

Practical Aspects of Small Ruminants Artificial Insemination

- Estrus Synchronization Protocols
- Heat Detection Methods
- Artificial Insemination Techniques
- Semen Considerations
- Welfare, Practical Limitations, and Field Challenges
- Future Directions in Small Ruminant AI
- Questions and Discussion



Synchronization

Breeding Season:

Prostaglandins
Progesterone
GnRH



Dr Rowe

Transitional or out of season:

Buck effect
Photoperiod manipulation
P4 plus eCG
Melatonin

Timed AI options are more limited than in cattle

Progesterone and Progestins

- Controlled Intravaginal Drug Release (CIDR)
 - The progesterone-implanted silicone device sits in the vagina
 - 1 CIDR can last up to 14 days -330mg P4
- Intravaginal sponges
 - 60mg Medroxyprogesterone acetate (MPA)
 - 40mg fluorogestone acetate (FGA)
- Melengesterol Acetate (MGA)
 - Oral synthetic progesterone source



Prostaglandins ($\text{PGF}_{2\alpha}$)

- Dinoprost tromethamine (Lutalyse) – 5mg/ml
 - Small Ruminant dose – 12.5 mg IM (2.5cc)
 - Natural analogue
 - $t_{1/2}$ = 45-60 seconds
- Cloprostenol sodium (Estrumate, Estroplan) - 250 $\mu\text{g}/\text{ml}$
 - Small Ruminant dose - 250 μg IM (1cc)
 - Synthetic analogue
 - $t_{1/2}$ = 3 hours



GnRH

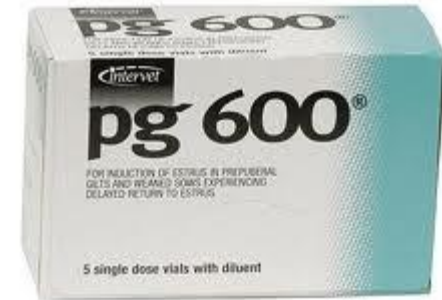
- (Cystorelin, Fertagyl, Factrel) – 50µg/ml
 - Cow dose - 100µg IM (2cc)
- GonaBREED – 100 µg/ml
 - Cow dose – 1cc
- Has an “LH effect” in sheep
 - Effective after day 3 of the cycle
 - Induce ovulation of a dominant follicle
 - Induce emergence of a new follicular wave



eCG/PMSG

eCG (equine chorionic gonadotropin, formerly known as PMSG)

- PG-600
 - 400 IU eCG + 200 IU hCG
 - hCG (human chorionic gonadotropin) has an LH-effect
 - Increases gonadotropin response to progesterone withdrawal
 - Better ovulation rates
- eCG 400IU
- reCG 105IU



Melatonin

Very good section for Mediterranean systems.

