

M-BoSs project “Out scaling of community-based breeding programs: attractive and innovative approach to improving the lives of smallholder producers in low input systems”

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# Dissemination and Delivery Systems of Improved Genetics

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ICARDA



*Breeding rams for sale and sold rams loaded on a lorry to be transported to Ambo area - Ethiopia*

## Narrow View

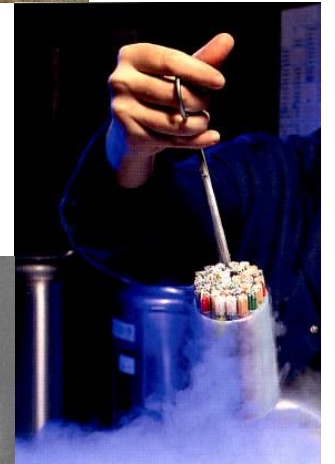
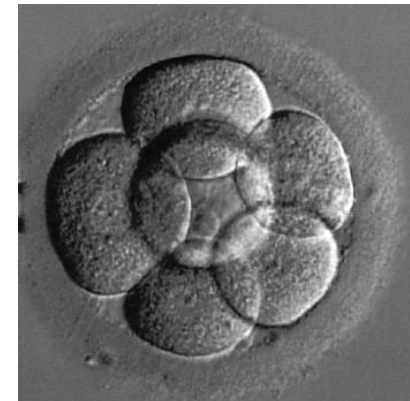
Reproductive biotechnologies and related reproductive techniques to manage matings within a breeding program

## Broader Concept

Layout of technical, institutional and policy options to promote use, exchange and appropriation of improved genetics by end users

# What to deliver?

- Entire rams
- Semen
- Embryos
- Genes (genome editing)
- ... Females



# Entire males

## - Origin

- ✓ Improved male lambs from nuclei flocks
- ✓ Improved males from participating farmers
- ✓ Exchange of males between participating farmers

## - Full certification

- ✓ Breeding value and genetic ranking amongst counterparts
- ✓ Clinical fitness (breeding soundness)
- ✓ Semen viability
- ✓ Libido aptitude

## - Uses

- ✓ Individual use: most preferred – greatest waste
- ✓ Circulation of rams between participating flocks: exhausting for the rams – poor reproductive performance – risk of diseases spread
- ✓ Community rams: appropriate for small flocks – risk of diseases reduced if within the same epidemiological context – increase in heterozygosity





# Semen

## - Fresh at 35-37 °C

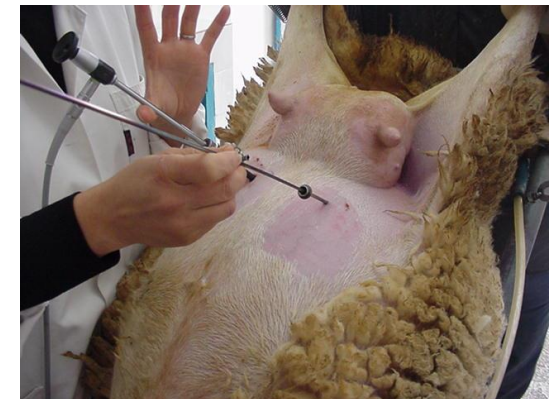
- ✓ Yields higher conception rate
- ✓ Greater dilution factors
- ✓ Constraining because decentralized and requires mobile facilities

## - Fresh at 15 °C

- ✓ More appropriate for centralized labs to reach communities and flocks in a radius of 100 – 150 km
- ✓ Requires cooling facilities and cold chain during transportation
- ✓ Acceptable semen quality with practice and routine exercise

## - Frozen in LN

- ✓ Less and less used because of the necessity to use intra-uterine artificial insemination in sheep but high conception rates
- ✓ No such constraint in goats but tedious processing of the buck semen prior to freezing
- ✓ Restricted to exchange of germplasm between countries



# Embryos (fresh – frozen – vitrified)

- ✓ Too laborious, requires upgraded lab logistics and very high technicity
- ✓ Cost not justified if not outstanding, high value donor ewes
- ✓ Reasonable option for conservation programs
- ✓ Reasonable option for between countries exchanges



# Females

- ✓ True, their impact in a breeding program is low
- ✓ Often neglected “secondary product” of the breeding programs
- ✓ Pathway to enroll new farmers in the breeding program
- ✓ Exclude from inseminations when maiden

# How to deliver?



- Exo-cervical, fixed-time artificial insemination with fresh semen
  - Mobile or centralized labs
  - Requires synchronization of oestrus and ovulation
  - Progestogen/PMSG protocol most widely used
  - More and more questioned (cost – health side effects – immune response)
  - Alternative, clean, cheap, non-steroid based protocols are effective
  - More effectiveness when packaged with ultrasound pregnancy diagnosis



# When to deliver?

- Aim one single main season for delivery of improved genetics (any form)
- Not worth attempting a second round for females failing to conceive in the main round
- Target the main breeding season of the breed: increased fertility and higher semen quality
- Deliver on non-suckling, dry females – be as far as possible from lactation in goats
- Avoid any management stresses after AI (abrupt changes of the diet, vaccinations, dipping...)



