

# NEWSLETTER

APRIL 2017—ISSUE 1



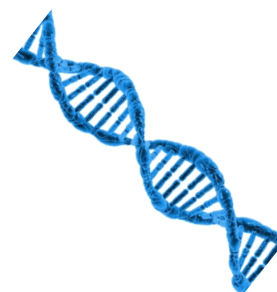
## editorial

Animal genetic resources provide the basis for selection and improvement of livestock, as well as for research projects aimed at characterizing the genome diversity and the relationships between genotype and phenotype. A large diversity of traditional and commercial breeds as well as experimental lines has been obtained as a result of domestication and selection of the main domestic animal species: cattle, sheep, goats, horses, donkeys, pigs, rabbits, poultry (chickens, turkeys, ducks, quails, guinea-fowls) and fishes. This variety ensures the capability and adaptability of livestock to fulfil its role in food production under different circumstances, now and in the future.

***"One third of domestic breeds are considered to be at risk of extinction."***

collection genetic reproductive gene resources bank local available rationalising operations breeding management procedures product germplasm genomic central upgrade

Farm animal gene banks are important sources of genetic variation to ensure breeds' long term survival and for research purposes. However, most cryobanks are currently more active in storage than in distribution of genetic resources. Genetic diversity of livestock species has been shaped by breeders as well as by environmental variation. Thus, cryobanks are both a heritage and a resource for the future, which needs to be better evaluated and exploited in breeding plans to face adaptation to climate change, to respond to unanticipated market changes and to improve resilience of farming systems by increasing the range of diversity available to farmers.



***"A renewed strategy is necessary for animal gene banks, taking advantage of genomics and biotechnologies."***

## IMAGE: a project for animal genetic resources

"Innovative Management of Animal Genetic Resources" (acronym IMAGE) is a project funded by the Horizon 2020 Research and Innovation Programme of the European Union.

It started on March 1<sup>st</sup>, 2016 and unites 28 partners, including three SMEs, three NGOs, the Food and Agriculture Organization of the United Nations (FAO), nine research institutions, 11 higher education and research institutions, and INRA Transfert, a subsidiary of INRA, the co-ordinating partner. 13 EU countries are involved, together with Switzerland and four non-European countries: Argentina, Colombia, Egypt and Morocco.

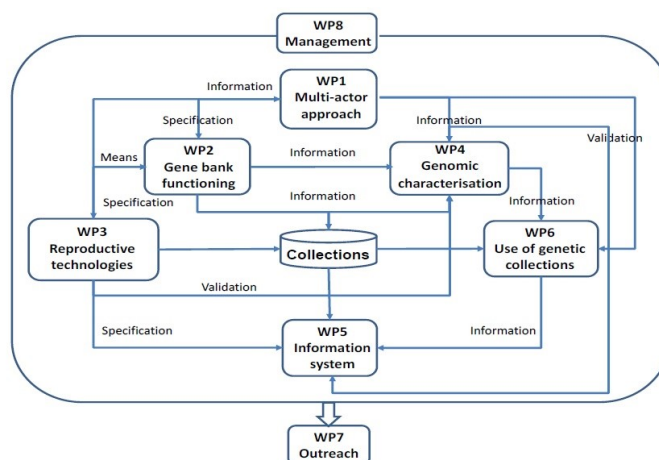
***"IMAGE aims at enhancing the use of genetic collections and upgrading animal gene bank management."***



***IMAGE will further develop genomic methodologies, biotechnologies and bioinformatics for a better knowledge and exploitation of animal genetic resources."***

The ultimate goal of the project is to demonstrate the benefits brought by gene banks to the development of more sustainable livestock farming systems.

The project is organised in six research work packages (WP), one dissemination WP and the management WP.



***"Raising awareness about the value of animal gene banks will contribute to popularising them in the society as a whole, since they represent both a heritage and a resource for the future."***

First priorities are to launch surveys for 1) gene bank managers and 2) stakeholders, and to map available molecular data on gene bank collections in order to identify gaps and to define priorities for further characterisation through whole genome sequencing. At the same time, studies aimed at improving reproductive biotechnologies will be starting.

For more information on IMAGE please [visit our website](http://www.imageh2020.eu)

### IMAGE at a glance

[www.imageh2020.eu](http://www.imageh2020.eu)

**28 partners:** 13 EU countries and 5 non-EU including Switzerland, Argentina, Colombia, Egypt and Morocco

**Project duration:** 1 March 2016 - 29 February 2020

**Project Coordinator:** Dr. Michèle Tixier-Boichard, INRA

**Project Manager:** Dr. Irina Carpusca, INRA Transfert



## news

### IMAGE Kick-Off Meeting

The kick-off meeting of the H2020 IMAGE project took place in Paris, 19-20 May 2016. It gathered 50 participants from 11 European countries and one non-EU country, Colombia.