- **Mechanism**

- Mimics short-day photoperiod

- **Uses**

- Advance breeding season
- Improve cyclicity

- **Timing**

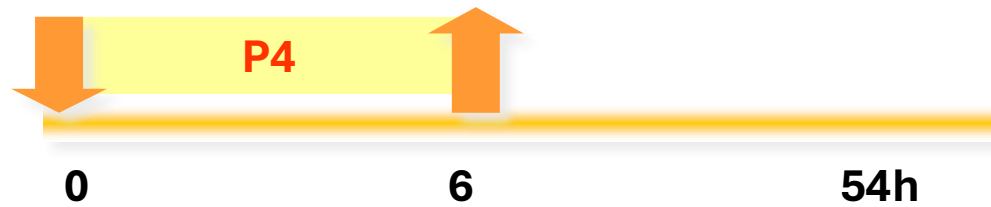
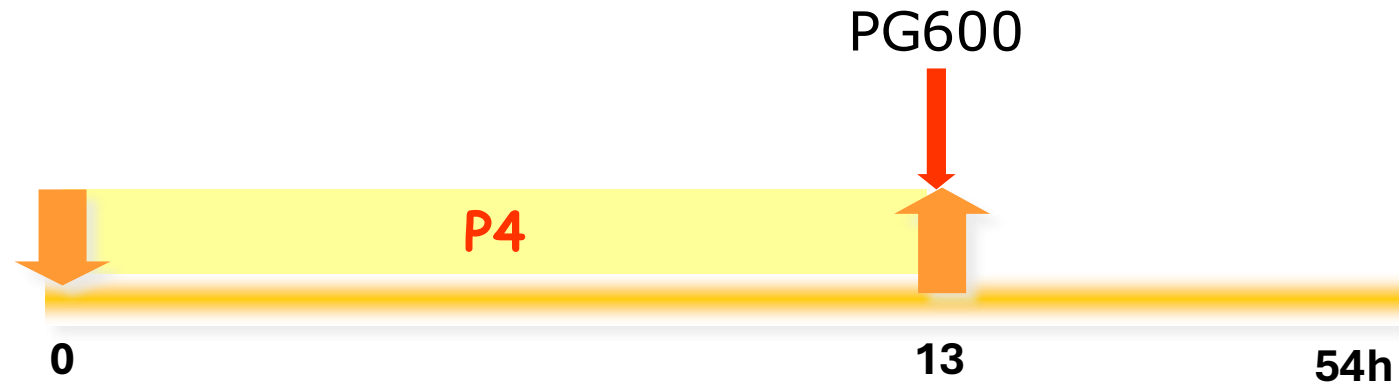
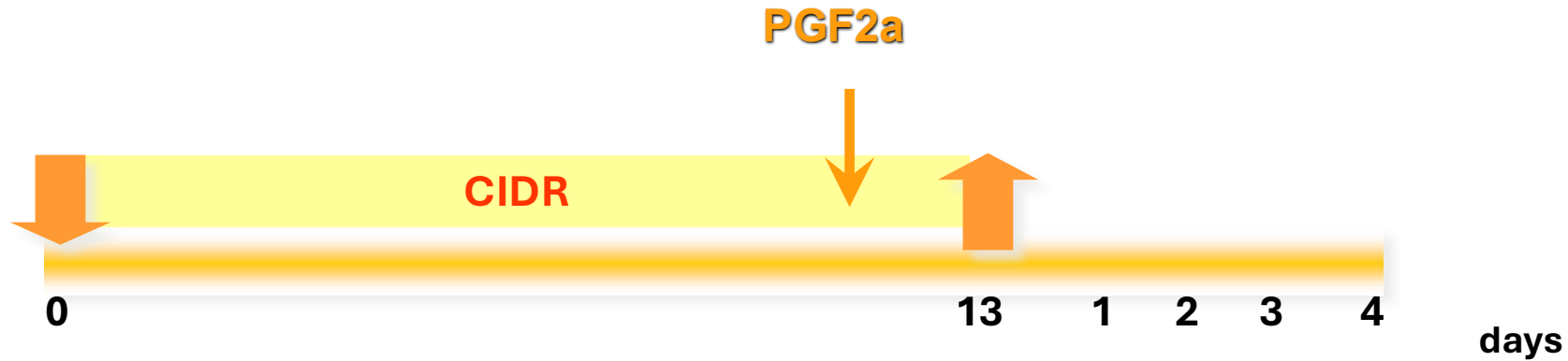
- Usually 30–45 d before breeding

