbreeding in a minority breed will increase rapidly. In the White Park breed one bull, Whipsnade 201, has contributed 15.44% of the genetic make-up of the breed only 20 years after his birth. The analysis of his relationship to the breed is shown in Table 6.7. It is essential to maintain the maximum number of males in each generation. In minority breeds the ratio of females to males must be as low as possible, and the relationship between the number of males and females and the increase in the coefficient of inbreeding is shown in Table 6.8.

The creation of new breeding units of minority breeds is another vital part of the strategy of conservation. In the early stages of the RBST's development a major part of the Technical Consultant's energy was devoted to ensuring that each breed was maintained in an adequate number of well-managed units. He was responsible for finding new breeders for seriously endangered breeds such as Shetland cattle and Leicester Longwool sheep, and for the dramatic increase in the number of herds of Tamworth pigs and White Park cattle (Table 6.9). Other breeds with a larger population may be endangered because they exist only in a very small number of breeding units or in a very limited geographical area. For example, North Ronaldsay sheep were found only on the island of that name in the Orkney archipelago and pure Shetland sheep were found only on the main island in the Shetland Group. In both cases the RBST established new breeding groups on other islands and on the mainland.

In the case of North Ronaldsay sheep, special care had to be taken to ensure that the breed was established in a correct environment. The North Ronaldsay exists almost exclusively on seaweed, and has adapted itself to this unorthodox diet. As seaweed contains a substance that inhibits the absorption of copper, these sheep have become so efficient in the utilization of dietary copper that they experience a high level of mortality on normal diets as a result of copper toxicity. Thus the RBST has undertaken a programme of research to monitor the behavioural and physiological changes in the new flock that it has established on the island of Linga Holm.

Currently the Technical Consultant is placing less emphasis on the creation of new breeding units of minority breeds, and more on the introduction of small units of minority breeds into large commercial enterprises based on popular breeds. This has three advantages. It is likely that they will be subjected to a good standard of management. It is more likely that accurate and detailed records will be maintained. It provides an opportunity to evaluate the minority breeds in comparison with popular breeds.

6.4.2 Evaluation

Several trials have been carried out to compare minority breeds with other breeds. Ease of parturition is a characteristic which has become more important to British breeders following the introduction of breeds such as Charolais cattle and Texel sheep, which cause severe problems. Hindson has compared several breeds of sheep and has demonstrated that some "unimproved breeds" have bigger pelvic dimensions in relation to body size, giving fewer lambing difficulties (Table 6.10). A trial carried out to compare White Park, Welsh Black and Hereford bulls as terminal beef sires, demonstrated that the White Park crossbred calves were 25 kg heavier at 55° days of age. In another trial carried out by the Royal Agricultural Society of England to evaluate sheep breeds for the production of heavyweight lambs, a minority breed, the Oxford Down, proved the most successful (Table 6.11).

Perhaps the most surprising results have been obtained with the Soay sheep. This primitive breed has played no part in the commercial sheep industry, but recent work has demonstrated that it possesses unique carcass characteristics and resistance to footrot. Trials at the Grassland Research Institute have shown that a Soay ewe rearing crossbred twins will yield 1.57 times her own body weight of milk on one lactation, compared with a yield of only 1.21 times her own body weight by the Scotch Halfbred, a popular British ewe. In terms of efficiency of production (measured as weight of lamb reared to 50 days of age per unit of feed consumed) the Soay ewe proved 15.65% superior to the Welsh Mountain ewe, and 3.01% superior to the Clun Forest ewe.

6.4.3 Advice and cooperation

Members of the RBST have access to an advisory service. This is provided by the Technical Consultant who is a geneticist and a breeder of pedigree livestock, and he in turn can call on specialist advisors who are leading authorities in Great Britain on the breeding and management of livestock. The advice is made available to individuals in the case of large breeding units and Approved Centres, but for the owners of smaller breeding units a series of breeders workshops is held in each region to provide a more elementary level of advice on livestock management. Owners of minority breeders are encouraged to

participate in group breeding programmes. These programmes are based on two principles. Firstly, each bloodline must be maintained as a distinct entity within the breed and this involves some inbreeding. Secondly, the majority of females in the breed follow a pattern of cyclic crossing between each bloodline (Figure 6.2). Thus females from group A are either mated to males of group A or group B, and females from group B to males of group B or group C etc. It is appreciated that this is not theoretically the most efficient system of maintaining genetic variability, but it is the system most likely to succeed where the animals are owned by a number of independent breeders.

The Advisory Programme is complemented by other technical meetings to discuss in detail specialist topics such as wool, recording, feeding, etc. In addition scientific seminars and symposia are organized as necessary. An annual symposium is held at Edinburgh, while policy seminars were held in December 1978 and February 1980 and benefitted from the participation of leading British scientists from the Animal Breeding Research Organization, Grassland Research Institute, Milk Marketing Board, Hill Farming Research Organization, and the Universities of Cambridge, Newcastle and Reading.

6.4.4 Publicity

Publicity has played an essential part in the success of the genetic conservation policy in Great Britain. Rare breeds have been featured frequently on T.V. and radio programmes, and the RBST was able to present its own thirty minute programme 'Domestic Dodos' on television. In May 1974 "the first issue of a monthly magazine, The Ark, was published. Initially this was a private venture and, although it was taken over by the RBST in 1978, it has retained the facility to comment on a broad front, and contains articles on foreign breeds, dogs, etc., which are not included in the RBST's programme. It provides a valuable medium for members of the RBST to express their views, for the work of the RBST to be reported, and for the Technical Consultant to give general advice and guidance.

The main promotional event in the 'rare breeds' calendar in Great Britain is the annual Show & Sale. This attracts great publicity, but it also provides owners of the minority breeds with a common meeting ground where they can discuss mutual problems, obtain new breeding stock, and assess the qualities of their animals in comparison with a wide selection of other animals of the same breed. The first Show & Sale was held in 1975 and since then has been expanded each year, so that in 1979 it became a two-day event with entries of 1682 animals and birds (cattle, sheep, pigs and poultry). In 1979 classes for horses and goats were discontinued for administrative reasons, but the British Waterfowl Association again took advantage of the facilities offered by the RBST at the event.

