

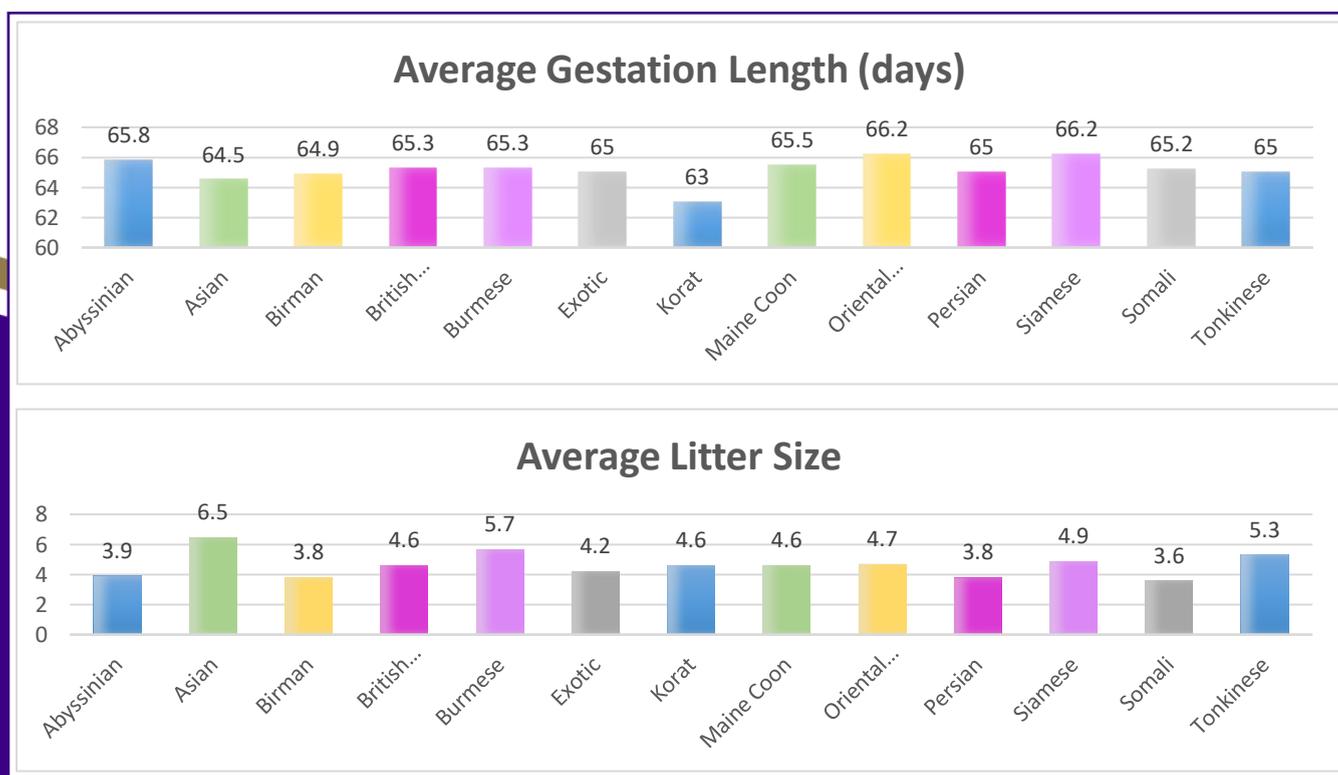
FOCUS ON BREEDING

Pregnancy in a cat

Pregnancy usually lasts for an average 65 days (range 61-67 days) following the first mating. It's a time of rapid change and growth; understanding some of the main changes can be helpful in appreciating the changing needs of the queen during these 9 weeks.

Litter sizes will vary depending on the breed of cat. For example an average-sized Burmese litter may be expected to be around 5 kittens although 8 or 9 kittens are not uncommon. Did you know that the size of a litter can influence the length of gestation? Larger litters are often associated with a shorter gestation time (see Burmese & Asians) whereas smaller litters or single kittens may be associated with a longer gestation as with the Somali. This may be partly due to weaker uterine stimulation, (although the Egyptian Mau has a longer gestation period of around 65-70 days and their average litter size is 4 to 5 kittens). Other factors known to influence litter size are the reproductive age and stage of development, hereditary factors, the presence of disease, bacterial infection, trauma and the nutritional status of a cat. Stress can also play its part.

Below, you can see how a sample of 14 breed groups in the UK. (1)



Fertility and Conception - some facts:

- Entire Burmese females can come into call from around 4-5 months of age!
- Cats are polyoestrus - they are highly fertile as a species having multiple 'heats' in a year.
- Cats are induced ovulators. It may take several matings, (ideally close together) to stimulate the release of hormones responsible for triggering ovulation.
- After ovulation, the queen generally goes off heat within 2 days.
- The first observed mating may not necessarily be the first successful mating.
- Some females have very long heat cycles (up to around 21 days) when early mating may not produce ovulation even though they may be otherwise receptive to the tom.