- **Works best when combined with:**

- Ram effect
- Progesterone/eCG protocols

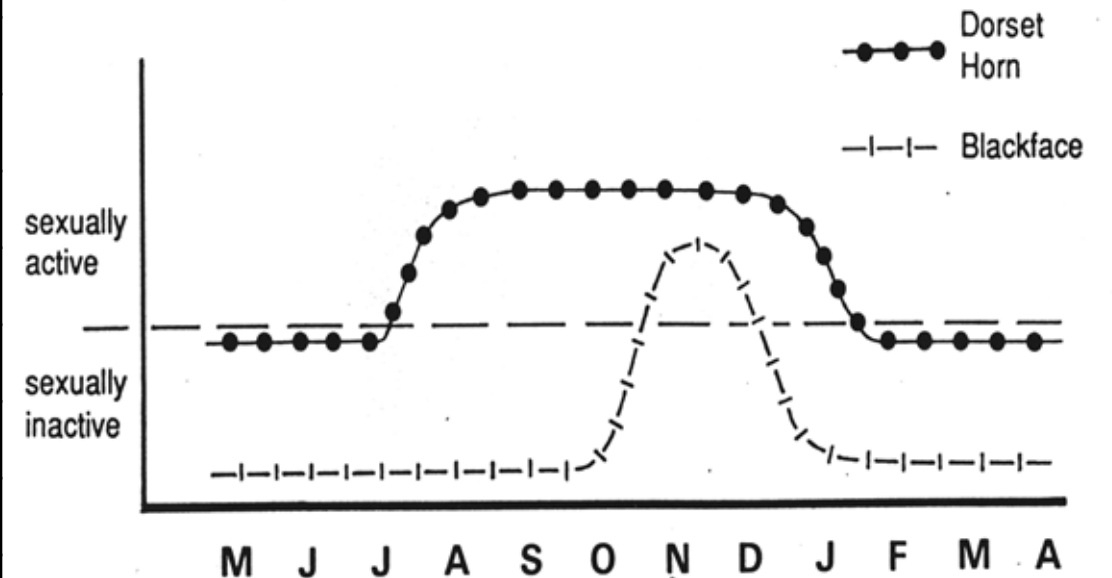


Synchronization

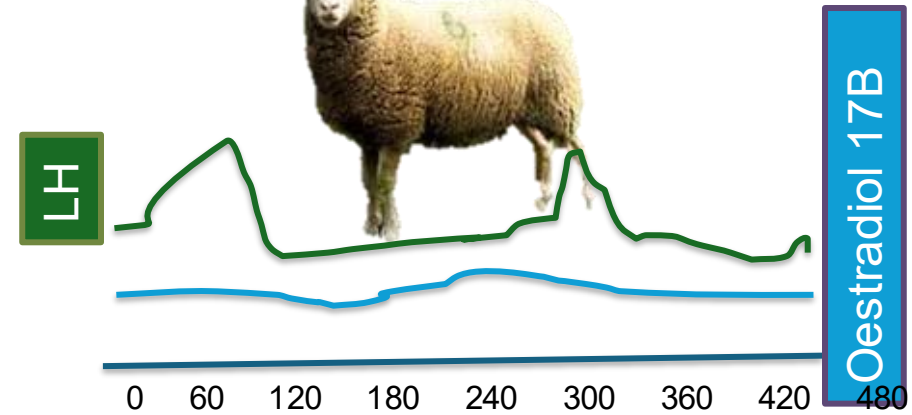
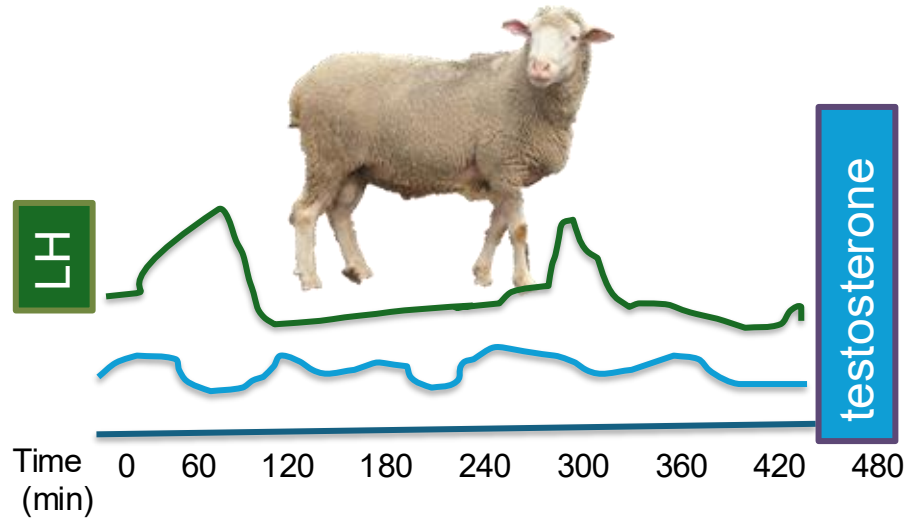


Seasonality

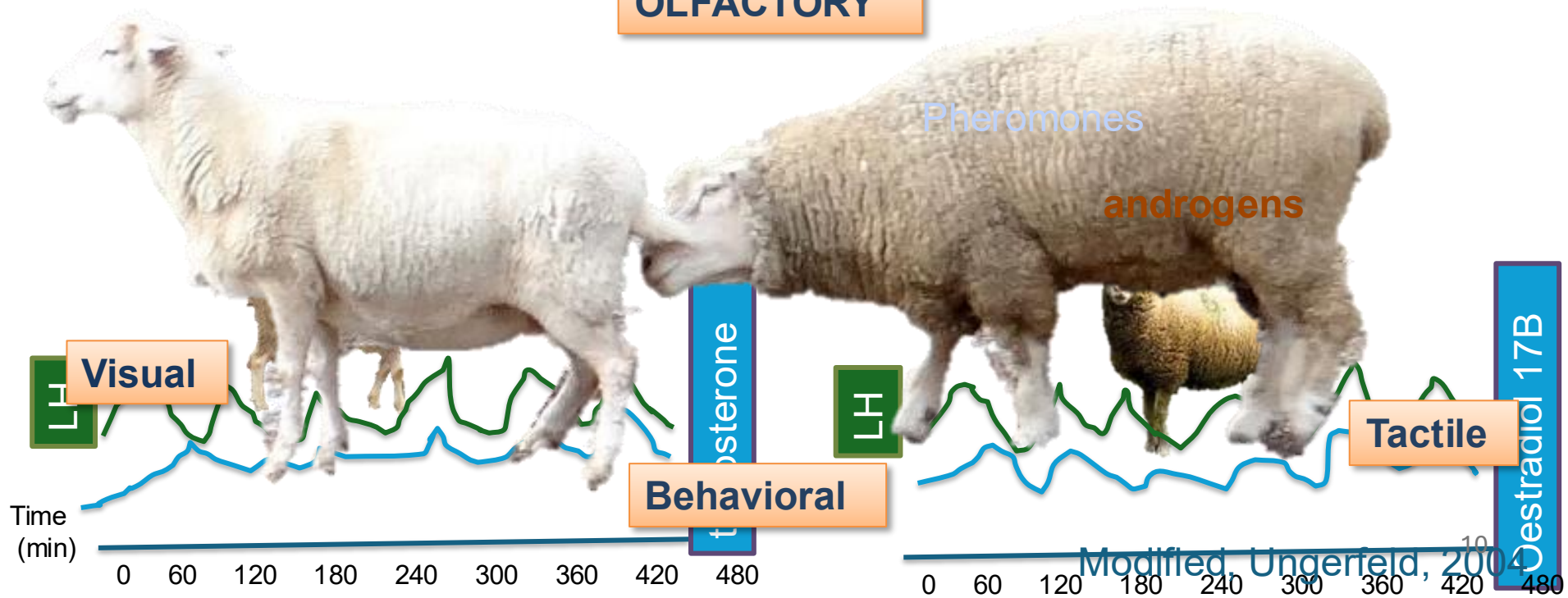
	<i>Breeding Season Onset</i>		
Breed	Early	Intermediate	Late
Rambouillet	X		
Merino	X		
Dorset	X		
Suffolk		X	
Columbia		X	
Targhee		X	
Corriedale		X	
Southdown		X	
Cheviot			X
Blackface			X
Long Wool			X



