

# NEWSLETTER

DECEMBER 2019 – ISSUE 7

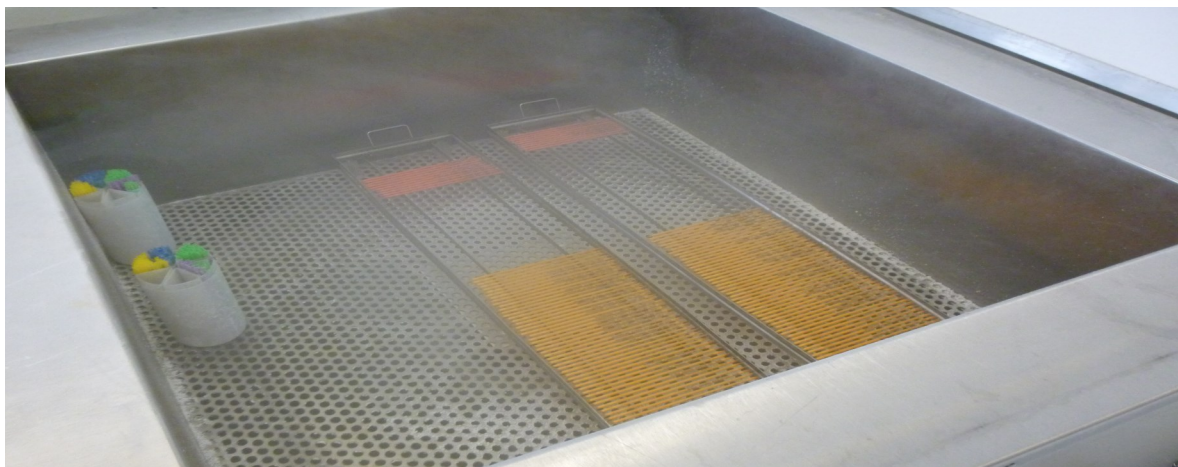


Photo: Courtesy of WUR

## editorial

By Michèle Tixier-Boichard, INRA

### IMAGE at ATF 2019

As a member of the Common Dissemination Booster (CDB) “Fitter Livestock Farming”, IMAGE was invited to participate in the meeting «Towards climate smart European livestock farming» co-organised by CDB Fitter Livestock Farming Cluster and Animal Task Force (ATF) on 06 November 2019, in Brussels. [The morning session](#) featured a range of invited speakers covering policy as well as technical issues, with presentations by a Member of the European Parliament, representatives of farmers, associations or companies, and scientific experts discussing Methane emissions and Intergovernmental Panel on Climate Change (IPCC) report. For this meeting, IMAGE prepared a policy brief showing the challenges for gene banks and the benefits they can bring to farming systems. The IMAGE policy brief is available on [IMAGE’s website](#).

The afternoon session was specifically organised by the CDB “Fitter Livestock Farming” and each project had 5-7 minutes to present themselves and their contribution to adaptation to and mitigation of climate change. The presentation of IMAGE underlined the interest of landscape genomics analysis that can be performed, thanks to gene bank collections covering a range of countries and climate conditions.



Michèle Tixier-Boichard at ATF-CDB Workshop





### Hot Spots of IMAGE in its final phase

The last months of IMAGE are showing a sustained effort in training courses, as illustrated below. At the same time, new results have been published regarding the management of genetic diversity of domestic animals.

This fall, many partners have been busy working with Wageningen University to prepare the validation of IMAGE001 SNP chip.

About 2000 samples were collected representing a great diversity of populations for six species (cattle, sheep, goat, pig, horse, chicken) from several gene banks participating to IMAGE. Results will be presented at the IMAGE conference in Madrid.

A brainstorming workshop was held in Vienna

to address the major challenge of rationalization of the collections. In addition to the economic optimization already developed within IMAGE, a major message coming from IMAGE ethical survey is that gene banks are facing a range of expectations from various stakeholders. This calls for a thorough discussion of the concept of equity and how it can be implemented for gene banking. A panel of 27 case studies has been assembled by IMAGE partners, which all contribute information to the delicate exercise of rationalization.

We are looking forward sharing our results and ideas for the future, at the open international IMAGE conference to be held in Madrid, February 5, 2020.



*Photo: Courtesy of WUR*



After 4 years of intensive and successful work full of many achievements, the IMAGE project is coming to an end. The final meeting of the IMAGE project will take place between **04-06 February 2020, in Madrid, Spain**. The final meeting also includes an open scientific conference on **05 February**, where the main achievements of IMAGE will be made public. The conference will take place at Salón de Actos, Facultad de Veterinaria, Universidad Complutense de Madrid, in Spain. The participation in the Conference is free, but attendants are kindly asked to register: [http://www.imageh2020.eu/Events/annoucement\\_final\\_conference.pdf](http://www.imageh2020.eu/Events/annoucement_final_conference.pdf)



European Commission

Horizon 2020  
European Union funding  
for Research & Innovation

### IMAGE Scientific Conference- Madrid, Feb. 5, 2020

#### Gene banks for animal genetic resources : what's new ?

9h Introduction Michèle Tixier-Boichard

#### Session 1 : Current analysis of animal gene banks in Europe and options for optimization

9h10 Pan-European gap analysis of livestock gene bank collections. Gregoire Leroy et al.

