
IMAGE

Innovative Management of Animal Genetic Resources

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Horizon 2020 FRAMEWORK PROGRAMME

TOPIC: MANAGEMENT AND SUSTAINABLE USE OF GENETIC RESOURCES

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DELIVERABLE D7.6

Deliverable title: Post-graduate course n°2

Abstract:

The course aimed at developing capacity building for the usage of novel methods to characterise, manage and exploit animal genomic diversity and provide participants with the opportunity to apply this new acquired knowledge to their own research. The target audience consisted in PhD candidates at least in their 2nd year, post-docs and researchers interested in genomic diversity. Applicants were asked to submit an abstract describing their own research and experience. During the course, 28 participants from different countries (23 EU, 5 non EU) have applied the newly acquired knowledge and tools on their own data.

Due date of deliverable: [M30](#)

Start date of the project: March 1st, 2016

Organisation name of lead contractor: INRA

Contributors: WR, WU, BOKU, FLI, INRA

Dissemination level: [PU \(available on the website\)](#)

Revision N°: V1

Actual submission date: [M33](#)

Duration: 48 months

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Executive Summary

<p>Background</p>	<p>T7.5 Training T7.5 The heterogeneity in level of development and organisation of gene banks throughout Europe and several other countries makes it necessary to undertake training activities to promote the adoption of appropriate methodologies of characterisation, collection, storage and utilisation of animal germplasm.</p>
<p>Objectives</p>	<p>Organization of a post-graduate training course in Europe mainly intended for PhD candidates or young scientists to disseminate how genetic diversity contributes to the ability of a species to respond to environmental changes, with implications in terms of, for example, breeding strategies in farm animals and conservation of endangered breeds.</p>
<p>Methods</p>	<p>IMAGE experts presented lectures and practical data analysis tools. Presentations provided by lecturers are being edited and will be made available at the IMAGE website.</p>
<p>Results & implications</p>	<p>The post-graduate course took place at Wageningen University and Research, in Wageningen, Netherlands, 15-19 October 2018, and it was organized by Wageningen Research. The event gathered 28 researchers, of which 23 came from 10 different EU countries and 5 came from non-EU countries, namely, Argentina, Brazil, South Africa and USA. This event allowed the improvement of competences of researchers in this field of knowledge. During the course many participants succeeded in applying the acquired knowledge and tools to their research and presented their results.</p>

Program of Post-graduate training course organized at WUR, Netherlands

Postgraduate course

“Characterisation, management and exploitation of genomic diversity in animals”

Aim: Disseminate the usage of novel methods to characterise, manage and exploit genomic diversity (animal genetic resources) and direct application to the participants’ on-going research.

Scope of the course: Genetic diversity contributes to the ability of a species to respond to environmental changes, with implications in terms of, for example, breeding strategies in farm animals and conservation of endangered breeds. In the genomics era, genotypes and whole-genome sequence (WGS) data play an important role in maintaining, preserving and utilisation of genetic diversity. This course focused on the use of genomic data to identify and exploit genetic diversity in an optimal way for a sustainable future.

PhD students were asked to bring their own data sets in order to apply the methods. Group of students were set up for that aim, they chose the analysis they wished to perform and presented their results on the afternoon of Friday October 19, 2018.

Target: The course was attended by 28 young researchers, of which 23 came from EU-countries and 5 came from non-EU countries (Figure 1). A selection process was implemented, based on the abstracts describing individual research and experience received from all applicants.

