Better lives through livestock

ILRI plans and activities on Animal Resources development in Africa

24 November 2023
AU-IBAR high level annual coordination meeting – online

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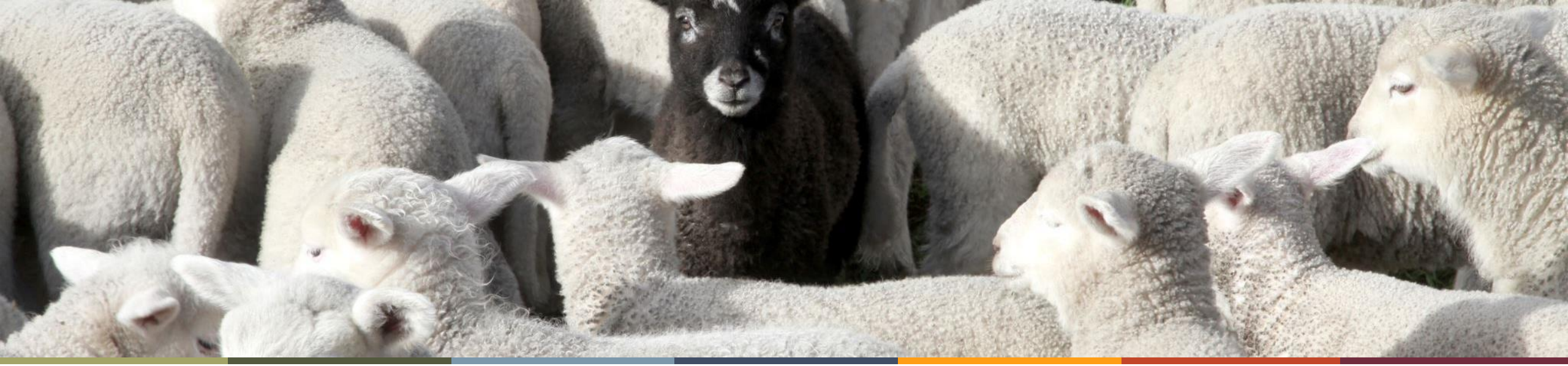

My points

1. The context
2. ILRI: key programmes
3. ILRI and AU-IBAR – now and later

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828 million people

going hungry everyday

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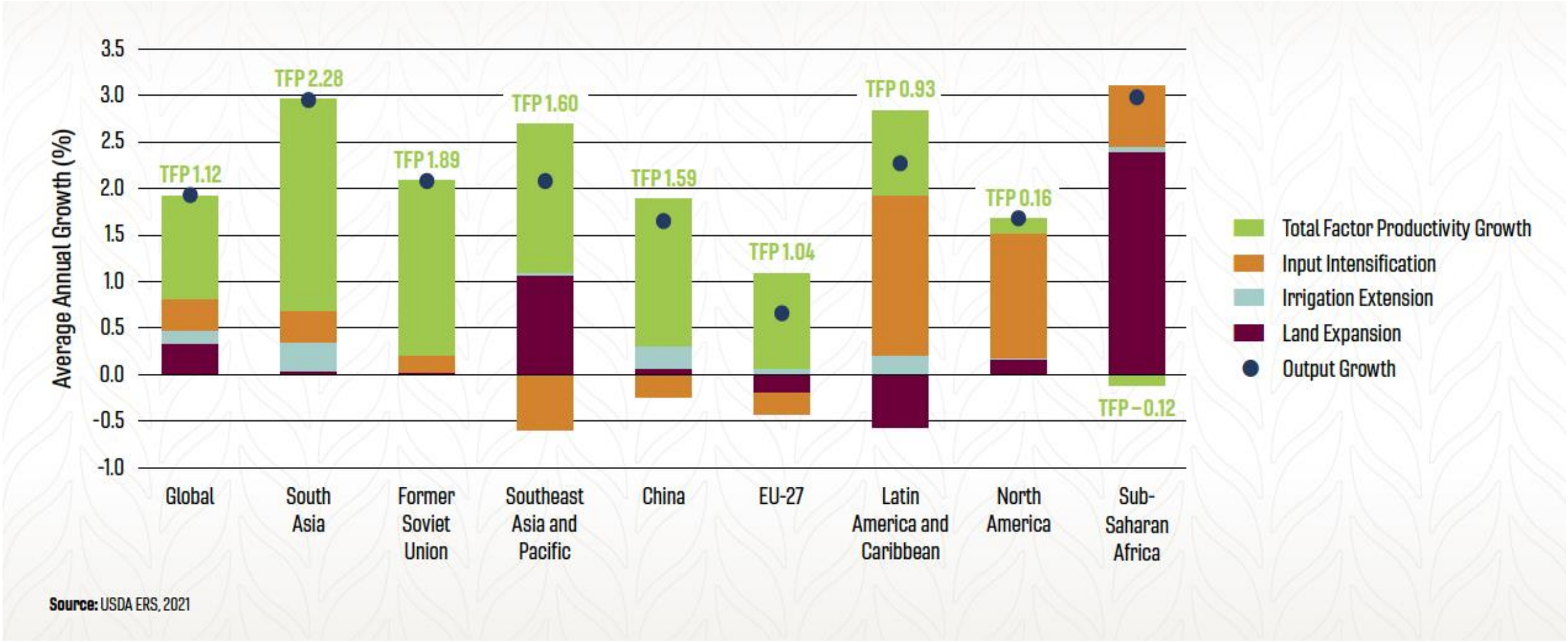
Horn of Africa & The Sahel

