



RESEARCH  
PROGRAM ON  
Livestock

*More meat, milk and eggs by and for the poor*

# Reproductive interventions for more efficient sheep and goats breeding programs

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# State of the art of reproduction of Ethiopian sheep breeds



Working Paper 23



## **Review of the reproductive performances of sheep breeds in Ethiopia**

Documenting existing knowledge and identifying priority research needs

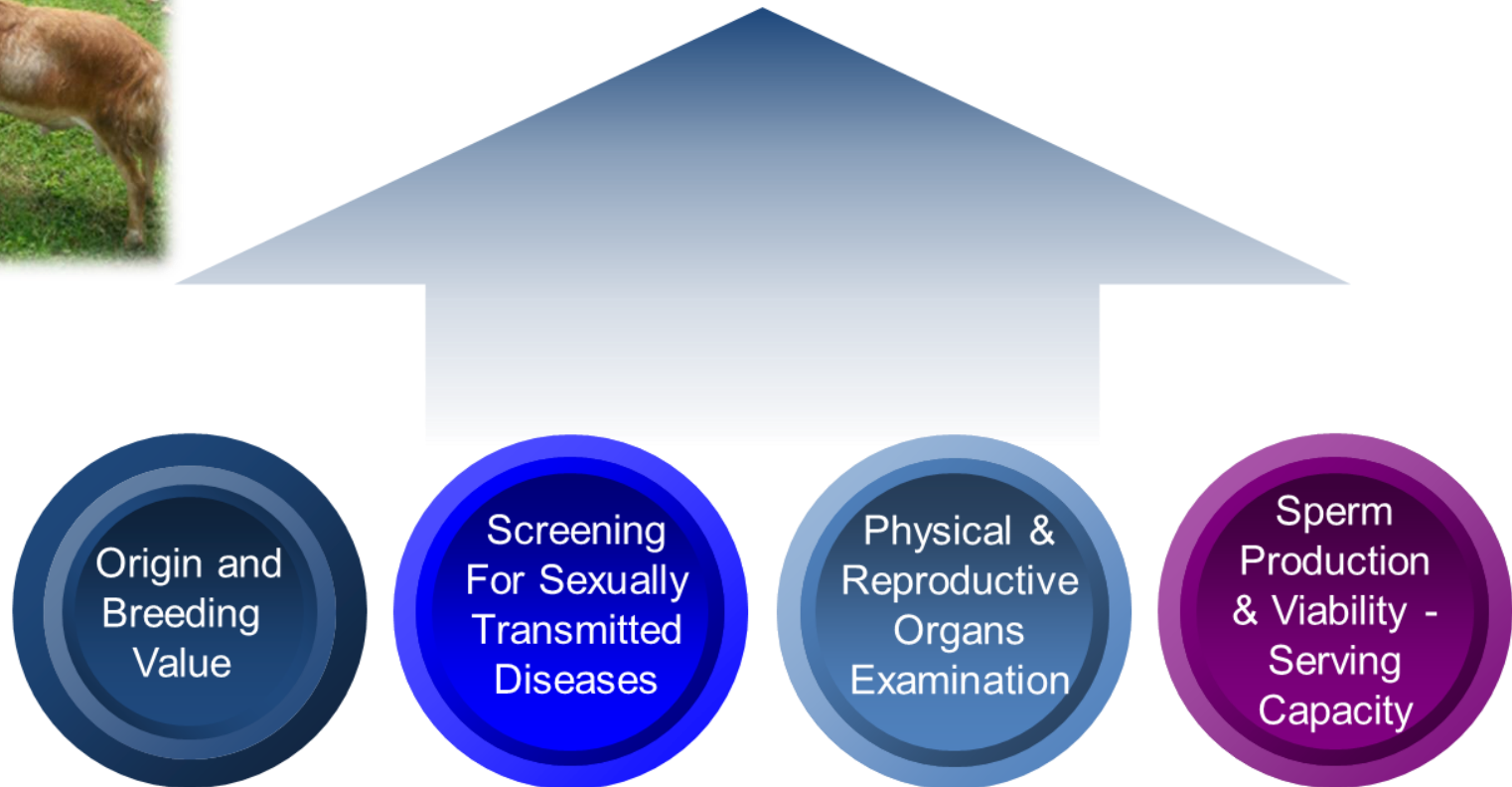
# Low Reproductive Performances

- Local breeds have been little selected for improved productivity including reproduction
- Low dependency on photoperiod but seasonality geared by other environmental factors for some breeds
- Delayed puberty and sexual maturity
- High prevalence of diseases
- Large phenotypic variability of litter size
- Variable lambing rates and overall tendency to be low
- Take-off of the best performing animals
- Slaughter of pregnant animals

