Ferret Reproductive and Neonatal Diseases

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Energy Requirements

• 200-300Kcal/kg BW/day for adult maintenance
• Kit, pregnant and lactating jills have 2-3 times maintenance energy needs
• Adult mouse ~ 5.25Kcal/g
• 20gm mouse = 105Kcal. Feed 2-3 mice/day
• Dry foods ~ 3.5-4.5Kcal/g. Feed ~ 2 oz/day
• Raw Commercial Diet ~ 2.2Kcal/g
• Canned foods ~ 0.9-1.1Kcal/g *meeting energy requirements can be difficult or impossible!

Nutrition for Reproduction, Lactation and Growth

• Good quality meat protein: 32-50% DW
• Minimal carbohydrate
• High fat content: 20-30% DW
• Kit, pregnant, lactating have 2-3 times maintenance energy needs
• May need taurine
• No consensus on specific diet for breeding ferrets
• Kit food preferences set by 4 to 6 mo of age
Feeding Recommendations

• No need for kit, pregnant or lactating jill to change diet if high quality protein and high fat
  – Offer food more frequently or ad lib
• Offer food 2X daily for maintenance of healthy ferret
• Conception rates, litter size and kit survivability increases when protein increased to 35-40%
• Feeding milk replacer (20% fat), kits drink 30% BW per day
• Availability of drinking water determines amount of food intake
• Use safe chew treats

Nursing Jills and Neonates

• Jills with > 8 kits often loose weight
• Allow kits access to jill's soft food @ 3 weeks
• Eyes open @30-35 days; baby teeth erupt @ 2 weeks of age
• Wean @ 5-6 weeks. Later = bigger kits
• Depriving jills of needed energy at any time can lead to fatty liver syndrome
  ➢ Energy or protein deficient diets have increased sick kits (resp. or diarrhea), failure to thrive kits/ fading/ runting or poor jill condition and lower milk production.

Breeding and Reproduction

• Sexually mature after 4-8 months
• Photoperiod induced at 14-17 hours of light
• Seasonal polyestrus (March-September)
• Induced ovulator
• Gestation 41-42 days
• Litter size 8-10 kits
• Weaned at 5-6 weeks
• Breeders MUST keep good breeding records!

Is she or isn't she??? Only the ultrasound knows for sure!
7 days gestation
10 days gestation

37 days gestation

37 days gestation

36 hours post partum
Males much larger than females
12-14 weeks of age

Reproduction Diseases in Jill's

- Estrogen induced anemia / Hyperestrogenism
- Pseudopregnancy
- Pregnancy Toxemia / Metabolic Imbalance
- Dystocia
- Mastitis
- Pyometra and Vaginitis
- Cannibalism
Hyperestrogenism

- Uncommon due to early spaying
- Prolonged estrus (>1 mo) causes aplastic anemia
- Signs: Swollen vulva, pale MM, alopecia
- Later signs: lethargy, melena, petechiation
- Dx: PE, PCV, CBC
- Tx: HCG, GnRH, Lupron, Trelstar, V-hob
- Tx: Transfuse, Procrit, anabolic steroids, OVX
- PCV > 20% is a good prognostic indicator

Pseudopregnancy

- False pregnancies are common
- Can be seen after V-hob breeding, HCG or GnRH treatments for estrus
- Palpate or US for presence of kits
- Tx: HCG, GnRH, Lupron, Trelstar, OVX
Pregnancy Toxemia / Metabolic Imbalance
- occurs usually in the last 10 days of gestation
- Jill usually is carrying >10 kits
- Jill usually is fed a poor quality feed
- Signs - lethargy, tarry stools, dehydration, thin, lying flat on abdomen, glazed eyes
- Tx – intensive care and emergency C-section
  - Post-op jills don’t lactate
  - If jill survives first 24 hours, they often survive

Agalactia: Low milk producing Jill
- Cause unknown but possibly associated with other disease states or poor nutrition of jill
- Old age
- Excess or thin body condition.
- Water shortage
- Poor crate design, lacking proper stimulation
- Sequel to edema or mastitis
- Common after C-section for at least 24-48 hrs

Agalactia: Low milk producing Jill
- Cause unknown but possibly associated with other disease states or poor nutrition of jill
- Old age
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- Water shortage
- Poor crate design, lacking proper stimulation
- Sequel to oedema or mastitis
Agalactia: Low milk producing Jill

- Tx: 1 mg Reglan TID and 1 U oxytocin TID
- Make sure there is no mastitis
- Proper food, water and amounts to jill
- Add extra salt to jill’s diet
- Add liver to jill’s diet
- Wean kits ASAP; wean biggest first
- Low to poor success of significantly increasing milk production.

3 day old kits: cold, thin dehydrated

Agalactia in 3 year old Jill 7 days post partum

This Jill had 8 kits that all died by 5 days due to agalactia. This Jill had diarrhea and wasting from Coronavirus infection.
Dystocia

- If it has been 6-7 hours since the last kit, or if the female is in distress, it is then considered a dystocia
- An average parturition takes about 2-3 hours
- An average of 5 kits born per hour
- DO NOT GIVE OXYTOCIN - do a caesarian section to increase likelihood of live kits
- Oxytocin can be used to hasten delivery in jills with prolong or slow parturition, with dead kits

Caesarian section

- Gestation is 41-42 days. Kits that are in utero past 43 days will die. This can happen with small litters (1-2 kits) due to lack of induction
  - US is better than radiographs to determine fetal number
- Aside from known dystocia, an exact breeding date and gestational age (GA) determine when to do a caesarian section
  - GA can only be estimated from US exam
- Do a caesarian section on day 42 or 43 if you want live kits!
- Breeders MUST keep good breeding records to determine when to do C-section.