OFFTRACK


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

Sources of agricultural output growth:
more land and more animals in LMICs

GAP REPORT® GLOBAL AGRICULTURAL PRODUCTIVITY REPORT®



Source: USDA ERS, 2021

ILRI's livestock research: solutions for food and nutritional security, poverty, environmental and human health

Feed and Forage Development

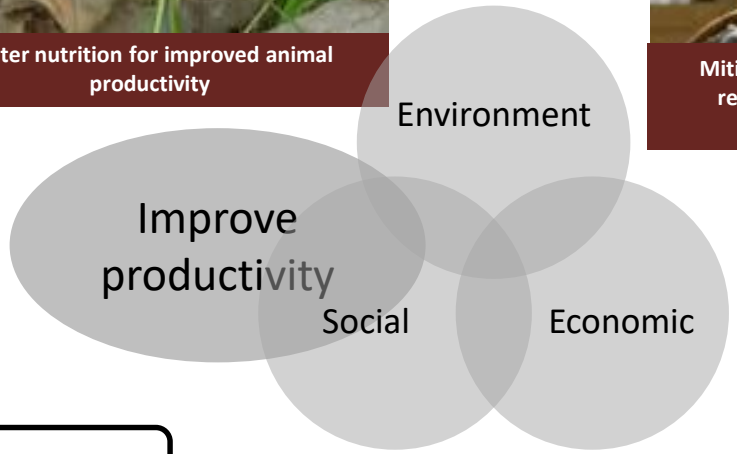
Better nutrition for improved animal productivity

Sustainable Livestock Systems

Mitigating climate change, enhancing resilience and increasing livestock productivity

Animal and Human Health

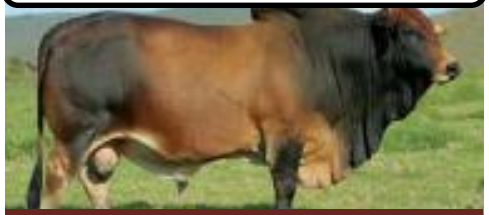
Delivering solutions for livestock, zoonotic and foodborne diseases



Impact at Scale

Taking livestock solutions to scale for inclusive development

Livestock Genetics



Improving genetics for better productivity and profitability

Policies, Institutions & Livelihoods (including gender)

Efficient livestock production driving inclusive growth and employment

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Livestock Genetics

Improving genetics for better productivity and profitability

- Genetic improvement (poultry, diary, small ruminants, pig
- Genomic resources,
- Genomics (structural, comparative, landscape …)
- Breeding
- Data (performance recording, key traits …)