9h30 Economic optimization of national and pan-European gene bank collections. Rafael Silva et al.

10h Ethical and social values associated with gene bank collections. Michèle Tixier-Boichard et al.

10h30 break and posters

#### Session 2 : New methods to preserve genetic resources

11h Strategy for biobanking avian resources:

Advantages and limits in the implementation of a sperm cryobank. Julian Moreno &amp; Elisabeth Blesbois

Poultry stem cells for biobanking avian genetic resources. Mike Mc Grew et al.

A hybrid model to restore resources of avian species using PGC or gonadal tissue transfer.

Krisztina Liptoi et al.

11h40 Modelling vitrification for mammal embryos. Henri Woelders &amp; Florence Guignot

12h00 Lunch

#### Session 3 : New knowledge on genetic resources obtained from gene bank collections

13h20 Which genes to trick to grow feathered feet? Chiara Bortoluzzi

13h40 Reading the history of the Asturiana de los Valles breed in its genome. Susana Dunner et al.

14h00 Deciphering adaptation to environment by landscape genomics. Paolo Ajmone-Marsan et al.

#### Session 4 : Collecting and connecting data to characterize genetic resources

14h30: A new standard to compare gene bank collections: the IMAGE multi-species SNP chip.

Richard Crooijmans

15h00 IMAGE data portal and tools for efficient access and use of information. Alessandra Stella

#### Session 5 : Enhancing the use of gene bank collections for fitter livestock farming

15h30 MoBPS – a web-based tool to make optimal use of genetic resources in breeding programs.

Henner Simianer &amp; Torsten Pook

15h45 Case studies

15h45 Breeding programs in the South American Creole cattle. Gabor Mezaros et al.

16h Trade-offs between genetic diversity and genetic merit when using gene bank bulls.

Harmen Doekes &amp; Jack Windig

16h15 Painting eggs in blue.

Claudia Dierks

16h40 break and posters

#### Session 6 : Prospects from IMAGE for the future of Animal Gene banks

17h10 The role of capacity building and updated FAO guidelines to support gene banking strategies.

Luis Telo de Gama

17h30 Expectations from breeders

EFFAB (speaker to be confirmed)

A public-private partnership on a reproductive technology (speaker to be confirmed)

17h50 Common objectives and specific issues for the 3 European networks of genetic resources,

ERFP, ECPGR, EUFORGEN

(speaker to be confirmed)

18h15 Concluding remarks





Fitter LiveStock Farming

## IMAGE was Present at ATF-Fitter Livestock Farming Workshop



*"What research and innovation can deliver to support climate mitigation and adaptation in livestock farming?"*

IMAGE project joined the afternoon session of the 9<sup>th</sup> Seminar of Animal Task Force on 6 November 2019 in Brussels. The session focused on "What R&I can deliver to support climate mitigation and adaptation in livestock farming". The well-attended workshop was organized by the ATF and the Fitter Livestock Farming Common Dissemination Booster (CDB) Cluster.

The coordinators of the Fitter Livestock Farming CDB projects presented the products, tools, devices and systems developed by these projects. IMAGE coordinator Michèle Tixier-Boichard presented the objectives and outcomes of the IMAGE project. She reported the first results from a landscape genomics study on sheep breeds, showing significant associations between environmental variables and 44 candidate genes.



Michèle Tixier-Boichard

As lessons learned from the IMAGE project, Tixier-Boichard reported several critical issues that have been detected and underlined the contributions that the IMAGE project has made to overcome them:

- Gene banks lack molecular data: IMAGE provides new data
- Data are not shared: IMAGE portal will be open via Biosamples by EMBL-EBI
- A trusted regulatory framework is needed: IMAGE has a review on Nagoya protocol for Access & Benefit sharing and IMAGE has proposals for regulating new reproductive biotechnologies

- Reproductive technologies need to be efficient in all species: IMAGE developed new protocols for chickens and pigs
- Tools are needed to monitor the use of breeding material from gene banks: IMAGE has developed a new software to simulate breeding programs

As recommendations from the IMAGE project, Michèle Tixier-Boichard said: "National authorities should recognize national gene banks for conservation purposes, more cooperation between European gene banks should be supported, gene bank collections have to be better documented and initiatives for introducing specific traits from genetic collections into commercial breeding programs should be supported in particular for increasing the adaptation to different environments and changes in production systems."

In the discussion part of the workshop, the coordinators mentioned that linking information about the health and management of livestock to environmental data is a key component in making livestock enterprises more sustainable in the battle with climate change. The importance of communication of science with society in a wider context for the future of European R&I programs, and involving industry and stakeholders to the project from the start were among the common opinions of the coordinators of Fitter Livestock Farming CDB projects.



