

National Centre for Biodiversity and Gene Conservation -
Institute for Farm Animal Gene Conservation

NBGK-HGI GENE BANK



Krisztina Liptói

National Centre for Biodiversity and Gene Conservation - Institute for Farm Animal Gene Conservation

● Foundation: 1897

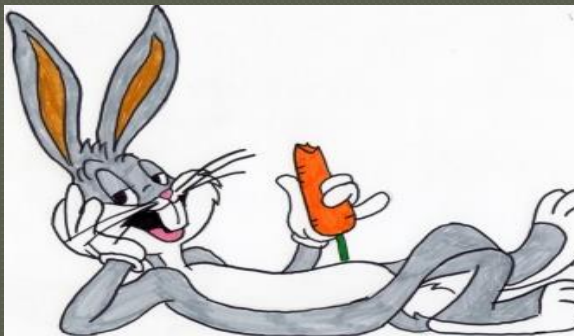
- Poultry and honey bee breeding, research as well as education
- Gene conservation from: 2010
- Current form: 2019
 - Non profit, public body



National Centre for Biodiversity and Gene Conservation - Institute for Farm Animal Gene Conservation

◉ Departments

- Department for Gene Conservation
- Department for Small Animal Research and Gene Conservation Biology
- Department for Apiculture and Bee Biology
- Department for Aquatic Genetic Resources Conservation



In vivo poultry gene bank since 1997



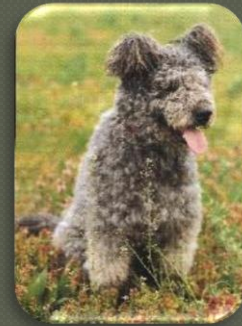
In vivo mammalian nucleus populations since 2010



Gene conservation of indigenous farm fish species from 2015



Genetic investigation of Hungarian dog breeds – model program



Horse model programs



- Hucul sperm cryopreservation
- Genetic investigation of Muraközi



Fotó: Nitrov-Gab

Gene conservation of honey bee since 2021



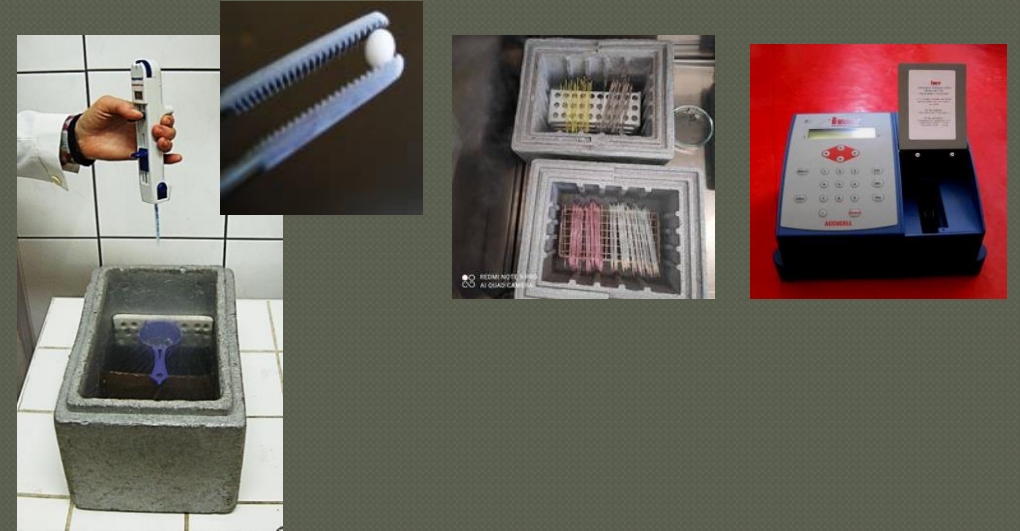


Gene conservation

- ◉ *In vivo* poultry and waterfowl gene bank with all Hungarian indigenous and old poultry species and breeds
- ◉ *In vitro* poultry sperm cryobank, which is extend with storage of PG (and blastodermal) cells and gonadal tissues
 - DNA bank
- ◉ Nucleus populations of indigenous cattle, goat and sheep as well as Hungarian Giant Rabbit
 - DNA bank
- ◉ *In vivo* and *in vitro* honey bee gene bank is under construction for Pannon bee, as the Hungarian variety of Carniolan honey bee
- ◉ Tench and Crucian Carp *in vivo* and *in vitro* gene conservation
- ◉ DNA bank and *in vitro* gene bank of Hungarian dog breeds.

