



# Introduction to laparoscopic AI and embryo transfer in small ruminants

2023 CORNELL SHEEP & GOAT SYMPOSIUM  
 RACHAEL GATELY, DVM  
 TUFTS VETERINARY FIELD SERVICE



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## Outline

- ▶ Demands & reasons for advanced reproductive techniques
- ▶ Laparoscopic artificial insemination (LAI)
- ▶ Laparoscopic assisted embryo transfer (ET)
- ▶ Considerations for electing to do these procedures in your herd or flock




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## Demand for SR ART

- ▶ Why?
  - ▶ Advance genetics
  - ▶ Decrease cost and facility needs to maintain a ram/buck
  - ▶ Import genetics
  - ▶ Synchronize lambing/kidding

**LOT 7-1526**




**High Performance Toned Semen Heads to New Zealand**

**Sire:** Mr. Majestic  
**Dam:** 8453 (Next Level x Polar VJ Sundown's Sister)  
**DOB:** January 2021


**Recent News**


- ▶ 100% Head Semen Count
- ▶ 100% Motility
- ▶ 100% Survival of Post-Thawing
- ▶ High Performance Head
- ▶ Lower Needs to Free Thawed
- ▶ Superior Motility
- ▶ Excellent Progress
- ▶ Ready to Ship



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## Clientele





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## Why Laparoscopically?

**Goat**



**Sheep**



Kershaw et al. Theriogenology, 64:1225-1235, 2005.



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## Laparoscopic Artificial Insemination



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### When to AI?

- Natural heat
- Timed AI following estrus synchronization



#### Seasonality of SR LAI


Month	Count
January	0
February	0
March	0
April	3
May	1
June	0
July	2
August	4
September	5
October	3
November	0
December	0




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### Characteristics of Small Ruminant Reproduction

	Length of Estrus Cycle	Estrus	Timing of Ovulation
Cattle	21 days	6-30 hours	24-32 hours after onset of estrus
Goats	21 days	36 hours	9-72 hours after onset of estrus
Sheep	17 days	24-36 hours	~24 hours after onset of estrus



**So, how do we time this just right?**



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### Estrus Synchronization

- Most protocols use some combination of:
  - CIDR
  - Prostaglandin
  - PG600
  - GnRH
- Exact protocol details vary with:
  - Veterinarian
  - Species
  - Time of year
  - Type/breed
  - Etc

#### Tufts Veterinary Field Service - Small Ruminant LAP AI - FROZEN SEMEN

Client:	HEAT/Al Date
Client: AETA demo	Heat/Al Date Thursday, October 27, 2022
Donor Barn Name:	Arrival Time: 2PM
Donor Reg Number:	
Donor Full Name:	
Protocol:	

NOTE: Laparoscopic AI will be timed for 48-54hr post CIDR removal


Date	Time	Protocol	Set #/Notes
Thursday, May 3, 2018	10AM	Insert CIDR	
Friday, May 11, 2018	10AM	pull CIDR & give pg600 IM	
Monday, May 14, 2018	10AM	Remove all feed/water after am meal	
Monday, May 14, 2018	1PM	Introduce teaser ram (back if available)	
Monday, May 14, 2018	3PM	Laparoscopic AI	

NOTE AND RECORD TIME OF STANDING HEAT WHEN USING TEASER RAM/BUCK

Please ask the Tufts office for small ruminant CIDRs, applicators and pg600 if you do not already have them on hand

Have this protocol available along with frozen semen and sire registration information at the time of lap AI

Injection reminders: Refrigerate pg600 once reconstituted - please ask about freezing left over dosages  
Use 2" needles to ensure all injections given into deep muscle (rump)



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Date	Time	Protocol	NOTES
Thursday, September 27, 2022	~30	BoSe dose (2.5cc/100lbs SC) this week	
Thursday, October 13, 2022	0	8-10AM Insert CIDR	
Monday, October 24, 2022	11	8-10AM 0.5ml Estrumate IM	
Tuesday, October 25, 2022	12	1PM pull CIDR & 4ml pg600 IM	
Wednesday, October 26, 2022	13	8AM Remove all feed/water after am meal	
Wednesday, October 26, 2022	13	3PM Put teaser ram in with ewes (if available)	
Thursday, October 27, 2022	14	3PM Laparoscopic AI	

NOTE AND RECORD TIME OF STANDING HEAT WHEN USING TEASER RAM; REMOVES EWES FROM THE TEASER AS THEY MARK

Please ask the Tufts office for small ruminant CIDRs, applicators and pg600 if you do not already have them on hand