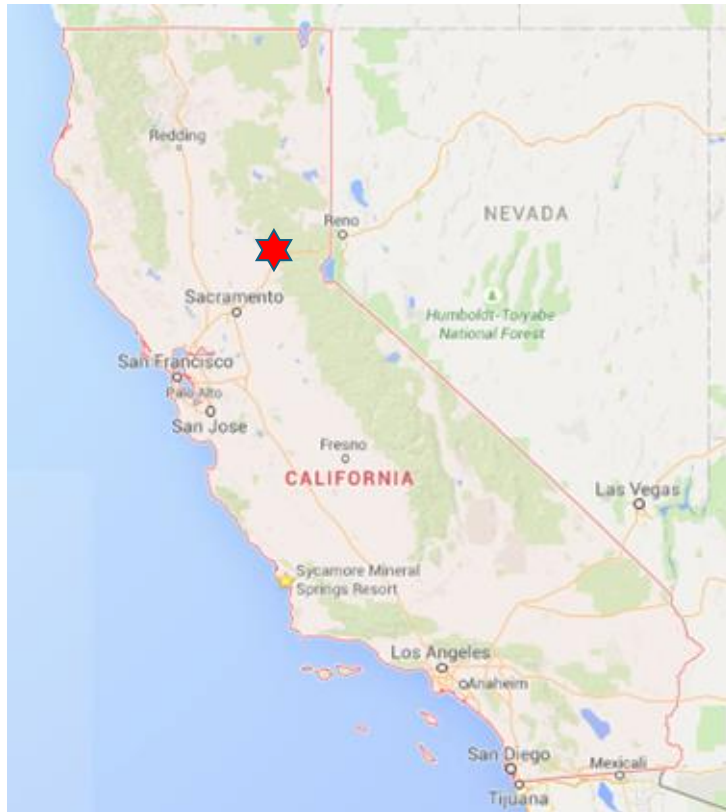
Male effect



OLFACTORY



Hopland Research and Extension Center



- Randomized clinical trial
- Late spring
- Multiparous Targhee ewes (n = 283) 2 and 9 years of age
- Intact males (n = 12)
- Vasectomized rams (n=6)

Experimental design

					
					
CIDR (progesterone) 5 days					
PG600 (eCG + hCG)					
Ram+ CIDR+ PG600	CIDR + PG 600	Ram+CIDR	CIDR only	Ram only	CONTROL