# Fit sires for successful reproduction



## Full Certification of Breeding Rams

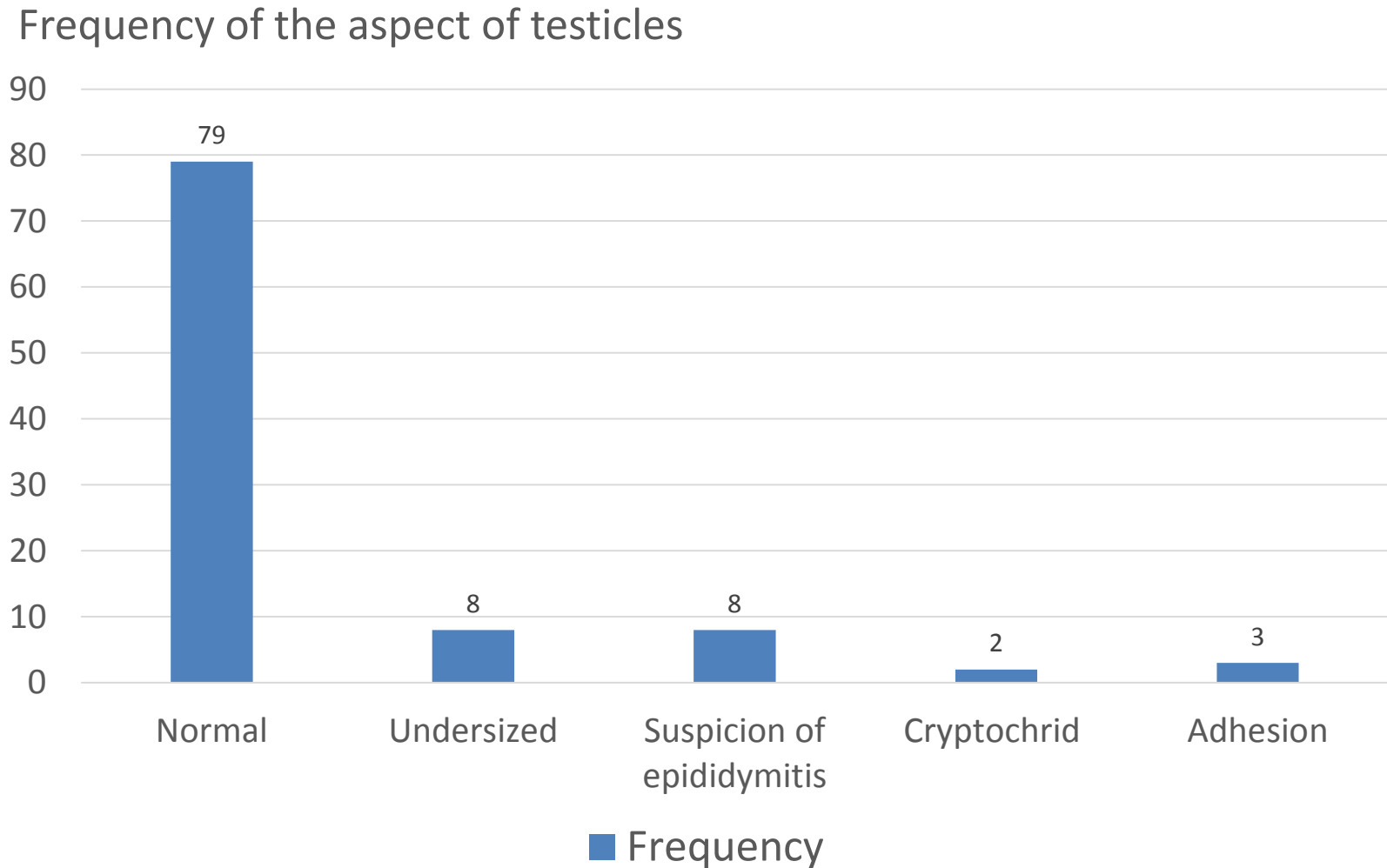


# Rams' breeding soundness in all CBBP locations: release of fit rams

- Systematic examination of selected ram lambs
- Regular examination for each batch of selected rams
- General clinical exam
- General health and body condition
- Detailed exam of the integrity of the reproductive organs
- Semen and libido assessment towards full reproductive certification



# Consequences for intensity of selection



# Field Solution for the Artificial Insemination of Ethiopian Sheep Breeds





The community based breeding program (CBBP) in Ethiopia: not only a history of 8 years of community mobilization but also of a steady genetic progress

- Participatory breeding – decentralized breeding plans and programs;
- Improvement programs carried out by communities of smallholder farmers often at subsistence level;
- Community based breeding relies on proper consideration of farmers, breeding objectives, infrastructure, participation and ownership.

Estimated BV for six months weight

	Menz	Horro	Bonga
<b>Overall</b>	0.14± 0.006	0.31± 0.060	0.26± 0.058
<b>2009</b>	0.07± 0.017		-0.07±0.266
<b>2010</b>	0.08± 0.013	-0.03±0.143	0.18± 0.189
<b>2011</b>	0.11± 0.014	0.06± 0.095	0.22± 0.158
<b>2012</b>	0.13± 0.015	0.24± 0.082	0.24± 0.139
<b>2013</b>	0.20± 0.016	0.36± 0.086	0.35± 0.112
<b>2014</b>	0.25± 0.014	0.28± 0.079	0.46± 0.082
<b>2015</b>	0.14± 0.027	0.52± 0.097	0.32± 0.065
<b>2016</b>		0.78± 0.339	0.38± 0.209