Feed and Forage Development

Better nutrition for improved animal productivity

- Forages resources
- Crops residies
- Alternative feeds

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Sustainable Livestock Systems

Mitigating climate change, enhancing resilience and increasing livestock productivity

- Livestock and the environment
- Adaptation and mitigation
- Production systems
- Methane emission

Animal and Human Health

Delivering solutions for livestock, zoonotic and foodborne diseases

- Epidemiology and incidence of key diseases
- Vaccine, diagnostic and other disease control tools
- Zonooses diseases
- Food safety
- AMR

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Policies, Institutions & Livelihoods (including gender)

Efficient livestock production driving inclusive growth and employment

- Policies, regulations
- Gender, social inclusion …

Impact at Scale

Taking livestock solutions to scale for inclusive development

- Science of scaling
- Scaling of interventions/innovations/technologies

Contributing to the development and application of robust and agile Systems for Characterization, Conservation, Improvement and Certification of Farm AnGRs

Livestock Genetics

Improving genetics for better productivity and profitability

LN_2 Refrigerators more

Unit	Temp	level	lid	fill	alarms	last report
1	-184	normal	shut	off	none	18:09
2	-178	normal	shut	off	none	18:09
3	-181	normal	shut	off	none	18:09
4	-194	normal	shut	off	none	18:09
6	-175	normal	shut	off	none	18:09
7	-183	normal	shut	off	none	18:09

Ancilliary LN_2 systems

Bulk Tank		Room	LN Supply	
Contents	Pressure	O_2	LN Plant	Last Report
61 %	2 bar	20.8 %	stopped	18:37

The LN plant ran for **0%** of the time in the last 10 days. It has logged a total of **13,379** hours since 2011-02-16 (52% duty).
The external fill point was used for 0 hours in the last 10 days. Since 2011-03-16 it has been in use for 20.4 hours.

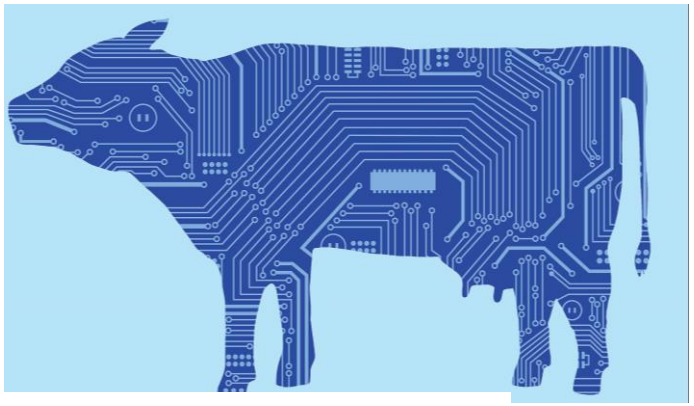
GS FLX lab fridges & freezers more

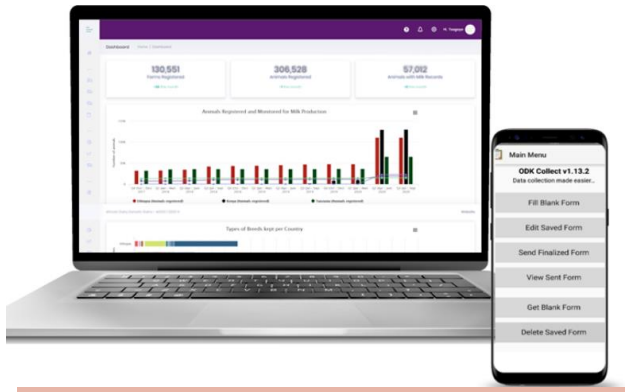
Id	Location	Description	Temp	Last Report
41	4-10	twin lid chest freezer	-27.9	18:36
42	4-11	freezer fridge - freezer	-19.2	18:36
43	4-10	upright -20 1	-28.4	18:36
45	4-03	Haier Pharmaceutical Refrigerator	5.8	18:36
46	4-03	Haier Deep freeze	-15.3	18:36
49	4-11	fridge	2	18:36
52	5.04	freezer AIN0	-20.7	18:35
53	5.04	freezer AIN1	-21.9	18:35
54	5.04	freezer AIN2	-21.5	18:36
55	5.04	freezer AIN3	-19.8	18:36
57	lab 4	CTLGH -40	-40.6	18:35
62	virus lab	Freezer fridge-freezer	-17.8	18:36
240	Azizi anex	CTLGH-80 TC1	-75.9	18:30
314	H-14	Fridge	4.8	18:05
315	H-14	Freezer	-18.7	18:37
316	H-14	rear space	22.1	18:05
3006	Repro Lab	-20 Freezer	-23.8	18:15
3007	Repro Lab	Fridge	2.2	18:15