1 2 3 4 5 6

Implementation of the study

Vasectomy



Marking



CIDR insertion



PG 600

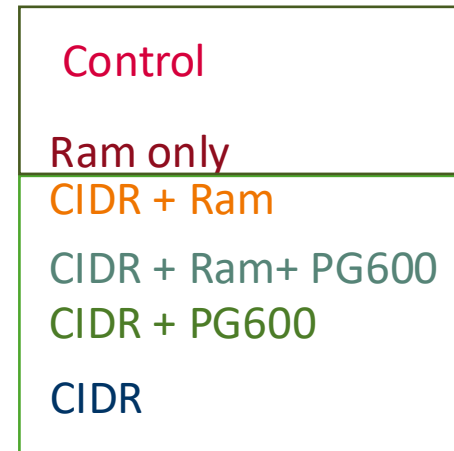
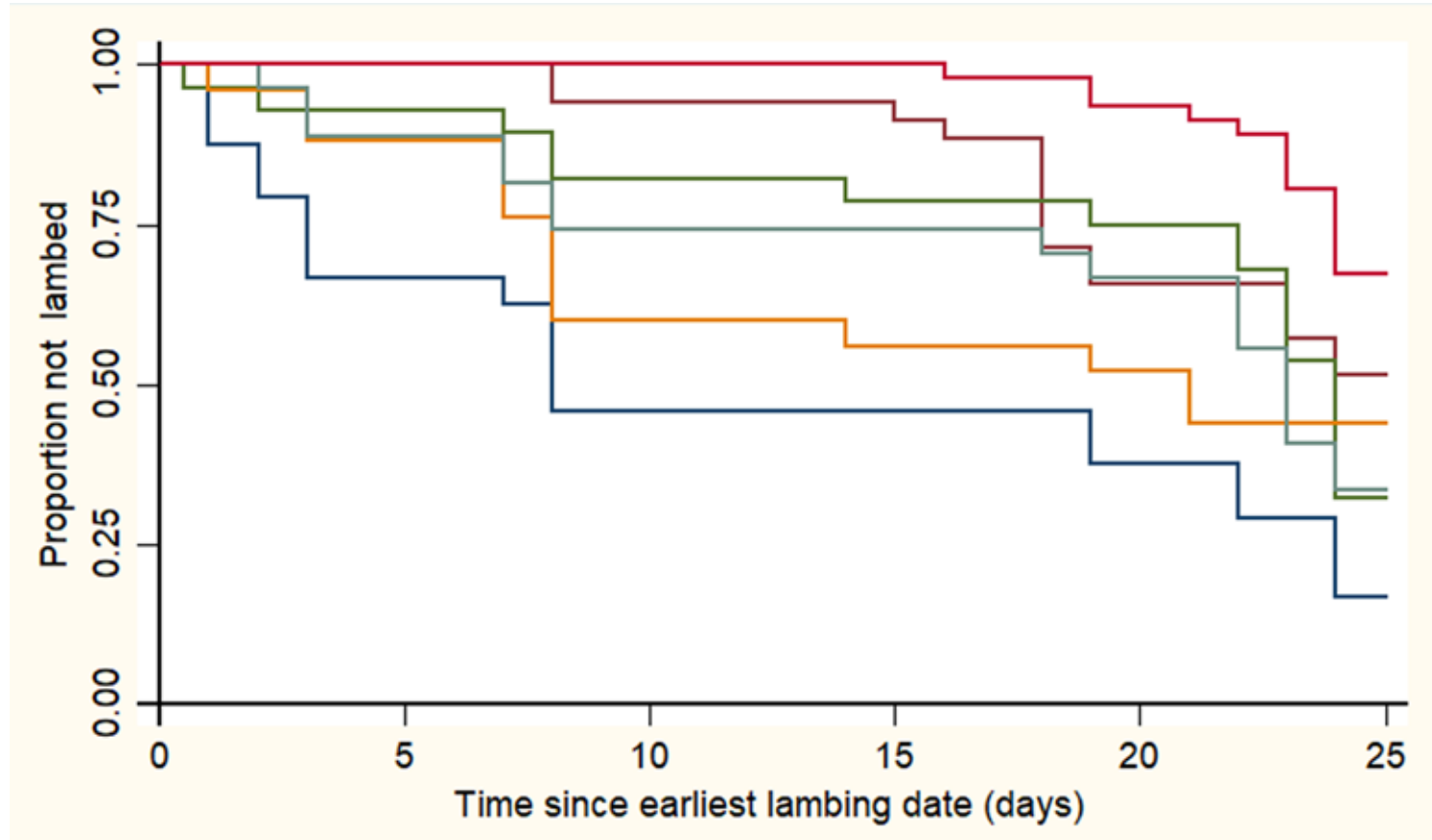


Ultrasound



Lambing

Use of CIDRs to achieve earlier lambing dates



b

a

CIDR's hazard ratio: 1.62 ($p=0.023$)