Have this protocol available along with frozen semen and sire registration information at the time of lap AI

Injection reminders: Refrigerate pg600 once reconstituted - please ask about freezing left over dosages  
Use 2" needles to ensure all injections given into deep muscle (rump)

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### October 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13 CIDR In	14	15
16	17	18	19	20	21	22
23	24 Estrumate	25 CIDR Out (PG 600)	26 Fast & TEASE	27 AI	28	29
30	31	← 48-54 hours →				

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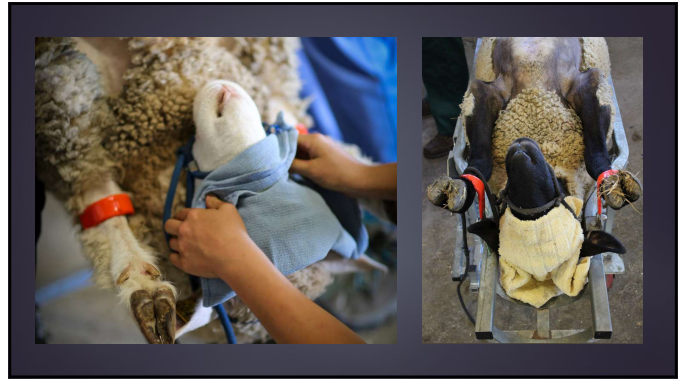
### Laparoscopic AI Procedure



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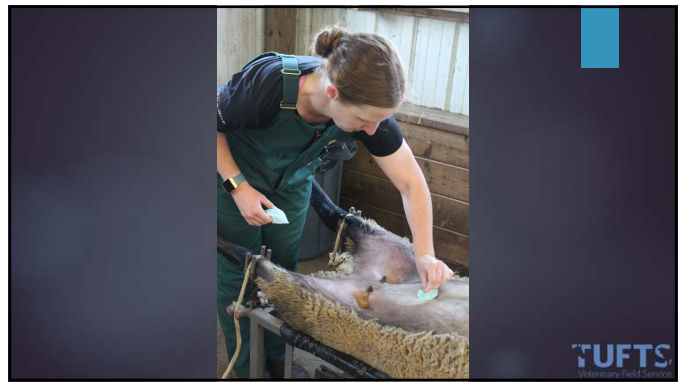
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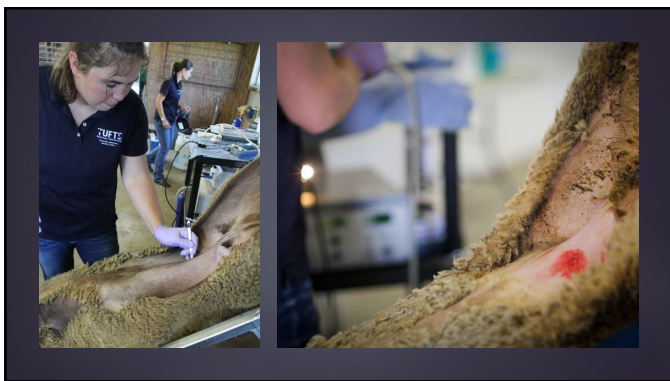
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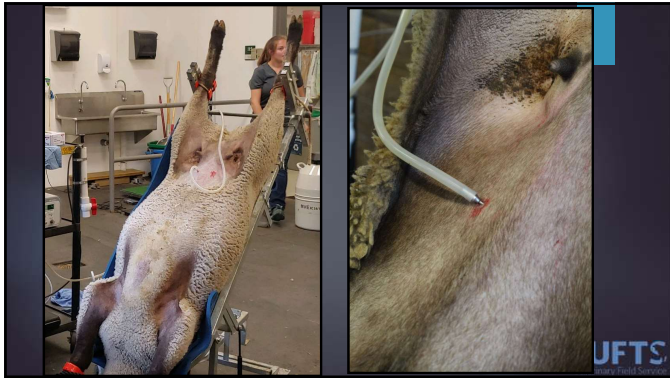


