

Reproductive Management in Common Marmoset Colonies

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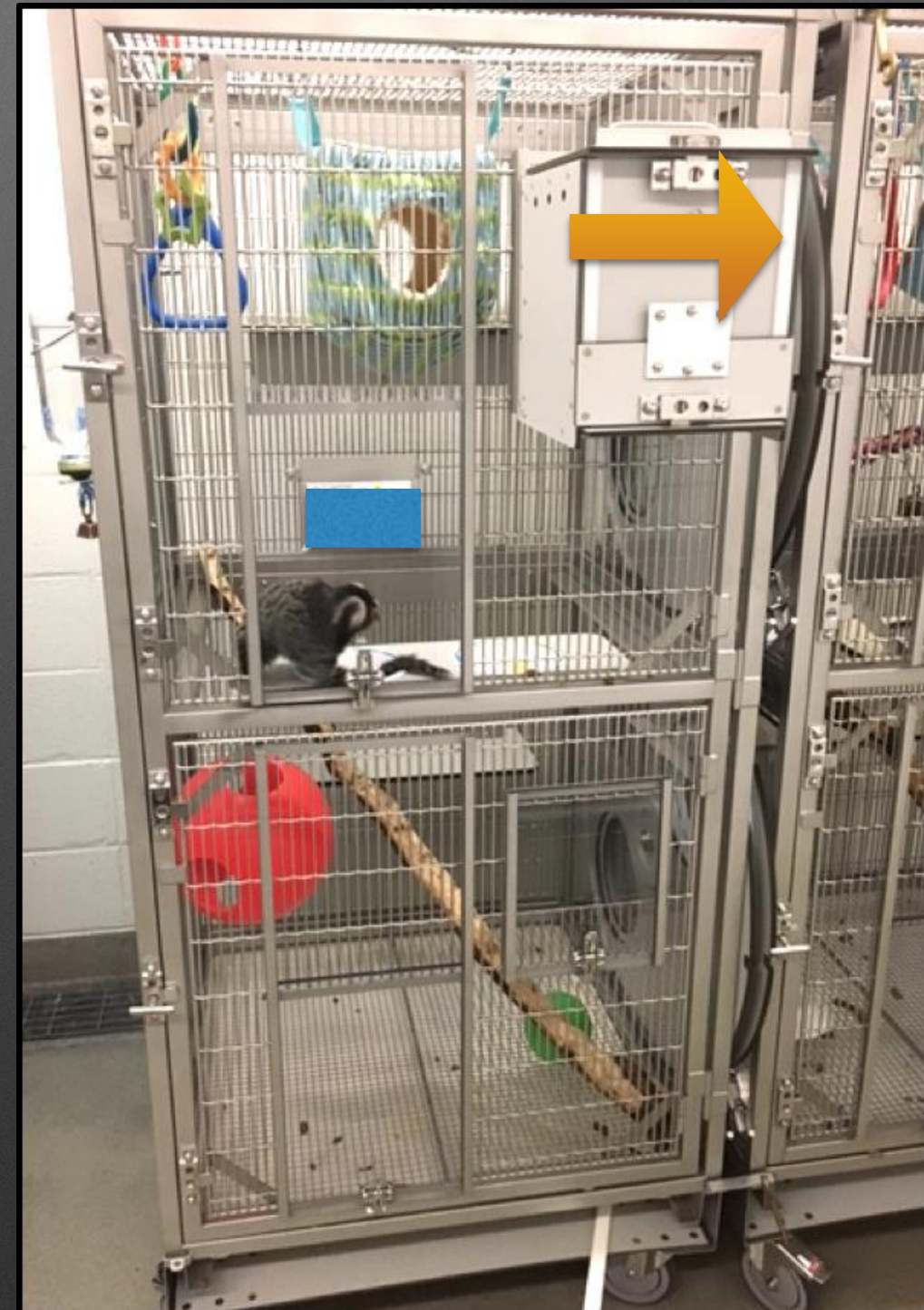
Marmoset Reproductive Biology & Physiology

- Sexual maturity @ 12-13 months of age
- Family groups with one dominant breeding pair
 - Other group members are offspring of dominant pair
 - Rarely breed as estrous cycle and ovulation in subordinate females is suppressed
- Able to conceive on postpartum ovulation (10-20d)
- Sexual behavior/copulation is not limited to times of ovulation
- Average gestation - 143 -144d
- Twins - most common birth group size
- Littermates share placenta, demonstrate chimerism
- Extensive alloparenting within each family group