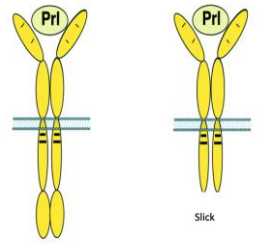
GS FLX equipment and rooms more

Id	Location	Description	Temp	CO2	O2	Last Report
48	4-03	seq room ambient	19.4			18:37
50	virus lab	ambient	28.2			18:36
51	5.04	ambient	23.5			18:35
56	lab 4	ambient	25.3			18:35
63	virus lab	incubator	38.7			18:36
65	virus lab	24C incubator	36.3			18:36
96	Generator Room	Water Jacket	22.1			18:37
97	Generator Room	labjack internal	23.9			18:37
101	T.vivax	probe 1	21.4			18:35
102	T.vivax	probe 2	19			18:35
103	T.vivax	labjack internal	22			18:35
104	Main Gate	labjack internal	23.4			18:05
105	Main Gate	Water tank level	100			18:05
201	LN2 plant	ambient	25.1			18:37
211	LN2 plant	Motor 1	27.5			18:37
212	LN2 plant	Chill Water 1	27.4			18:37
213	LN2 plant	Exhaust 1	27.7			18:37

Robust and harmonized sampling, banking, restoration protocols, and the data support systems.

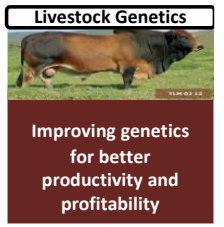




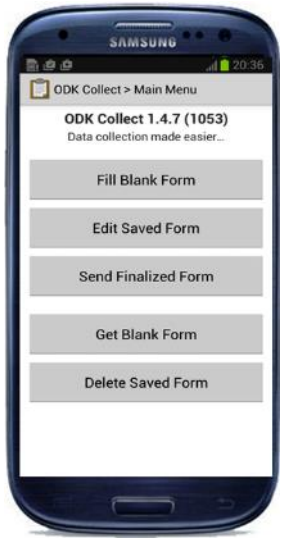


Agile Characterization/Phenotyping and evaluation and certification systems and platforms

Agile, robust, flexible & scalable systems



- Farming systems characteristics
- Characteristics of dairy animals on farms
- Monitor animal performance
- Monitor use of technologies (eg Artificial Insemination, vaccination)
- Service providers
- Costs of production



Data capture

Data Feedback systems

Data Validation
System Administration
API Management
Data Extraction
Country Data platforms
DATA PLATFORM

Analytics

- Customized data summaries
- Genomic evaluation
- Customized indexes for animal selection

E-Learning tools

- Managing reproduction
- Managing calves at different stages
- Using livestock data for decisions
- Managing animal health

Other data-sets & data bases

- i-Cow
- Interherd +
- KAZNET
- Digicow
- URUS

Facilitate | **Lead** | **Co-create with partners**

Technical capacity & partnerships

Services, Policies & Infrastructure

Conservation and development of Tropical poultry Genetic resources Using Primordial germ cells and the surrogate host technology

Conservation and development of Tropical pig Genetic resources Using induced pluripotent stem cells and the surrogate board technology

Local domestic pig (*Sus scrofa*) | Bushpig (*Potamochoerus larvatus*) | Warthogs (*Phacochoerus africanus*) | Giant forest hog (*Hylochoerus meinertzhageni*) | Red river hog (*Potamochoerus porcus*)