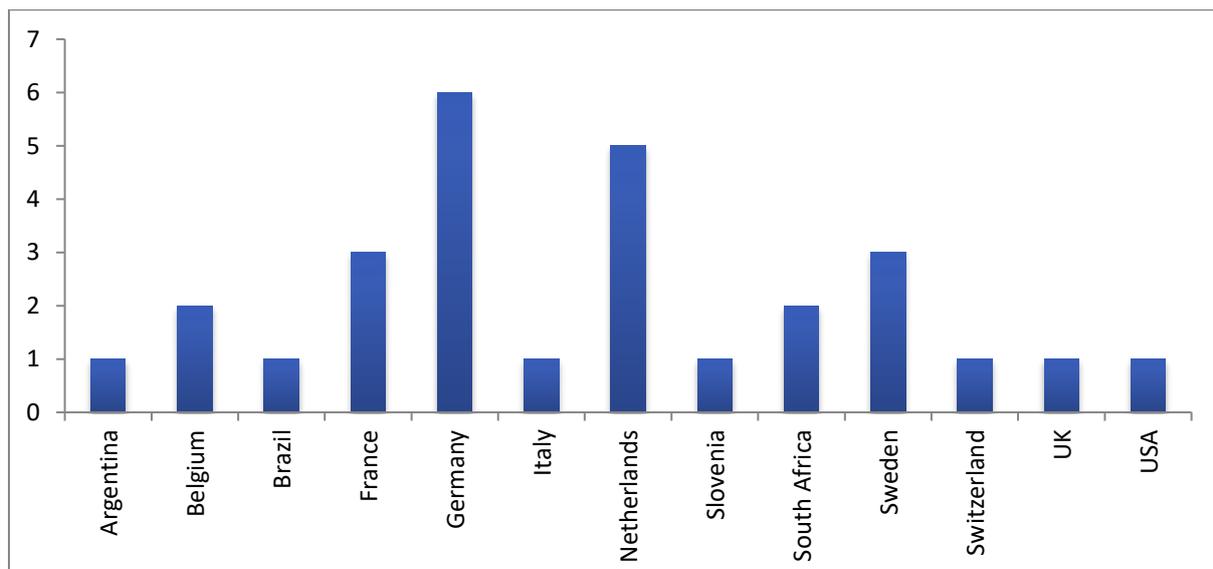


Figure 1- Distribution of participants per country.

Results: The course was successful in engaging researchers in the following research topics and questions:

- How to assess the genetic diversity, either between or within breeds, as documented by genomic data?
- How do gene banks help to elucidate the history of local populations and the history of major genes?
- Which potentially detrimental variants can contribute to inbreeding depression?
- Can we facilitate the effective use of gene bank samples in breeding by novel genome-assisted methods and tools?
- How does genomics lead to revisit the management of small populations?

Dates: 15-19 October 2018

Hours: 9:00-17:30

Venue: Orion (Building 103), Wageningen Campus, Room: PC4051 (4th floor)

Teachers:

Wageningen University, the Netherlands:

- Martien Groenen (MG), Animal Breeding and Genomics
- Mirte Bosse (MB) – Animal Breeding and Genomics
- Martien Groenen (MG) – Animal Breeding and Genomics

Wageningen Research, the Netherlands

- Jack Windig (JW) – Animal Breeding and Genomics
- Aniek Bouwman (AB) – Animal Breeding and Genomics
- Sipke Joost Hiemstra (SJH) – Centre for Genetic Resources, the Netherlands (CGN)

University of Natural Resources and Life Sciences, Austria

- Gabor Meszaros (GM)

Friedrich Loeffler Institute, Germany

- Steffen Weigend (SW),

French National Institute for Agricultural Research, France

- Michèle Tixier-Boichard (MT)

Programme:

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00-10:30	Welcome (AB/JW) intro Linux and HPC Lecture (GM) Intro genomic diversity	Lecture (SW) diversity across breeds	Lecture (MB) adaptive introgression	Lecture (JW) Optimal contribution	Lecture (JW) management small populations
10:30-11:00	Coffee	Coffee	Coffee	Coffee	coffee
11:00-12:30	Lecture (GM) Measures of genomic diversity	Lecture (SW) introgression	Lecture (HJM/MG) functional genomics	Lecture (MT) Building gene bank collections	Exercise (JW) management small populations
12:30-13:30	Lunch	Lunch	Lunch	Lunch	lunch
13:30-15:00	Exercise (GM) measures of genomic diversity	Exercise (SW) Structure	Exercise (HJM/MG) functional genomics	Exercise (JW) prioritization for conservation	Group presentations
15:00-15:30	Coffee	coffee	Coffee	coffee	coffee
15:30-17:30	Pitches (GM,SW,MB,HJM,JW)	Group work	Group work	Group work	Group presentations
Evening	Pizza night + forming groups		Seminar/ discussion (MT/SJH) “What diversity to manage?” Debate with stakeholders on ethical issues for breed cryoconservation	Course Dinner	

Outcome of the evening debate

The debate of wednesday evening involved the ethical questions related to objectives of gene banks. To inform and to facilitate the discussions, the organisers invited several Dutch stakeholder representatives. Sipke Joost Hiemstra, director of the Centre for Genetic Resources, the Netherlands (CGN) welcomed the participants and Michèle Tixier-Boichard, co-ordinator of the EU H2020 IMAGE project, introduced the IMAGE project.