# Year round breeding activity: accelerated reproduction & catalyzer to hasten genetic progress



Bonga

Totally  
aseasonal

1.4 litter size

8 months  
lambing  
interval



Doyogena

Totally  
aseasonal

1.3-1.4 litter  
size

8 months  
lambing  
interval



Menz

Sexually less  
active  
during the  
wet season

1.1 litter size

10 months  
lambing  
interval

# Development of a field solution for sheep insemination: Towards up/out-scaling CBBP's

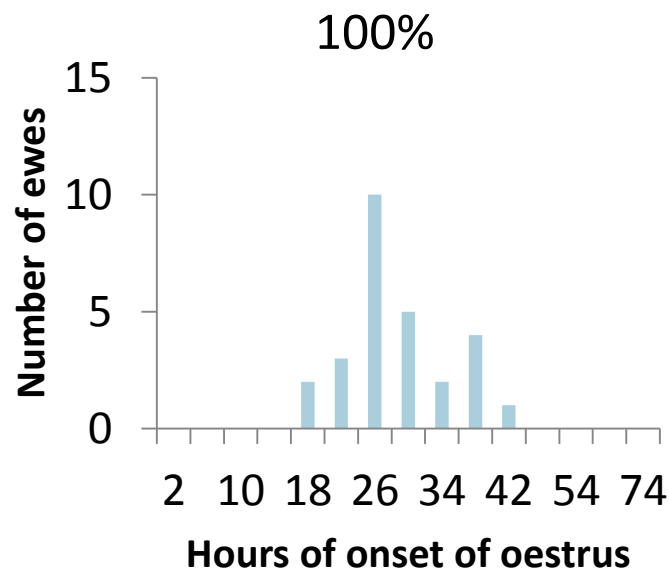
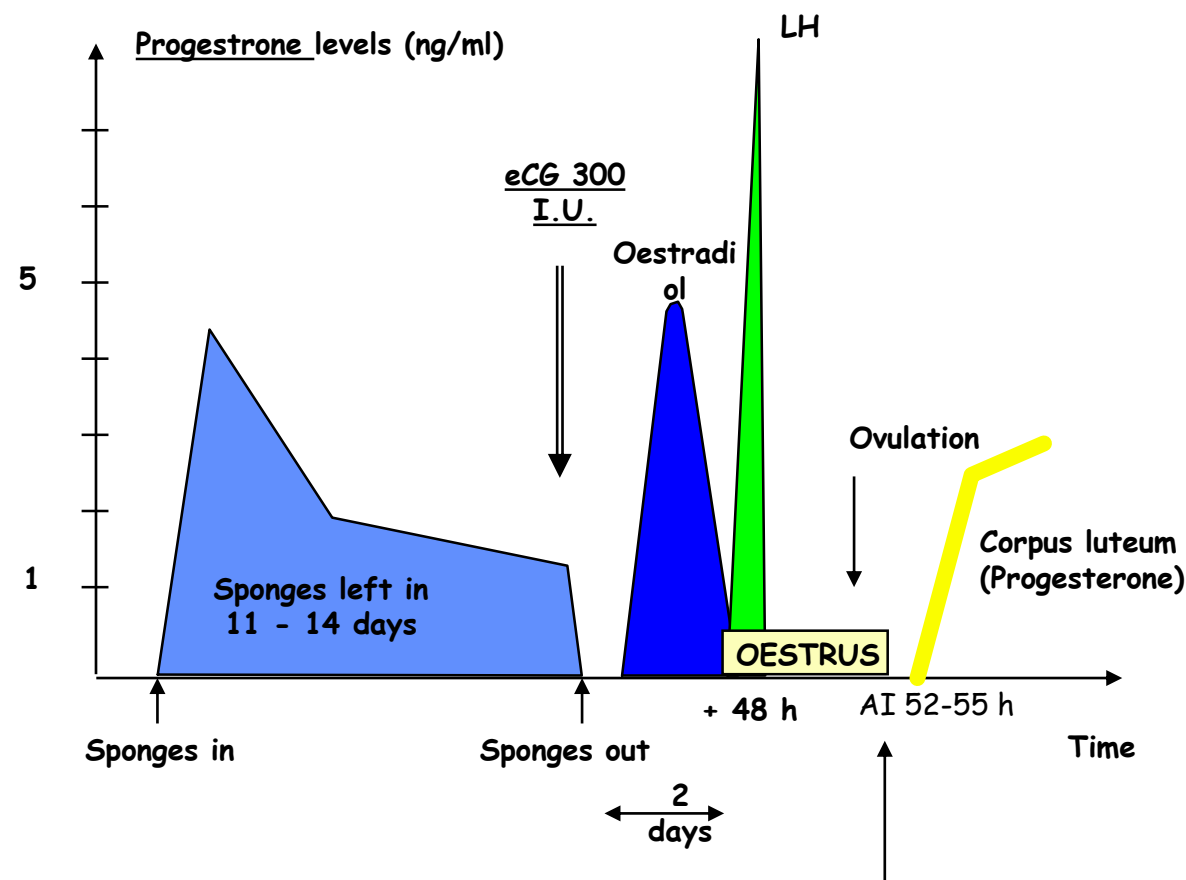
- Rams' selection and training;
- Synchronization preceded by ultrasound pregnancy diagnosis in small-mixed flocks to discard pregnant females;
- Simple, low-cost synchronization options;
- Use of fresh semen, collected, assessed, diluted and used at 35 °C;
- Cervical AI of sheep after synchronization;
- Low infrastructure field labs;
- Simple manual straw filling devices.

