



Report of the Peer Review of the Slovenian National Genebank

October 5th and 6th 2021, Ljubljana, Slovenia

Introduction

The Convention on Biological Diversity and UN 2030 Agenda recognized the importance of the *ex situ* conservation of genetic material in genebanks. The Sustainable Development Goal 2 (Zero Hunger) and more specifically indicator 2.5.1 (b) are devoted to the material stored in the genebanks. Many breeds in European countries have either no or insufficient material stored in the genebanks (Leroy et al., 2020). For that, *ex situ in vitro* programmes should be established, implemented, or strengthened to initiate or expand collections for all breeds, especially local breeds *at risk*.

Genebanks are critical facilities, therefore development and implementation of quality management systems for genebanks is very important, as well as research to develop, standardize and implement reproductive technologies and cryopreservation procedures. The research should contribute to the effectivity and efficiency of the genebank operations.

Exchanging knowledge and experiences, improving access to information about genebank collections, and facilitating the exchange of genetic material in Europe, is the main aim of European Genebank Network for Animal Genetic Resources (EUGENA), the European Genebank Network, governed by the European Regional Focal Point (ERFP).

Results of the Innovative Management of Animal Genetic Resources (IMAGE) project have also shown that there is room for improvement in terms of optimizing the cost of *ex situ* conservation in Europe by taking advantage of collaboration between genebanks to increase effectiveness, both within and across countries. The exchange of genetic material and data between collections and countries should become a more common practice in the future. To streamline the conservation activities in Europe over different domains (plant, animal and forest) ERFP cooperates in the EU Horizon 2020 GenRes Bridge project¹.

In the framework of ERFP and with the support of Genres Bridge, a system of peer reviews has been set up aiming at improving the quality of European genebanks by simply having the experts of these genebanks visit each other in their genebanks, giving full transparency about the facilities and protocols, and having discussions about these.

A pilot of these genebank peer reviews is being organised in the second half of 2021, involving the French national Cryobank at Institut de l'Élevage and French National Laboratory for Health Control of Breeding Animals (Paris, France), the Dutch national genebank at Centre for Genetic Resources, the Netherlands at Wageningen University & Research (Wageningen, the Netherlands) and the Slovenian genebank at University of Ljubljana, Biotechnical Faculty (Ljubljana, Slovenia) focussing on the animal genetic resources (AnGR) collections.

Organisation of the review

The review was facilitated by Danijela Bojkovski, manager of the Slovenian genebank, who organised

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meeting rooms, on-site transportation and everything else, and colleague Tina Flisar, responsible for the data collection and management.

The review took place on Tuesday October 5th and Wednesday October 6th and members of the review panel included Delphine Duclos (Institut de l'Elevage, manager of the French national genebank) and the genebank manager of the Dutch national genebank Marjolein Neuteboom and her colleague Mira Schoon (CGN, Wageningen, the Netherlands).

During these days, the reviewers visited the genebank facilities at the Faculty of Veterinary medicine, listened to presentations, and visited the storage site for cattle which is situated in a commercial AI centre. At the end of the visit on Wednesday, the reviewers presented and discussed their first impressions with the hosts (Danijela Bojkovski and Tina Flisar).

Observations, conclusions and recommendations

Organisation

The organisation of the Slovenian national genebank is complex: the manager and two additional employees are part of the Biotechnical Faculty. They are in charge to implement the National Programme for Animal Genetic Resources Conservation through the Public Service. It is funded by the Ministry based on a long-term programme of seven years, with annual decisions about the budget per year. There is no room to prepare new or additional funding and write advanced project plans within the AnGR programme. None of the other departments working alongside with the genebank have 'spare' room to start this either, or lack intrinsic values for this specific topic.

The programme is supervised by an Expert Council of 22 experts from five breeding organisations, research institutes and including a representative of the ministry.

The management of the national genebank is one of the main components. The three persons in charge of the public service are also supported by various experts in collection and freezing, selection and performance recording, herdbook management and research related to cryoconservation and sustainable breeding. Main part of the collection and freezing of the material is done at the Faculty of Veterinary Medicine for all species except the only native cattle breed of Slovenia, for which there is collaboration between the genebank and a commercial AI centre.

Recommendation 1: Structure is complex and make sometimes decisions difficult to take, it could be more efficient to give more independency to the manager of the genebank.

Recommendation 2: The 7-year programming including budget is excellent for planning and security. However, some flexibility when assigning the annual budget would be welcome to allow for unexpected costs.

Policy Development

Since 2002, the Livestock Farming Act indicates: '*The Republic of Slovenia provides and maintains "genetic reserves" for individual species, breeds and lines of domestic animals in the form of minimal doses of semen, ova or embryos.*' Several rules for the conservation of livestock biodiversity have also been written between 2004 and 2014 giving for example, the minimum number of males and females to preserve, but these rules are not always very clear.

The list of breeds to conserve was expanded in 2021 with two breeds. As the budget for all breeds is already tight for conservation of the current list, it is advised to increase the budget according when expanding number of breeds to avoid dilution of the conservation activities per breed.

Observation 1: The mention of the "genetic reserves" in the national regulation is a good point for the maintenance of the future of the genebank funding and interest.

Recommendation 3: Addition of breeds to the list for conservation, should only occur together with a proportional increase of the budget.

