LEAP-Agri: OPTIBOV-project

Genetic characterization of cattle populations for optimized performance in African ecosystems

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Outline

- What is LEAP-Agri
- OPTIBOV- project
- Nagoya protocol

LEAP-Agri

LEAP-Agri: **L**ong-term **E**U-**A**frica research and innovation **P**artnership on food and nutrition security and sustainable **Agri**culture

LEAP-Agri operates under the EU-Africa High Level Policy Dialogue on science, technology and innovation, which includes the implementation of the jointly funded EU-Africa Research and Innovation Partnership focusing on **food and nutrition security and sustainable agriculture** (endorsed by the EU-Africa Summit 2014).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727715

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LEAP-Agri

30 partners in **9 African** and **10 European** countries: research funding institutions (like NWO and LNV in NL) and some research organisations (like WUR)

- Common call for proposals

✓National funding agencies pool their resources
funds are provided and administrated in the respective country

✓Different national requirements for the funding -> for NL:
involvement of (preferably) Dutch private sector
business & close cooperation with African Union partner

✓EC tops-up the national funds by variable amounts

LEAP-Agri funding –focus NL

Partner contributions:
18.5 million Euro
EC top-up of the budget:
9.25 million Euro
Total of 27.75 million Euro
for three years of research projects approved

Funding details NL:
•LNV and NWO: 1.5 million Euro

TOTAL FUNDS
Share of contributions
18.5 million Euro
France
Germany
The Netherland
Kenya
Turkey
Uganda
Finland
Ghana
International
Egypt
Belgium
Algeria
South Africa
Norway
Cameroun
Spain
Portugal
Senegal
Burkina Faso15

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Projects approved –start Sept 2018

Total number of LEAP-Agri projects approved: **27**
(120 pre-proposals of which 87 full proposals submitted)

of which

14 projects with NL partners
8 projects with WUR as partner

OPTIBOV

Genetic characterization of cattle populations for optimized performance in African ecosystems

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Partners (PI) within OPTIBOV

- Europe:
  - Prof Dr. J. Kantanen (LUKE)
  - Dr. C. Ginja (PT)
  - Dr. R. Crooijmans (NL) project leader
- Africa:
  - Dr. D. Kuganza (MU-CAES)
  - Dr. M. Makgahlela (ARC)
  - Dr N. Ghanem (CU)

Why OPTIBOV

- Maintain traditional cattle breeds
- Capture genetic and genomic variation
- Use strength of these breed (adaptation)
- Use these breeds to find selective sweeps related to adaptation
- Use known variation in production to improve production (marker assistant selection)
- Train, educate and involve people to perform optimal breeding (longterm investment) (workshops, app, website)

Aim of the project: Adaptation!

- Improve production and survival of traditional breeds adapted to their local environment
  - Ecosystem (past- present- future): modelling
  - Select local breeds
  - Collect phenotypes
  - Collect DNA
    - Estimate the amount of inbreeding
    - Find selection signals on the genome
    - Find genes and variant on the genome
    - How to improve adaptation and production

Breeds

Eastern, northern and western Finn cattle

Groninger Whiteheaded Dutch belted, Tauros

Miranesa, Maranesa

Menofi (Baladi) / Domiaty (Damietta) / Maryuti

Ankole, East African Zebu

Nguni, Drakenberger

Potential traits:

-Climate, amount of rain, ecosystem

- Temperature-humidity index

Availability of water\food

- Food quality
- Amount of food available
- Type of food
- Disease recording
- Disease resistance
- Parasites infections (ticks, nematotes, mosquito's)
- Housing (outdoor-indoor)
- Production records
- Calving interval/total number of calves
- Age of first calf
- Treatments
- Biochemical measurements on blood
- Immune parameters (Ig)
- MHC haplotypes
- Milk components