Heat Detection



Monitoring Performance



Heat Detection



Heat Detection



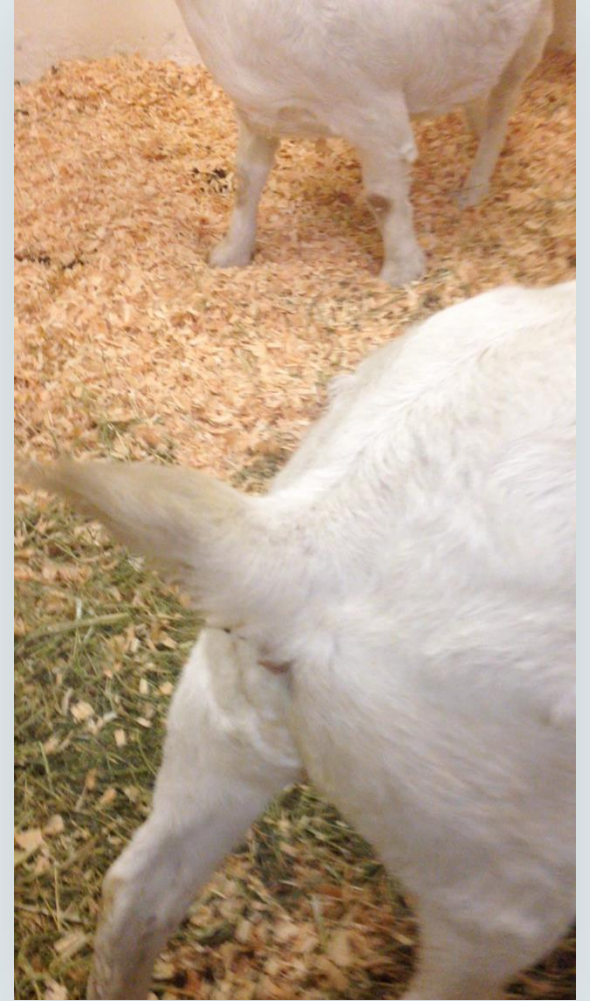
No mate Teaser Harness

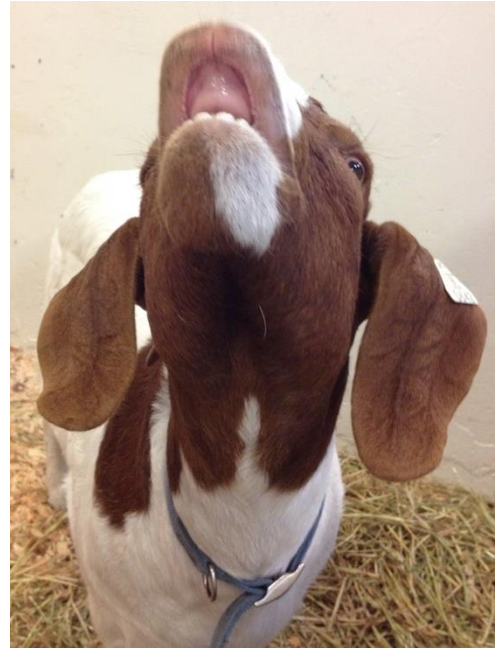
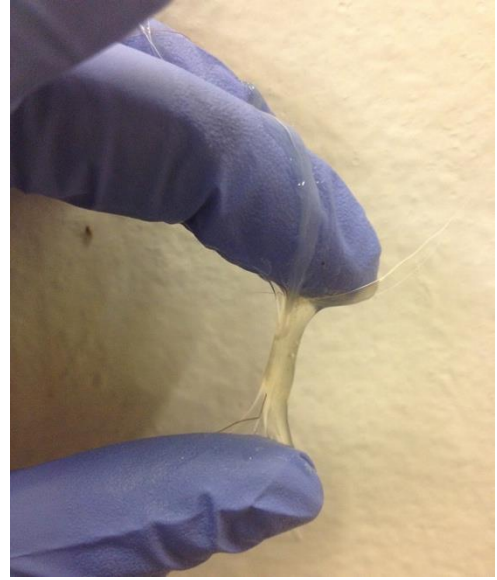
Optimal Breeding Does



Heat: 1.5-2 days

Flagging, Behavior
Teasing
Buck Rag





Optimum time to breed

In Goats - Ovulation occurs late during standing heat (estrus)