# Ewes' selection for synchronization

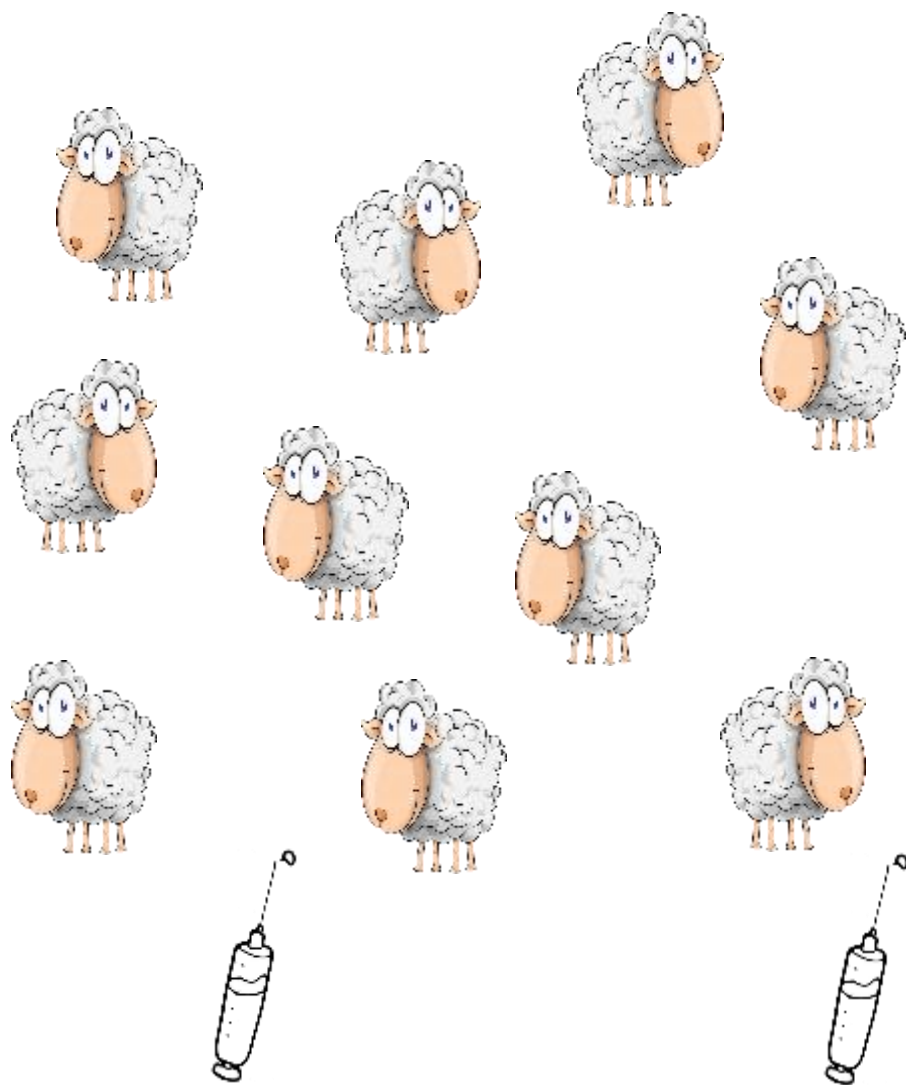
- Selection of adult ewes;
- Successfully lambed previous season;
- Not suckling;
- Body condition score  $> 2.5$ ;
- Synchronization preceded by ultrasound pregnancy diagnosis in small-mixed flocks to discard pregnant females.