Quality Management System

There is no Quality Management System (QMS) in place for the National Slovenian genebank and currently no plans for the near future to focus on this certification. Many of the vital collection, freezing and storing procedures are executed by the external Veterinary Faculty and by commercial AI centre.

Recommendation 3: To develop and write down guidelines and protocols on sampling, storage, registration and management for each species for different steps. First of all to standardize all procedures and to identify critical processes and reduce the risk of loss of expertise with change of staff. Secondly, when a QMS certification is needed, major part of the preparations are already provided. A quality management system can help to introduce protocols and procedures to staff or to inform colleagues and guests about procedures.

Storage of the material

The national Slovenian genebank has special derogations for collection and storage of semen outside an approved AI centre. The Faculty of Veterinary Medicine executes the major part of collection, freezing and storage for most species, sheep, goat, pig, horse and poultry. It is also in charge of the main site and the mirror site, located at the same campus, though in another building. The collaborations and agreements with the persons affiliated with the Faculty of Veterinary medicine are very good, the use of expertise and facilities is highly beneficial for the genebank. There are some issues with the size of the rooms where the nitrogen tanks are stored as the main room was not big enough for additional collections to come. There are three new tanks, already purchased, which cannot be used for the moment due to lack of space and air-conditioning problems. The alarm system for the oxygen level was not working in the main storage room and non-existing at the mirror site.

For the semen collection of cattle, the genebank is working with the AI centre Preska, a commercial collection centre for cattle semen. In collaboration with the national genebank they execute the semen collection, freezing and storage of the Cika cattle, the only local cattle breed in Slovenia. The relations and agreements with the AI centre are good.

A third storage site is located at the Biotechnical faculty, where the office of the genebank is located, these only consist of regular freezers for conservation of DNA and tissue. The bovine material is only marginally stored in duplo, with ten straws per bull.

Recommendation 4: The rooms where the material is stored should have a controlled access (at least the door locked) and equipped with a safety system (oxygen alarm). The storage facilities should be increased to be able to expand the collections. Exploration of further collaboration with the AI station is advised for storage of the other species.

Recommendation 5: The current mirror site is in another building at the same campus of the main storage location. In case of fire, the risk that both buildings will be lost is high. An actual mirror site, completely distinct from the main site will reduce these risks immediately.

Collection Management

The prevision of what priorities will be given for the collection of material next year are approved annually by the expert council of 22 members. Thus, the planning of the future collections is well organised and the choices are clear. The collaboration with all stakeholders is good.

It is very useful that herdbook registration is done by the same organisation, giving easy access to the relevant data to analyse the populations, which is very useful for the management of the collection. To better exploit this data, extra personnel would be needed.

The national genebank is the only place where they collect and freeze semen of local goat and sheep breeds. Due to limited storage capacity, all genetic material of male ruminants collected (ejaculates or epididymal) is partitioned in ten straws, despite concentration and number of doses per straw. The concentration is measured and recorded for each batch of straws, in case of future use the number of doses per straw can be calculated.

The genebank pays the breeders a set price to collect semen at the Faculty of Veterinary medicine, or they pay for the castration of boars and collect epididymal semen of the testicles. No documents are signed (MAA or MTA), only the invoices are a proof for the ownership of the material.

All material is directly added to the collection in the right location. Using a quarantine period in a separate tank would reduce the risk for the whole collection of a species in case of a disease outbreak.

Recommendation 6: Even if the priority for the moment is to store material for the long run, usage of the stored material is as important to consider right now. It might be worth to consider half of the material stored in doses and half of the material 'in bulk' straws.

Recommendation 7: Strong recommendation to set up standard MAA / MTA for ownership of collected material.

Access and Distribution

The conditions to use the material for the future have not been detailed for the moment as the priority is given to increase the collections. Particularly, the documents that will be necessary are not written now. But the exception for the use of this material is already mentioned in the national legislation.

As the concentration of the semen in the straws is not always standardized for small ruminants and above the concentration of a commercial straw, the person in charge at the Faculty of Veterinary medicine has provided to use one straw to inseminate several ewes. The logistic will have to be well organised not to waste semen at the moment of use.

Documentation

The genebank is using the Cryoweb documentation system. Since a new employee started last year the database has been improved a lot with more complete and correct information. The database is functional, but not very user-friendly. There is the possibility to cooperate in a common government digitalization project which might help to develop a new database, connected to other national databases. They have done a good information system mapping to detail their needs for the new system, all players and roles, needed information and suppliers of data, specifics of data and animal owners, services and samples are systematically written down in terms of needs and responsibilities.

Observation 2: The detailed information system will help to choose the new system for the management of the collection.

Final conclusion

The Slovenian national genebank is well organised with dedicated persons. Even though the facilities to conserve the collection are not optimal, there are very good collaborations with storage facilities, breeding organisations and other stakeholders involved. The link with researchers from the Faculty of Veterinary medicine are good but could be developed. A good communication strategy is existing for presenting the local breeds and their products for the general public. More focus can be put on the tasks related to the genebank to present the work done on *ex situ* conservation as well, for example on the website about the local breeds.

Final remarks

The reviewers appreciated the transparency and sharing of expertise, procedures and information given by the hosts during the review. The discussions were very interesting. The hospitality of the hosts, the positive atmosphere and the richness of exchanges suggest that reviews such as this would help other genebanks to develop their own structure.

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Delphine Duclos, Marjolein Neuteboom, Mira Schoon