Breeding Colony Management

- Recommended age of first pairing (both sexes)
 - Approx. 1.5 years
- Establish criteria for enrollment into breeding program
- Formation of new breeding pairs:
 - Pre-pairing behavioral evaluations are rarely performed
 - High success rate with gradual introduction
 - Avoid visual access w/ previous family group
 - Troubleshooting
- Pedigree analysis - minimize inbreeding coefficient, analyze coefficient of relationship/kinship
 - Software: PedScope, Filemaker Pro, Herd Ease



Methods of Contraception

- **Cloprostenol (Estrumate)**
 - 0.75 to 1.0ug diluted, given via intramuscular injection
 - Given 3 weeks postpartum, then monthly
- **Medroxyprogesterone acetate (Depro-Provera)**
 - Given @ 20 mg/kg monthly, subcutaneous/intramuscular injection; give w/in 10d postpartum
- **Etonogestrel implant (Implanon)**
 - 1/4 of human product implanted subcutaneously
- **Melengestrol acetate implant**
 - Subcutaneous
- **Surgical**
 - Vasectomy
 - Tubal ligation

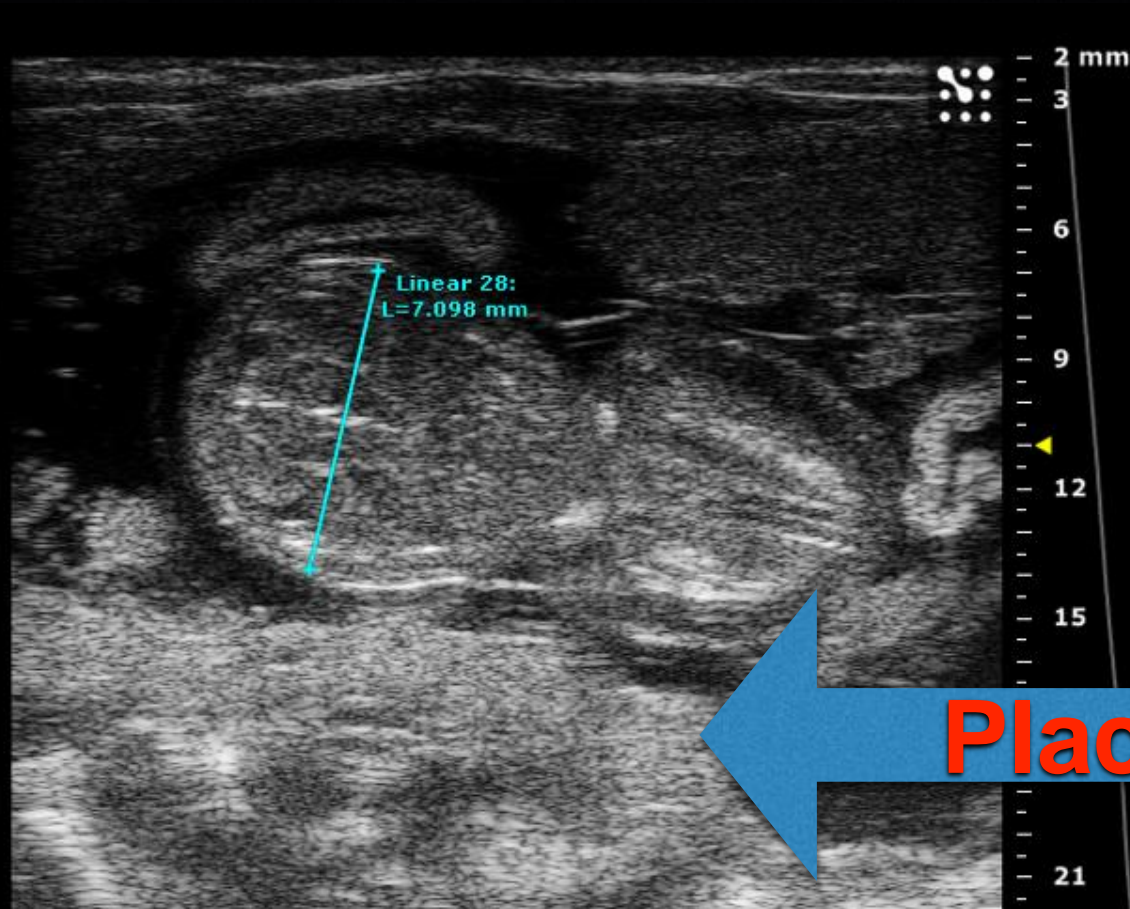


Clinical Methods of Pregnancy Diagnosis

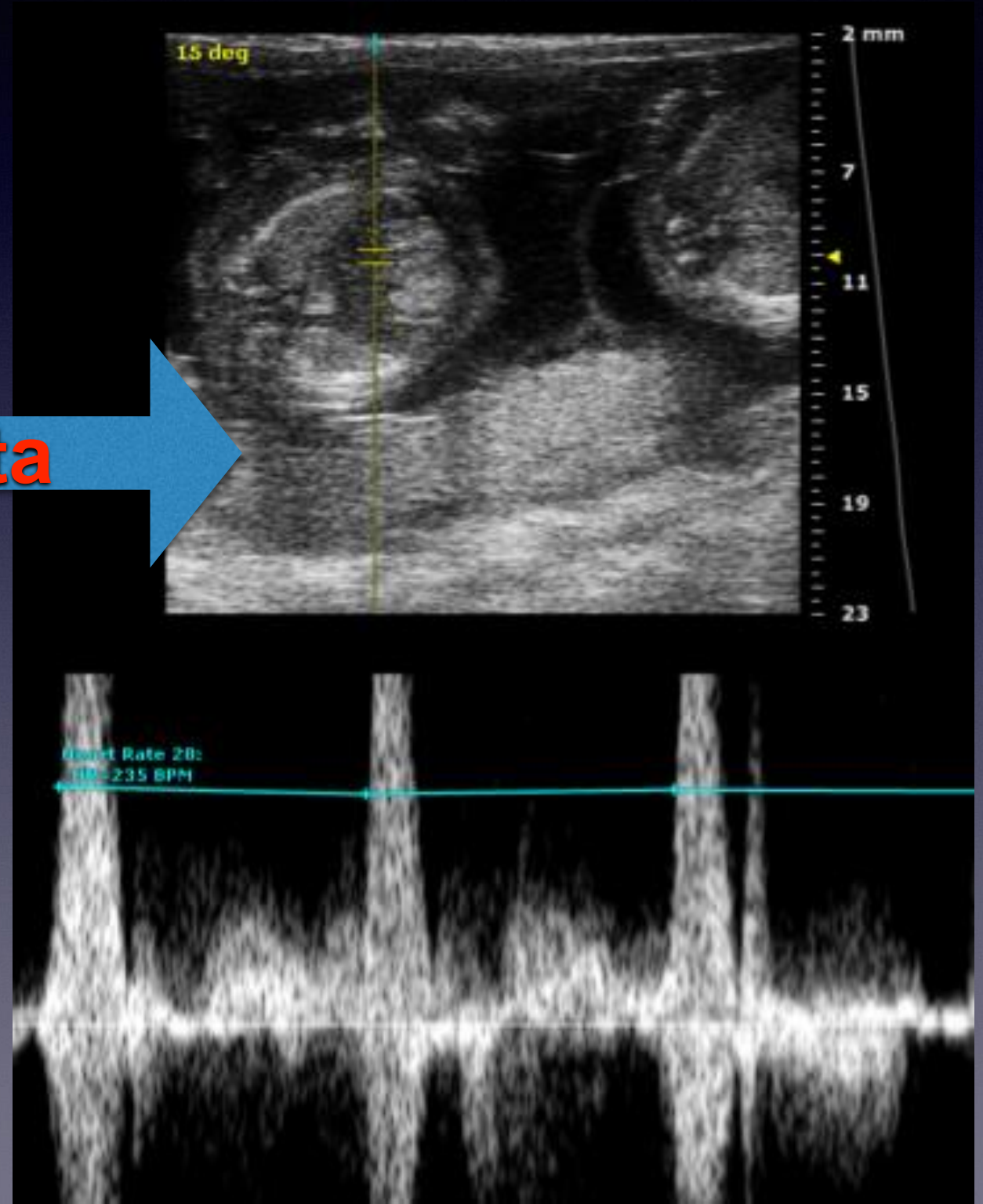
- Uterine palpation
- Ultrasonography with uterine/fetal measurements
 - Crown-rump length
 - Uterine diameter and lumen
 - Biparietal diameter
- Limitations of both methods: trained personnel



Biparietal diameter measurement



Fetal heart rate measurement (pulsed-wave doppler)



