Infectious Disease in Kittens: Prevention and Cure

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Kitten Mortality

- Higher incidence in pedigrees?
- Birth to 1 year: ~35%
  - Range 8-40%; compared to 10-17% in DSH
- Stillbirths: ~7%
- Pre-weaning: 15-30%
- FAB Survey*
  - Stillbirths: mean 7.2%
  - → 8 weeks: mean 9.1%

*Sparkes et al 2006 JFMS
Kitten Mortality

- Pre-weaning ‘fading kittens’
  - Stillbirths + birth → 4 weeks
- Post-weaning
  - 4 weeks → 6 months
Causes of Fading Kittens

- Birth / queen related
- Low birth weight
- Dystocia
- Inappropriate nutrition
- Congenital abnormalities
- Neonatal isoerythrolysis
- Environment
- Infection
- Multifactorial
## Kitten Mortality

### Diagnosis or class

<table>
<thead>
<tr>
<th>Diagnosis or class</th>
<th>Total</th>
<th>Perinatal &lt;1 day</th>
<th>Neonatal 1-14 days</th>
<th>Pre-weaning 15-34 days</th>
<th>Post-weaning 35-112 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feline Parvovirus</td>
<td>69</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>66</td>
</tr>
<tr>
<td>Inconclusive</td>
<td>44</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td>Enteritis</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>18</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Feline Infectious Peritonitis</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Feline Herpes Virus</td>
<td>14</td>
<td>0</td>
<td>9</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Feline Calici Virus</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Heart Failure*</td>
<td>14</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>10</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Congenital**</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Traumatic</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>229</strong></td>
<td><strong>4</strong></td>
<td><strong>25</strong></td>
<td><strong>28</strong></td>
<td><strong>172</strong></td>
</tr>
</tbody>
</table>

* Including 7 cats with congenital cardiac disease, and 7 with idiopathic cardiac disease. ** Excluding 7 cats with congenital cardiac disease.

Immunity

• Maternally Derived Antibody
  • Only 5% MDA is acquired transplacentally
  • Kittens require Colostrum for the development of a normal immune system
  • Kittens’ ability to absorb colostrum starts decrease at 6hrs old and is no longer possible from 48hrs.

• MDA Levels
  • Vary markedly between individual kittens
  • Wane typically around 3-4 weeks but highly variable, for example FHV 2-10wks, but FCV 10-14 wks.
Assessing Kittens

- Assessing kittens for signs of ill health can be challenging.
- The cardiovascular system, nervous system, urinary and GI tracts are not fully mature—"normal parameters" are altered.
# Assessing Kittens

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Weight</td>
<td>Domestic Shorthair/Longhair: 90-110g</td>
</tr>
<tr>
<td></td>
<td>Pedigree breeds: 73g (Korat) to 116g or more (Maine Coon)</td>
</tr>
<tr>
<td>Rectal Temperature</td>
<td>Newborn: 36-37°C</td>
</tr>
<tr>
<td></td>
<td>One month: 38°C</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>First 2 weeks: 220-260 bpm</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>Newborn: 10-18 bpm</td>
</tr>
<tr>
<td></td>
<td>One week: 15-35 bpm</td>
</tr>
<tr>
<td>Urine</td>
<td>Specific Gravity: &lt;1.020</td>
</tr>
<tr>
<td></td>
<td>Urine Output: 2.5ml/100g body weight/day</td>
</tr>
<tr>
<td>Water Requirement</td>
<td>13-22ml/100g body weight/day</td>
</tr>
<tr>
<td>Stomach Capacity</td>
<td>4-5 ml/100g body weight</td>
</tr>
<tr>
<td>Caloric requirement</td>
<td>20 kcal ME/100 g/d</td>
</tr>
</tbody>
</table>

Diagnostics

- Blood Sampling:
  - 4ml/kg/wk (7.5% blood volume)
    - Consider glucometer etc.
  - Sites:
    - Jugular
    - Medial Saphenous
  - 1ml Syringe with 25-, 26-guage needle
- Positioning
  - “Scruff” Reflex
  - On back
### Diagnostics

**Special Considerations:**
- Reference Values are for Adults
- FIV testing: Antibodies don't mean the kitten is infected
- Urinalysis: Urine concentrating capacity doesn't develop until 8-10wks of age