Around 10% of queens between weeks 3-6 of pregnancy can experience oestrus activity although it is uncommon for these cycles to be fertile.

- Endocrine tissues play an important role in feline reproduction. The pituitary gland produces gonadotropic hormones which trigger the release of follicle stimulating hormone (FSH) and luteinizing hormone (LH) which act to control ovarian function.
- A cat's uterus has 2 horns and a uterine body (bicornuate).
- The 'zonary' placenta forms a girdle-like band around the foetus.

Recognising Pregnancy

One of the first physical indications that a queen may be pregnant is at around 21 days after the first mating when the queen's nipples become visibly pinker, enlarged and the hair around them recedes. In a maiden queen this sign is usually more obvious. At this time also it is possible to palpate the grape-sized foetal structures in the abdomen (with experience - these can be detected up to around 35 days after which their increased size makes them less obvious individually).

The queen's behaviour and 'voice' may also change with the onset of pregnancy but this is not always the case. I have a roly-poly, high-pitched squeaker who is 7 weeks pregnant as I write!

Weight Changes

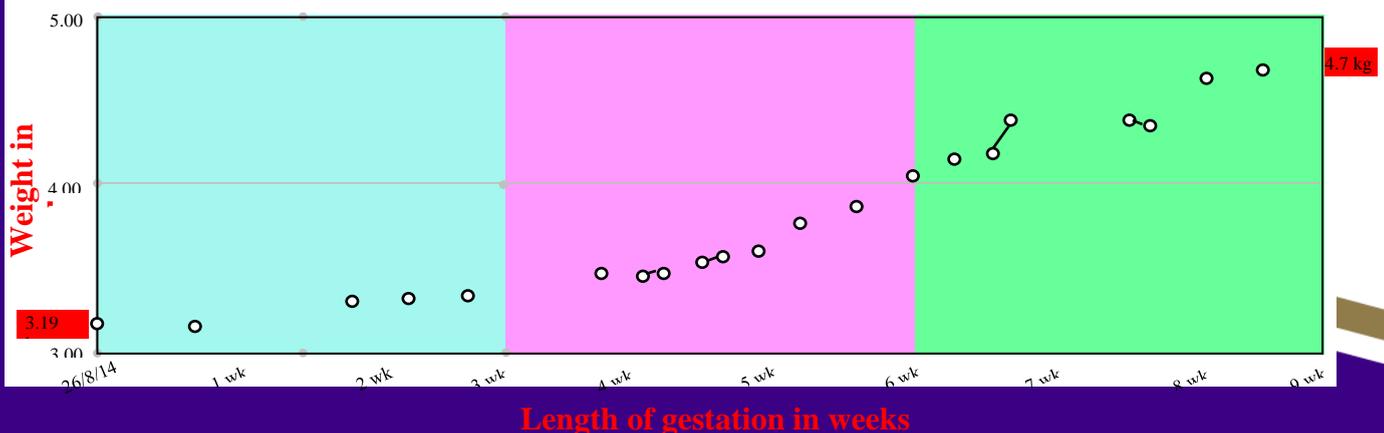
Weight steadily increases soon after mating but the greatest rate of change is seen during the 2nd trimester. A queen can be expected to gain around 40% of her pre-pregnant weight during these 9 weeks.

Below is a chart I made in October last year as an illustration. This shows an increase of approx. 46% on pre-pregnancy weight (resulting in 8 kittens), with the greatest increase during weeks 4-7 inclusive. Interestingly, the same girl (pictured below) is pregnant again and showing an almost identical profile at each point.



Champion Barbizon St Kitts shown seven weeks pregnant gave birth on the 25th September 2015 to six kittens.

Weight during pregnancy (64 days)



Important events during pregnancy

Looking at the pregnancy in trimesters, I've outlined some of the main changes and the key times when these changes occur or can be detected; these are illustrated with ultrasound and X-ray images where available.