Placenta

Pregnancy

- Implantation occurs between 11-13d post-conception
- Average duration of gestation is 143 - 144d
- Inter-birth interval about 150-170d
- Twins are the default litter size, can range from 1-5
- Pregnancy loss is quite common
 - Often reflected as prolonged inter-birth interval
 - Signs - often no signs or blood in cage, bloody vaginal discharge

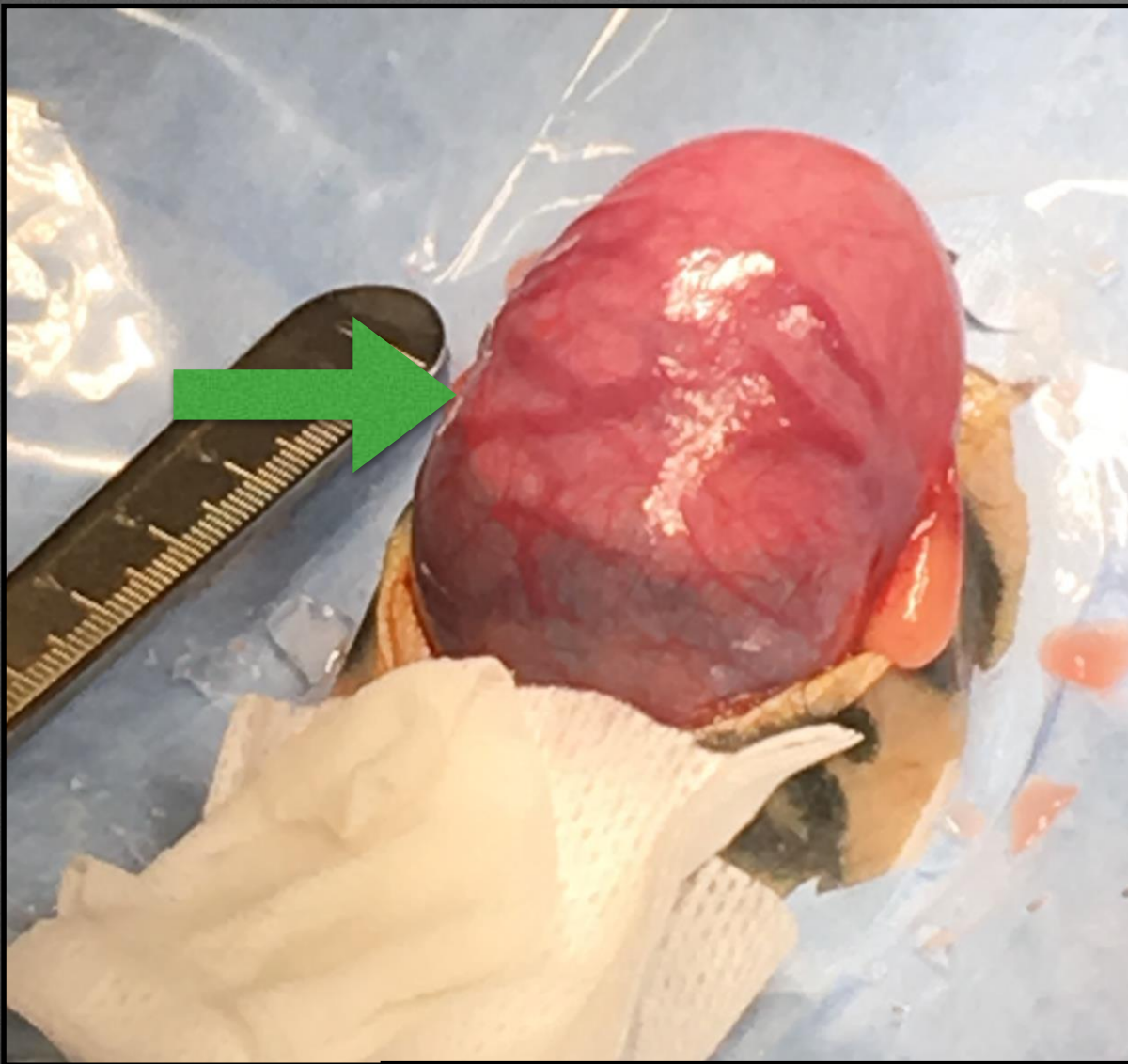


Parturition & Dystocia

- Most births occur in the evening, about 2-4 hours after lights out
- Dystocia is rare, but can be expected to occur in most colonies
- Most common presentation:
 - Marked lethargy and blood in cage in the morning
 - Weight loss, unproductive straining, vaginal bleeding
 - May be overdue - caution when interpreting due dates
- Medical management
 - Supportive care: fluids, gastroprotectants, nutritional support
 - Pain management
 - Oxytocin - up to 2-4 IU/animal, given in 0.25 - 1 IU increments
 - Intrauterine injection during C-section
 - Calcium gluconate - 10-50 mg/kg diluted to 10% in saline, SQ or IM
 - Manual extraction of dead fetuses in canal may be necessary