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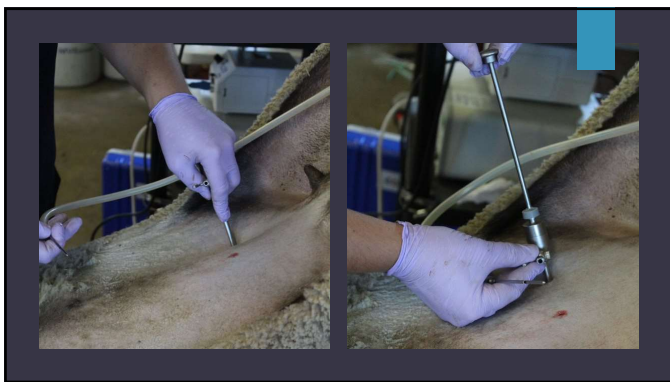




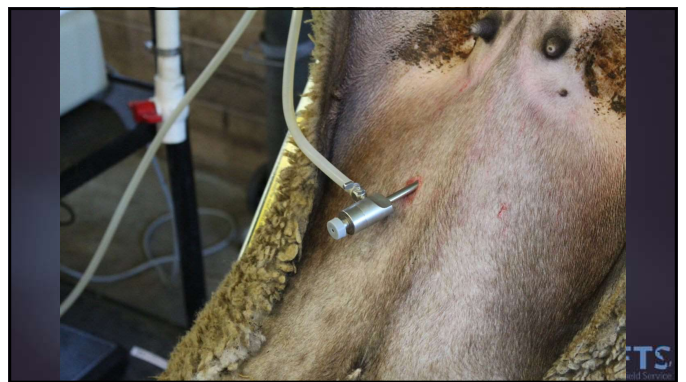
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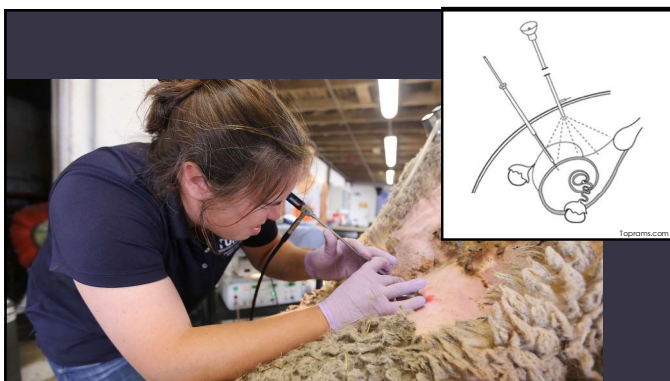
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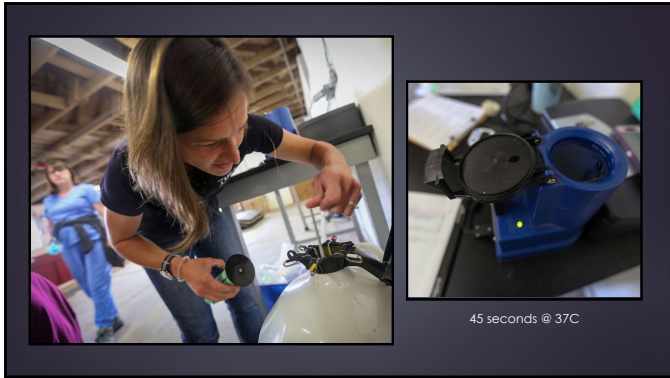
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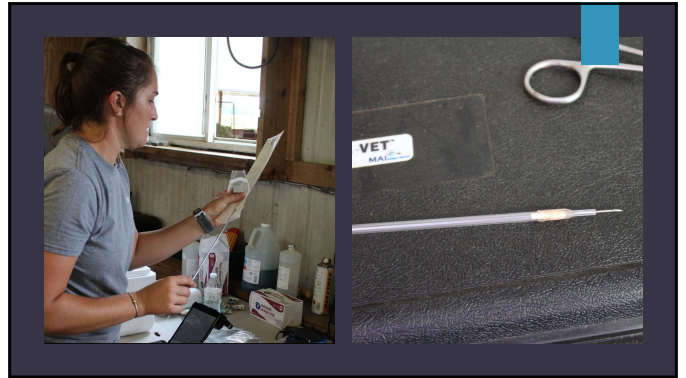
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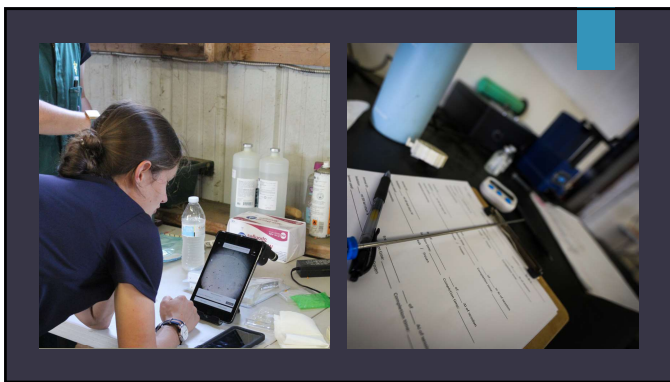
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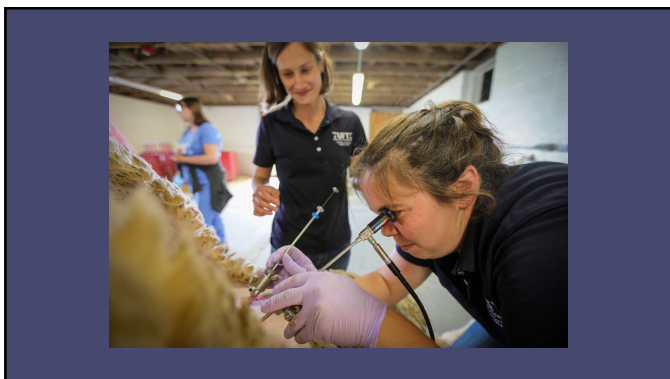
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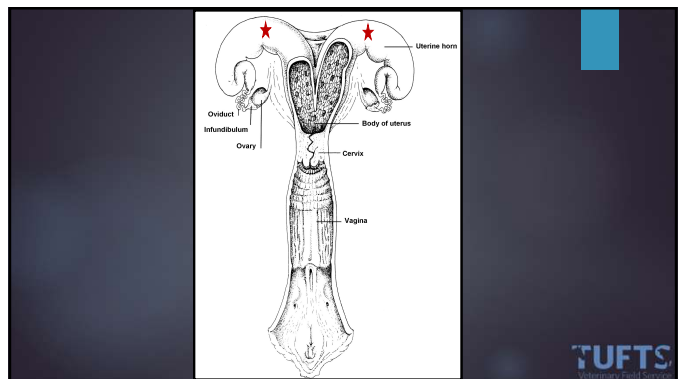
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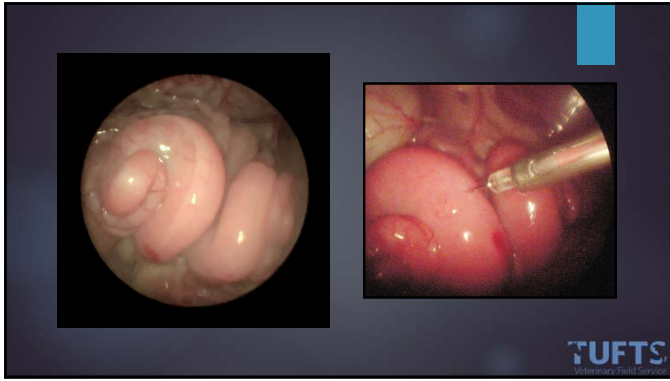