Coordinators of the CDB projects

## IMAGE Courses Completed with Success!

### Using Gene Bank Material for Livestock Populations: Case Studies and Optimization Using the MoBPS Software

*By Michèle Tixier-Boichard, INRA*

A training session on different scenarios for using the collections was organized by AgroParisTech as part of the IMAGE project between 20-22 November 2019 in Paris, France. It brought together 15 participants, stakeholders in the conservation of genetic resources or researchers, from 11 countries and almost all continents (Europe, Africa, Asia, South America). It was organized in 3 parts:

- A session to present case studies: CRB-Anim provided 4 examples illustrating the reconstitution of experimental trout lines, the reintroduction of diversity into an experimental chicken line or into local pig breeds, the molecular characterization of the diversity of local breeds of small ruminants and the contribution of cryobanks to the management of the diversity of these breeds;
- A course on molecular indicators of genetic diversity and associated data;
- A training session on MoBPS software, which simulates an animal breeding program developed by the University of Göttingen as part of the IMAGE project.

The important international participation shows that, concerns about the use of biobanks for the management of animal genetic diversity are very strong, reflecting FAO's action to promote a global action plan for animal genetic resources. Mastering of MoBPS software will be an asset to make the best use of collections.



*Course participants in Paris*

### Characterization, Management and Exploitation of Genomic Diversity in Animals

*By Aniek Bouwman, WUR*

An enthusiastic group of 27 participants from Europe, Russia, China and South America followed the course on characterization, management and exploitation of genomic diversity in animals, between 9-13 December 2019 at Wageningen University & Research (WUR) in the Netherlands. The course was organised by the IMAGE project. A team of international lecturers, mostly involved in the IMAGE project, put together a challenging program. All relevant topics, to understand and make best use of genetic diversity, were covered in the course.

#### Genetic diversity topics

Gabor Meszaros (BOKU, Austria) started the course by teaching about measures of genetic diversity. Christian Reimer (University of Goettingen, Germany) took over explaining aspects of the analysis of across population genetic diversity and introgression of specific genetic regions into another breed. Mirte Bosse and Martien Groenen (WUR, The Netherlands) jumped into linking phenotype, genotype and selection history, using GWAS, selective sweeps, and functional genomics. Michèle Tixier-Boichard (INRA, France) taught the participants more on building gene bank collections. Jack Windig (WUR, The Netherlands) finished the course with optimal contribution selection and management of small populations with nice exercises on dog populations.

#### Excellent group work

The participants got to learn each other better during a speed-dating session to assist in the process of group forming. During the week they worked in groups applying the material learned to actual datasets. A networking dinner was organised (kindly sponsored by Neogen), in which participants and lecturers could interact and discuss genetic diversity topics.



*Course participants in the Netherlands*



## Management of Livestock and Poultry Genetic Resources within the scope of climate change

*By Ahmed R. ELBELTAGY, APRI*

*Edited by Andreia de Jesus Amaral, ULisboa*

The workshop “Management of Livestock and Poultry Genetic Resources within the Scope of Climate Change” took place in Cairo, Egypt between 3rd to 7th November 2019, at the Animal Health Research Institute (AHRI), Agricultural Research Center.

The training was organized including both lectures and field visits to the National Gene Bank and AnGR related lab facilities. The main themes of the training workshop included:

- Analysis of policies and legislation dealing with management of AnGR;
- status of inventory and characterization (phenotypic and molecular), and applicable characterization approaches including adaptation traits;
- assessment of the current status on conservation of Egyptian indigenous AnGR including community-based utilization programs;
- assessment of the National Gene Bank (NGB) role in the management of AnGR;
- and the road map for innovative management of AnGR in Egypt.

A total number of 27 Egyptian trainees participated, and training was provided by 25 substitute lecturers (21 Egyptian and 4 from IMAGE). The trainees were selected to represent different geographically distributed universities and research centers; and different scientific disciplines within the scope of AnGR management. All trainees were scientists in their early to mid-career stages (post-graduate university and research centers students, university staff, and young researchers) in different fields of AnGR management. The IMAGE lecturers were Dr. Badr Benjelloun (Centre Régional de la Recherche Agronomique de Tadla, Maroc); Prof. Hans Sölkner (BOKU, Austria); Dr. Paul Boetcher (FAO); and Prof. Sipke-Joost Hiemstra (WR, Netherlands).

Workshop sessions covered the current status, gaps, opportunities, and the way-forward for the innovative management of AnGR in Egypt. This initiative allowed to discuss with stakeholders the major issues of AnGR management and which should be the road map for the Innovative Management of Animal Genetic Resources in Egypt. A framework for innovative management (characterization, utilization and conservation) of prioritized indigenous AnGR resources (Egyptian buffalo and goats, and Fayoumi chicken) was formed, following community-based utilization approach.



*Course participants in Egypt*



## news

### IMAGE at GenRes Bridge website

IMAGE project was mentioned in the article named "[The DNA of rare goat breeds in France reveals secrets of paternity](#)" on the website of the H2020 project GenRes Bridge (Genetic resources for a food-secure and forested Europe).