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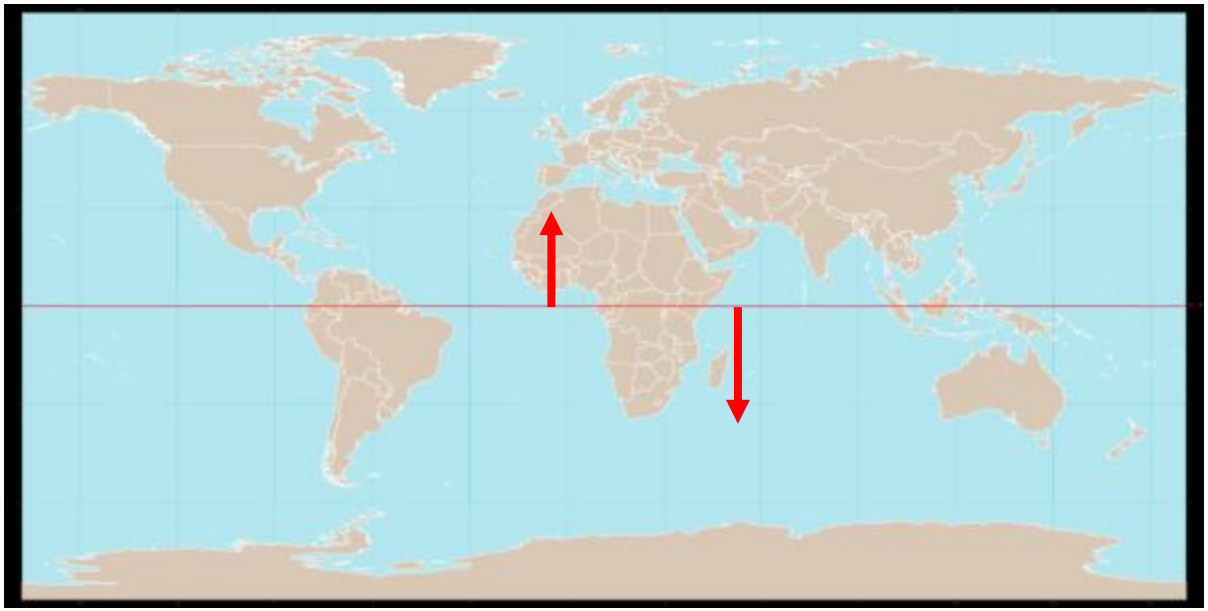
Local breeds

ecosystems

equator



Adaptation started in the past

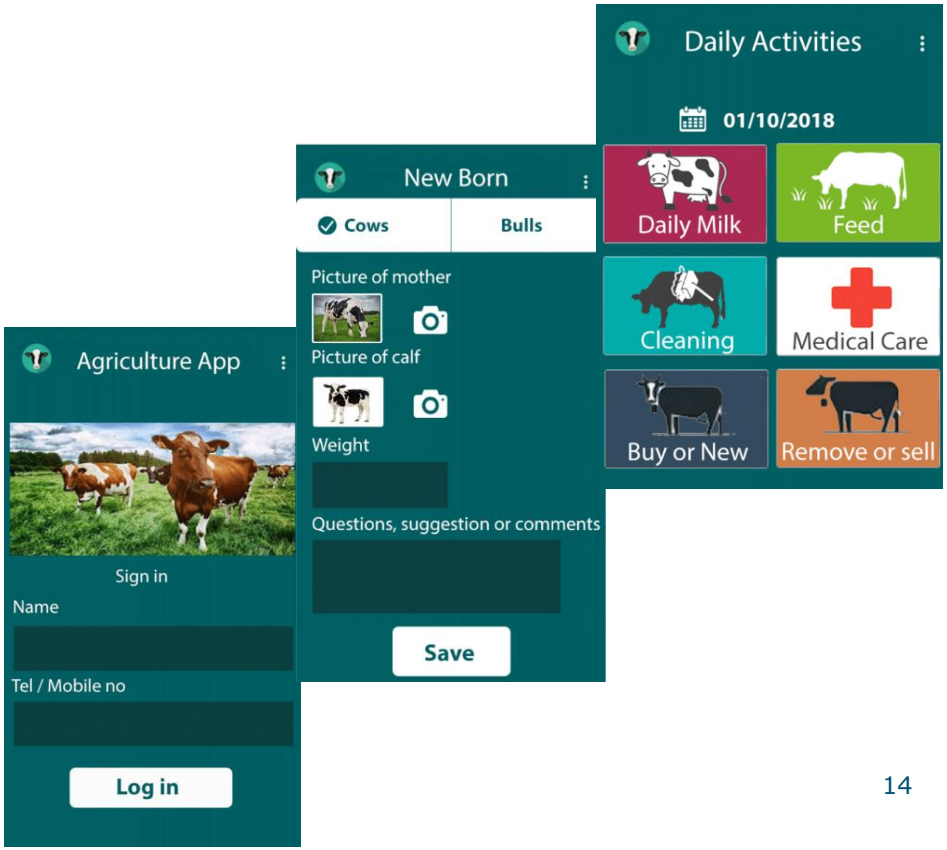
Modelling: climate and climate change; availability of water and food; diseases (transmitted by insects like ticks);