Tropical Suidae

Local Pig fibroblasts

Somatic cells

Fibroblasts propagation

Reprogramming factors (Oct4, Sox2, Klf4, cMyc)

iPSCs

Differentiation

IVF

Embryo Transplantation

Locally adapted sow

IVF & ET, or

Donor SSC culture

SSC transplantation

Gene Editing & cells transplantation in testis

Nuclear Transfer

Blastocyst Complementation

Germline ablated locally adapted boar carrier of elite breed semen

Indigenous piglets restored

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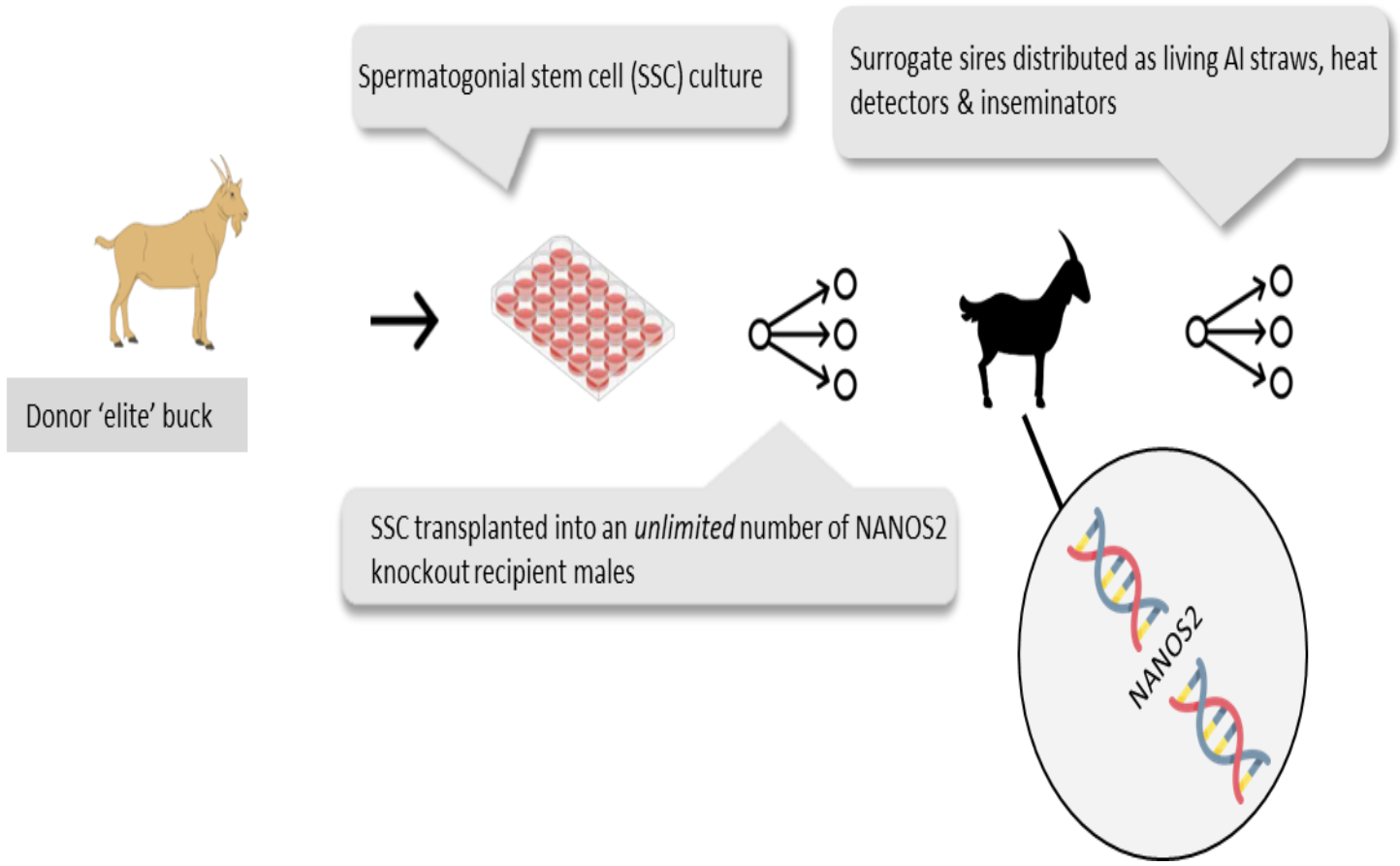
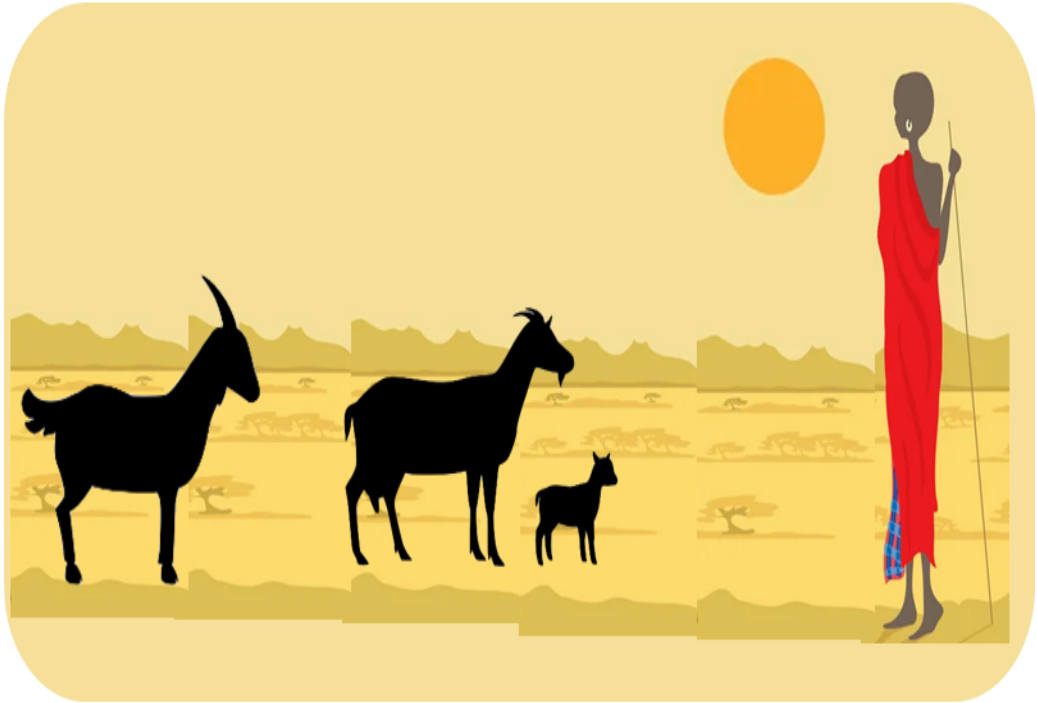
Conservation and development of Tropical goat and sheep Genetic resources Using induced pluripotent stem cells and the surrogate buck technology