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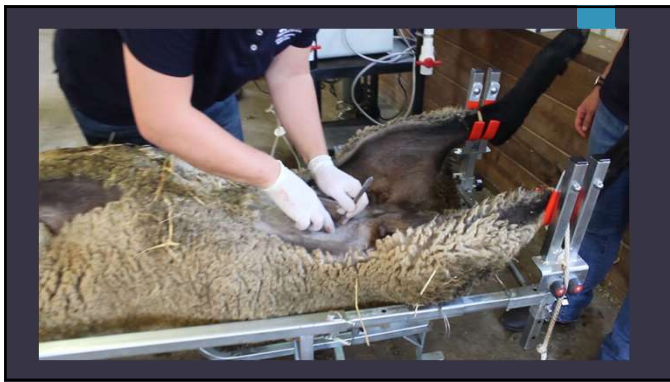




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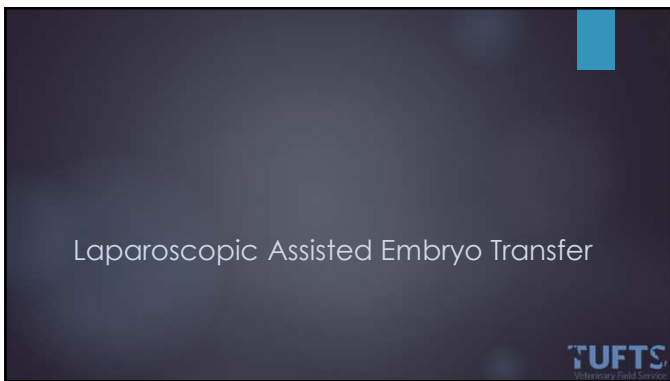