Recording phenotype (1)

- Basis is the FAO list but expanded with new knowledge
- Well defined phenotyping protocol
  - Blood collection
    - Whole blood, EDTA/Heparin blood, blood in RNA later
  - Milk collection
  - Hair collection
  - Feces collection
  - Mouth swaps

Recording phenotype (2)

- Records of abbreviations of normal status
  - In time
- Easy access
  - App (info/pictures)
  - Website
  - Database

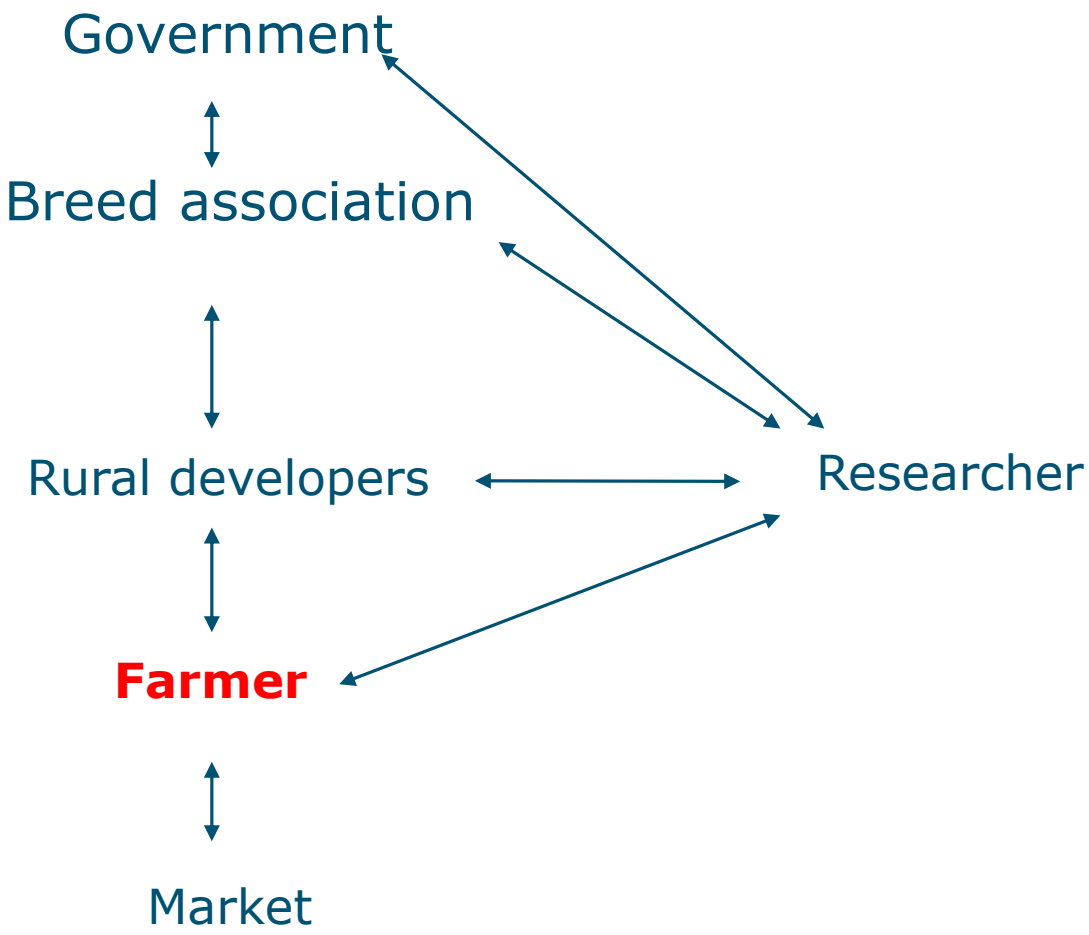


Recording genotypes

- WGS > 720 animals
  - 10x coverage
  - Illumina based
  - Per breed at least 10 males and 10 females

- New designed African SNP array (50K)
  - Taurine and Indicine
  - Traditional breed info

Information/data flow



Outcomes OPTIBOV

- Markers detected for selective adaptation traits
- Phenotype list
- African cattle breed variants
- Traditional/local breed characterisation
- New African SNP array (Taurine-Indicine)
- Recording/communication systems (app, database, website)
- Training schools (phenotype and genotype analysis)

Nagoya protocol

What:
The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity is a supplementary agreement to the Convention on Biological Diversity.