Thin Mucus=
too early



Cloudy to thick=
good timing





Optimum time to breed



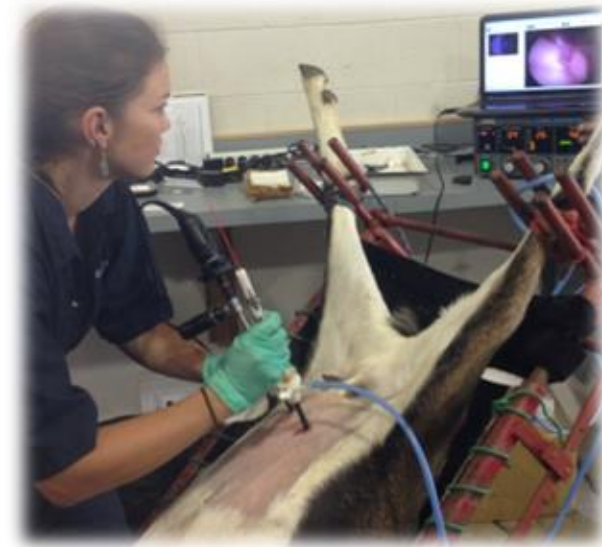
Technique

Trans-cervical

Intrauterine **Deep cervical**



Laparoscopic



Transcervical AI

Insert lubricated speculum
Visualize Cervix
introduce AI gun



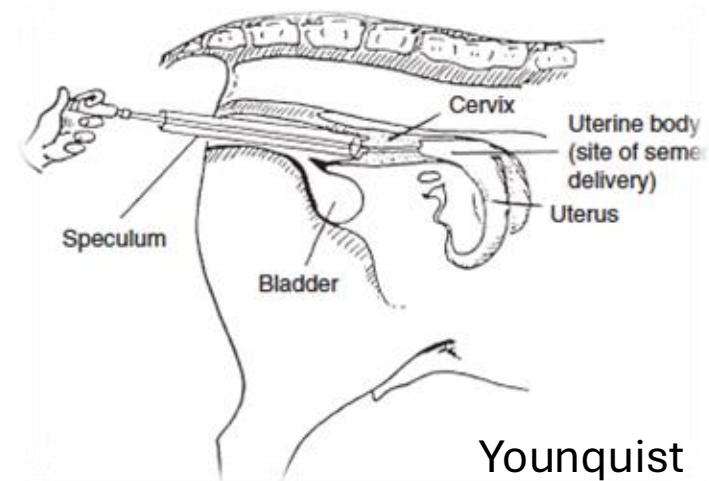
Dr Rowe



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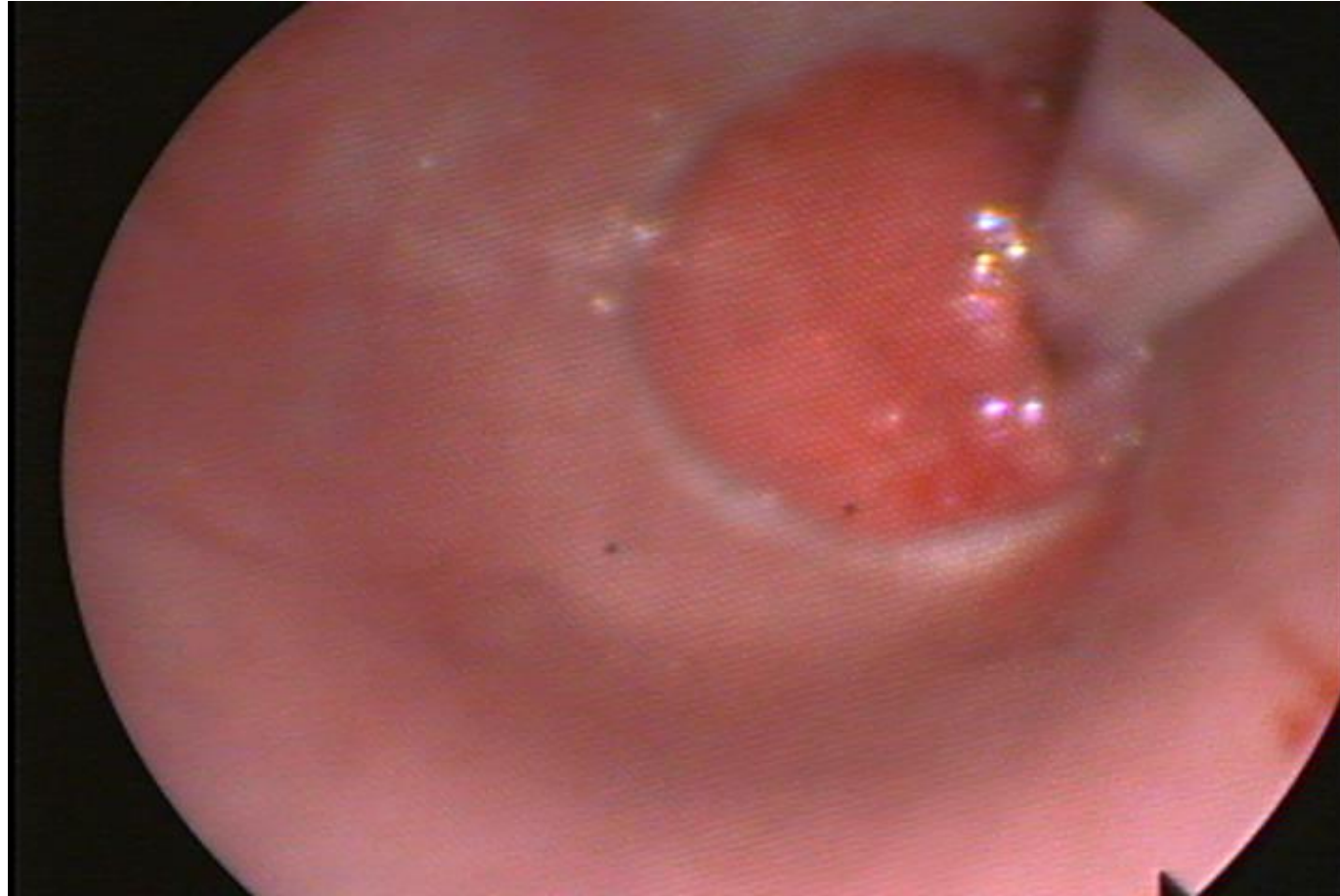