6.7 Future policy

The programme for the conservation of animal genetic resources probably is more advanced in Great Britain than in other countries. The rate of growth has been very rapid and this has highlighted two main problems. Firstly, it has been necessary at all stages of development to find a compromise between the idealistic objectives of the conservation of genetic variability and the natural desire of breeders to change and 'improve' their livestock. Selection policies can lead to a change in the characteristics of a breed. The British White for example, is now a beef breed, but no more than a decade ago it was a dairy/dual purpose breed. Secondly, there is an increasing danger that an organization whose income relies partly on membership subscription, will divert some of its funds away from conservation activities to the provision of services for its members. To anticipate this danger the RBST has launched a major project programme to which most of its funds will be allocated.

The project programme will be the basis of conservation work in Great Britain during the next five years, and will be implemented in conjunction with the established services and events which "rare breed" owners enjoy already. The new projects include research on milk typing, blood typing, and chromosome analysis, behavioural studies, an analysis of the frequency and inheritance of congenital defects, and a comparative study of ease of parturition in sheep and cattle.

In summary the programme of genetic conservation in Great Britain is a combination of practical services, technical and advice supported by scientific research and analysis. It relies heavily on individual breeders, but the main coordinating organization is the RBST.

6.5 References and further reading

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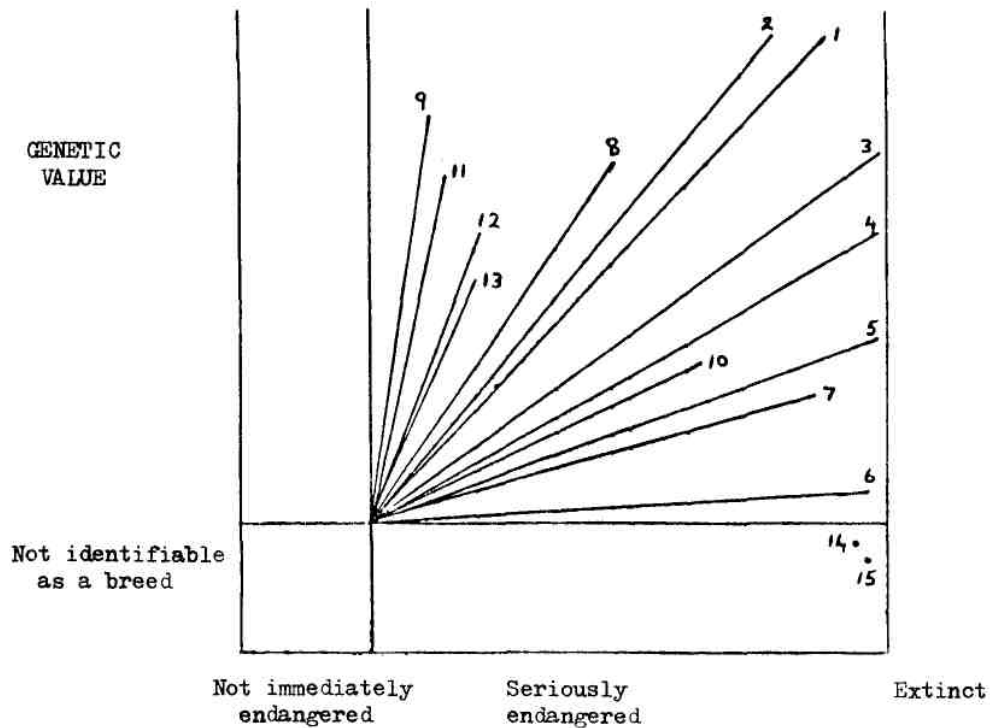
Rare Breeds Survival Trust Minutes of the Linga Holm Management Committee

White Park Cattle Herd Book 1978 Countrywide Livestock Limited, Market Place, Haltwhistle, Northumberland. Vol. II

Note: The Ark is published by Countrywide Livestock Ltd.

FIGURE 6.1

Priority rating of seriously endangered British breeds of cattle (1980)



VULNERABILITY

Note: Genetic Value is an expression of purity, distinctiveness and commercial qualities.
 Vulnerability is an expression of population size and population trends of purebred animals.

Code	Breed	Rating	Code	Breed	Rating
1	Kerry	103	9	Red Poll	64
2	White Park	98	10	British White	56
3	Shetland	97	11	Belted Galloway	55
4	NDS	90	12	Whitebred	48
5	Irish Moyled	83	13	Dexter	41
6	White Galloway	77	14	Bolian Gwynion	-
7	Gloucester	71	15	Blue Albion	-
8	Longhorn	67			