Prior to the discussion, Sipke Joost provided some background information on the ethical questions to be discussed. Questions were related to the objectives of gene banks, the choice of breeds to conserve, the decision making process, funding of gene banks, the balance between in situ and ex situ efforts, and the use of innovative cryobiology and reproductive technologies. Henri Woelders explained in more detail about the perspectives and ethical

aspects of emerging technologies, such as cryoconservation and transplantation of ovarian tissue and primordial germ cells.

The PhD students and several course teachers formed four groups to represent different stakeholder perspectives. The Dutch stakeholder representatives were: Sijne van der Beek - CRV (cattle breeding company), Rolinka Snijders - Moorkop rare chicken breed society, Geert Boink - chair of the Dutch Rare Breed Survival Trust (SZH) and Karel de Greef - Wageningen Livestock Research, representing a citizen perspective.

Discussions were lively and rendered a general consensus on several topics. The main conclusions are presented in Newsletter #4, on IMAGE web site and will be incorporated into the corresponding ethical deliverable.

Projects developed by participants during the course

- Mini pigs, maxi results: evaluation of different methods for estimation of inbreeding in Goettingen mini pig.
- Diversity within and across Dutch and Belgian cattle breeds
- Analysis of two subpopulations in Lacaune dairy sheep breed
- Genetic diversity in cattle and dog populations
- Population structure analysis of sheep, cattle and horses
- Chicken team: 1) population stratification and differentiation
2) genomic inbreeding and selective sweeps

Assessment of the course by the students

The course was evaluated by the participants using a survey. In total 25 of the 28 participants returned the evaluation form. Overall the course received a score of 4.5 out of 5, ranking 6th of 31 courses given in 2017 and 2018, see figure 2 for the distribution of overall scores of PhD level course in Animal Sciences given at Wageningen University.

The discussion evening received the lowest score (3.9). Reasons provided showed that the participants liked the interaction with different stakeholders, but the long day with an evening session and limited food in between was simply too tough.

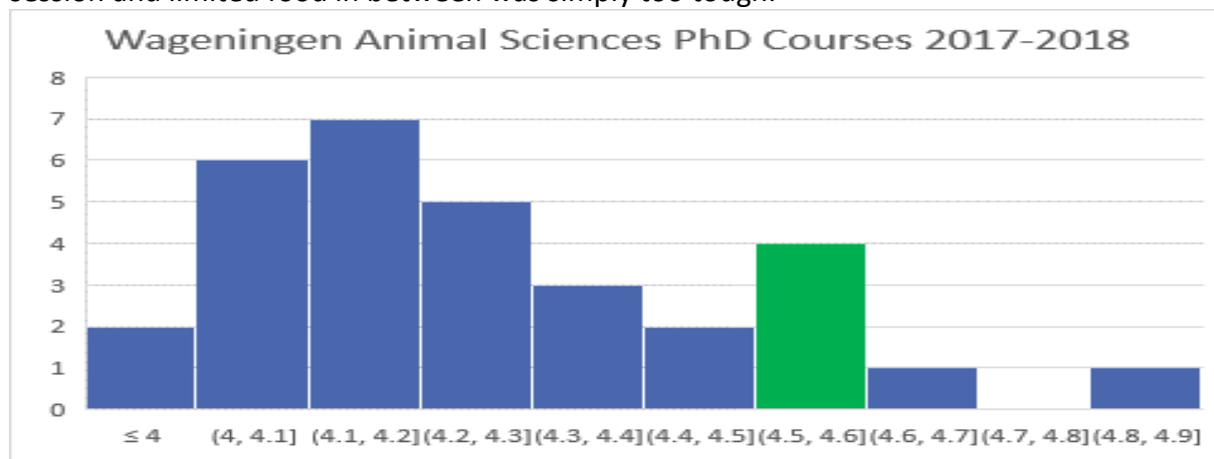


Figure 2 - Distribution of overall scores of PhD level courses given at the Wageningen graduate school of Animal Sciences (WIAS), with in green the bar including the score of this IMAGE course