# What to retain?

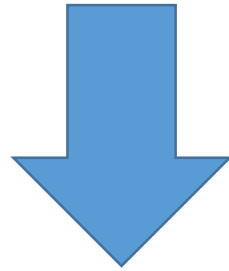
- In Country

- Dissemination of live rams
- Artificial insemination with fresh semen (35 °C or cooled)
- Clean – Green – Non steroid-based  
synchronization protocols: Male effect;  
prostaglandin analogue; GnRH analogue

- Between countries

- Exchange of live animals to be used for AI with fresh semen
- Exchange of frozen semen (Intra Uterine AI)
- Guidelines of the World Organization of Animal Health <http://www.oie.int/en/international-standard-setting/terrestrial-code/access-online/>

*Little impact will be felt without functional and sustainable delivery systems and services for the created genetic progress.*

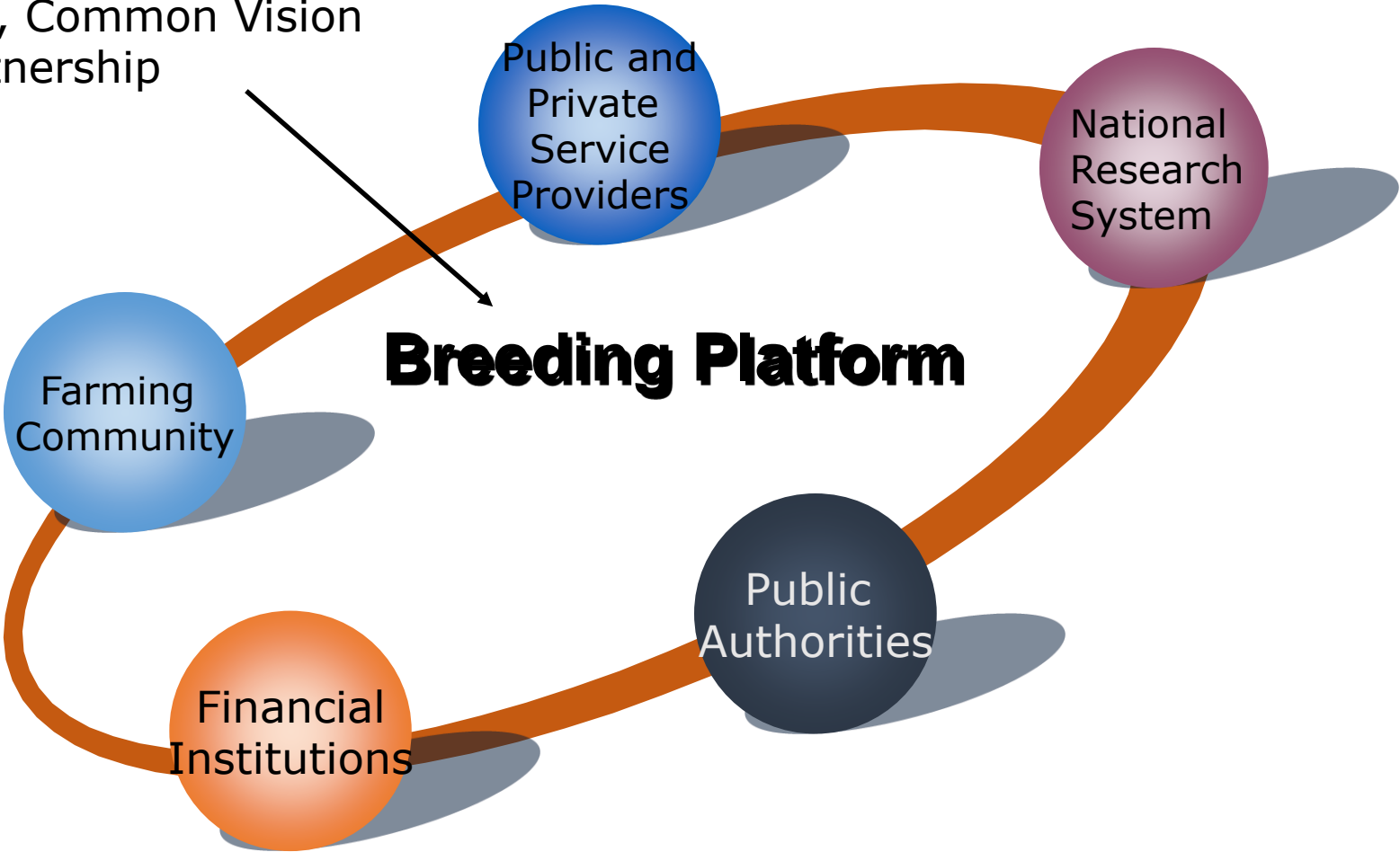


*Sustainable community/public private partnership business models for multiplication/production and use of improved genetics*

# Who is involved in the delivery? Institutional framework – Context based

- Farmers – Farmers' cooperatives
- Financial institutions/banks
  - Credit lines to fund the farmers' cooperatives – Insurance of genetically superior products
- Nuclei flocks – Pilot flocks
  - Resource genetic material – know how
- Artificial insemination centers
  - Public – Private (business models for delivery of improved genetics)
- Performance recording centers
  - Public – farmer recording - numerators
- Animal health labs
  - Certification of genetic products
- Ministry of agriculture (livestock)
  - Platforms and systems supporting breeding programs – initial investment
- Research institutes and universities
  - Breeding values – genetic progress; independent - unbiased

Communication  
Synergy, Common Vision  
and Partnership



# Conducive policy environment

- National recognition of livestock genetic improvement as a pillar for livestock development; AnGR policies and legal frameworks
- National strategies to preserve threatened breeds
- Pricing mechanisms to segregate between genetically improved animals and consumption lambs
- Funding mechanisms of the farmers' cooperatives channeled for breeding



Thank you