The kick-off included a half-day devoted to WP meetings and exchanges between WPs in order to facilitate collaborations between them.



The main approaches of IMAGE were presented:

- Engaging the different types of stakeholders which are relevant for IMAGE, from the beginning of the project, and targeted meetings are both needed on a case by case basis;
- Improving the reproductive quality of the gene bank samples and their 'usability' in the field, with the development of new protocols and the perspective to assess the potential of new technologies to improve the cost-efficiency of using gene bank samples;
- Improving the connection between gene bank managers and supporting the set-up of the European Gene Bank Network for Animal Genetic Resources (EUGENA) in connection with the European Regional Focal Point;
- Assessing the potential of genetic diversity present in genetic collections by genomics and data integration;
- Facilitating access to information and resources by developing a new model for data integration in a web

portal, and registering collections into the BioSamples database of EMBL-EBI;

- Developing, testing and demonstrating strategies and scenarios to facilitate the use of this diversity and to enhance synergy between gene banks and on-farm management of genetic resources; and
- Increasing awareness about the value of gene banks by a multi-faceted dissemination programme, including decision support tools for breeds and North-South workshops for capacity building.

### IMAGE 1<sup>st</sup> Dialogue Forum Meeting

The first IMAGE Dialogue forum was held on August 28<sup>th</sup>, 2016 at Riddel Hall, Queen's University, Belfast, Northern Ireland, in association with the ERFP general assembly and the EAAP conference.

***"The IMAGE Dialogue Forum is a platform designed to involve all stakeholders in the discussion about the future of genetic management of farm animals."***

Stakeholders with wide-ranging experience joined the IMAGE partners to discuss their views on the management of gene bank resources. Amongst the 51 participants were ERFP National Coordinators, scientists, government officials, as well as representatives from industry and NGOs. The event was hosted and moderated by Waltraud Kugler, SAVE Foundation, Switzerland.

The event started with a presentation by Michèle Tixier-Boichard, IMAGE Coordinator on the objectives and approaches of IMAGE. Sipke-Joost Hiemstra, ERFP chair and national coordinator gave his presentation on the European gene bank network EUGENA. The event continued with Beate Berger, the Austrian ERFP national coordinator and gene bank manager, on practical examples of gene bank management in Europe.

The ensuing discussion covered topics such as sanitary regulations, data/material sharing, ethics in biotech and standardization of gene bank management. ➔



Up to now there are 25 gene banks for animal genetic resources identified within Europe. Some are governmental with the main purpose of conservation, while others are research gene banks that are not fully connected. Knowledge is needed to better involve gene banks in animal breeding programmes. IMAGE aims to improve the connections between gene bank managers and users.



A demonstration program for genetic introgression in chicken will show possible ways of using gene bank material. Priorities for cattle genotyping will be identified. Populations which are represented in gene banks with time series (i.e. samples from different stages of the breeding programme) will be inventoried in order to identify possible case studies for monitoring trends in genetic diversity.

***"The Dialogue Forum consists of annual meetings, smaller topical meetings and any further measures to identify ideas, needs and attitudes of stakeholders."***

Besides the expected achievements, Michèle Tixier-Boichard pointed out the importance of the involvement of stakeholders from the very beginning to be able to shape the whole process of the project, instead of simply presenting them with completed results at the end of the project.

## Quality Management Systems for Gene Banks (WP2)

The 16<sup>th</sup> Regular Session of the FAO Commission on Genetic Resources for Food and Agriculture was held in late January in Rome. IMAGE partners contributing to Task2.2 on *"Benchmarking of gene bank protocols and standards"* took advantage of the occasion to interact with FAO National Coordinators for the Management of Animal Genetic Resources.

Specifically, Ms. Maëlle D'Arbaumont from INRA spent the week in Rome and used the opportunity to interview National Coordinators and gene bank managers from several countries regarding their quality management system and quality control.

In addition, FAO organized a special meeting of participants on quality management systems for gene banks. Ms. D'Arbaumont (INRA, France), Sipke J. Hiemstra (Centre for Genetic Resources, the Netherlands (CGN) of Wageningen University & Research) and Paul Boettcher (FAO) gave presentations at the meeting, which also included general discussion on gene bank management. The meeting was attended by more than 20 persons.

Commission's Session report is available [here](#).



### IMAGE Dialogue Forum

The next annual IMAGE Dialogue Forum will be held around the EAAP conference in Talinn, Estonia (28 August - 1 September 2017, <https://eaap2017.org/>) and will include presentations, a discussion session and wine & snacks.