Pro-oestrus	Pro-oestrus period lasts between 12 hours and 3 days. Behavioural changes include rolling, rubbing against objects, increased affection and vocalisation although the queen is not yet fully receptive to the tom cat.
--------------------	--

Implantation



Days 1-7	<p>Oestrus period - Estradiol hormone levels increase causing behavioural oestrus as follicular activity peaks. Queen comes into full mating behaviour and becomes receptive to tomcat.</p> <p>Mating triggers release of Gonadotropin releasing hormone (GrRH), which binds to receptors in the pituitary and controls release of LH and FSH.</p> <p>Ovulation occurs 24-36hrs after mating - fertilised ova remain in oviduct for 4 days. Oocytes (immature eggs) are released at 5 days.</p> <p>Corpus luteum (CL) produces progesterone supporting foetal implantation and growth.</p>
8-14	<p>Embryos position in uterine horns around 11 days.</p> <p>Implantation occurs between days 11-14.</p> <p>Embryonic kittens can be detected by ultrasound as early as 14-15 days (with skill!) as small swelling of 5-9mm diameter in the uterine horns.</p> <p>Queen may feel nauseous and lack appetite during early period in pregnancy.</p>
15-21	<p>At around 16 days foetal heartbeat can be detected by ultrasound (average 230bpm; range 193 - 263bpm).</p> <p>Embryonic foetuses can be detected by palpation at 21 days (range 17-25 days). They are small grape-sized structures of about 30mm diameter.</p> <p>At 3 weeks they have optic cups, limb buds and a small opening (mouth) in head.</p> <p>Relaxin hormone is secreted by placenta 20-3- days after mating. Mammary glands 'pink up' at 21 days.</p> <p>Superfetation (oestrus activity) may be seen around day 21-24.</p>

After fertilisation, the first division takes place 60 to 68 hours after coitus. These first cells are called blastomeres. After that first division, there will be a division every 10 to 14 hours as the foetus continues to grow.

Development

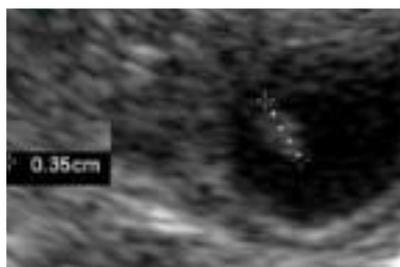


<p>Days</p> <p>22-28</p>	<p>Queen gains significant weight during weeks 4-6. Abdominal distension is visible to flank by 28 days.</p> <p>Vocal change in the queen is often noticeable at around 4 weeks.</p> <p>Prolactin (produced by anterior pituitary) increases from day 25.</p> <p>+/-4 weeks - forearms, rear digits and the start of a tail form. Dark pigment indicates position of eyes and holes appear where ears will develop.</p> <p>The heart and intestinal structures are present but the abdomen has not yet fused along the midline.</p> <p>Heartbeats can be detected by stethoscope at 25-28 days. Foetal size is around 40-50mm diameter at 4 weeks.</p>
<p>29-35</p>	<p>Opaque cartilage forms the frontal plates of the skull.</p> <p>Spinal cord, muzzle, nose, ear flaps start to develop from 4 weeks.</p> <p>Foetal organs can be detected by ultrasound from 30 days onwards and movement at around 32 days.</p> <p>Calorific requirement of the queen increase by 1/3 to around 370 kj per kg bodyweight.</p>
<p>36-42</p>	<p>By 5 weeks the ribs start to calcify.</p> <p>Digits separate and tiny paw pads and claws are formed.</p> <p>Skin thickens slightly and whiskers start to merge. Gender can be detected by ultrasound from 38-43 days.</p> <p>Progesterone levels in the queen are at their peak between 30-50 days. Again, signs of oestrus behaviour may be seen in week 6!</p>

Ultrasound Scans



Ultrasound images to show early development at 23 days.



At length of 3.5mm.



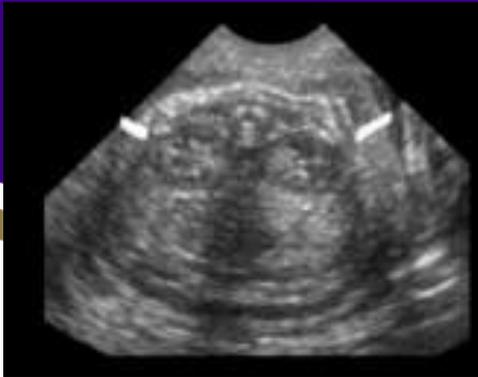
Ultrasound scan at 27 days.



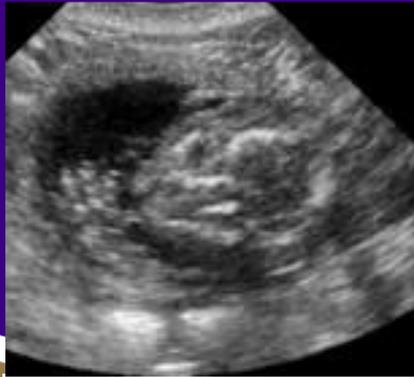
Ultrasound scans showing the position of fetuses on both horns.



