Field solution for the Artificial Insemination of Ethiopian Sheep Breeds

Reproductive package to effectively vehicle improved genetics from the communities to the communities

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Artificial insemination: additional resource to a decade of supporting genetic progress in Ethiopian sheep breeds

\[
\text{Rate of gain} = \text{Intensity of selection} \times \text{Heritability of the trait} \times \text{Variation in the population} \times \frac{1}{\text{Generation interval}}
\]

Artificial insemination

- Performance recording
- Intensive use of top 10% sires via artificial insemination

Genetic gain for live weight in recorded and unrecorded Suffolk sheep flock
The community based breeding program in Ethiopia: not only a history of 6 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.
Selected sites for sheep and goat value chains
Year round breeding activity: accelerated reproduction & catalyzer to hasten genetic progress

<table>
<thead>
<tr>
<th>Breed</th>
<th>Breeding Pattern</th>
<th>Litter Size</th>
<th>Lambing Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonga</td>
<td>Totally aseasonal</td>
<td>1.4 litter size</td>
<td>8 months</td>
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<tr>
<td>Doyogena</td>
<td>Totally aseasonal</td>
<td>1.3-1.4 litter size</td>
<td>8 months</td>
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<tr>
<td>Menz</td>
<td>Sexually less active during the wet season</td>
<td>1.1 litter size</td>
<td>10 months</td>
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</tbody>
</table>
Development of a field solution for sheep insemination: Towards up/out-scaling the delivery system of CBBP’s

- Rams’ selection and training;

- Synchronization preceded by ultrasound pregnancy diagnosis in small-mixed flocks to discard pregnant females;

- Different synchronization options;

- Use of fresh semen, collected, assessed, diluted and used at 35 °C;

- Cervical AI of sheep after synchronization;

- Basic equipment needed: electricity generator, thermos flask, microscope (mass and individual motility), field spectrophotometer for the determination of semen concentration;

- Simple manual straw filling devices.
Rams’ selection and training

- Selected best-ranked rams and ram lambs on the basis of their breeding value and preferred by the communities;
- General clinical and body condition examination;
- Detailed exam of the integrity of the reproductive organs;
- Semen and libido assessment;
- Training on ejaculating in an artificial vagina 2 times per week for at least a month prior to artificial insemination.
Rams’ selection and training

In the presence of 2 estrous females record during 10 minutes:
- Latency to first reaction (s)
- Total activity time (min)
- Vulva sniffing
- Flehmen
- Lateral approaches
- Mount attempts

Libido test

Training on semen collection in artificial vagina
Ewes’ selection for synchronization

- Selection of adult ewes;
- No maiden sheep;
- 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)

Progestrone levels (ng/ml)

- Sponges in
- Sponges left in 11 - 14 days
- Sponges out 2 days

LH

Oestradiol

Ovulation

Corpus luteum (Progesterone)

Time

AI 52-55 h

Sponges in OESTRUS

Sponges out 2 days

Hours of onset of oestrus

Number of ewes

Response of Menz ewes to a synthetic progestogen + eCG synchronization protocol
Day 0: PGF2α analogue dinoprost
1 ml Enzaprost (CEVA Labs)

Day 11: PGF2α analogue dinoprost
1 ml Enzaprost (CEVA Labs)

AI: 55-60 h after second injection
Day 0: GnRH analogue
gonadorelin
1 ml Cystoreline (CEVA Labs)

Day 6: PGF2α analogue dinoprost
1 ml Enzaprost (CEVA Labs)

Day 9: GnRH analogue
gonadorelin
1 ml Cystoreline (CEVA Labs)

Al: 30-36 h after second injection of GnRH
Semen collection

Allow enough sets of artificial vagina and accessories with graduated tubes and lubricant

Let the rams in with the estrous ewe one by one with the minimum disturbance

Let the rams express their full sexual behavior before ejaculating (1. vulva sniffing)

Use graduated tubes for a direct determination of the volume

Let the rams express their full sexual behavior before ejaculating (3. mounting attempts)

Let the rams express their full sexual behavior before ejaculating (2. lateral approaches)
Field semen assessment and processing
Field semen assessment and processing

- Collect, assess and process semen at 35 – 37 °C;
- Prepare straws and store at 35 – 37 °C;
- Use straws within 20 min of preparation;
- Dilute semen in extenders warmed at 35 – 37 °C;
- Use ejaculates with a mass motility > 3 – 3.5; (surging rapid waves) and a concentration > 3.5 \(10^9\) spz/ml;
- Calculate number of straws and volume of extender to add so that every straw with a 0.25 ml volume contains a minimum of 200 \(10^6\) spz/straw.
Cervical insemination

- Inseminate the ewes in the upright position;
- Most ewes should present mucus discharges in the vagina and this is a good sign;
- Do not inseminate ewes with clear signs of vaginal irritation and pus;
- Deposit semen at the entrance of the cervix; do not push the insemination gun deep into the cervix rings (permanent damage of the cervix and sterility); and
- Gently down release the ewe after insemination.
Post-insemination management

- Inseminated ewes should remain isolated from community rams;
- Reintroduce rams 10 days after insemination to ensure return estrus and guarantee flock fertility;
- No sharp change in the diet during the 2 weeks after insemination;
- Perform an ultrasound pregnancy diagnosis 30-35 days after insemination for preliminary conception rate;
- Ewes lambing between $150 \pm 5$ days after the date of insemination will be considered as conceiving to insemination.
The team... & others
ICARDA Sheep and Goats Reproduction Range

Rams’ breeding soundness evaluation

Year round management for rams that are fit for successful reproduction

Ultrasound Diagnosis for Better Reproductive Management

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