Visit our website for details on the Dialogue Forum Meetings and Sessions [www.imageh2020.eu](http://www.imageh2020.eu)

If you would like to participate or suggest topics to be discussed at the event, contact:

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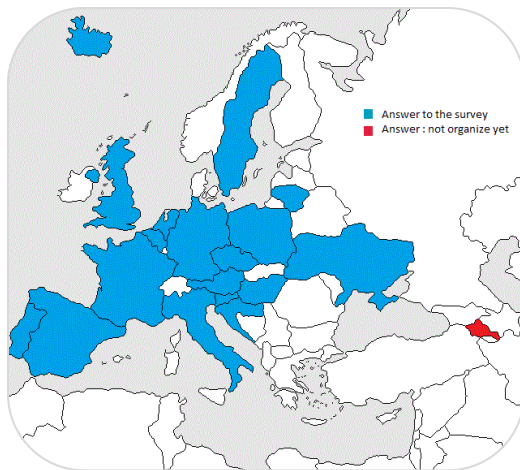
Eleonore Charvolin-Lemaire - INRA [eleonore.charvolin-lemaire@inra.fr](mailto:eleonore.charvolin-lemaire@inra.fr)

## WP2 "The European Genetic Collection Survey" Preliminary Results

The European genetic collection survey for animal genetic resources draws to a close. The goal of this survey was to characterize and map genetic collections all around Europe. Two types of collections can be distinguished:

- i) *germplasm collections covering biological samples of reproductive material, and*
- ii) *genomic collections covering other biological samples (DNA, tissue).*

After the initial distribution of the questionnaire, 54 gene banks from 19 European countries have replied to the survey in the first 3 months.



According to the preliminary results 28 institutions are holding a germplasm collection, whereas 8 institutions are holding a genomic collection and 18 institutions are holding both collections.

In more than 80% of cases, the institution managing the collection is public. In most of the cases 5 species are dominant in germplasm collections: cattle, sheep, goat, horse and pig. For genomic collections, chicken can be added.

A detailed report of the results of the survey is under development, and will become available soon at the [IMAGE website](http://image.iti.uni-goettingen.de).

## WP6 Case study "from gene banks to breeding lines"

The first steps towards demonstrating an efficient introgression of a rare characteristic from a chicken gene bank into a contemporary laying line have been carried out.



Araucana goldhalsig

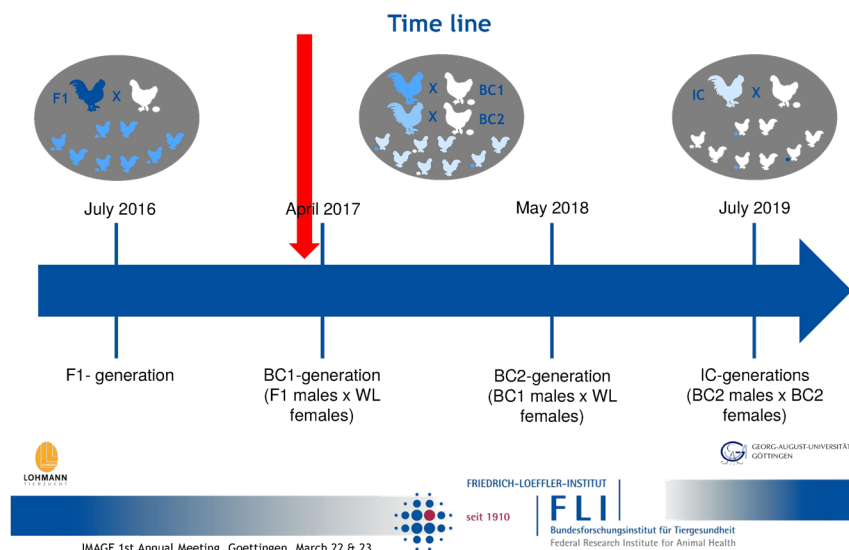


White Leghorn

Photo by S. Henne



### Task 6.3: Case study - from gene bank into breeding line



F1 crosses have been set up based on a cross of Araucana males, which carry the blue egg shell color as single monogenic dominant trait, and White Leghorn females of a high performing layer line. F1 males have been genotyped and selected for further breeding.

The selection is based on a "gene-dropping" simulation approach incorporating molecular information. This simulation approach was implemented in a flexible way enabling

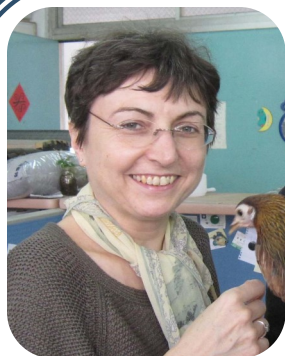


the simultaneous consideration of multiple factors, which may influence the selection progress.

Using this approach, several selection strategies were compared and the best F1 males, which will ensure the highest genetic diversity and the preservation of the genetic make-up of the recipient line while at the same time transferring the gene of interest, were identified.