According to the article, we know more about pedigrees and kinship, thanks to the genomic tools available today. The article says: "As part of the IMAGE project, scientists received fresh insights into the male goats whose sperm is stored in the French genebank. The researchers analyzed the genetic material of the goats in the genebank and compared it with the DNA of living animals."

Coralie Danchin, from IDELE, reported that the results were quite surprising and very interesting for the breeders' associations. Danchin said: "We discovered that two males we thought were full brothers, since they were born from the same litter, are actually half siblings". "It looks like their dam was bred by two different males on the same day", she added.

To read the whole article, please visit the [website](#).



**Photo credit:** C.Danchin/IDELE

### Post-Graduate Course of IMAGE

The National Institute of Agronomic Research in Morocco ([INRA-Maroc](#)) organizes a course from **21 to 24 January 2020**, in **Beni Mellal, Morocco**. The course's title is "Biobanking for a sustainable management of farm animal genetic resources (FAnGR): novel approaches in genomics, reproductive technologies and economics".

The aim of the course is to give an update on the role of biobanking for a sustainable management of FAnGR with a focus on the use of novel methods in genomics, reproduction, economics and the possibility to carry out practical cases of interest to participants.

Summarized content of the course is as follows:

- Assessment of genomic diversity
- Progress in genotyping
- Adaptive/productive introgression
- Functional genomics
- Economic assessment of conservation
- Conservation strategies
- Conception and use of animal genebanks
- Sustainable Management of livestock populations
- Legal issues
- Practical exercises

This event will follow the [1-day workshop](#) that will be organised by the IMAGE project with Moroccan decision makers and stakeholders, to discuss and exchange experiences on FAnGR conservation and disseminate novel methods in genomics, biobanking and agroeconomics. For more information and registration, please visit the [link](#).

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

By **Mariann Molnár** and **Eszter Patakiné Várkonyi** (National Centre for Biodiversity and Gene Conservation, Gödöllő, Hungary)

**Bence Lázár** (NARIC Agricultural Biotechnology Institute, Gödöllő, Hungary)

**Sunil Nandi** and **Michael J. McGrew** (The Roslin Institute and Royal Dick School of Veterinary Studies, University of Edinburgh, Midlothian, UK)

Production of infertile interspecific (Guinea fowl x Domestic fowl) hybrids, as first steps of our research, was previously reported in IMAGE Newsletter 3 and since then, a research article about our results was published in [Scientific Reports](#).

The aim of the research was to investigate an infertile interspecific hybrid (recipient) as an appropriate host for primordial germ cells (PGCs) of native poultry breeds (donor). To achieve our goals, female Hungarian guineafowls were crossed with Hungarian yellow roosters by artificial insemination and the crossing was repeated inversely. The phenotype, the hatching time, the hatching rate, the sex ratio, the presence of own germ cells, the fertility and the phenotype of viable hybrids and the incidence of chromosomal abnormalities of dead hybrid embryos were described. 6.65% viable offspring was obtained with crossing of Guinea fowl females with domestic fowl males (**Image 1, 2**), but crossing of domestic fowl hens with Guinea fowl males was unsuccessful; 98,4% of eggs were infertile. Our investigations also show that these sterile hybrids have endogenous germ cells, but they do not develop into sperm cells.



**Image 1:** 1 day old hybrid

To investigate their ability of hosting the primordial germ cells, sterile hybrid male embryos were tested by injecting fluorescently labelled chicken PGCs. The integration rate of labelled PGCs was measured in 7.5-day, 14.5-day and 18.5-day old embryonic gonads. 50%, 5.3% and 2.4% of the injected hybrid embryos survived and 40%, 5.3% and 2.4% of the examined gonads contained fluorescent labeled donor PGCs.