# Different synchronization options

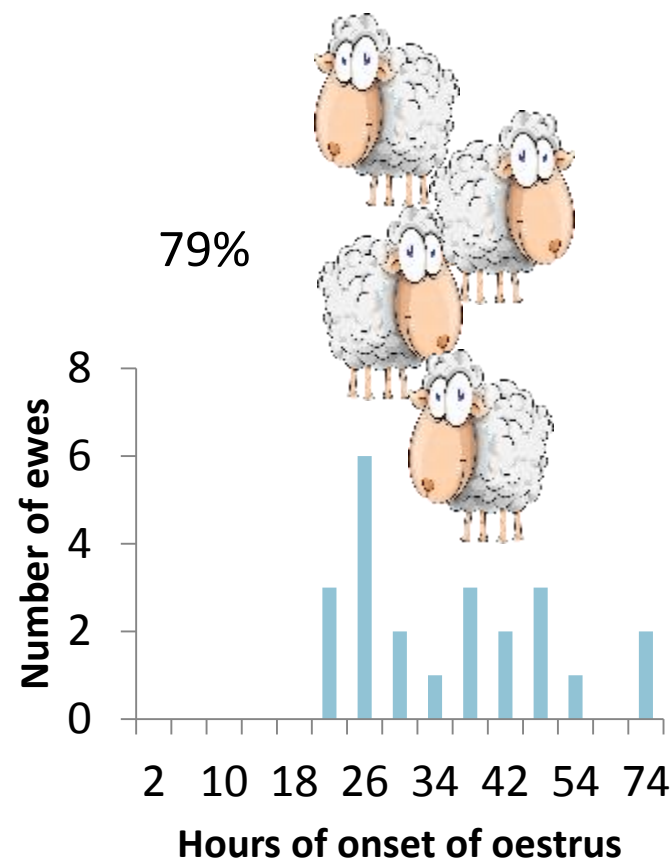


Conventional synthetic progestogen + eCG (PMSG)