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#### Chemistry

<table>
<thead>
<tr>
<th></th>
<th>2 Days</th>
<th>1 Week</th>
<th>2 Weeks</th>
<th>4 Weeks</th>
<th>8 Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin (g/dL)</td>
<td>1.6–2.6</td>
<td>2.0–2.5</td>
<td>2.1–2.6</td>
<td>2.4–2.9</td>
<td>2.4–3.0</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>12–84</td>
<td>11–76</td>
<td>10–21</td>
<td>14–55</td>
<td>12–56</td>
</tr>
<tr>
<td>Bilirubin (mg/dL)</td>
<td>0–0.7</td>
<td>0–0.6</td>
<td>0–0.2</td>
<td>0–0.3</td>
<td>0–0.1</td>
</tr>
<tr>
<td>Calcium (mg/dL)</td>
<td>8.6–12.7</td>
<td>10.0–13.7</td>
<td>9.9–13.0</td>
<td>10.0–12.2</td>
<td>9.8–11.7</td>
</tr>
<tr>
<td>Cholesterol (mg/dL)</td>
<td>80–175</td>
<td>119–213</td>
<td>137–223</td>
<td>173–253</td>
<td>124–221</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>0.5–1.1</td>
<td>0.3–0.7</td>
<td>0.4–0.6</td>
<td>0.4–0.7</td>
<td>0.6–1.2</td>
</tr>
<tr>
<td>GGT (U/L)</td>
<td>0–5</td>
<td>0–5</td>
<td>0–4</td>
<td>0–1</td>
<td>0–2</td>
</tr>
<tr>
<td>Glucose (mg/dL)</td>
<td>75–154</td>
<td>105–145</td>
<td>107–158</td>
<td>117–152</td>
<td>94–143</td>
</tr>
<tr>
<td>Phosphorus (mg/dL)</td>
<td>4.1–10.5</td>
<td>6.7–11.0</td>
<td>7.2–11.1</td>
<td>6.7–9.0</td>
<td>7.6–11.7</td>
</tr>
<tr>
<td>Total protein (g/dL)</td>
<td>3.9–5.8</td>
<td>3.5–4.8</td>
<td>3.7–5.0</td>
<td>4.5–5.6</td>
<td>4.8–6.5</td>
</tr>
<tr>
<td>Urea (mg/dL)</td>
<td>24–71</td>
<td>16–36</td>
<td>11–30</td>
<td>10–22</td>
<td>16–33</td>
</tr>
</tbody>
</table>
Viral Infections
Viral Infection

- 71% deaths are attributable to viral disease
  - FHV, FCV, FCoV, FPV, FeLV, FIV
    - FHV most common cause of death 2-14 days
    - FPV and FIP most prevalent in post weaning period (35-112d)
Treatment

- Intravenous Fluid Therapy
  - Lack of renal concentrating ability
  - Lack of skin tent until severely dehydrated
  - Immature sympathetic nervous system
  - “Maintenance” 80-100ml/kg/day
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Treatment

- **Nutrition**
  - Quickly develop hypoglycaemia
  - DO NOT feed when hypothermic/hypovolaemic (gag reflex not present until 10d pp)
    - IV dextrose
    - Stomach tube (Pre-weaning) 5% to 10% dextrose orally at 0.25 to 0.50 mL/100 g
    - Syringe feeding: 4–5 ml/100 g body weight
    - Oesophagostomy tube: first 4 weeks of life is approximately 24 kcal ME/100 g body weight
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Treatment

- Anti-Viral Medications
  - FHV: Famciclovir (40-90mg/kg PO q8hr)
  - ? Interferon
  - Nucleoside Analog GC or GS Medications
Antibiotics

- Secondary Bacterial Infections
- Broad Spectrum cover
Bacterial Infections
Bacterial Infections

- Common infections from
  - Queen’s birth canal (beta haemolytic *Streptococcus* sp. [Strep. G infection])
  - Gastrointestinal tract (*E. coli, Salmonella sp., Campylobacter sp.,* many normal enteric bacteria)
  - Respiratory tract (*Bordetella sp., Pasturella sp., Mycoplasma sp.*)
Bacterial Infections

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Bacterial Infections

• Risk septicaemia and death
  • Kittens have an increased risk of sepsis, especially if there has been inadequate colostrum intake, or failure of passive transfer of MDA.
  • Neonates develop hypoglycaemia and hypothermia, both of which predispose to the onset of intestinal ileus.
    • If ileus develops there is significant risk that bacteria will translocate from the GI tract and enter the blood stream. Clinical signs can occur very rapidly or the disease may run a more protracted course. Severe cases will present with bradycardia, dyspnoea, dehydration, weakness, crying, seizures, coma or death
Treatment

- Maintain normovolaemia
- Treat hypothermia once normovolaemic
- Treat hypoglycaemia once normothermic
- Antibiotics
  - Antibiotics would ideally be selected according to culture and sensitivity testing.
  - Often it isn’t possible to wait for laboratory results as neonates can decompensate rapidly.
  - The penicillins are often the first choice, as they are generally less toxic than most other antibiotics.
Parasitic Infections
Parasitic Infections

- A severe flea, tick or hookworm infestation can result in significant anaemia.

- Gut parasites, such as Giardia, Tritrichomonas foetus, Isospora or Cryptosporidia may cause diarrhoea and a failure to thrive.

- Toxoplasma infection may result in abortion, stillbirths and fading kittens.
Treatment of Parasitic Infections

- **Toxocara**
  - Pyrantel pamoate or fenbendazole from 2-3wks

- **Giardia**
  - Fenbendazole or metronidazole (care)

- **T. foetus**
  - Ronidazole (not licensed)

- **Coccidial**
  - Toltrazuril or TMPS (care)

- **Toxoplasma**
  - Clindamycin or azithromycin

- **External Parasites**
  - Fipronil (2d)
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Any Questions?