**Image 2:** 16 weeks old hybrids





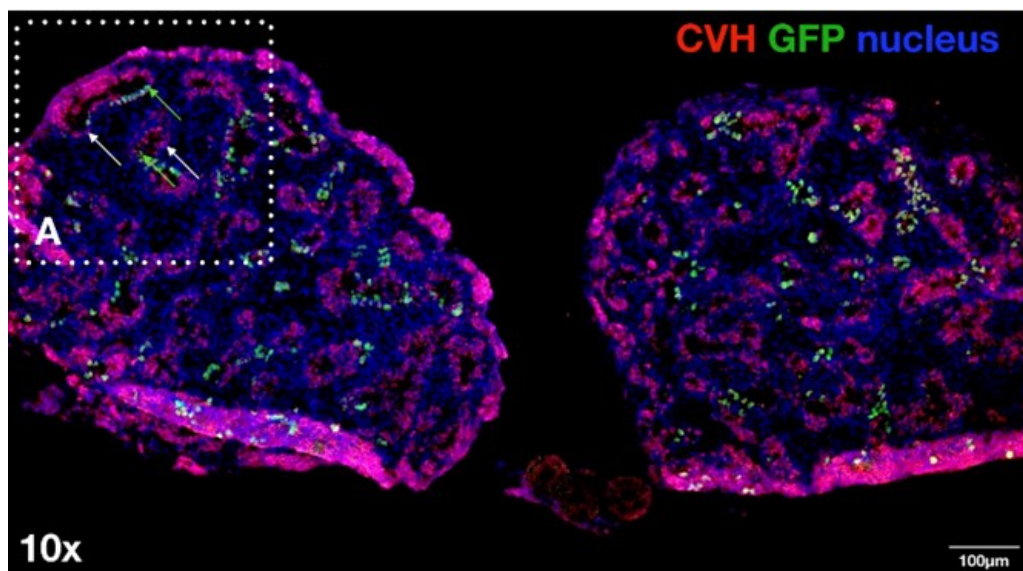


| Age of embryos | No. injected embryos | No. live embryos | No. GFP-positive gonads |
|----------------|----------------------|------------------|-------------------------|
| 7.5-day        | 30                   | 15 (50%)         | 12 (40%)                |
| 14.5-day       | 75                   | 4 (5.3%)         | 4 (5.3%)                |
| 18.5-day       | 42                   | 1 (2.4%)         | 1 (2.4%)                |
| Total No.      | 147                  | 20 (13.6%)       | 17 (11.6%)              |

**Table 1:** Developmental rate of 3-day-old hybrid recipient embryos injected with fluorescent-labeled PGCs.

After the injection, 85% of survived embryos had fluorescently labeled donor PGCs in their gonads (*Image 3*). This research work shows that these sterile hybrid males can be

used in gene conservation and may be suitable recipients for PGCs of different avian species.



**Image 3:** Gonad of 18.5 days old hybrid, injected GFP expressing donor derived PGCs are green colored

## Persistence of small populations depend on the type of population contraction

*By Chiara Bortoluzzi, Mirte Bosse, Martijn F. L. Derks, Richard P. M. A. Crooijmans, Martien A. M. Groenen, and Hendrik-Jan Megens (Wageningen University & Research, the Netherlands)*

Small populations are of increased conservation concern, because their small population size reduces the effectiveness of selection against harmful mutations. An elevated level of harmful mutations in a genome is of particular concern when mutations become homozygous due to inbreeding, a phenomenon called inbreeding depression. In the genomics era, this paradigm has, however, started to be challenged in both studies of wild and domesticated species. A major conclusion of many recent studies is that small populations can nevertheless persist with small numbers with no signs of inbreeding depression. Even though researchers have proposed that the persistence of small populations may depend on the type and time-frame in which the population contracted in the past (i.e. population bottleneck), so far these have remained pure hypotheses.

In a recent study published in *Evolutionary Applications*, researchers from Wageningen University & Research have provided evidence that the type and time-frame of the population bottleneck can severely affect the genome of small populations. In their study, researchers used domesticated traditional breeds of chicken from the Netherlands as a model species, as

these populations went through two different types of bottleneck at different time-points in their demographic history: the domestication bottleneck, occurred some thousands years ago, and the breed formation bottleneck occurred in the last decades.