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Younquist

Transcervical AI



Artificial Insemination in Ewes

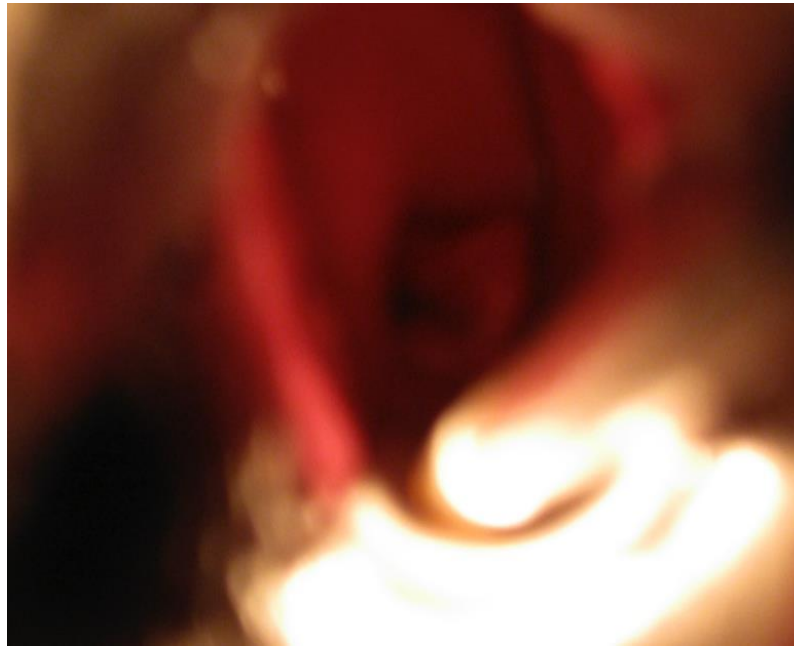


Artificial Insemination in Ewes

- Vaginal insemination
- Cervical insemination
- Trans-cervical insemination
- Laparoscopic insemination



Shallow cervical Technique



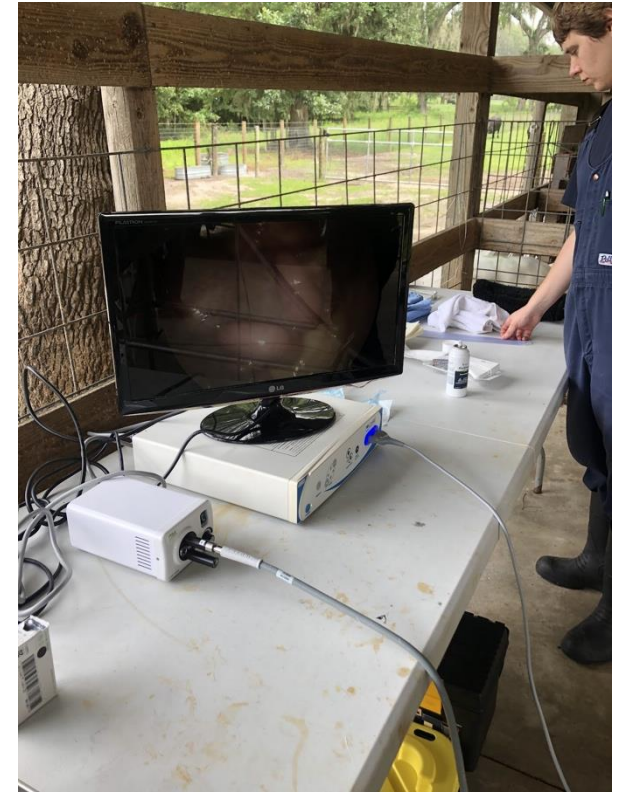
Technique – Shallow cervical



Laparoscopic Technique



Laparoscopic Technique



Laparoscopic Technique



Laparoscopic Technique



Laparoscopic Technique



Laparoscopic Technique



Laparoscopic Technique



References

- Reuse of CIDRs

<https://doi.org/10.1016/j.theriogenology.2012.10.007>

- CIDR vs Ram effect to accelerate breeding season

[10.1016/j.theriogenology.2019.01.015](https://doi.org/10.1016/j.theriogenology.2019.01.015)

- Sheep cervix anatomy

<https://doi.org/10.1016/j.theriogenology.2005.02.017>