FIGURE 6.2

A diagrammatic representation of a group breeding programme for a minority breed

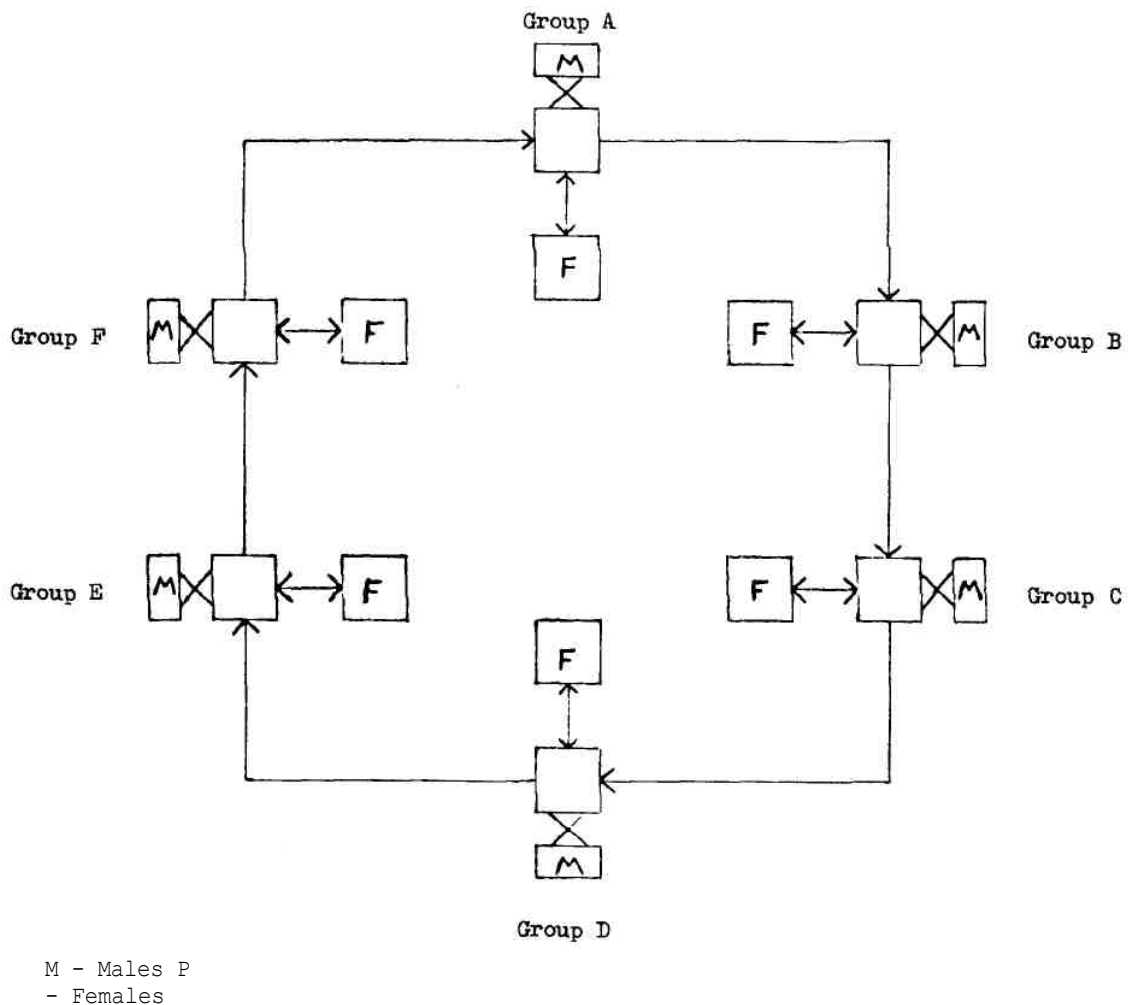


TABLE 6.1

British breeds of large livestock which have become extinct
in the twentieth century

CATTLE:	Alderney, Caithness, Castlemartin, Irish Dun, Sheeted Somerset, Suffolk Dun.
SHEEP:	Limestone, Norfolk Horn, Rhiw, Roscommon, St. Rona's Hill.
PIGS:	Cumberland, Dorset Gold Tip, Lincolnshire Curly Coat, Small White, Ulster White, Yorkshire Blue & White.
HORSES:	Cushendale, Galloway, Goonhilly, Long Mynd, Manx, Tiree.

TABLE 6.2

Endangered breeds of domestic livestock in the United Kingdom (1980)

CATTLE	SHEEP	GOATS	PIGS	HORSES
<u>Category 1</u>				
White Park	Portland	Bagot	Tamworth	Exmoor Pony
Kerry-	Leicester		Middle White	Caspian
Shetland	Manx Loghtan		Berkshire	
N.D.S.	Wensleydale		British Lop	
Irish Moyled			Large Black	
Gloucester				
White Galloway				
<u>Category 2</u>				
Longhorn	Cotswold	Golden	G.O.S.	Dales Pony
Dexter	Whitefaced	Guernsey		Suffolk
	Woodland			Cleveland Bay
Whitebred	Oxford Down			
Shorthorn				
British White	Teeswater			
	Shropshire			
<u>Category 3</u>				
Belted	Lleyn		British	Fell Pony
Galloway	North		Saddleback	Shire
	Ronaldsay			Clydesdale
	Shetland			
	Soay			
	Hebridean			
	Wiltshire			
	Horn			
	Southdown			
	Ryeland			
<u>Category 4</u>				
Blue Albion	B.W.M.	Old	Oxford Sandy	
Bolian Gwynion	Jacob	English	& Black	
	Castlemilk			
	Shetland			
	New Norfolk			
	Horn			

TABLE 6.3

Rare breeds acceptance procedure

Set out below is the outline of the procedure used by the Council of the Rare Breeds Survival Trust to determine which breeds merit support and encouragement.

Section A:

1. Has there been an official Herd/Flock Book for six generations?
2. Does it breed true to type?
3. Have other breeds contributed less than 20% of the genetic make-up of the breed in the last six generations?
4. Has it been known for 75 years?

If 3 or 4 affirmative answers proceed to Section B.

If less than 3 affirmative answers the breed should be excluded unless it possesses a distinct characteristic not found elsewhere.

Section B:

To be included in the lists there should be less than the following number of breeding females in the breed:

Cattle 750

Sheep 1500

Pigs 150

Horses 1000

Goats 500

Proceed to Section C.

Section C:

1. Are the numbers of the breed decreasing significantly?
2. Is the breed found in less than 4 significant units which are more than 50 miles apart?

Affirmative answers to these questions give the breed a higher priority within the lists, or may even permit a breed which does not qualify otherwise to be included.

TABLE 6.4

Numerical status of minority breeds of livestock in Great Britain (1979)

Breed	Animals used for pure breeding		Females registered per year	No. of active breeders	Females used for cross breeding	Significant foreign population	Notes on additional populations
	females	males					
Cattle:							
Beef Shorthorn			245	46	-	YES	Cross-breeding programme
Belted Galloway*							
British White	177	28	40	-	-	NO	
Dexter	416	45	138	-	-	YES	
Gloucester	79	7	6	26	-	NO	
Kerry	241	13	45	36	-	YES	
Longhorn	343	27	69	29	-	NO	
Red Poll*							
Shetland	61	9		11		NO	
Whitebred Shorthorn	450		132	66	-	NO	Cross-breeding programme
White Park	102	10	39	18	-	NO	
Sheep:							
Cotswold	250	25	125	17		NO	
Dartmoor	1790	120	664	34	500	NO	Unregistered population
Hebridean			173	32	-	NO	
Hill Radnor	650	78	73	17	-	NO	Unregistered population
Leicester	327	32		14	-	NO	
Lleyn*							

RBST 1979 livestock Survey - Cont.