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### Post-procedural care

- ▶ NSAIDS / antibiotics?
- ▶ Return to natural environment ASAP
- ▶ No stress for at least 10 days
- ▶ Remove staples @ 14 - 30 days
- ▶ 50-60% conception with frozen semen
- ▶ 70%+ conception with fresh semen

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June 2021						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3 <i>CIDR In</i>	4	5
6	7	8	9	10	11	12
13	14 <i>Estrumate IM</i>	15 <i>CIDR Out (PG 600)</i>	16 <i>Heat Detect</i>	17 <i>Heat Detect</i>	18	19
20	21	22 <i>Begin Fasting</i>	23 <i>Embryo Transfer</i>	24	25	26
27	28	29	30			

← 24-72 hours → Ideal = 6\* days

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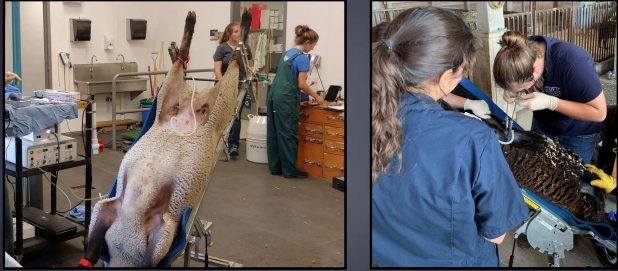


### Procedure

- ▶ Similar to LAI, but more complicated
- ▶ Confirm presence & location of CLs
- ▶ Pull out tip of uterine horn associated with best CLs
- ▶ Load embryos into tom-cat catheter
  - ▶ 1 vs. 2 vs 3 embryos per transfer
- ▶ Transfer & close


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Direct Transfer Embryos:

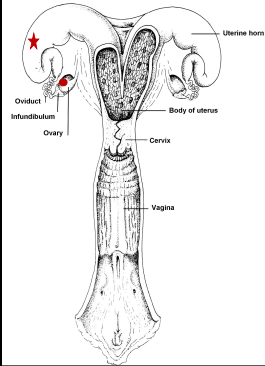
- Ethylene glycol
- Often U.S. derived
- 20 second thaw

Long Thaw Embryos:

- Glycerol
- Non-US derived
- 20 minute thaw

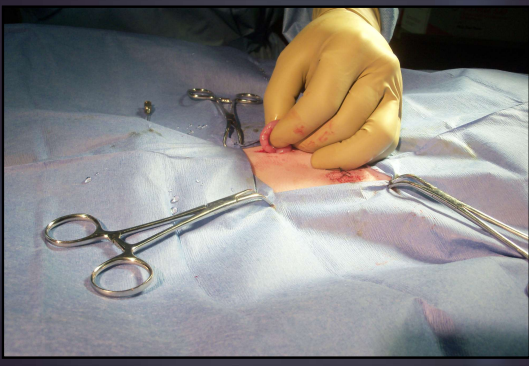
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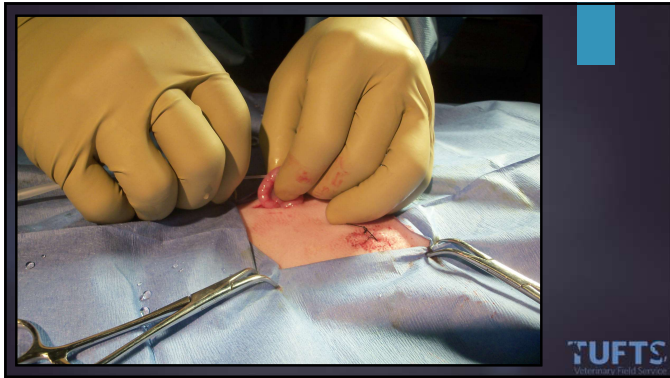
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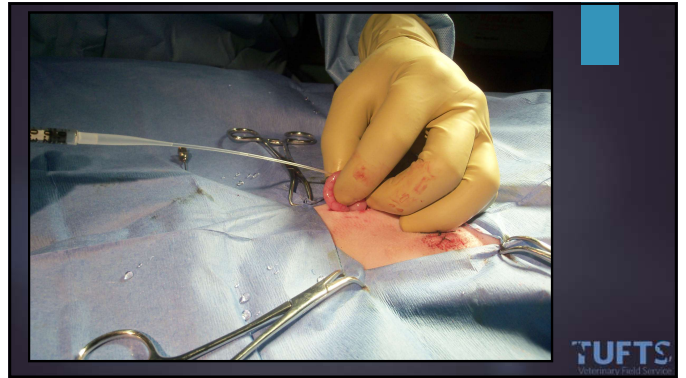


