Feeding Cats Through Life

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Lifestage Feeding

* Reproduction
* Growth
* Maintenance (1-7yr?)
* (Obesity)
* (Seniors/geriatrics)
Feeding for Maintenance

* Adult – no longer growing
* Not pregnant or lactating
* Moderate activity

* Maintenance energy requirement (MER) in kcal:
  * Cats = 1.1 to 1.4 x RER (Body weight^{0.75} x 70) or
  * MER for lean cats = 100 x kcal BW^{0.67}
  * MER for obese cats is 130 kcal BW^{0.4}
Obesity

* Diabetes mellitus
* Hepatic lipidosis
* Pickwickian syndrome – difficulty breathing
* Aggravation of arthritis
* FLUTD
* Hypertriglyceridaemia
* Immune competence
* Dermatological disorders
* Shortened life span
Obesity – A Few Tips

* Feed therapeutic weight loss diet rather than less of maintenance diet
  * Decreased calories with increase in other nutrients e.g. protein
  * Feed at RER for ideal weight?
  * Activity feeders
* Consider goal, 6/9 may be ok for many cats, especially cats over 12 yr old, cats with CKD, etc.
* Be patient – weight loss in cats can be difficult
Maternal nutrition can affect interuterine growth of kittens

Malnutrition decreases dam’s immune function and can cause offspring to be immune impaired

Affects foetal programming which can affect the risk of disease later in life
Reproduction: Queens Energy (calories/kcal)

* Queens: energy intake and wt gain increase **linearly** from conception to parturition
* Increase 25 - 50% above MER or up to 70% above!
* Kcal: 100-120 kcal/kg/d
Cats Pregnancy & Lactation
Energy

* Increase in weight during gestation
  * Early gain not just foetal growth
  * Increase in body fat for later energy
* Need high energy diet early in pregnancy (unlike dogs)
* Need high quality, high energy diet to make milk during lactation
* Feed a growth (kitten) diet
Nutrients for Gestation and Lactation
Compared to maintenance, dams need:

* Increased protein
* Increased calcium and phosphorus
* Ca:P ratio of 1:1 to 1.5:1.
* Linoleic acid and arachidonic acid essential for cats
* Omega-3 fatty acids (DHA): role in neural, retinal and lung development during in utero
* Carbohydrates help to make lactose (milk sugar)
Protein for Gestation

- Suboptimal protein levels:
  - Reduce wt gains & result in smaller litters
  - Higher neonatal mortality
  - Lowered immunocompetency
  - Kittens with abnormal behaviours & poor locomotion
- Protein levels (w/ good amino acid profile)
  - Queen: 35% to 50% DMB (7.5 g/100 kcal)
  - Taurine required
Protein for Lactation

* Queen increases protein synthesis for milk protein (~36% or higher DMB)

* Inadequate amounts reduce kitten growth
Feeding reproducing queens

* Imbalances may be inadvertently caused by breeders or owners as they
  * add supplements
  * feed maintenance diets
  * or feed home-made diets
Colostrum

- Provides nutrients, growth factors, digestive enzymes and maternal immunoglobulins
- Passive and local immunity
- Should get colostrum within first 12 hr of life, especially for IgG
- Milk provides cytokines, memory cells, and antiviral enzymes (lactoferrin, lysozyme) and antibacterial factors
Using Milk Replacers for Orphans or Insufficient Lactation

* Foster if possible
* **Milk replacers should closely replicate dam’s milk**
* Other species’ milk: not complete for kittens
  * Cow’s milk: lower in protein, fat and minerals than queen's & has insufficient taurine
* Goat's milk has no nutritional benefits cv with cow's milk
* Homemade formulas: best reserved for short-term or emergency use
* Learn how to tube feed
Growing Kittens
Post-weaning

* Usually start eating dam’s food at around 3 to 5 wk
* Rapid growth until around 5 months
* Slows as kitten reaches 80% of adult size (~9 mo)
* Most cats reach skeletal maturity by 1 yr
* Additional weight after skeletal maturity is muscle (if BCS is ok)
Growing Kittens Post-weaning Nutrients

* **Energy**
  * 8 wk old kittens 3x RER
  * 50-80% adult wt: 2.5x RER
  * 80% adult wt 1.8-2 x RER
  * Need increased calories but keep BCS at 5/9

* **Protein**
  * Kittens: 28-30% DM (70-75 g/1000kcal)
Feeding Growing Kittens

- Need increased calcium/kg cv adult
- Ca: Phos ratio of 1:1 to 1.5 :1
- Feed a food for growth
- Don’t supplement a complete & balanced diet
Feeding Growing Kittens

- No specific requirement for carbohydrates (but can digest them)
- Usually can be fed free choice or frequent feeding
- Less tendency for DOD due to rapid growth
- Milk is not necessary & can cause diarrhoea
- High protein requirements, and require animal protein
Kitten Diet Sensitive Diarrhoea