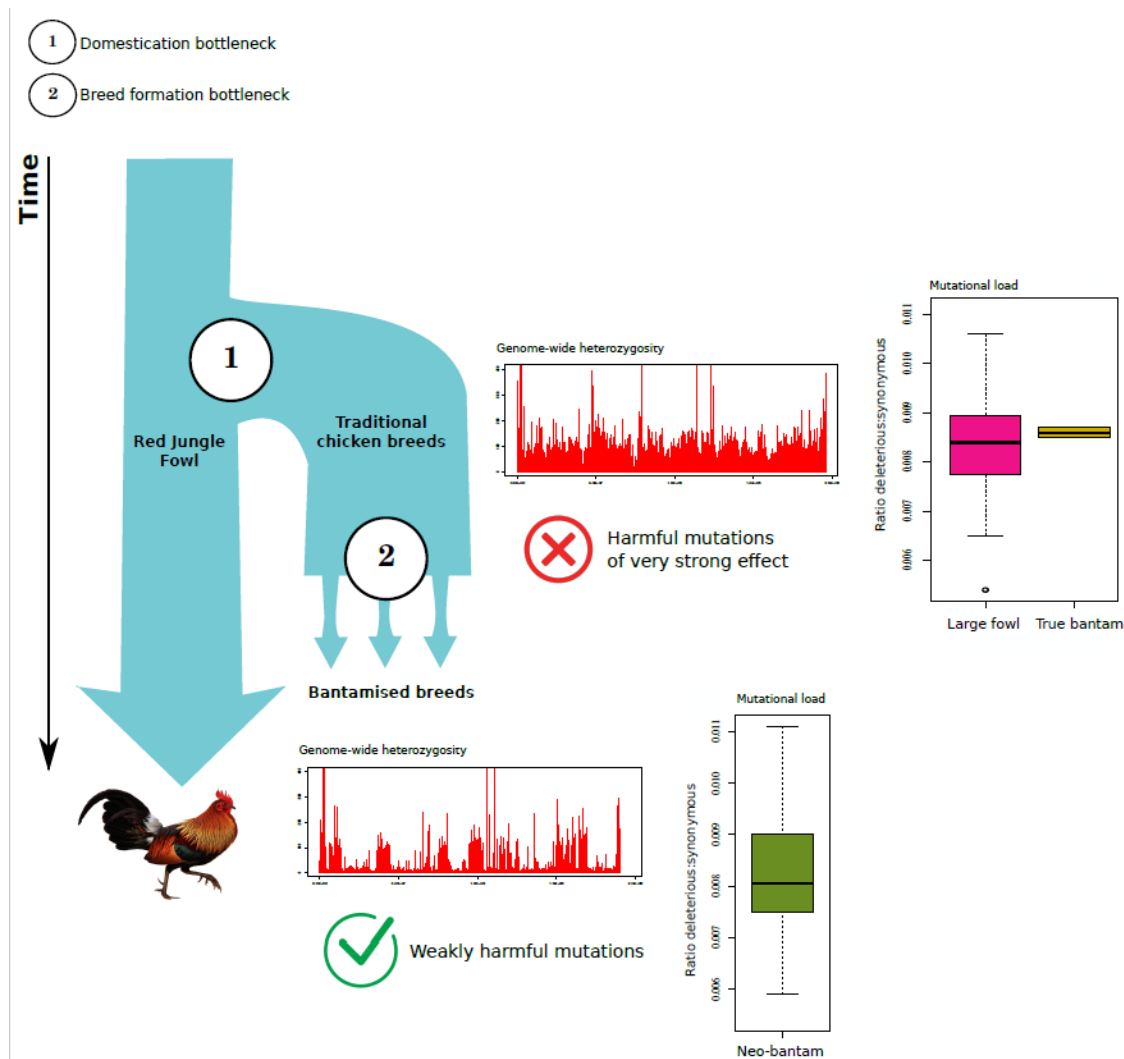
By means of whole-genome resequencing data, researchers showed that the size of a population is an important factor in determining the level of genetic variability and the effectiveness of selection to remove harmful mutations. In particular, populations that since the ancient domestication bottleneck have been kept with small census seem to have eliminated harmful mutations of a very strong effect. On the contrary, in recently bottlenecked populations the accumulation of weakly harmful mutations is mainly driven by stochastic demographic and genetic events, which overrule selection against them. In recently bottleneck populations, harmful mutations were also mostly found in long regions of the genome with reduced variation (runs of homozygosity), suggesting that this clustering is likely to occur due to stochastic effects and increased chances of mating between related individuals (i.e. inbreeding).





Even though (wild and domesticated) small populations are of conservation concern, conservation or breeding programmes are often not in place. Therefore, the establishment of such programmes that combine genomic information on harmful variation with inbreeding avoidance is the first step to assure the long-term survival of small populations, while enhancing their genetic diversity.

More information about the impact of different population bottlenecks on the genetic and deleterious variation in small populations is available in our paper here: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/eva.12872>



**Image:** The impact of the domestication and breed formation bottleneck on genetic and deleterious variation. Populations that went through the domestication bottleneck display higher genetic diversity and low mutational load as harmful mutations of very strong effect have been purged. On the contrary, the higher mutational load displayed by recently bottlenecked populations is mainly driven by genetic drift, which overrules selection against them.



## Not all inbreeding is (equally) depressing

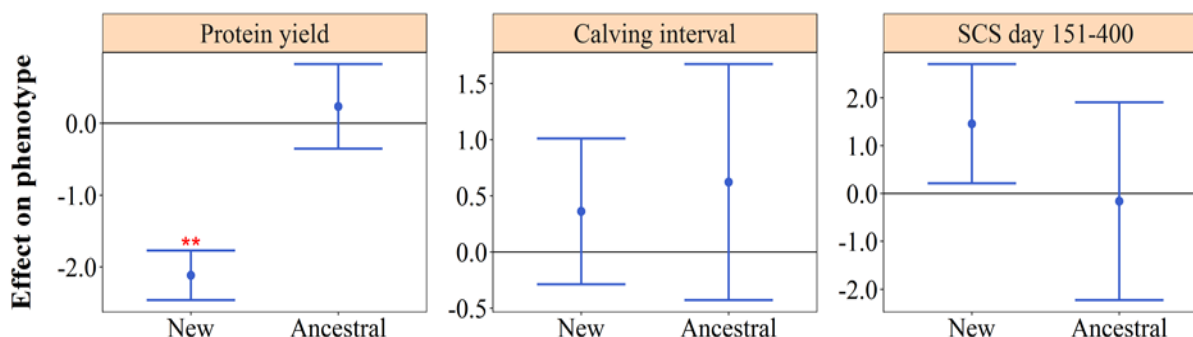
**By Harmen Doekes, Roel Veerkamp, Piter Bijma, Jack Windig (Wageningen University & Research, the Netherlands), Sipke Joost Hiemstra (Centre for Genetic Resources, the Netherlands), and Gerben de Jong (Dutch Cattle Improvement Cooperative, the Netherlands)**

Inbreeding decreases the mean performance of animals, a phenomenon known as inbreeding depression. In the context of IMAGE, we investigated the effects of inbreeding on the performance of Dutch Holstein Friesian dairy cattle. We particularly focussed on the effects of “old inbreeding” versus “recent inbreeding” and showed that recent inbreeding may be more harmful than old inbreeding.

