Portuguese Animal Germplasm Bank - BPGA

1. Historical Overview

Since the 1960's, an official Artificial Insemination center near Lisbon belonging to the veterinary authority-DGV has been collecting and freezing bovine semen, mainly from Friesian cattle, but also from native cattle breeds in the framework of *in situ* conservation and breeding programmes.

In 2004, a 4-year application project was developed, aiming at the organization of an *ex-situ* gene bank of Portuguese livestock breeds of caprine, ovine, bovine and swine species. This project was coordinated by the National Agricultural and Fisheries Research Institute (formerly INIAP, presently INRB, I.P. – INIA), and involving four other official partners, i.e., the Veterinary General Directorate (formerly DGV, presently DGAV), two regional agricultural services and the University of Évora, covering geographically all the country, with the collaboration of Breeders Associations. In this project, semen, embryos and DNA samples of most breeds of the aforementioned species (except swine) were safeguarded under the umbrella of an informal structure, which later became the Portuguese Animal Germplasm Bank (BPGA).

By the end of this project (2008), it became clear the need to formally create an official structure within the Ministry of Agriculture capable of organizing, maintaining and improving the activities of the BPGA. This was accomplished in 2010 through a joint INRB, I.P.-INIA and DGV protocol in the framework of the Ministry of Agriculture, leading to the official creation of the Portuguese Animal Gene Bank – BPGA, with headquarters at Vale de Santarém. The activity of BPGA is coordinated by a Management Committee Board constituted by two representatives of each of the responsible institutions (INRB, I.P.- INIA and DGV) and three nominees representing the Breeders Associations.
The official establishment of the BPGA created the conditions for the existence of an organized structure able to maintain the existing germplasm collected over the years and promote the continued updating of the genebank..

2. Objectives of national cryopreservation programme/policy

- Collection goals and categories

The International Technical Conference on Animal Genetic Resources, organized by FAO in 2007, approved the Global Plan of Action for Animal Genetic Resources, which encourages the development of concerted national

policies and strategies for conservation, namely through the implementation of *ex situ* conservation programmes. Portugal has a very rich diversity of animal genetic resources, with a large number of local breeds presently recognized, but most of them have an endangered status. This emphasizes the collective responsibility to assure the conservation of native breeds for the future, which has been included in national policies for several years. Therefore, the need to promote *in situ* preservation of local breeds by producers was recognized, as well as the urgency to develop *ex situ* conservation programmes, aiming at the safeguard of this threatened animal genetic legacy.

The recently created Animal Germplasm Bank in Portugal – BPGA, has the objective of assuring the collection and maintenance of genetic material, namely semen, oocytes, embryos, somatic cells and DNA, of all domestic Portuguese breeds of livestock, in order to:

- Guarantee their conservation for the future, according to the recommendations of appropriate international organizations
- Assure their availability for selection and *in situ* conservation programmes of native breeds, according to the rules to be established by the Management Committee Board of BPGA.
- Promote the exchange of information and, when judged appropriate, the exchange of genetic material with similar foreign gene banks.

- Achievements until today

The genetic material cryopreserved and the number of females currently existing per breed are presented in the following tables.

Cryopreserved embryos/ovaries

Species	Breed	Females	Embryos	Female Population
Ovis aries	Churra Galega Mirandesa	6	20	5,396
	Merina Preta	29	161	9,870
Total	**2**	**35**	**181**	
Capra hircus	Algarvia	7	41	3,850
	Serpentina	14	93	4,463
	Bravia	2	10	9,600
	Serrana	4	41	17,126
Total	**4**	**27**	**185**	
Bos taurus	Algarvia	1	2 ovaries*	7

* slices of ovarian cortex frozen by vitrification

Cryopreserved Semen

Species	Breed	Males	Doses	Female population
Ovis aries	Bordaleira E.D. Minho	6	1,262	5,396
	Campaniça	1	33	6,451
	Churra Algarvia	-	-	2,544
	Churra Badana	-	-	4,371
	Churra do Campo	3	102	210
	Churra do Minho	4	301	3,767
	Churra da Terra Quente	-	-	17,520
	Churra Galega Bragançana	-	-	9,683
	Churra Galega Mirandesa	12	2,519	6,468
	Merina Branca	19	1,351	9,750
	Merina da Beira Baixa	6	911	6,015
	Merina Preta	16	2,133	9,870
	Mondegueira	3	280	2,758
	Saloia	5	1,033	3,867
	Serra da Estrela	14	1,948	15,041
Total	**15**	**89**	**11,873**	**103,701**
Capra hircus	Algarvia	-	-	3,850
	Bravia	15	2,306	9,600
	Charnequeira	6	1,251	3,851
	Preta de Montesinho	3	554	674
	Serpentina	16	691	4,463
	Serrana (3 varieties)	17	2,537	17,126
Total	**6**	**57**	**7,339**	**39,564**
Bos taurus	Alentejana	40	43,870	16,612
	Algarvia	4	2,005	7
	Arouquesa	18	23,030	4,073
	Barrosã	39	12,077	6,414
	Brava	-	-	8,805
	Cachena	12	4,045	3,660
	Garvonesa	9	2,767	361
	Jarmelista	3	1,039	96
	Marinhoa	9	925	1,347
	Maronesa	13	9,973	5,102
	Mertolenga	28	13,288	19,052
	Minhota	20	43,330	5,090
	Mirandesa	17	7,818	4,957
	Preta	18	8,167	2,935
	Ramo Grande	5	3,500	1,250
Total	**15**		**175,834**	**79,761**

Besides embryos and semen, the BPGA includes a DNA bank consisting of samples of 429 individuals from 17 breeds of small ruminants, and 1043 individuals from 15 bovine breeds. All DNA samples are extracted and genotyped. Furthermore, the genetic characterization (20-30 microsatellites) for all local breeds of ovine, caprine, bovine and swine has been accomplished.

- Future plans

In the near future, regulations will be developed in order to establish the rules concerning the activities of BPGA. These will define:

- geographical location of duplicates to assure security of collected genetic material;
- conditions to use genetic material of BPGA for selection programmes, other users, export and research;
- prices for semen and embryos;
- costs involved in BPGA maintenance and entities participating in those costs (stakeholders);
- implementation of a national germplasm database, with appropriate rules of access and administration;
- minimum quantities of each genetic material category to be maintained by breed;
- rules for destruction of genetic material;
- renewal of genetic material ensuring a broad representation of existing genetic variability
- definition of criteria for free use and for genetic reserve;
- inclusion in the BPGA of genetic material currently kept by other institutions through agreement protocols, in articulation with the duplicates of the BPGA;
- financial sources to support BPGA activities, publicity and marketing;
- exchange of genetic material with similar gene banks;
- recommendations for sanitary and zootechnical rules;
- consideration of other species to be included in the BPGA;

In addition to its role in collecting and maintaining germplasm from the different native breeds, BPGA is also involved in documenting, promoting and spreading information relative to Portuguese livestock breeds, including their cultural and social relevance.

Information contributed by

António Horta, Luís T. Gama, P. Canas Simões and Filomena Afonso.