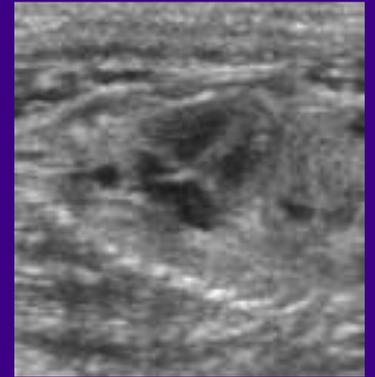
Growth by 5 weeks.



Kitten's developing kidneys.

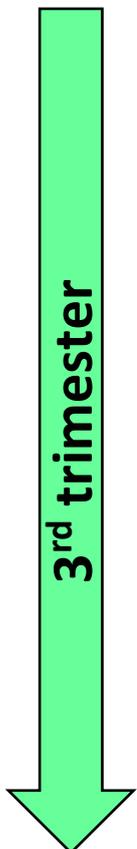


Head and front limb.

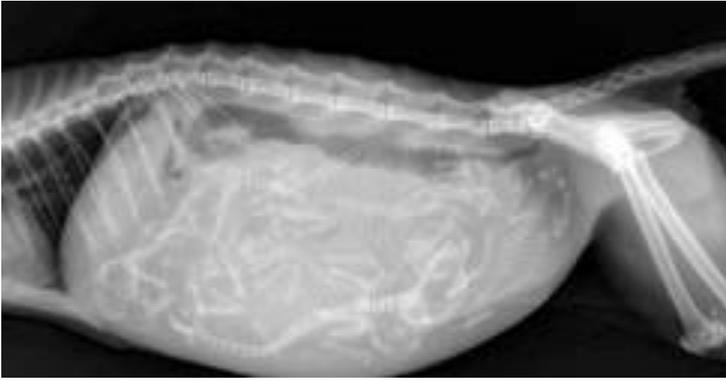


4 chambers of kit's heart.

Growth



57-65	<p>The ears become bigger and the inner ear is formed, but is still of cartilage.</p> <p>The tail grows longer. The alveoli are developed and the pituitary gland becomes lobed. In the intestines the intestinal villi are growing. The eyelids are complete and present although closed. Pigmentation is visible.</p> <p>The embryo is now between 65 to 125 mm.</p>
50-56	<p>Protruding tongue and skin folds in the arm & groin indicate rapid growth. Pigmented body hair sprouts from follicles.</p> <p>Kittens are almost completely formed by 8 weeks.</p> <p>Significant foetal activity can be seen and felt as undulating movements in the queen's abdomen.</p> <p>Mammary development increases during last 2 weeks.</p>
57-65	<p>Prolactin levels reach pregnancy peak - partly stimulated by increased oestrogen (levels increase dramatically again after parturition).</p> <p>During the last week of pregnancy, the queen develops nesting behaviour, often becoming restless and vocal and looking for places to hide.</p> <p>In the queen, glandular tissue becomes enlarged as milk comes in. Growing foetal size triggers birthing event at around 65 days.</p>



Radiograph showing skeletal development of 6 kittens. (image: www.eastcentralvet.com)



Radiograph showing 8 kittens in a Siamese cat just before birth.

Medication and Vaccinations

Most drugs are not licensed for use in pregnancy (they have not been tested to understand their effects) but may variously cause miscarriage, abortion or birth defects. Developing foetuses have little or no ability to metabolise or excrete drugs and the concentration to which they are exposed may be higher than that of the queen if she is given medication herself. The queen's own tolerance to drugs may also be affected during pregnancy. It is therefore generally recommended to avoid giving medication during pregnancy.

All breeding cats should be vaccinated against feline infectious enteritis (FIE) and the respiratory viruses (FCV, FHV) and these vaccinations should be current (2). Transferred immunity may be boosted by (early) vaccination prior to mating. Protection is passed to the kittens during the first 18hrs following the birth through MDA's in colostrum. Vaccination during pregnancy is not recommended.

The stages leading up to a successful mating and the anticipation during a pregnancy can seem like a long time but the birth of a healthy litter is the ultimate reward for any breeder. Now the fun really starts!

Juanita Sharp
Barbizon Burmese 2015

Further reading suggestions

The GCCF website has lots of interesting and informative information www.gccfcats.org.

Feline reproduction:

Problems and clinical challenges. *Journal of Feline Medicine and Surgery* (2011) 13, p508-515

"Practical Guide to Cat Breeding" produced by Royal Canin.

(1) Chart to show gestation length & litter size based on results taken from a questionnaire-based study of gestation, parturition and neonatal mortality in pedigree breeding cats in the UK published by the *Journal of Feline Medicine and Surgery*, June 2006. Sample size was 1056 litters (14 breed groups - Rex represents combined Rex breeds).

(2) FeLV vaccination may be required in addition to core vaccines.