For almost 40,000 cows, we first calculated inbreeding coefficients based on pedigree and genomic data. Then we estimated the effect of a 1% increase in these coefficients on yield (3 traits), fertility (4 traits) and udder health (2 traits). We observed an unfavourable effect of inbreeding on all traits, although not all effects were significant. For example, a 1% increase in genomic inbreeding based on “regions of homozygosity” (ROH) was associated with a decrease in 305-day milk yield of 36.3 kg (SE = 2.4), an increase in calving interval of 0.48 days (SE = 0.15) and an increase in mean somatic

cell score for day 150 through to 400 of 0.86 units (SE = 0.28).

After investigating the effects of total inbreeding on performance, we split the total inbreeding coefficients into components based on the “age” of inbreeding. We found that, based on pedigree information and for production traits, the degree of inbreeding depression was higher for recent inbreeding than for older inbreeding. For example, a 1% increase in inbreeding on ancestors from the first four to five ancestral generations was associated with a decrease in 305-day milk yield of about 35 kg, whereas inbreeding resulting from matings among older related ancestors had no significant effect. We also split the total inbreeding into an ancestral component and a new component, based on whether alleles were inbred (i.e. “identical by descent”) for the first time or not. We found that new inbreeding significantly reduced yield traits, whereas ancestral inbreeding had no effect (*Image 1*).



**Image 1:** Effect of a 1% increase in new and ancestral inbreeding on phenotypes.



This difference may be explained by purging, which is the process in which inbreeding increases the selection efficiency against deleterious recessive alleles. Interestingly, the stronger effect of new compared to ancestral inbreeding was clearly present for yield traits, but less so (or not at all) for fertility and udder health traits. This may be due to the longer selection history for yield traits.

Overall, our findings emphasize the importance of managing the increase in inbreeding (i.e. the inbreeding rate) in livestock populations. Selection may counteract the negative effects of inbreeding, provided that inbreeding does not

increase too quickly. By managing the inbreeding rate, the amount of new inbreeding is also limited.

### More information & acknowledgements

More information can be found in the scientific paper in [Genetics Selection Evolution](#).

The research leading to these results has been conducted as part of the IMAGE project which received funding from the European Union's Horizon 2020 Research and Innovation Programme under the grant agreement n° 677353. Data were provided by the Dutch-Flemish cattle improvement co-operative (CRV).



*Dutch Holstein Friesian dairy cattle*

## publications

An overview of all IMAGE publications can be found [on the website](#). The newest publications are listed below:

Gregoire Leroy, Paul Boettcher, Badi Besbes, Coralie Danchin-Burge, Roswitha Baumung, Sipke J. Hiemstra "[Cryoconservation of Animal Genetic Resources in Europe and Two African Countries: A Gap Analysis](#)". *Diversity* (2019) 11(12), 240.

Oliver Michele Selmoni, Elia Vajana, Annie Sandrine Guillaume, Estelle Rochat, Stéphane Joost "[Sampling strategy optimization to increase statistical power in landscape genomics: a simulation-based approach](#)". *Molecular Ecology Resources* (2019).