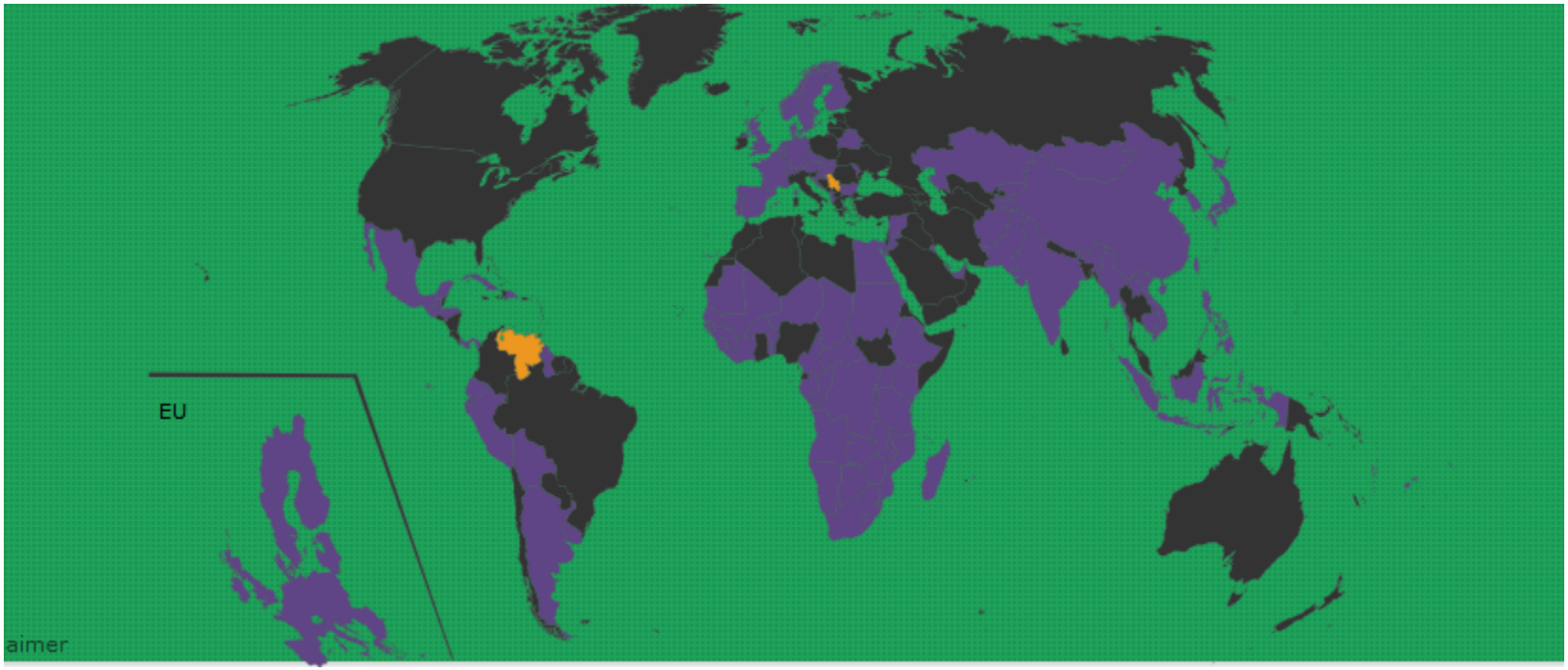
Why:

The Nagoya Protocol will create greater legal certainty and transparency for both providers and users of genetic resources by:

- Establishing more predictable conditions for access to genetic resources.
- Helping to ensure benefit-sharing when genetic resources leave the country providing the genetic resources

By helping to ensure benefit-sharing, the Nagoya Protocol creates incentives to conserve and sustainably use genetic resources, and therefore enhances the contribution of biodiversity to development and human well-being.

Nagoya protocol: countries



Access and benefit sharing

- Nagoya guidelines
  - MAT agreement over 6 countries
  - student started working on this topic

- Local guidelines importing animal material
  - National food security services/ national animal health services

Thanks

A Long term EU-Africa research and innovation Partnership on food and nutrition security and sustainable AGRIculture

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