

Neonate care: Hand-rearing new-born kittens

Devna Arora

Similar guidelines may be used for hand-rearing non-domestic Felids. Care must be taken to minimize imprinting and handling must be restricted to 1-2 keepers



With recently rescued orphaned kittens
Photograph clicked by Varsha Belagavi

Kittens that require hand-rearing

Young kittens are most commonly found as people stumble upon the queen's hiding/nesting place while she is away foraging. Such kittens are often mistakenly picked up as orphans. Kittens that appear healthy and clean are certainly being cared for and the mother will return to them. If the kittens appear to be cold or are at risk of becoming hypothermic, you may put them in a shallow cardboard box and place them on some warm bedding but refrain from shifting them around as the mother will have difficulty in locating them.

Kittens that appear scraggy and emaciated are quite likely orphaned or have been separated from their mother. It could also be that the mother is in too poor a condition herself to feed the kittens adequately. Once the mother returns, the kittens and the mother may both be given supplemental feeding. If not, the kittens must be hand-raised.

Neonate care: Hand-rearing new born kittens

Young kittens may be orphaned as a consequence of losing their mothers which could be due to parturition or road accidents. It is also not uncommon to find an entire litter that has been abandoned by humans. Rarely, a kitten may be too weak to suckle or may not be accepted by the mother. Such kittens will require your assistance and will need to be hand-fed. Sick or unfit kittens may be rejected by the mother – in addition to care, such kittens will require veterinary attention. Often, the mother may accept the kittens after a few days or the kitten regains sufficient strength to suckle without help. In all other instances, the kitten must be cared for.

Cross fostering



Mother with new-born kittens

Cross-fostering is a technique commonly used to foster non-biological offspring where orphaned young are offered to lactating mothers with kittens of her own. Due to a surge of maternal hormones during lactation, most females readily accept introduced babies and will care for them as attentively as she would her own. It is ideal for new-born young to be fostered by another mother if you know of any lactating females with kittens of her own. Mothers that do not readily accept an orphaned kitten must never be forced to do so and the kitten must be hand-reared.

Guidelines for the hand-rearing and care of neonates

New-born babies must be handled very gently as they are extremely delicate and can be easily injured. It is therefore advisable for the young to be handled and fed by experienced people alone. They also require a considerable amount of time and attention and you must only take them home if you are able to commit to their care, if not, they must be shifted to an appropriate facility.

The umbilical cord

In most instances, the mother will chew up the umbilical cord after birth requiring little intervention on your behalf. In rare instances, you may find a kitten with the cord attached and you might be required to have the cord cut but it would be advisable to seek help from a veterinarian to do so. The cord must be cut with sterile equipment as using unsterile equipment will only lead to infections.

The cord usually dries up and falls off on its own in a couple of days and the scab too drops off by itself within a week or a maximum of 10 days. The navel is prone to infections until the cord completely dries up. It is crucial to keep the kittens and their bedding extremely clean and dry in the meanwhile.

In most cases, it is absolutely unnecessary to interfere but if required, *Calendula*, *Neosporin* or *Betadine* powder [or any appropriate antiseptic powder used for dressing wounds] may be sprinkled lightly on and around the cord a couple of times a day. In addition to forming a protective layer over the cord, the powder will absorb the moisture and allow the cord to dry up without any infections.

Hygiene

Young animals have underdeveloped immune systems and are extremely susceptible to infections. It is vital to maintain very high standards of hygiene when handling the young. Orphaned animals are at a further disadvantage of not having received their mother's milk, and hence the maternal anti-bodies, and need special care in terms of handling and hygiene.

Neonate care: Hand-rearing new born kittens

It is essential to always wash your hands thoroughly before handling the kittens especially when they are under 4-6 weeks of age. It is important to clean your fingernails after cooking or eating food, chillies, pickles, *chiwda* (a spicy, savoury mix), etc. as the spices get caught under the nails. Fingernails must be kept trimmed when handling neonates. Owing to their small size, the hands and nails inevitably come in contact with their eyes while handling the kittens, thereby, unintentionally scratching them or smearing the eye with spices that may burn or irritate the eye intensely. Also wash your hands thoroughly after touching any harmful chemicals like mosquito mats, insecticides, bleach, etc.