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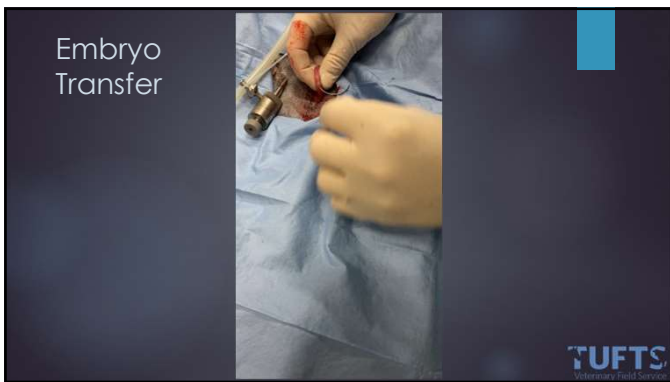
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Post-procedural care

- ▶ Yes to NSAIDs & antibiotics
- ▶ Return to natural environment ASAP
- ▶ No stress for at least 10 days
- ▶ Remove staples @ 14 - 30 days
  
- ▶ Remember, the embryo was already 6 days old when you put it in
- ▶ 45-55% conception with frozen embryos



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Considerations for Producers

- ▶ Hauling to ART facility or having procedures done on farm?
  - ▶ Covered, warm, and flat area with access to electricity
  - ▶ Stress of travel
  - ▶ Expense – most services require a minimum financial commitment to perform these services on-farm
- ▶ Comfort with protocol & the ability to carry it out ACCURATELY – major commitment
- ▶ Semen/embryo acquisition & subsequent storage
  - ▶ Amount & quality
  - ▶ Value of teaser ram/buck
  - ▶ Cost

Small Ruminant Advanced Reproductive Services	
<b>Location &amp; Travel Fees</b>	
TVFS haul-in facility	\$2,000.00 minimum travel fee
On-farm	\$38.50
Mobile lab set-up	\$2,200/mile from TVFS roundtrip
<b>Ram/Buck Procedures</b>	
Breeding Soundness Exam	\$192.50
Semen collection & analysis	\$137.50
Repeat semen collection	\$87.00
Semen freezing (1-30 straws)	\$209.00
Semen freezing (33+ straw-s)	\$5.50/straw
Vasectomy	\$225.50
<b>Artificial Insemination</b>	
Optim semen analysis	\$122.00 per sample
<b>Transcervical AI</b>	
1 female	\$82.50
2-5 females	\$69.00 each
6-10 females	\$59.50 each
11+ females	\$50.50 each
<b>Laparoscopic AI</b>	
1 female	\$137.50
2-4 females	\$110.00 each
5-9 females	\$88.00 each
10-14 females	\$74.00 each
15-49 females	\$70.00 each
50+ females	\$62.00 each
<b>Surgical embryo transfer</b>	
1 <sup>st</sup> recipient	\$177.00
Additional recipients	\$145.00 each
Rejected recipient evaluation	\$84.00
<b>Laparoscopic embryo transfer</b>	
1 female	\$137.50
2-4 females	\$110.00 each
5-9 females	\$88.00 each
10-14 females	\$74.00 each
15-49 females	\$70.00 each
50+ females	\$62.00 each
<b>Embryo freezing</b>	
1 <sup>st</sup> straw (1-3 embryos)	\$115.50
Additional straws (per session)	\$69.00
<b>Embryo long-thaw add-on</b>	
Set-up fee (per session)	\$146.00
Per recipient	\$62.50
<b>Germplasm &amp; Tank Handling/Shipping</b>	
Tank inventory	\$236.50
Shipper tank rental & packaging	\$247.50
Tank shipping	by weight & destination (call for specific quotes)
Tank handling & processing	\$35.50
Tank liquid nitrogen recharge	\$11.00+
Cane splitting	\$14.00
Cane storage (only offered to active ART clients)	\$13.00/quarter

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Necessity = A GOOD TEAM!



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Questions?

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