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 with 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
  - Singletonas > 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 NPRC:
    - 1.6% quadruplets
    - 14.9% singletons
    - 37.5% triplets
    - 45.9% twins
- Fewer maternal resources per infant
- Causes?
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
Neonates are removed from parents and weighed the morning after birth (*as long as it can be done safely)

Neonates are identified with a shaved spot on upper or lower back

One infant is kept out for supplemental feeding 5x/day w/ Primilac and dilute dextrose mixture

Others replaced back in cage, removed for feeding on alternating days

28 day program, tailored as needed

Management of triplet litters
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
References


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