Breed	Animals used for pure breeding		Females registered per year	No. of active breeders	Females used for cross breeding	Significant foreign population	Notes on additional populations
	females	males					
Lincoln	529	31		16	-	YES	
Manx Loghtan			70	18	-	NO	Island population
North Ronaldsay			31	10	-	NO	Island population
Oxford Down*			37	14		NO	
Portland							
Ryeland*							
Shetland			113	22	-	NO	Island population
Shropshire	729	40	74	25	-	NO	
Soay			131	37	-	NO	Island
South-down	1427			41		"YES	population
Teeswater			283		-	NO	
Wensleydale	340	30	80	30	-	NO	
White-faced Dartmoor*							
White-faced Woodland			93	13	-	NO	Unregistered population
Wiltshire Horn*							
Horses:							
Caspian	21	9		10	-	NO	

RBST 1979 livestock Survey - Cont.

Breed	Animals pure br	used for aeding	Females registered per year	No. of active breeders	Females used for cross breeding	Signifi- cant for- eign pop- ulation	Notes on additional populations
	females	males					
Cleveland Bay	109	44	23		-	NO	
Clydesdale	600			121	-	YES	
Dales Pony	40	20	25		-	NO	
Exmoor Pony*							
Fell Pony*							
Shire			145			YES	
Suffolk	80	25	17	16	-	YES	
Gloats:							
Bagot	36	15		9		NO	
Golden Guernsey	100	22	46		-	NO	Mainland only

* Information not received

The information included in the above table was obtained from the relevant Breed Societies and the most recent Stud/Herd/Flock Books.

TABLE 6.5

Financial incentives approved for endangered breeds by the
Rare Breeds Survival Trust

Species	Breed	Nature of incentive
Cattle:	Gloucester	Embryo transfer and A.I. Service
	White Park	Performance test and A.I. Service
	British White	Performance test and A.I. Service
	Shetland	A.I. service
	N.D.S.	A.I. service

Species	Breed	Nature of incentive
Cattle:	Kerry	A.I. service
	Longhorn	Performance test
	Irish Moyle	Blood typing
Sheep:	North Ronaldsay	Purchase of island and setting
	Combined Flock Book (8 breeds)	up of reserve flock Publication of flock book
	Wensleydale	Publicity material
Goats:	Bagot	Management expenses
	Golden Guernsey	Milk recording
Pigs:	Tamworth	Importation of boars
	Berkshire	Importation of boars
	Middle White	Cost of keeping boars
Horses:	Suffolk Exmoor	Breed structure analysis
	Pony	Publicity material and blood
	Cleveland Bay	"typing Blood typing

TABLE 6.6

Bulls of minority breeds represented in the Bank of Genetic Variability as at March 1980.

Breed	Bull	No. of straws used*
Belted Galloway	Burnside Remarkable	
British White	Castleton Consort	111
	Kelmarsh Premier	
	6 bulls	
Dexter	Bemborough Solomon	94
	Bemborough Hopeful	96
	Noent Napoleon Bigarreau	76
Kerry	Muckcross Balbo	8
	Muckcross Dickler	8
	N.D.S.	Cast Lies Lancer
Red Poll	Lords Just Right	nil
	Wmbrook Atom 2nd	56
	Castiles Delson	
Shetland	6 bulls	
	Heather Chieftain	
	Rasmie	52
White Park	Stanemore Odin	52
	RASE Royal Sultan	202

* for bulls directly controlled by the RBST

TABLE 6.7

Relationship of White Park bull, Whipsnade 201, to the White Park breed

	<u>No. of crosses of Whipsnade 201</u>			
	1st generation	2nd generation	3rd generation	4th generation
Bulls	1	13	1	-
Cows	4	65	32	2

Total number of animals in breed: 18 bulls, 132 cows.

Average contribution per animal from Whipsnade 201: 15.44%

TABLE 6.8

The relationship between the number of animals used for breeding per generation and the increase in the coefficient of inbreeding per generation

No. of females	No. of males	Increase in coefficient of inbreeding (%)
100	9	1.5
50	10	1.5
25	13	1.5
100	6	2.0
50	7	2.0
25	8	2.0

TABLE 6.9

Population trends for Tamworth pigs and White Park cattle

	Tamworth pigs No. of litters notified	White Park cattle No. of herds
1973	33	5
1975	48	9
1977	90	15
1979	128 (1978)	20

TABLE 6.10

Comparison of various breeds of sheep to examine the relationship
between body weight and pelvic dimension (inter-ischial tuberosity
 diameter - ITD)

Breed	Average body weight (female adult) kg	Average ITD mm
<u>Primitive</u>		
Soay	22.68	26.80
North Ronaldsay	23.21	25.66
Shetland	32.75	35.40
Hebridean	33.83	35.33
Manx Loghtan	40.52	41.16
<u>Hill</u>		
Herdwick	43.97	42.77
Jacob	47.17	42.60
Whitefaced Woodland	54.78	46.86
New Norfolk Horn	55.93	48.40
<u>Shortwool</u>		
Portland	32.15	31.75
Lleyn	44.23	41.75
Shropshire	71.90	42.00
<u>Finewool</u>		
Merino (Tasmanian)	44.49	40.75

TABLE 6.11

Value of various British breeds of sheep for the production of heavyweight lamb

Sire Breed	Average birth weight (kg)	Average weaning weight (kg)	Average carcass weight (kg)	% lambs over 22.5 kg dead carcass weight
Oxford Down.	5.3	28.6	24.9	64
Suffolk	4.9	26.5	22.7	30
Hampshire Down	5.0	26.9	23.1	27
Lincoln	5.9	26.0	21.8	23
Wiltshire Horn	5.0	24.9	21.3	20
Cotswold	5.3	24.4	21.3	7

6.6 Appendix

A DEFINITION OF TRUST POLICY

1. What is the purpose of the Trust?

The purpose of the Trust is to conserve animal genetic resources. Although the Trust has been involved to some degree with supporting genetic conservation in other countries, its main concern is with the genetic resources contained in British rare breeds of livestock (i.e. cattle, sheep, goats, pigs and horses and poultry). The breeds which qualify as 'rare' are identified by the Rare Breeds Acceptance Procedure.