* Can be due to transitioning to food or new food – transition slowly
* Treats or inappropriate foods
* Use a highly digestible diet
* Chicken only?
## Chicken Only Diet

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>% of Requirement</th>
<th>Amount (per Mcal)</th>
<th>Requirement Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>216.8%</td>
<td>135.512 g</td>
<td>(62.5 to [no max] g)</td>
</tr>
<tr>
<td>[511] Arginine</td>
<td>378.2%</td>
<td>9.456 g</td>
<td>(2.5 to [no max] g)</td>
</tr>
<tr>
<td>Histidine</td>
<td>529.3%</td>
<td>4.045 g</td>
<td>(0.75 to [no max] g)</td>
</tr>
<tr>
<td>[503] Isoleucine</td>
<td>521.6%</td>
<td>6.468 g</td>
<td>(1.24 to [no max] g)</td>
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<tr>
<td>Leucine</td>
<td>394.1%</td>
<td>11.546 g</td>
<td>(2.93 to [no max] g)</td>
</tr>
<tr>
<td>Lysine</td>
<td>1503.9%</td>
<td>12.783 g</td>
<td>(0.85 to [no max] g)</td>
</tr>
<tr>
<td>Methionine</td>
<td>901.2%</td>
<td>3.375 g</td>
<td>(0.43 to [no max] g)</td>
</tr>
<tr>
<td>[1001013] Methionine-cysteine</td>
<td>642.0%</td>
<td>5.457 g</td>
<td>(0.85 to [no max] g)</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>470.6%</td>
<td>5.411 g</td>
<td>(1.15 to [no max] g)</td>
</tr>
<tr>
<td>[1001017] Phenylalanine-tyrosine</td>
<td>238.8%</td>
<td>10.507 g</td>
<td>(4.4 to [no max] g)</td>
</tr>
<tr>
<td>Taurine</td>
<td>0.0%</td>
<td>0.000 g</td>
<td>(0.5 to [no max] g)</td>
</tr>
<tr>
<td>Threonine</td>
<td>427.1%</td>
<td>6.406 g</td>
<td>(1.5 to [no max] g)</td>
</tr>
<tr>
<td>Tryptophan</td>
<td>413.7%</td>
<td>1.531 g</td>
<td>(0.37 to [no max] g)</td>
</tr>
<tr>
<td>Valine</td>
<td>448.1%</td>
<td>6.586 g</td>
<td>(1.47 to [no max] g)</td>
</tr>
<tr>
<td>Total lipid (fat)</td>
<td>207.6%</td>
<td>46.715 g</td>
<td>(22.5 to [no max] g)</td>
</tr>
<tr>
<td>18:2 undifferentiated</td>
<td>638.1%</td>
<td>7.976 g</td>
<td>(1.25 to [no max] g)</td>
</tr>
<tr>
<td>20:4 undifferentiated</td>
<td>2937.3%</td>
<td>0.441 g</td>
<td>(0.015 to [no max] g)</td>
</tr>
<tr>
<td>Carbohydrate, by difference</td>
<td>0.0%</td>
<td>0.000 g</td>
<td>(0 to [no max] g)</td>
</tr>
<tr>
<td>Biotin</td>
<td>69.1%</td>
<td>405.575 mg</td>
<td>(587.081 to [no max] mg)</td>
</tr>
<tr>
<td>Choline, total</td>
<td>69.1%</td>
<td>405.575 mg</td>
<td>(587.081 to [no max] mg)</td>
</tr>
<tr>
<td>Folate, DFE</td>
<td>14.1%</td>
<td>28.243 mcg_DFE</td>
<td>(200 to [no max] mcg_DFE)</td>
</tr>
<tr>
<td>Niacin</td>
<td>349.4%</td>
<td>34.937 mg</td>
<td>(10 to [no max] mg)</td>
</tr>
<tr>
<td>Pantothentic acid</td>
<td>510.0%</td>
<td>7.343 mg</td>
<td>(1.44 to [no max] mg)</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>105.6%</td>
<td>1.056 mg</td>
<td>(1 to [no max] mg)</td>
</tr>
<tr>
<td>Thiamin</td>
<td>38.4%</td>
<td>0.537 mg</td>
<td>(1.4 to [no max] mg)</td>
</tr>
<tr>
<td>Vitamin B-12</td>
<td>40.1%</td>
<td>0.002 mg</td>
<td>(0.006 to [no max] mg)</td>
</tr>
<tr>
<td>Vitamin B-6</td>
<td>410.7%</td>
<td>2.587 mg</td>
<td>(0.63 to [no max] mg)</td>
</tr>
<tr>
<td>Vitamin E (alpha-tocopherol)</td>
<td>10.7%</td>
<td>1.017 IU, Vit E</td>
<td>(0 to [no max] IU, Vit E)</td>
</tr>
<tr>
<td>Vitamin K (phyloquinone)</td>
<td>88.1%</td>
<td>0.022 mg</td>
<td>(0.025 to [no max] mg)</td>
</tr>
<tr>
<td>Calcium, Ca</td>
<td>3.8%</td>
<td>0.057 g</td>
<td>(1.48 to [no max] g)</td>
</tr>
<tr>
<td>Chloride</td>
<td>0.0%</td>
<td>0.000 g</td>
<td>(0.29 to [no max] g)</td>
</tr>
<tr>
<td>Copper, Cu</td>
<td>2.4%</td>
<td>0.305 mg</td>
<td>(1.25 to 7.1 mg)</td>
</tr>
<tr>
<td>Iodine</td>
<td>0.0%</td>
<td>0.000 mg</td>
<td>(0.125 to 2.8 mg)</td>
</tr>
<tr>
<td>Iron, Fe</td>
<td>30.5%</td>
<td>6.101 mg</td>
<td>(20 to 355 mg)</td>
</tr>
<tr>
<td>Magnesium, Mg</td>
<td>136.0%</td>
<td>0.136 g</td>
<td>(0.1 to [no max] g)</td>
</tr>
<tr>
<td>Manganese, Mn</td>
<td>9.5%</td>
<td>0.119 mg</td>
<td>(1.25 to 24.5 mg)</td>
</tr>
<tr>
<td>Phosphorus, P</td>
<td>98.1%</td>
<td>1.226 g</td>
<td>(1.25 to [no max] g)</td>
</tr>
<tr>
<td>Potassium, K</td>
<td>104.3%</td>
<td>1.565 g</td>
<td>(1.5 to [no max] g)</td>
</tr>
</tbody>
</table>
Diet Sensitive Diarrhoea