Surgical management of dystocia

- Requires many hands - round up everyone!
- Ultrasound assessment of fetal viability
 - Measurement of fetal heart rate with pulsed-wave doppler
- Surgical technique
 - Midline ventral abdominal longitudinal incision, exteriorize or pack-off uterus, placing stay-sutures as needed
 - Identify fetus(es) within uterus, carefully incise through uterine myometrium, avoiding placental and fetal vasculature, milk fetus and placental tissues through incision
 - Disrupt fetal membranes, clamp umbilical vessels on both sides before cutting
 - Immediately give fetus to team member responsible for resuscitation
 - Ensure that all fetuses and placental tissues have been removed
 - Close uterus in 2 layers w/ Cushing or Connell pattern as 2nd layer, close abdominal wall and skin



Infants

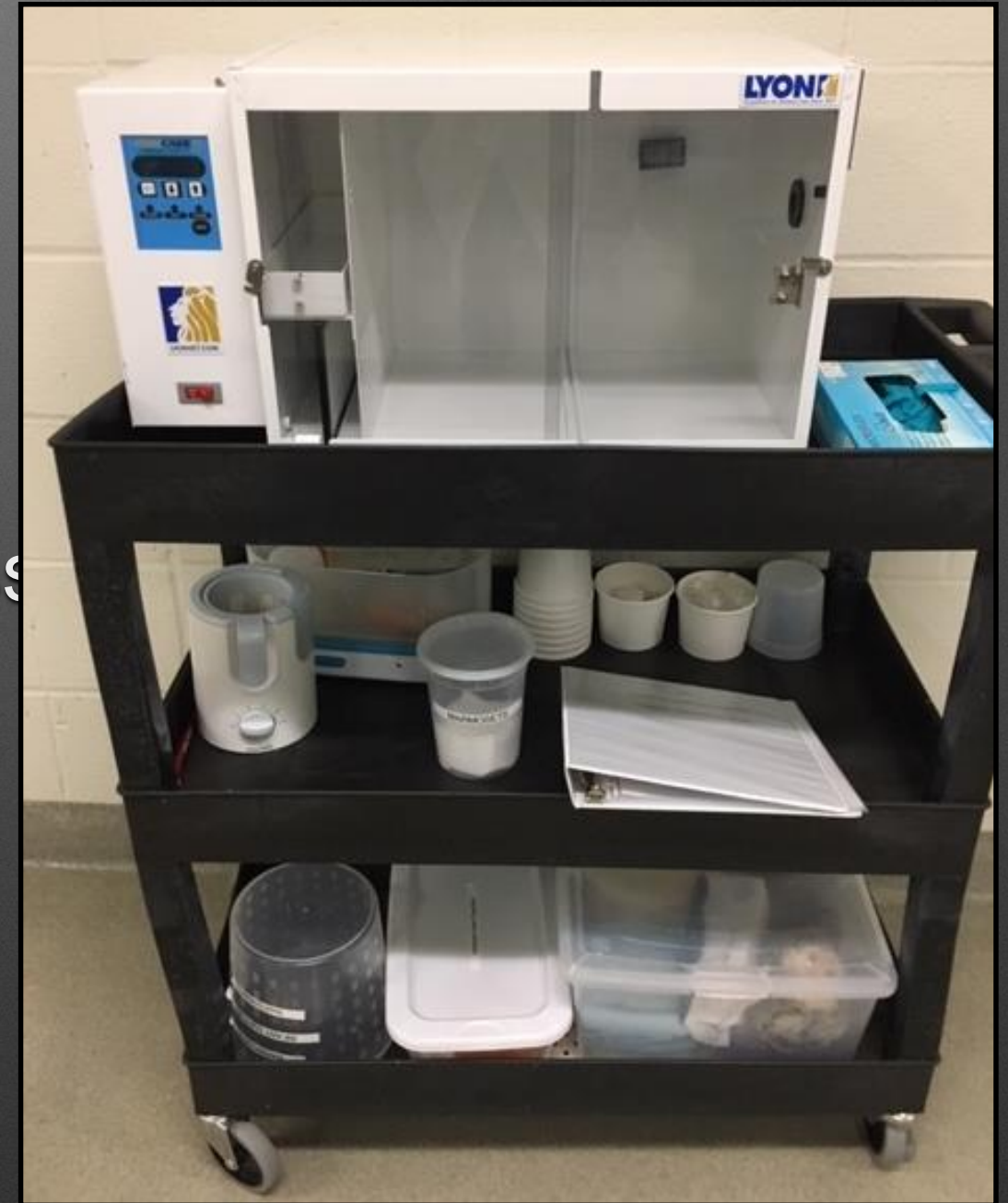
- Mean birth weight varies with litter size
 - Singletons > twins > triplets
- Carried dorsally by parents and/or older siblings for first 3-4 weeks of life
 - Tail-biting may occur
- Problem: triplet litters
 - 2014 retrospective study at NPPRC:
 - 1.6% quadruplets
 - 14.9% singletons
 - 37.5% triplets
 - 45.9% twins
 - Fewer maternal resources per infant
 - Causes?