2. How can the purpose of the Trust be realized?

The conservation of genetic resources will be achieved either by direct action with the relevant breeds of livestock or by indirect action through the breeders and owners of these animals.

The most important methods of realizing the purpose of the Trust can be categorized as follows:

- a. preventing rare breeds becoming extinct.
- b. long-term storage of frozen embryos and semen.
- c. creation of new breeding units:
 - (i) independent units.
 - (ii) units within larger commercial units.
- d. increasing the numerical status of each rare breed.
- e. Improved management of rare breeds.
- f. evaluation of rare breeds.
- g. promotion and utilization of rare breeds.

3. How can these methods be implemented most effectively?

a. Although the Trust has compiled a list (1974) of breeds of livestock that are in danger and merit support, the mere knowledge of the numerical status of a breed does not guarantee its survival. It is necessary to maintain a continuing, up-dated, information bank. The necessary information is being obtained on a regular basis by direct

contact with breeders and Breed Societies, supplemented at intervals by a detailed survey of endangered and potentially endangered breeds and by specific research and trials.

b. As a long-term policy and as an insurance against the disappearance of all the living representatives of a breed, the storage of frozen semen for cattle breeds at this stage, and the storage of frozen embryos for all species, when the necessary technological advances have been made, are of great importance. The Bank of Genetic Variability already exists, but should be extended to include as wide a selection of bulls as possible from each generation of each breed. The selection of the bulls (and embryo parents) should be based on their pedigree and an inspection. They should be a representative sample of the total population and they should be of sound constitution and free from defects.

c. The creation of significant breeding units of rare breeds received high priority during the early years of the Trust's life. It remains an item that should receive a good deal of attention, but now greater emphasis is placed on persuading owners of large commercial units to include a small group of a rare breed within such units. This is likely to give several benefits; the standard of management can be expected to be above average; the rare breed can be evaluated alongside popular breeds; and in most cases accurate and detailed records will be available to feed into the information bank. The security of a breed increases in proportion to the number of breeding units, so that even small units can play an important role.

The procurement of livestock is a necessary part of establishing a new unit and in this context the breed organizations, the Show & Sale and The Ark, have a valuable role to play. They are able to provide focal points to facilitate the exchange of breeding stock between existing breeders. The purchase of livestock must be based on a planned programme which is designed to control inbreeding. Breeders are advised regarding breeding programmes which can take advantage of contract matings, A.I., etc., and which should actively maintain existing bloodlines. The structure of each breed is analysed and weak lines given extra incentives.

d. The increase in the numerical status of the rare breeds should result automatically from the Trust's activities. The natural increase in numbers that derives from the creation of new breeding units and the increasing confidence and involvement of established breeders, provides the most secure and long-lasting foundation for the future viability of a **breed**. In some cases extra stimulation may be necessary. This can be achieved either by intensifying the tempo of the Trust's activities, or by special projects, such as an embryo transfer programme. In any breed where numbers are increasing significantly, a close watch must be maintained on the quality of the animals with special regard to congenital defects, which should be recorded and eliminated. To achieve this the necessary information must be collated and analysed to provide the results on the basis of which decisions can be taken.

e. The involvement of a disproportionately high number of breeders who are relatively inexperienced in livestock husbandry, and the special characteristics of at least some of the rare breeds of livestock, makes the provision of advice on the management of livestock a matter of high priority. It is of little use saving a breed and devising carefully formulated breeding programmes if the management of the animals inhibits them from growing, reproducing and performing successfully.

Advice is made available to breeders in various ways. At the most elementary level organizations such as the A.T.B. provide courses for beginners, although these are directed to breeders of commercial livestock, and this applies also to a series of ADAS leaflets. However, much of the information provided is relevant. More specific advice is provided through The Ark or by letter and telephone. The amount of advice directed to individual breeders is limited, although it can be justified in the case of the larger rare breed units and Approved Centres. For other breeders a programme of breeders' workshops, technical meetings and seminars is available to give advice on a group basis.

f. The evaluation of rare breeds, and the definition of their qualities and characteristics, is an activity of secondary importance, but nevertheless it forms an integral part of the long-term survival of these breeds. A considerable element of evaluation arises naturally from the records maintained by breeders. These records are collated and stored in the information bank. In addition specific qualities can be measured as part of a purpose-designed project e.g. Ease of Parturition, Bull Performance Test, and added to the information bank.

g. The promotion of rare breeds is the final essential ingredient of a total package that is calculated to ensure their survival. The dramatic and beneficial effect of publicity on the fortunes of various breeds has been demonstrated already. The annual Show & Sale and The Ark both play an important role in this progress. There is a need to achieve wider coverage in those magazines and journals which reach breeders and potential breeders who are likely to play an active and constructive role in maintaining breeding units of rare breeds.

4. Trust policy and its implementation.

Taking the purpose of the Trust as defined in item 1 as the starting point, the Trust has been successful to a large extent in achieving its initial objectives but has been deficient in consolidating its position, partly due to limited financial resources. This limitation still obtains and there is a need to identify those aspects of the Trust's work which should receive priority.