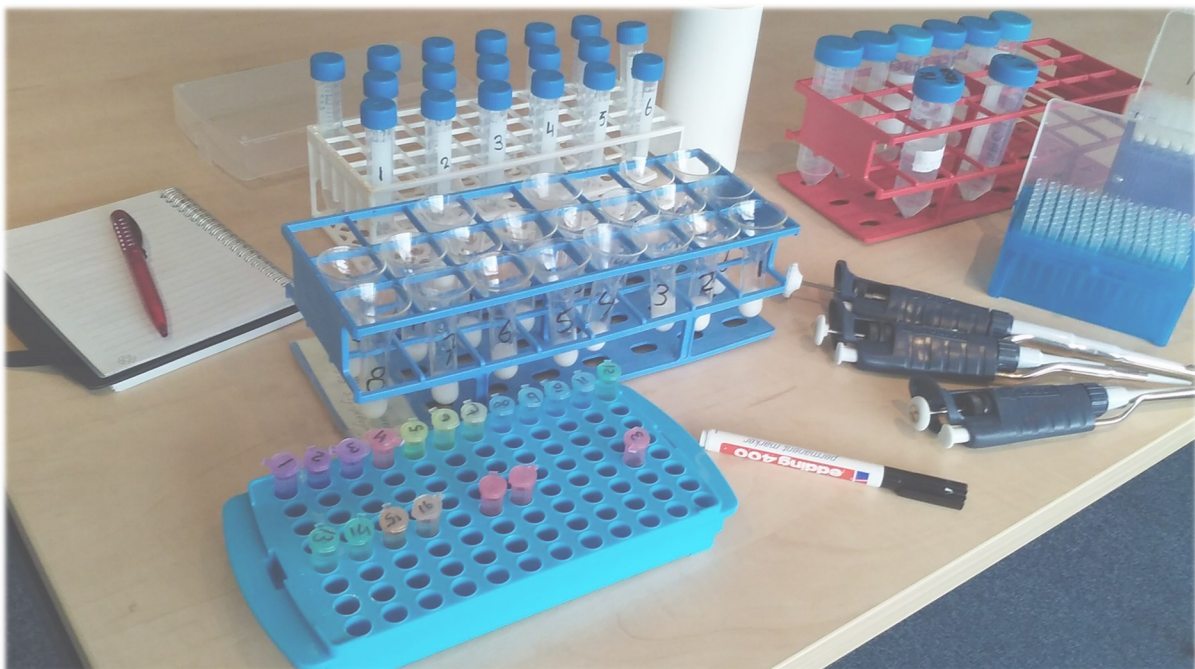


Photo: Courtesy of WUR



## profiles



### Paul Boettcher, FAO

[Paul.Boettcher@fao.org](mailto:Paul.Boettcher@fao.org)

Paul Boettcher is currently an Animal Production Officer at the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy, within the Animal Production and Health Division. He is currently outposted at the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture at the headquarters of the International Atomic Energy Agency in Vienna, Austria. The primary activity of his work is to support countries to implement the [Global Plan of Action for Animal Genetic Resources](#), with a particular emphasis on conservation and on application of biotechnologies. He currently serves as the Secretary of the Intergovernmental Technical Working Group for Animal Genetic Resources, within the Commission of Genetic Resources for Food and Agriculture. Boettcher, a native of the United States of America, was raised on a dairy farm in Wisconsin and holds a BSc from the University of Wisconsin, MSc from the University of Minnesota and PhD from Iowa State University. Boettcher has been at FAO for 12 years. He previously worked as a research scientist in Canada and Italy and at the IAEA.



### Dr. Maria Rosa Lanari, Instituto Nacional de Tecnología Agropecuaria (INTA), Argentina

[lanari.mariarosa@inta.gob.ar](mailto:lanari.mariarosa@inta.gob.ar)

Dr. Maria Rosa Lanari works as a researcher on animal genetic resources in the Experimental Station Bariloche, in Patagonia since 1993. She is a postgraduate professor at the National University of Comahue in Patagonia. Maria Rosa is a National Coordinator of the Genetic Resources Program of INTA. This Program includes the National Network for Conservation of Plants, Animals, Forest and Microorganism. The Program also includes different projects to promote conservation strategies and national policies.

In the IMAGE Project, she contributed to the WP7 for the postgraduate course organisation and teaching in Argentina. In WP1, she organized the exchange with other IMAGE partners and different Ministries to promote Access and Benefit Sharing (ABS) and Nagoya Protocol in Argentina. Finally, as she is responsible for the Animal Genetic Resources Network, she also collaborated to the WP2. Her principal aim is to strengthen awareness on animal genetic resources and knowledge of the associated communities.

## videos

IMAGE coordinator Michèle Tixier-Boichard's interview and presentation at the Fitter Livestock Farming Workshop during the 9<sup>th</sup> Animal Task Force Seminar are now available on [IMAGE's YouTube channel](#)! All presentations and the discussion session of the workshop are published on the [YouTube channel of the GenTORE project](#), that initiated the Common Dissemination Booster (CDB) Fitter Livestock Farming.



Michèle Tixier-Boichard presented the IMAGE project at ATF - Fitter Livestock Farming Workshop, providing information on the challenges addressed by the project, project objectives and outcomes, lessons learned and recommendations of the project. Watch the video by clicking the picture above!

IMAGE project's coordinator Michèle Tixier-Boichard described the partners, aims and achievements of the IMAGE project in her interview at the ATF - Fitter Livestock Farming Workshop. Watch the video by clicking the picture above!

## contact

**U** WP7 Outreach  
 Prof. Luís Telo Gama  
 LISBOA [ltgama@fmv.ulisboa.pt](mailto:ltgama@fmv.ulisboa.pt)



**IMAGE Newsletter**  
 Duru Eroglu vd Schoor  
[duru.eroglu@effab.info](mailto:duru.eroglu@effab.info)



@imageh2020

@imageh2020



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

Copyright © 2017 IMAGE Project, All rights reserved.

You receive this newsletter because you are on the IMAGE contact list or on the contact list of one of our project partners and we sincerely think you might be interested in the IMAGE project news.

Do you wish not to receive further newsletters of IMAGE, [unsubscribe from this list](#).

This publication reflects the views only of the author, and not the European Commission (EC). The EC is not liable for any use that may be made of the information contained herein.