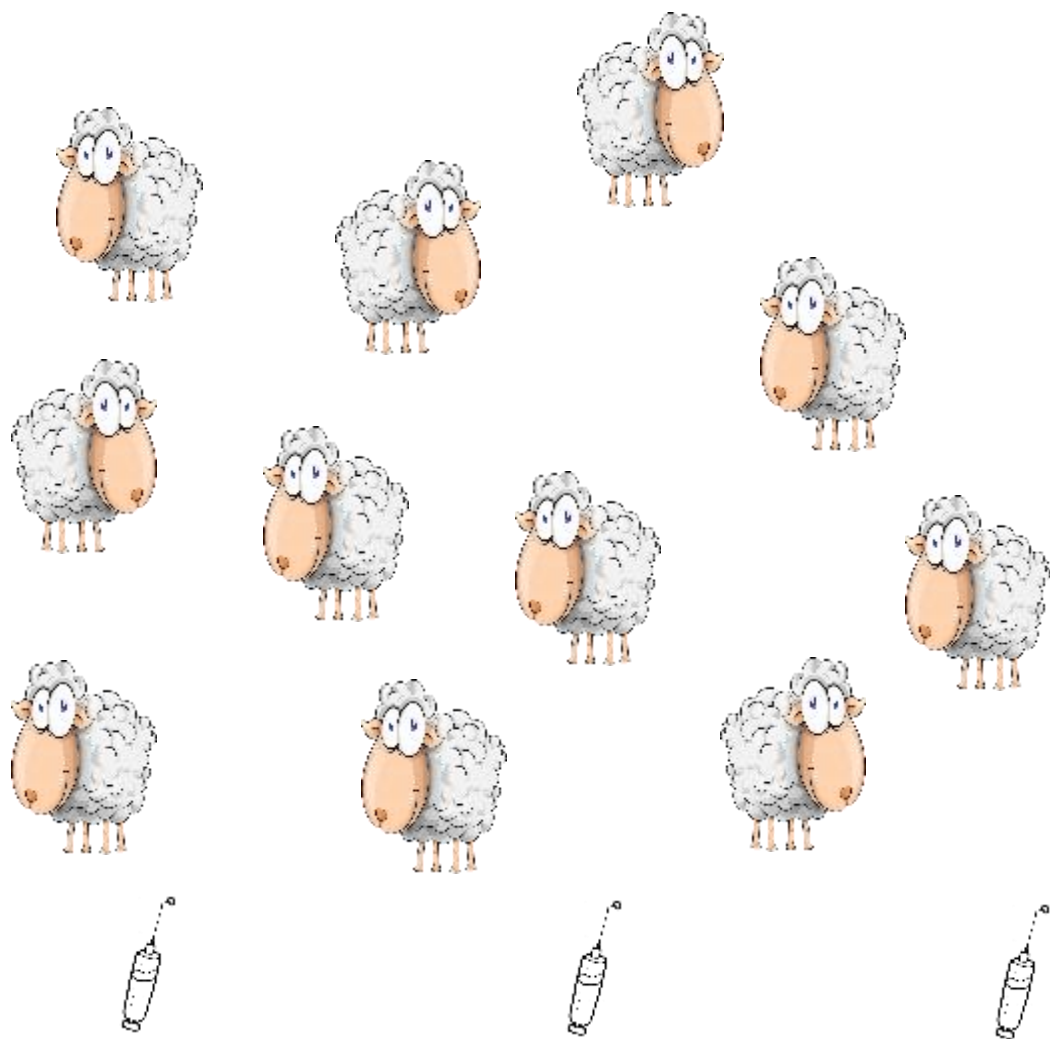


Day 0: PGF2 $\alpha$  analogue  
dinoprost 1 ml Enzaprost

Day 11: PGF2 $\alpha$  analogue  
dinoprost 1 ml Enzaprost



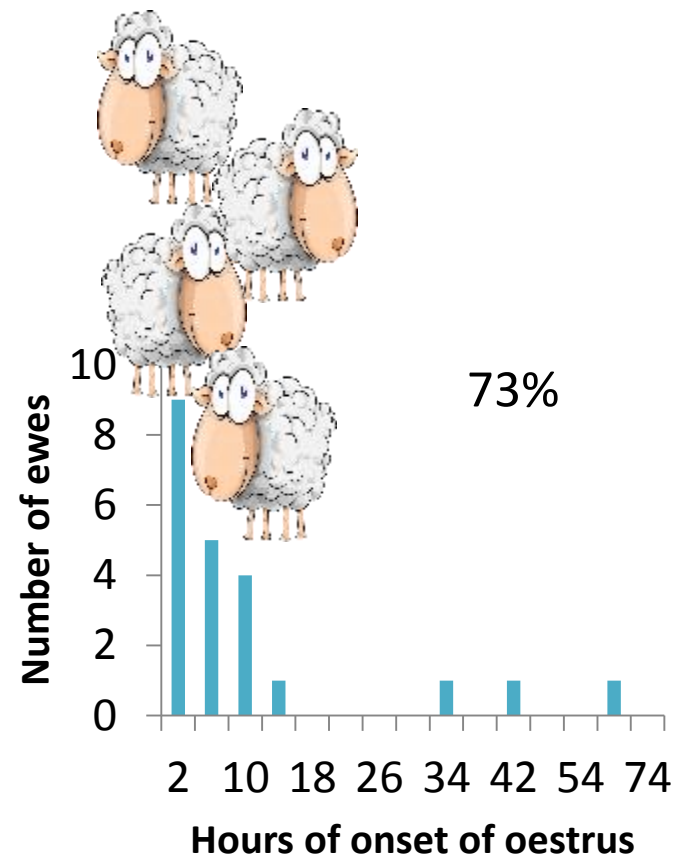
AI: 55-57 h after  
second injection



Day 0: GnRH analogue  
gonadorelin  
1 ml Cystoreline

Day 6: PGF2 $\alpha$  analogue  
dinoprost  
1 ml Enzaprost

Day 9: GnRH analogue  
gonadorelin  
1 ml Cystoreline



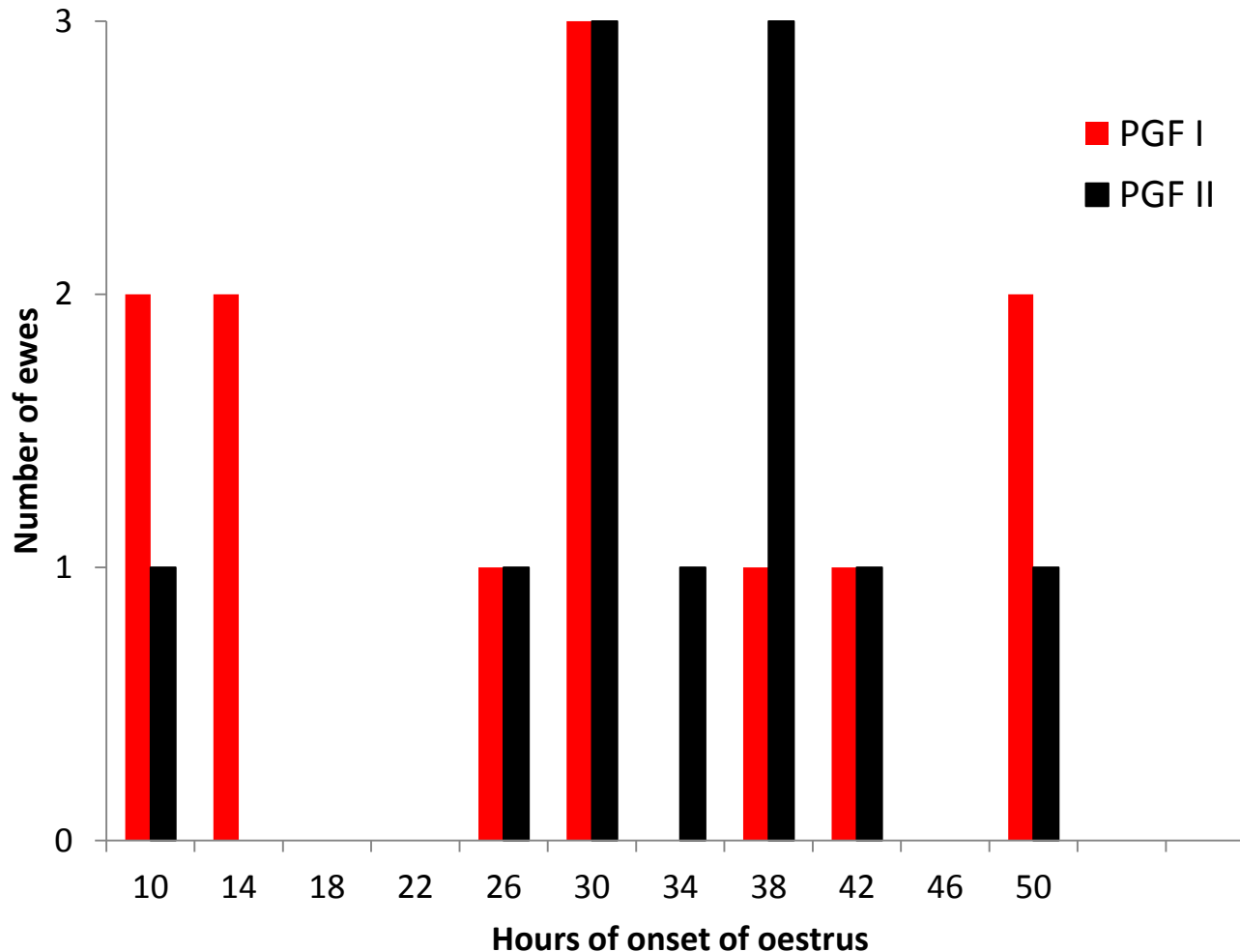
# Safer, accessible and affordable synchronization alternatives

Using a simple protocol of 2 injections of a prostaglandin analogue 11 days apart:

- Increased fertility to 89% compared to only 70% with the standard protocol after natural mating,
- Levels of synchronization of estrus were satisfactory to allow fixed time artificial insemination,
- The cost of the new protocol is US\$ 1.3 compared to US\$ 8.5 for the conventional protocol,
- The new protocol is based on products registered and available in the Ethiopian market unlike the products which form the conventional protocol.



Further simplifying to one single injection of a  $\text{PGF}_{2\alpha}$  analogue  
and to a 7-days interval between  $\text{PGF}_{2\alpha}$  injections



# Capacity development

Upgrading local infrastructure in 4 sheep sites in synergy with the national system. Established reproductive platforms are providing the following services:

1. Males' breeding soundness examination
2. Artificial insemination with fresh, non-cooled semen
3. Ultrasound service provision for pregnancy diagnosis



Inauguration of the Doyogenna platform

# On-job training

- Delivered to at least 40 staff members of the national institutions in different locations
- Breeding soundness examination
- Semen collection, assessment and handling for fresh AI
- Semen deposition
- Data recording
- Ultrasound pregnancy diagnosis
- 2 core teams in Doyogenna and Debre Birhan fully autonomous and supervising AI's in the new locations



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The **CGIAR Research Program on Livestock** aims to increase the productivity of productivity of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world.