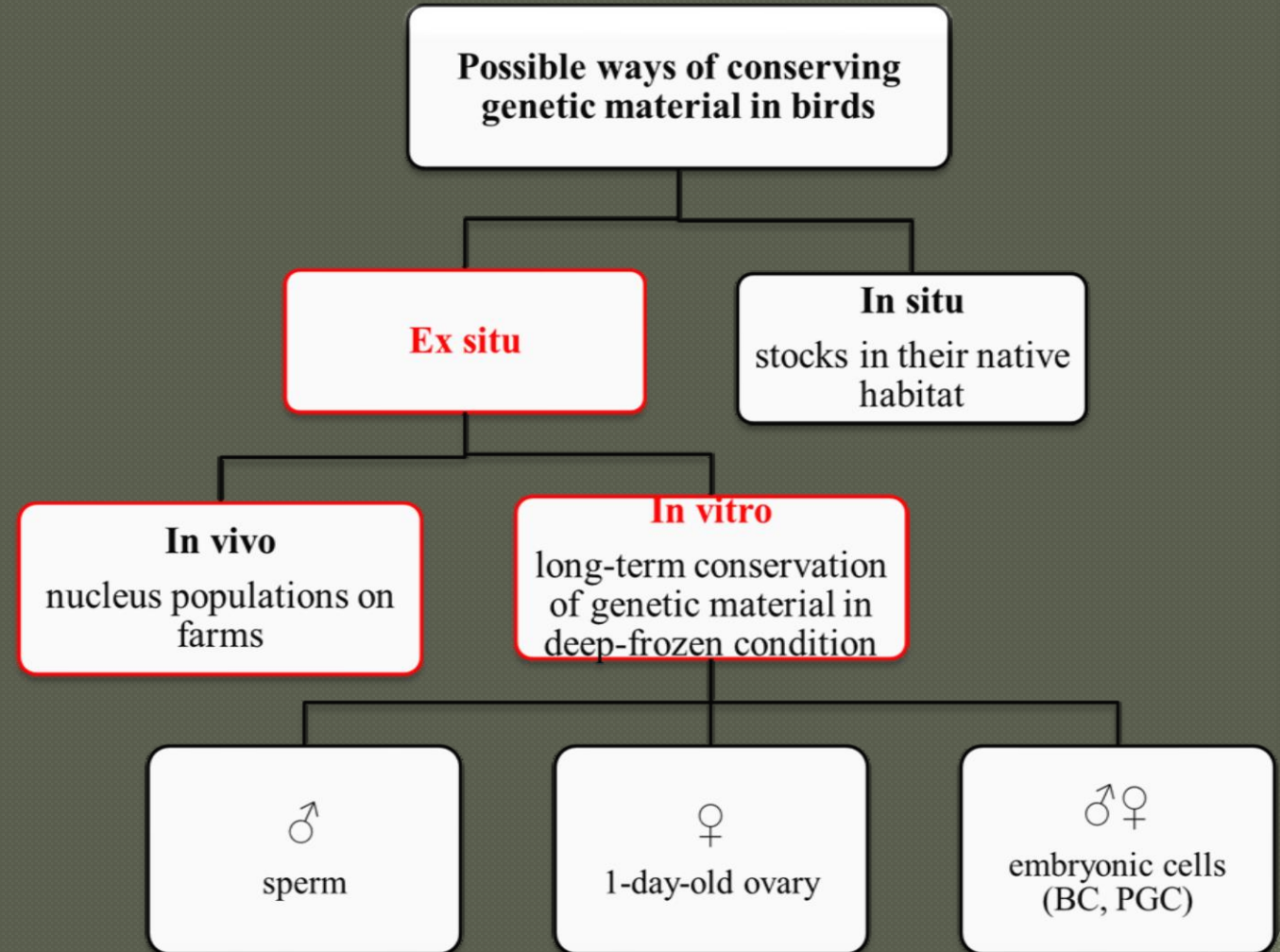
2013: *In vitro* genebank in NBGK-HGI



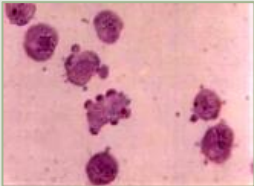

- Preservation of the indigenous farm animal genetic resources
 - Applying effective methods for cryopreservation
 - Developing effective methods for recovery the genetic material
 - Investigations of the pathogen decontamination of the samples