* Number of meals/day influences stool consistency, e.g. feed 4 + meals per day
* Check if kittens are being fed cow’s milk (e.g. lactose intolerance)
* Anecdotally, sometimes changing from dry to canned food can help kittens’ stool quality
Old Age

* Geriatric – last 1/3 of expected life?
* Breed differences in cats
* Cats:
  * Adult from 1-7 years
  * Senior from 7–11 years (active maturity)
  * Geriatric at 12+ years
Influencing Ageing

* Environmental effects have a great impact on longevity
* Areas we can influence
  * Housing
  * Medical attention
  * Diet: body and muscle condition, mentation, mobility, treating disease
Ageing, Body Weight and Composition

* Cat gain weight from 1 to about 7 years
* After 12 years, cats are more likely to lose weight
* Both fat & lean tissue as well as body weight decreases
* By 15 years, cats have mean lean tissue less than 2 kg; 1/3 less than the mean of 3 kg during the adult age
Changes in Weight and Body Composition

* Speed of LBM & wt decline is a predictor of time of death
* LMB and wt loss occurs from:
  * Secondary to chronic inflammation/disease, e.g. cancer, CKD, CHF, DM
  * Reduced physical activity, ageing CNS, decreased motor units, circulating GH, testosterone & oestradiol
  * An additional contributing cause can be an inadequate intake of energy and/or protein

LBM loss is more important than fat loss as it increases morbidity and mortality
* For example, many cats with DM were previously overweight & then lose muscle mass = ventrally displaced weight (aka “body drop”)

* Weakness, weight loss, & poor quality of life

* These can contribute to an owner’s decision to euthanize so are critically important
Diagnosing Muscle Loss
WSAVA.org Muscle Condition Score
Treatment of Cachexia & Sarcopenia
Stimulating Appetite

* Treat dental disease
* Rotating flavourful foods or use flavourings on foods
* Accessible food bowls
* Mirtazapine has both appetite stimulating and anti-emetic/anti-nausea effects
* Cyproheptadine but not with mirtazapine
Senior diets vary greatly in calorie density (kcal/g)
Calorie content not required on European labels
Can be roughly estimated from the macronutrients (fat, protein on label, calculate CHO)
PFMA.org.uk has a website tool for calculation
Or obtained from some manufacturers
* Sufficient and probably increased amounts of highly digestible protein should be fed to most older cats
* Only restrict protein in IRIS Stage 2 to 4 CKD and HE
* Many cats >15 have decreased protein & fat digestibility compared to younger cats
* Older humans resist anabolism and need extra protein for muscle synthesis
Many older cats have a CE similar to IBD w/o V+ or D+

Consider highly digestible food, added cobalamin and folate, vitamin E, pre- and/or probiotics

Role of gut microbiota?
What Can We Do for Cats with Weight and Muscle Loss?

* Awareness and earlier diagnosis
* Monitoring weight, BCS & MSC
* Higher calorie, highly digestible diet with ample protein
* Consider supplementing with omega 3 fatty acid (fish oil), cobalamin, folate vitamin E, pre- and probiotics
* Appetite stimulants
* Watch for new treatments, ensuring safety & efficacy studies have been done in cats
The End (from Jack, Ella and me)