From the details included in items 2 and 3 above, it is clear that only a minority of the membership of the Trust is actively concerned with keeping rare breeds. These members need to be provided with a more comprehensive range of services than they receive at present in order to help them to continue and improve the work that they are doing. In an ideal situation all the items listed below should be fully and vigorously implemented. In practice limited financial resources will place some restrictions on the work that can be done.

a. Conservation policy and strategy. The basic philosophy of conservation is kept under regular review by the Technical Committee and the Rare Breeds Acceptance Procedure is applied in the revision of the list of 'priority breeds'.

b. Maintenance of an information bank. This contains all information relating to rare breeds and genetic conservation. Data is obtained to a large extent through the Breed Liaison Committee from all possible sources, e.g. Breed Societies, breeding units, projects, etc., and the analysed information is used to provide advisory service to be maintained.

c. Advice on the breeding and management of rare breeds. This includes direct advice to larger breeders, Approved Centres, and to groups of smaller breeders. The breeders' workshop programme, reinforced by other technical meetings and seminars, and by correspondence and direct telephone contact, provides a wide range of management advice. Advice on breeding is provided most effectively either directly to larger breeders or through the medium of group programmes.

d. Creation of new breeding units. New units, either as a separate entity or within a larger unit, involves direct contact with potential breeders and the provision of advice regarding breed selection, procurement of breeding stock, breeding programmes, management system, recording, etc.

e. Inspection of livestock. With the necessary development of the semen bank and contract mating, and the possible introduction of embryo transfer, embryo storage and pig A.I., there will be an increasing need to select the breeding animals for each purpose. Inspection of animals for congenital defects would be desirable.

f. Show and Sale as a focal centre for rare breeds promotion and the procurement of breeding stock.

g. The Ark as a medium for rare breeds promotion, for the procurement of breeding stock, and for providing advice to breeders.

h. Projects. The following projects in the Trust's current programme deserve high priority! Survey, Breed Incentives, Breed Structure Analysis, and Register of Congenital Defects.

In summary, the main part of the Trust's resources should be directed *more* effectively towards the realization of its primary objective, namely genetic conservation, and to those breeders who are contributing positively to this objective,

Etat d'avancement des travaux sur la conservation des ressources
génétiques animales au Royaume-Uni

Resume

L'intérêt porté à la conservation des ressources génétiques animales en Grande-Bretagne

a marqué pour la première fois un pas important au début des années 1960 lorsque la Zoological Society of London a établi à Whipsnade Park de petits groupes d'animaux de diverses races en peril. Déjà à cette époque plus de 20 races britanniques de gros bétail s'étaient éteintes depuis le début du siècle, bien qu'il subsistât plus de 100 races indigènes de bovins, d'ovins, de caprins, de porcins et de chevaux.

Le mouvement actuel en faveur des "races rares" en Grande-Bretagne est né de cette action initiale de la Zoological Society of London, et dès le début la politique suivie consistait à maintenir des races distinctes de bétail plutôt qu'à créer un pool génétique. En conséquence, les organisations participant au mouvement, telles que les associations de sélectionneurs, les sociétés d'experts-conseils en matière d'élevage, l'Office de commercialisation du lait, etc., étaient orientées vers la notion de race et l'organisation spécialisée qui a été formée en 1973, à savoir le Rare Breeds Survival Trust (Conservatoire pour la survie des races rares), a suivi le même chemin. Un précieux soutien a été fourni par des sélectionneurs individuels de races indigènes rares et d'autres races qui n'étaient pas originaires du Royaume-Uni, par exemple les bovins Kerry et les chevaux nains de la Gaspie.

Chaque association d'éleveurs s'était préoccupée principalement de la promotion et des normes de la race qui l'intéressait particulièrement, alors que la plupart des sélectionneurs s'inquiètent surtout des qualités commerciales de leurs animaux plutôt que de conservation génétique. Pour les races qui n'étaient pas contrôlées par une association d'éleveurs, on met l'accent davantage sur la conservation dans le cadre d'un programme d'enregistrement géré par Countrywide Livestock Limited. La Bank of Genetic Variability, créée par l'Office de commercialisation du lait, est également destinée uniquement à des fins de conservation.

Le Rare Breeds Survival Trust est l'organisation la plus importante qui s'occupe de conservation génétique au Royaume-Uni. C'est une association à but non lucratif administrée par un conseil élu, la mise en oeuvre de sa politique étant contrôlée par un consultant technique. Ce consultant gère une banque de données, s'occupe de promouvoir la création de nouvelles unités de sélection, donne des avis sur la sélection et l'exploitation du bétail, et coordonne les principaux programmes du Conservatoire.

Il existe au Royaume-Uni 55 "races rares" de gros bétail, mais 45 d'entre elles seulement sont reconnues par le Rare Breeds Survival Trust qui a institué une procédure très stricte pour l'homologation des races rares, fondée sur deux critères, à savoir l'effectif et la valeur génétique. La liste des races prioritaires est continuellement mise à jour et,

récemment, parmi les races ovines la Black Welsh Mountain et la Jacob ont été rayées de la liste des races "rares", tandis qu'il semble probable que des races telles que la Cheviot y soient inscrites dans un proche avenir. Il peut arriver que des races soient en péril parce qu'elles sont passées de mode, d'autres parce qu'elles sont improductives, d'autres enfin parce qu'elles font l'objet de croisements avec d'autres races.

La doctrine en matière de conservation au Royaume-Uni, qui repose sur l'hypothèse que les races reconnues de bétail constituent les unités fonctionnelles, exige que chaque race demeure dans une large mesure exempte de l'introduction de "sang" provenant d'autres races et possède des caractéristiques raisonnablement distinctes. Si le génotype de la race dans son ensemble a été sérieusement dilué par des croisements, ou s'il s'agit simplement d'une variante d'une grande famille de races possédant des caractéristiques communes, la justification de sa conservation peut être contestée.

Le rythme d'activité s'est nettement accéléré au Royaume-Uni depuis 1974t année où le Conservatoire a mené une enquête sur les races britanniques de bétail en vue d'en déterminer les effectifs. Une seconde enquête a eu lieu en 1979 et le procédé sera répété tous les trois ans en vue de déceler les changements intervenus dans la population et donner l'alerte en cas de difficultés potentielles. Les résultats de l'enquête sont introduit dans la banque de données gérée par le consultant technique et ce système sera renforcé par l'emploi d'un ordinateur à l'Université de Reading pour analyser la structure des races en péril.