Laboratory assays as well as statistical procedures have been established and optimized to identify potential breeders at an early age.

## profiles



### Dr. Michèle Tixier-Boichard, INRA

#### Project Coordinator

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Dr. Tixier-Boichard is a senior scientist at GABI, working on chicken genetics since 1985.

She participated in the European projects, ChickMap (1995- 1998) and AvianDiv (1998-2000), and was an invited expert in SEFABAR (sustainable breeding) and GLOBALDIV (characterisation and management of animal genetic resources).

She has more than 100 papers published in peer-reviewed journals, and she has been the supervisor of 10 theses (two at present) and 15 master students.

She chairs the board of the French National Cryobank and coordinates the national infrastructure project for biological resource centres of domestic animals, CRB-Anim.

She has been elected as vice-president of the World Poultry Science Association's board from 2004 to 2016.



### Prof. Dr. Johann Sölkner, BOKU

#### WP1 Leader—Multi actor participation and knowledge exchange

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Prof. Dr. Johann Sölkner is a full professor at the University of Natural Resources and Life Sciences, Vienna and leader of the animal breeding and genetics working group.

He has been involved in the design of breeding programs for different species in Austria, but also in various developing countries.

He is the National Coordinator of the Genetics Commission of the European Association for Animal Production (EAAP), and President of the Austrian Association for Rare Endangered Breeds (ÖNGENE).

ÖNGENE has developed rules and procedures for support of keepers of currently more than 30 local endangered livestock breeds implemented by the European Regional Development Fund.

# publications

## Pan European Networks: Science & Technology

A review of IMAGE by Michèle Tixier-Boichard, Project Coordinator

### PROFILE

### RECENT NEWS FROM IMAGE

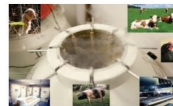
Co-ordinator of the IMAGE project Michèle Tixier-Boichard shares with PEN some updates from the Horizon 2020-funded initiative

Following the kick-off meeting of the H2020 IMAGE project on animal genetic resources (Paris, 19-20 May 2016), the first actions have been undertaken and the website is now open. Considering the importance of involving stakeholders from the very beginning of the project, the first IMAGE Dialogue Forum was held on 28 August 2016 at Rijkswijk, Queen's University, Belfast. Northern Ireland, in association with the European Regional Food Policy (ERFP) General Assembly and the European Federation of Animal Science (EFAS) conference. Stakeholders with wide-ranging experience joined the IMAGE partners to discuss their views on the management of gene bank resources.

The forum gathered 12 participants from 24 European countries, who were ERFP national co-ordinators, scientists, government officials, and representatives from industries and NGOs. The event was hosted and moderated by Waltraud Rüdiger of the SAFE Foundation, Switzerland. After three presentations introducing IMAGE and animal gene banks, the discussion focused on several issues:

- **Sanitary regulations** – they may limit the use of old material, are designations possible?
- **Data sharing for research** – which incentives, which tools to facilitate sharing?
- **Sharing gene bank material** – which features are of interest for the breeding sector?
- **Ethics and biotechnology** – will any technology be easily accepted by the public?
- **Standardisation of protocols and harmonisation of conservation criteria** are needed; and
- **Options and limits of gene banks** – is it always possible to recreate a breed? How can gene banks be most useful by supporting the development of endangered breeds?

A survey among gene bank managers was launched in October 2016 to learn more about the current state of gene bank collections for livestock, both for reproductive material (gametes) and for genomic material. In January 2017, a total of 12 gene banks had responded, which is a satisfactory rate of response, showing that both types of gene banks were interested in contributing. The majority of them declared they had a quality management system and agreed to share their experience and participate in further work, which perfectly assesses the expectations of IMAGE. A more refined analysis will be made available through our website.



The challenges for an integrated information system were discussed at a meeting with the UN Food and Agricultural Organization in Rome, Italy, on 16-17 November 2016, with a new dedicated meeting taking place in Milan on 13 December 2016 to identify the technical solutions to resolve different databases.

**Looking ahead**  
IMAGE partners are now getting ready for their next annual assembly which will take place near Cologne, Germany, from 22-24 March. In addition to monitoring work progress, this assembly will give our FPO members an opportunity to reinforce themselves to the community and will feature invited talks from other European research projects on animal and plant genetic diversity. Our work programme in 2017 will feature an important genome sequencing effort, for 200 chickens, 100 pigs, 100 sheep and 20 cattle, to better characterise gene bank material. A second Dialogue Forum will take place at the next ERFP meeting from 28 August to 1 September 2017 in Edinburgh, Scotland.

**IMAGE**  
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This project has received funding from the European Union's [Horizon 2020](#) research and innovation programme under grant agreement No 677353.

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