WNPPRC

Management of triplet litters

- Option 1: no intervention
- Option 2: removal of 1 infant
- Option 3: fostering
- Option 4: supplemental feeding/assisted rearing
- Option 5: full nursery rearing



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Assessment of Infant Viability

- Weight
- Grip strength
- Attached or **dropped**?
 - Position on parent
- Temperature
- Respiratory rate/effort, vocalizations
- Mucous membrane color
- Withdrawal reflex
- Tail curl



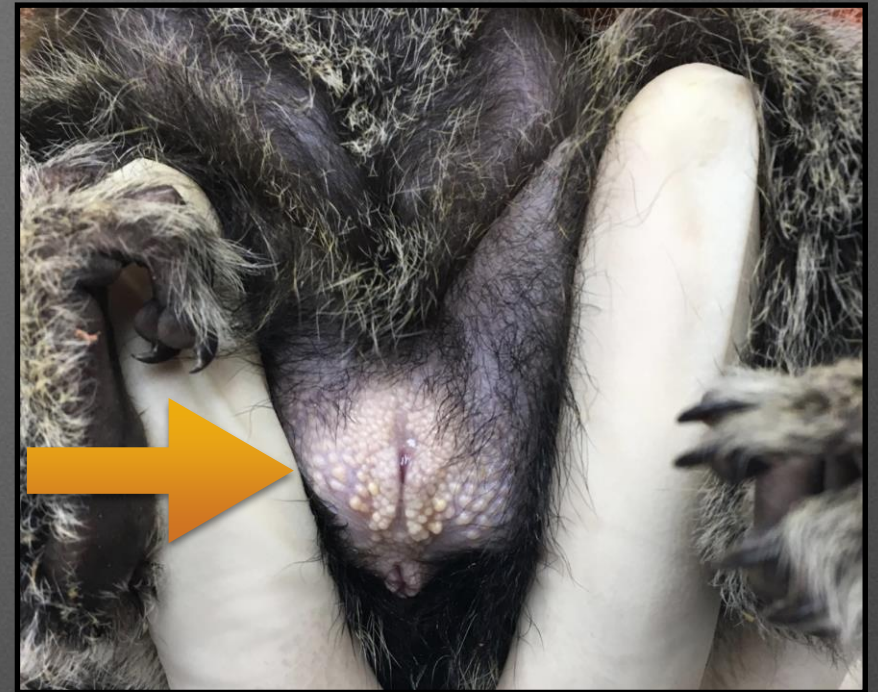
Lactation and Weaning

- **Postpartum calcium supplementation**
 - Calcium carbonate or calcium citrate
 - Calcium citrate (ex. Now® brand) @ 75 mg PO SID dissolved in 3-5 ml Ensure®
 - Calcium carbonate pellets (BioServ) @ 1 x 30 mg pellet per adult, ground and mixed in yogurt, SID PO x 40d
- **Lactation lasts 65-90 days**
- Weaning occurs by 8-10 weeks of age; consumption of solid food begins around week 4



Miscellaneous Repro Issues

- Uterine prolapse
- Uterine rupture
- Congenital anomalies
 - Females w/ small vulvar opening
 - Cryptorchidism
 - XY female



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