Dès qu'on a observé un problème en puissance, diverses mesures sont prises pour mieux assurer la sécurité de la race menacée. Le Conservatoire a mis en route un Projet d'incita-tion en faveur des races de bétail qui encourage financièrement les sélectionneurs et les associations d'éleveurs à suivre des politiques d'élevage de race pure, à conserver un plus grand nombre de géniteurs mâles provenant de lignées non apparentées, et à publier des livres généalogiques. Comme mesure de sauvegarde à long terme, la Banque du sperme (et plus tard, espère-t-on une Banque d'embryons) conserve des échantillons du génotype de la race.

La création de nouvelles unités de sélection est un procédé très lent, mais il est essentiel au bien-être d'une race. Même si une race n'est pas gravement menacée sur le plan numérique, elle peut courir un risque si elle n'est représentée que par un très petit nombre de grandes unités. Le mouton North Ronaldsay représente un exemple extrême car presque tous les représentants de cette race se trouvaient sur une seule île de l'archipel des Orcades. Le Conservatoire a acheté une autre île où il a établi un nouveau troupeau comme élevage de réserve. D'autre part, il importe d'établir de petites unités d'une race en péril à l'intérieur même d'unités commerciales plus grandes composées de races plus appréciées. On aura ainsi de meilleures chances d'obtenir des relevés détaillés et l'on disposera d'une meilleure base pour l'évaluation exacte des races en péril.

Les membres du Rare Breeds Survival Trust ont accès à un service de renseignement. Dans le cas de certaines des unités d'élevage plus grandes et des centre agréés, les services de renseignement sont à la disposition des individus, mais on a organisé dans la plupart des régions du Royaume-Uni une série d'ateliers pour éleveurs afin de pouvoir fournir des conseils d'un niveau plus élémentaire aux propriétaires d'unités plus modestes. Les conseils donnés portent à la fois sur les programmes d'élevage et sur les méthodes d'exploitation. Les ateliers pour éleveurs sont complétés par d'autre réunions techniques, par des séminaires scientifiques et par des colloques où l'on discute de la stratégie à suivre en matière de conservation génétique.

La publicité a joué un rôle important dans le succès du mouvement en faveur des races en péril au Royaume-Uni. C'est en mai 1974 qu'a paru le premier numéro d'une revue mensuelle, The Ark, dont le contenu porte sur un

éventail de questions qui déborde le champ d'activité du Conservatoire mais offre néanmoins une tribune utile où les membres peuvent exprimer leurs vues, où le Conservatoire peut signaler les travaux qu'il a accomplis et où le consultant technique peut fournir des conseils de caractères généraux. La foire-exposition annuelle représente dans le domaine de la promotion une manifestation importante où les sélectionneurs peuvent se réunir, obtenir de nouveaux reproducteurs et comparer les qualités de leurs bêtes.

Deux problèmes principaux ont été identifiés pour l'avenir: en premier lieu, il convient d'exercer un contrôle constant et -vigilant pour s'assurer que le désir naturel des éleveurs de modifier et d'"améliorer" leur bétail ne conduise ni à une modification de type ni à, une réduction de la variabilité génétique d'une race en péril; en second lieu, il faut veiller à ce que les ressources du Conservatoire ne soient pas détournées de leur but initial en matière de conservation génétique à mesure que le nombre des membres augmente et que ceux-ci formulent leurs propres exigences dans leur propre intérêt. Afin d'atteindre ces objectifs, il a été mis en route un programme comportant des grands projets qui intéressent notamment la recherche sur le polymorphisme des protéines du sang et du lait, l'analyse chromosomique, les études de comportement, les malformations congénitales et la facilité de parturition.

Actividades realizadas en materia de conservación de
recursos genéticos animales en el Reino Unido

Resumen

El interés por la conservación de los recursos zoogenéticos en Gran Bretaña empezó a aumentar considerablemente a principios de los años 1960, cuando la Sociedad Zoológica de Londres estableció pequeños grupos de diversas especies en peligro en Whipsnade Park. Por esas fechas, ya se habían extinguido más de veinte razas de grandes especies británicas solamente durante el transcurso del siglo en curso, aunque quedaban más de cien razas nativas de ganado vacuno, lanar, cabrío, porcino y caballar.

El actual movimiento en favor de las "razas poco comunes" ha cobrado impulso en Gran Bretaña a raíz de esa acción inicial de la Sociedad Zoológica de Londres y su política se ha inspirado desde el primer momento en el principio de la conservación de distintas razas de ganado con preferencia en la creación de un banco de genes. De este modo, las organizaciones que tomaron parte en el mencionado movimiento, como las sociedades de razas, las empresas de consultoría ganadera, el Milk Marketing Board (el Consejo de Comercialización lechera), etc., se orientaron hacia la protección de las razas, y la organización de especialistas que se formó en 1973 con el nombre de consorcio para la supervivencia de razas poco comunes, siguió la misma orientación. Se recibió un apoyo valioso de varios criadores de razas nativas poco frecuentes y de otras razas no originarias del Reino Unido, tales como el ganado Kerry y los Caballos Miniatura del Caspio. Cada sociedad de razas se ha preocupado principalmente de la promoción y de las normas de su raza, mientras que la mayor parte de los ganaderos se interesan más por las cualidades comerciales de sus animales que por la conservación genética. En lo que se refiere a las razas no controladas por una sociedad se dedica atención preferente a la conservación por medio de un programa de registros administrado por el Countrywide Livestock Limited. El Banco de Variabilidad Genética, establecido por el Milk Marketing Board, también se propone trabajar exclusivamente en la conservación.

El Consorcio para la supervivencia de razas poco comunes (Rare Breeds Survival Trust) es la organización más importante que se ocupa de la conservación genética en el Reino Unido. Se trata de una empresa benéfica administrada por un consejo elegido, mientras que la ejecución de su política está controlada por un asesor técnico. El asesor mantiene un banco de información, fomenta la creación de nuevos centros de cría, presta asesoramiento sobre cría y manejo del ganado y coordina los principales programas del Consorcio.