In vitro gene conservation in poultry

- Female: ZW
- Male: ZZ
- Possibilities of in vitro gene conservation:
 - Sperm bank – males
 - Tissue bank – females / males
 - Embryonic cell bank - females / males
- Cryopreservation of eggs and embryos is not possible



Conservable avian genetic material	Challenges	Current cryopreserved samples
Sperm cells 	<ul style="list-style-type: none"> - FAO Protocols are only for domestic fowl 	<ul style="list-style-type: none"> - 850 straw / breed – 5950 straw core collection - 200 samples- work collection
Gonadal tissue 	<ul style="list-style-type: none"> - Female is heterogametic in avian species - Oocyte and embryo cannot be frozen - Ovarian tissue of day-old chick can be frozen - Forming suitable donor/recipient pairs - Developing species-specific techniques 	<ul style="list-style-type: none"> - 454 sample core collection
Primordial germ cells 	<ul style="list-style-type: none"> - Starting and maintaining cell lines - Creation of sterile recipients - Increasing the efficiency 	<ul style="list-style-type: none"> -1034 PGC samples - 517 - 517 samples core and work collection
DNA, tissue 		<ul style="list-style-type: none"> - 12000

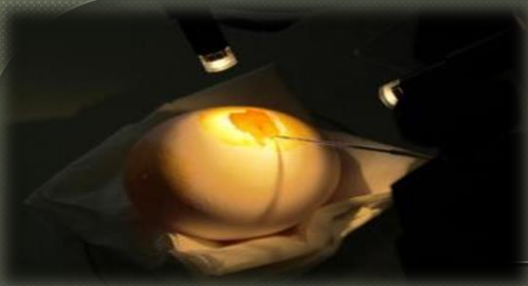
In vitro gene conservation of honey bee

- ◉ Adaptation and application of the method of artificial insemination of queen bees.
- ◉ Development and improvement of methods for *in vitro* sperm storage.



Preserved genetic materials

Species	Number of breeds	TYPE OF SAMPLES					
		sperm	pgc	gonadal tissue	DNA	blood	somatic tissue
Chicken	7	6585	1034	454	520	4818	
Turkey	2	642			128	164	
Guinea fowl	1	348			62	62	
Goose	2	305		11 work s.	128	164	
Duck	2	667			128	164	
Honey bee	1	151			501		800
Rabbit	1						121
Sheep	4				59	431	
Cattle	2				18	66	
Horse	3				96	96	
Dog	9	709			229	861	
11	34	9407	1034	465	1869	6826	921



Research

○ Genetics and Reproductive Biology

- Laboratory of Genetics
- Laboratory of *In Vitro* Gene Conservation and Reproductive Biology

○ Animal Nutrition

- Laboratory of Animal Nutrition

○ Honey bee breeding

- Laboratory for investigation of apiculture products
- Laboratory of Reproductive Biology





Research

BASIC AND APPLIED RESEARCHES

- ◉ Collection of indigenous, local species and breeds
- ◉ Creation of *in vivo* gene banks
 - Molecular genetics
 - Genetic diversity
 - Genetic origin
- ◉ *Developement of In vitro* gene conservation methodology
 - Cryopreservation of
 - sperm
 - Bc, PGc
 - Gonadal tissue
- ◉ Possibilities for active use of indigenous animals
 - crossing
- ◉ Investigation of reproductive traits
 - Genetic and technological basis
 - Reproductive biology investigations
 - sperm, egg, embryo
- ◉ Investigations on avoiding negative effect of climate change
- ◉ Developement of GMO free poultry feed
- ◉ Apiculture investigations
 - Apiculture products
 - Breed characteristics
 - Honey bee heath
 - Pollen and bee pasture
 - Bee toxicity tests

Methods for Cryopreservation of Guinea Fowl Sperm

Éva Váradi*, Barbara Végi, Krisztina Liptói, Judit Barna

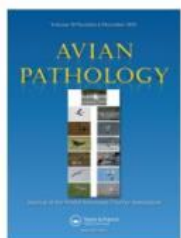
Institute for Small Animal Research and Co-ordination Centre for Gene Conservation, G



Poultry Science
Volume 100, Issue 8, August 2021, 101207

Successful cryopreservation and regeneration of a partridge colored Hungarian native chicken breed using primordial germ cells

Bence Lázár*,†, Mariann Molnár*, Nikolett Sztán*, Barbara Végi*, Árpád Drobnyák*, Roland Tóth†, Nikolett Tokodyné Szabadi†, Michael J. McGrew†, Elen Gócza†, Eszter Patakiné Várkonyi*