Surrogate Sires amplify the genetic potential of suitable males, while replacing the fragile, expensive & time-critical steps needed for delivery





Natural heat detection & mating yields the productive & resilient offspring desired by communities, with the added benefit of reduced environmental impact

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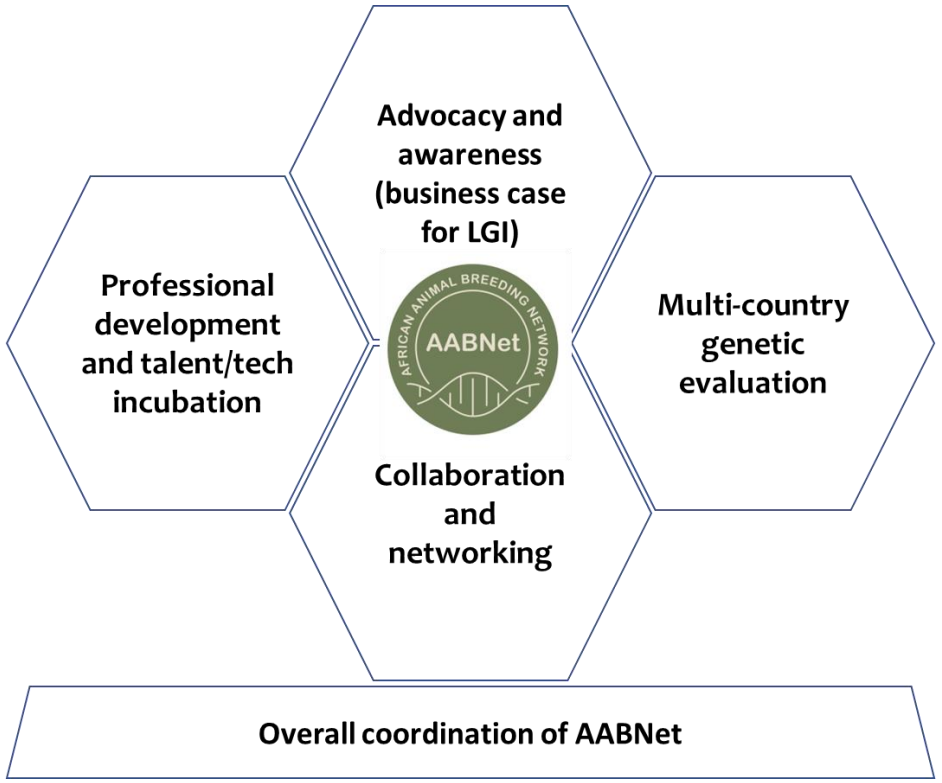
From regional Gene Banks to Africa Union Animal Resources Seed Centres of Excellence (ARSCoE)

1. Support development and implementation of continental cryoconservation programmes
2. Development of cryoconservation strategies for AnGR across the continent
3. Training of stakeholders to develop and adopt innovative technologies – PGCs, PSC/iPSCs, molecular phenotyping local breeds
4. Promote Intra- and inter- regional sharing of genetic materials
5. Promote sharing of best practices and lessons learnt
6. Continental Guidelines for the harmonization of Seed evaluation and Regulatory Frameworks in Africa.
7. Continental Guidelines on the use of Biotechnology to enhance agricultural productivity for food security and nutrition in Africa
8. Advocacy and awareness creation on sustainable utilization of local breed genetics

The African Animal Breeding Network (AABNet)

Capacity development



1. Transformation of livestock production systems in Africa (the animal breeding resources challenge !)
2. Development and deployment of livestock breeding tools, selection of improved livestock germplasms, dissemination

http://animalbreeding-africa.org/

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Priorities to facilitate Animal biotechnology in Africa

1. Integrated data systems, unified recording schemes and genetic evaluation
2. Capacity building: scientists, technicians and field-workers
3. Improved coordination between industry, learning and research institutions
4. Technology adapted to small scale systems
5. Improved bio-safety/bio-security and IP measures
6. Increased investment in animal biotechnology
7. Clarified and unified policy and commitment from African governments
8. Value indigenous knowledge and local animal resources management

ILRI, AU-IBAR, AUDA-NEPAD: 2024 and beyond

- Establish technical working groups in each region to support operationalization of the AU seed centres of Excellence and support on the implementation of the mandate of the ARSCoEs
- Finalize continental based MOUs led by the Regional Economic Communities (RECs) and training in Biobanking using the stem cell technologies
- Ground assessment of the existing 5 Centres of excellence for Animal resources and proposed back-up genebank to identify additional needs
- Establish the continental back up centre at ILRI and AU-PANVAC
- Resource Mobilization to support the centres of excellence to fulfil their mandate – Capacity building, conservation programmes, breeding programmes

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ILRI thanks all donors and organizations who globally supported its work through their contributions to the **CGIAR system**

Patron: Professor Peter C Doherty AC, FAA, FRS
Animal scientist, Nobel Prize Laureate for Physiology or Medicine–1996

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