En el Reino Unido existen 55 "razas poco comunes" de grandes especies pero solamente 45 de ellas están reconocidas por el Consorcio el cual ha instituido para la Aceptación de Razas poco Comunes un riguroso procedimiento basado en dos criterios a saber: el estado numérico y el valor genético. La lista de razas prioritarias se actualiza de manera continua, y recientemente, entre las razas de ganado lanar, la Black Welsh Mountain y la Jacob han perdido su condición de "poco común", mientras que parece probable que razas como la Cheviot puedan añadirse a la lista en un futuro próximo. Algunas razas pueden llegar a estar en

peligro por haber pasado de moda, otras, porque son improductivas y otras por haberse cruzado con otras razas.

Los principios predominantes en el Reino Unido en materia de conservación, según los cuales las razas reconocidas de ganado son las unidades funcionales, exigen que cada raza se mantenga en gran parte libre de la introducción de "sangre" de otras razas y posea características razonablemente distintivas. Si el genotipo de la raza en conjunto se ha diluido seriamente por cruzamientos, o si se trata simplemente de una variante de un amplio grupo familiar de razas que posee características comunes, habrá de ponerse en tela de juicio la justificación de su conservación.

En el Reino Unido el ritmo de actividad se ha acelerado notablemente desde 1974. En ese año, el Consorcio llevó a cabo un estudio de razas británicas de ganado para establecer niveles de población. En 1979, se llevó a cabo un segundo estudio que se repetirá cada tres años para identificar los cambios en la población y para dar la alarma sobre situaciones potencialmente problemáticas. Los resultados del estudio se comunican al banco de información a cargo del asesor técnico, labor ésta que se reforzará mediante el empleo de una computadora en la Universidad de Reading para el análisis estructural de las razas en peligro.

Una vez que se identifica un problema potencial, se aplican diversas medidas para proteger la raza amenazada. El Consorcio ha iniciado un proyecto de incentivos de razas en el que se proporciona apoyo financiero a criadores y sociedades de cría para que velen por la conservación de razas puras, para mantener un mayor número de machos reproductores de líneas no emparentadas, y publicar libros genealógicos de ganado. Como medida de salvaguardia a largo plazo, el Banco de Semen (y es de esperar en el futuro un Banco de Embriones) conserva una muestra representativa del genotipo de la raza.

La creación de nuevas unidades de cría constituye un proceso lento, pero resulta esencial para el bienestar de una raza. Incluso una raza que numéricamente no se encuentre en peligro grave puede estar expuesta a riesgos si existe solamente en un número muy reducido en grandes unidades. La oveja North Ronaldsay representa un ejemplo extremo, ya que casi toda la raza se encontraba en una isla del grupo Orkney. El Consorcio compró otra isla y estableció en ella una reserva del hato de cría. También resulta importante establecer pequeñas unidades de una raza en peligro, dentro de grandes unidades comerciales de razas más populares. De este modo, se aumentan las oportunidades de obtener registros detallados y se sientan las bases para una evaluación precisa de las razas en peligro.

Los miembros del Consorcio para la Supervivencia de Razas poco comunes tienen acceso a un servicio de asesoramiento. En el caso de algunas de las grandes unidades de cría y centros autorizados, el asesoramiento está a la disposición de los particulares, pero para los propietarios de unidades más pequeñas, se organizan cursos prácticos en la mayor parte de las regiones del Reino Unido, que ofrecen asesoramiento a un nivel elemental. El asesoramiento se refiere tanto a programas de cría como a métodos de manejo. Estos cursos prácticos se complementan con otras reuniones técnicas, seminarios científicos y simposios para estudiar la estrategia de la conservación genética.

La publicidad ha contribuido de manera importante a la conservación de razas en peligro en el Reino Unido. En mayo de 1974 se publicó el primer número de la revista mensual *The Ark (El Area)*. Su contenido abarca temas más amplios que las actividades del Consorcio. Además la revista constituye un medio excelente para que los miembros expresen sus puntos de vista, se da a conocer la labor del Consorcio, y el asesor técnico encuentra la oportunidad de proporcionar asesoramiento general. La Feria y el Mercado anual constituyen un importante acontecimiento de promoción, donde los ganaderos pueden encontrarse, obtener nuevo ganado de cría y evaluar la calidad relativa de sus animales.

Pensando en el futuro, se han definido dos problemas principales; en primer lugar, que debe mantenerse un control constante y vigilante para que el natural deseo de los ganaderos de cambiar y "mejorar" su ganado no lleve a una deriva en el tipo, ni a una reducción de la variabilidad genética de una raza en peligro; en segundo lugar, que los recursos del Consorcio no deben desviarse de su objetivo primordial de la conservación genética aun cuando aumente

el número de sus miembros y hagan peticiones para 'beneficio personal. Para alcanzar estos objetivos, se ha lanzado un importante programa que comprende investigación sobre la determinación de polimorfismos genéticos de las proteínas de sangre y de la leche (tipificación de la leche), análisis de cromosomas, estudios de comportamiento, defectos congénitos y facilidad de parto.

Conservation of genetic resources may not always be compatible with the objectives of nature conservation. Several countries are therefore reluctant to use protected areas as gene conservation units. Finland has chosen to establish managed in situ gene reserve forests which do not have the same constraints as strictly protected areas. The picture shows an old lime tree in Åyst Nature Reserve, Rogaland, Norway. Foto: Åsmund Åsdal areas studies. This will in the long term affect the genetic resources of the species in the northern environment. In another survey of the reproductive capacity of *Tilia cordata* in 27 nature reserves in Norway, only 11 seedlings were found, and only at sites with good climatic conditions. The legal framework for the conservation of animal genetic resources. Conference Paper (PDF Available) November 2005 with 49 Reads. Conference: International Workshop "Options and Strategies for the Conservation of Farm Animal Genetic Resources", At Montpellier, France. Cite this publication. Daniele Manzella. Figure 1. Status of information recorded in the Global Databank for Farm Animal Genetic Resources. Presently the databank is being updated and further developed and the number of recorded within-country breed populations has increased to nearly 14 000.