40 days gestation, CFD of heart
Jill 38 days pregnant. Radiographs not able to diagnose pregnancy, number of fetuses or viability.

Mastitis

- Seen in the first few weeks of lactation
- Normal glands feel like small firm, not hard, marbles
- Jill can die within 4-5 hours
- Isolate from other females, highly contagious
- Hemolytic *E. coli* is the most common isolate
  - causes gangrenous mastitis
  - jills rapidly become septic and/or endotoxemic
  - teats are swollen, necrotic, black, firm, and non-painful
- *Staph aureus*
  - mammary glands are hot, painful, and reddish in color; purulent exudate from glands

Mastitis Treatment

- Antibiotics (Clavamox, Trimethoprim sulfa, Chloramphenicol, Baytril)
- Fluids – route depends on severity
- NSAIDS – Banamine, Metacam, Carprofen
- Surgical removal of gland may be need in gangrenous, infarcted glands
- Isolate – kits and jill are possibly infectious
- Management of jill and environment
  - Good nutrition
  - Clean dry bedding
  - Avoid wood chips
  - Single housing before parturition

Pyometra and Vaginitis

- Pyometras are rare. Females can get stump pyometras secondary to an adrenal tumor
- Vaginitis is commonly seen in intact females and with ACD
- Vulvar cellulitis often associated with foreign material in the proximal vagina. Treat with topical antibiotic/steroid ointments and remove foreign material (hair, bedding)
Pyometra

Vaginitis – distended vagina in an OVH ferret

Cannibalism

- If a new mother eats a baby, don’t take the litter away. If she eats more than two kits, then take the litter away.
- Some breeders think this behavior is genetic.
- Do your best not to disturb new mothers!
Hand raising kits

- Hand raising kits is very difficult.
- If possible, try to foster kits of the same size or age onto another jill.
- Most jills accept kits of any size or age during any stage of lactation, but the biggest eat the most!
- Supplement neonatal kits with puppy or kitten milk replacements and added cream so that the fat content is 20% (i.e., 3 parts milk replacement to 1 part whipping cream).
- By 3 weeks of age, kits eat 6-8 ml of milk and can be supplemented with A/D

Reproduction Diseases in Hobs

- Infections of repro tract
- Prostatitis. Usually ACD related
- Urinary Calculi
- Trauma to repro tract – fighting, improper breeding
- Testicular tumor
- Behavior problems

Prostatic Cyst

Urine Analysis - Prostatitis
Urinary calculi, diet induced

Testicular tumor in a 5 year old Hob

Use of AI to Enhance Reproduction and bypass Behavior problems

• Non-breeding males
• Male aggression
• Poor positioning
• 5 yr old males
• Non-proven male fertility and kinship
• Maintain genetic diversity

Sperm Morphology

• Fertility evaluations
• Influenced by genetic variation
• ~50%........~20% normal sperm

Male Reproduction
Kit diseases

- Genetic or congenital defects
- Nutritional – MBD
- Enteric diseases – viral, parasitic (Giardia, coccidia), bacterial (Salmonella, Clostridia, Lawsonia)
- Respiratory diseases – Bordetella, Flu, milk aspiration, Distemper
- Management diseases – stress, hypothermia, improper nesting box or area

Ferret genetic or congenital defects

- Many are seen but most are never reported
- Heart: ASD, PDA
- Neural tube defects
- Hernias: diaphragm, inguinal, umbilical
- Atresia/agenesis: anal, choanal, renal
- Skeletal defects – congenital, genetic,

Neural tube defect

Diaphragm hernia
Anal agenesis with vaginal fistulae

Skeletal defects can be seen in long bones or vertebral bodies such as fused vertebrae, hemi-vertebrae and curved spinal columns

Kit Ferret Viruses

- Rota Virus – “ferret kit disease” at 2-6 weeks of age causes enzootic diarrhea in colony and stunts growth. Can cause death.
- IBR (Herpes Virus) – mild URI
- Influenza Virus (Orthomyxovirus) – URI
- Distemper (Paramyxovirus) – young kits die
- Aleutian Disease (Parvo Virus) – subclinical in jills but can cause increased % of dead and resorbed fetuses.
- Corona Virus – ECE, FIP – can stunt growth and cause agalactia
“ferret kit disease”

Rotavirus carried by Jill
Most kits will survive if given supportive care
Kits have slick hair coat from jill licking diarrhea

“Respiratory disease”

Can be caused by many pathogens and poor management:
Bordetella, Flu, Distemper, IBR, low environmental temps, very low RH, aspiration of milk, secondary bacteria

3 day old kit with acute enteritis: no milk in stomach, gas distended GIT, diarrhea

- Bronchicine was one of the first *Bordetella* vaccines produced.
- There are many vaccines produced today for cats and dogs: SQ, IM, IN.
- All are effective at minimizing clinical signs of *Bordetella* but no vaccine completely protects cats and dogs from infection.
- Vaccinate if there is a respiratory problem in the colony.
- Short-lived immunity ~ 6 months per vaccine
Ferret Coronavirus Enteritis (Green slime diarrhea, ECE)

- Adults: Vomiting 1st, then profuse green diarrhea, then “birdseed” BM
- Severe dehydration
- High morbidity, Low mortality
- Dx - clinical signs and Hx, ↑ ALT and AP, Bx
- Tx - antibiotics, fluids (150 ml / kg / day)
- Very contagious ----- STRICT SANITATION
- Chronic carriers common
- Large variations in clinical disease

Two ferrets the same age; ferret on the right has stunted growth from chronic corona virus diarrhea.