Avian Pathology

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/cavp20>

Mycoplasma species in the male reproductive organs and the fresh and frozen semen of the Hungarian native goose

Barb Kreiz

To cite Miklós the fre 10.10 To lin

www.nature.com/scientificreports

SCIENTIFIC REPORTS
nature research

OPEN

Investigation of the Guinea fowl and domestic fowl hybrids as potential surrogate hosts for avian cryopreservation programmes

Mariann Molnár*, Bence Lázár*, Nikolett Sztán*, Barbara Végi*, Árpád Drobnyák*, Roland Tóth*, Krisztina Liptói*, Miklós Marosán*, Elen Gócza*, Sunil Nandi*, Michael J. McGrew* & Eszter Patakiné Várkonyi*

Received: 29 April 2019
Accepted: 17 September 2019
Published online: 03 October 2019

Animal Reproduction Science 141 (2013) 86–89

Contents lists available at ScienceDirect

Animal Reproduction Science

www.elsevier.com/locate/anireprosci

Application of gonadal tissue breeds in the poultry gene

h^a, Janos Gal^b, Eva Varadi^a, Judit Barna^a

Institute for Gene Conservation, Jancsi u. 200, H-2100 Godólla, Hungary

STRAT



Acta Veterinaria Hungarica

Volume/Issue: Volume 67: Issue 2

Cryopreservation of gander semen in cryovials – Comparative study

Animal Reproduction Science 213 (2020) 106280

Contents lists available at ScienceDirect

Animal Reproduction Science

journal homepage: www.elsevier.com/locate/anireprosci

Authors:
Csaba K

Pages: 2

Online P

Date: Ju

Publicat

01 Jun 2



Improvement of the application of gonadal tissue allotransplantation in the *in vitro* conservation of chicken genetic lines

Krisztina Liptói*, Kitti Buda, Emese Rohn, Arpad Drobnyak, Erika Edvine Meleg, Nora Palinkas-Bodzsar, Barbara Vegi, Judit Barna

National Centre for Biodiversity and Gene Conservation, Institute for Farm Animal Gene Conservation, H-2100, Godólla, Jancsi u. 200, Hungary

ARTICLE INFO

ABSTRACT

RESEARCH ARTICLE

Gene conservation of six Hungarian local chicken breeds maintained in small populations over time

Nora Palinkas-Bodzsar^{1,*,} Nikolett Sztan^{1,} Tamas Molnar^{1,2,} Andras Hidas^{1,3,}

¹ National Centre for Biodiversity and Gene Conservation, Institute for Farm Animal Gene Conservation, God

Ti
*bo

FAO 2022: INNOVATIONS IN CRYOCONSERVATION OF ANIMAL GENETIC RESOURCES

https://www.fao.org/fileadmin/user_upload/animal_genetics/docs/CGRFA-18-21-10_2_Inf1_forPDF.pdf

More important research cooperations on gene conservation

- **2017-2021.** VEKOP-2.3.2-16-2016-00012 Génnet 21: Scientific foundation and development of gene bank strategy of Charpatian Basin farm animal species, breeds and ecotypes for XXI century
- **2016-2020.** Horizon 2020 SFS 7B-2015: 677353- IMAGE Innovative Management of Genetic Resources
- **2014-2016.** AGR_PIAC_13-1-2013-003: Development of indigenous small animal breeding
- **2013-2016.** KTIÁ: Introduction of alternative biotechnological methods for the development of the Hungarian in vitro poultry and rabbit gene bank
- **2010-2013.** TET_09_FR_ANR_BIO-CryoBird: Development and application of biotechnological methods in poultry reproductive biology for the conservation of genetic diversity
- **2007-2009.** TÉT Development of cryopreservation methods of reproductive cells for the management of genetic diversity in native poultry breeds (waterfowl, chicken, and guinea fowl) in France and Hungary

Future

◉ National Farm Animal *in vitro* Genebank

- Samples of all Hungarian indigenous farm animal species and breeds
- Reproductive materials
- DNA and tissues



European Genebank Network for Animal Genetic Resources

- ◉ Increasing of the „visibility” of our genebank
- ◉ Increasing the network of contacts
 - Sharing good practices
 - Animal health conditions (germinatively transmitted infections / pathogenes)
 - Improving genebank management
 - Common projects, etc.

Thank you for your attention!

www.nbgk.hu