Although rare, it is important to keep in mind that the kittens may have been infected with rabies, especially if the origin of the kittens is unknown. You must therefore follow high levels of both personal hygiene and safety for the first two weeks. It is important for your safety that you do not permit biting/teething or sucking on your hands for the first two weeks. In case of a bite, contact a doctor or veterinarian immediately and follow the necessary treatment.

N.B. Once the kittens start teething and playing, they will naturally want to chew on everything. They may enjoy biting/chewing on your hands as it will give their teeth/gums some relief. Do not confuse this with aggression or rabies. This is a natural stage in the growth and development of the kitten's life.

Hypothermia

Animal young have higher basal body temperatures and should feel warm on touch. Prolonged exposure to the cold can result in hypothermia, a condition in which the body temperature falls substantially below normal and can prove to be fatal. Thermoregulation is poorly developed in young infants and they are unable to produce body heat to warm up. Consequently, rescued neonates are often in a hypothermic state when found. Even though thermoregulation develops by the time the kittens are densely furred, injured and sick kittens may require an external heating source to maintain their body temperatures until they recover and regain their strength.

Heat stress

If the kittens have been separated for a longer duration and are in a warm location, their body temperatures are likely to be elevated beyond normal. Thermoregulation being poorly developed, the kittens will be unable to cool themselves down either. It is important to first slowly bring down the young one's body temperature by placing them in a cool and well-ventilated area. They can also be offered a cold (mildly cold, never chilled) hydration formula as it helps in hydrating the young and bringing down their body temperature.

N.B. The young must never be either cooled or warmed too quickly.

Dehydration

Water constitutes a high percentage of body weight in young animals and they get dehydrated easily when not given suitable feeds or fed at regular intervals. Due to the time lag between having separated from their mothers and having been found and reached a rehabilitator, most young animals are quite dehydrated when they first arrive at rescue centres. The young can easily withstand the lack of food for a day but will not survive if dehydration levels peak.

Dehydrated young are unresponsive and listless. Their skin appears wrinkled; they have a weak grip and are unenthusiastic to feed. The Skin Turgor test, commonly referred to as the Tent Test, can be used to test the young for dehydration. Gently pinch a small amount of skin on the kitten's back, to form a tent, then let go. The skin quickly goes back down to normal when well hydrated, but takes longer to go back to normal, making the "tent" evident when the young are dehydrated.

A very hot hot-water bottle must never be used for the young as it dehydrates them very quickly. The ambient temperature in the box can be gauged by placing your hand in the box five minutes after placing the hot-water bottle. If the box feels too warm and uncomfortable, the warmth of the bottle should be reduced immediately and the box ventilated to bring down the temperature.

Re-hydration

An Oral Rehydration Solution (ORS) must be used for dehydrated kittens. Lactated Ringers and Pedialyte are excellent oral rehydration solutions and are advisable for cases of severe dehydration. A homemade oral rehydration solution can be made using 1 litre of water, 1 teaspoon of salt and 3 teaspoons of sugar, but must only be relied upon as a last resort as it cannot replenish other essential salts received through Lactated Ringers or Pedialyte. A home-made Pedialyte solution may be used but must be prepared cautiously and preferably in consultation with a veterinarian.

Although the kittens must solely be offered a rehydration solution when they are severely dehydrated, they can be offered a diluted feed if they appear to be mildly dehydrated. Feeds can initially be begun with a ratio of 60:40 feed and water and a teeny pinch of electrolytes, e.g., Electral powder. The electrolytes must be discontinued when the kittens start to appear hydrated. Smaller and frequent feeds must be offered to the kittens until their hydration levels reach normal and normal feeds must only be begun once the kittens are adequately hydrated.

Water and Digestion

The kittens must always first be re-hydrated before putting them onto a regular feed as rehydration and digestion are both mutually exclusive processes. Water is not only a prerequisite for digestion but also enables the body to perform other vital functions. When food is introduced into the stomach, the stomach draws out water from other cells of the body to aid the process of digestion. Even a dehydrated body will give up fluids to aid digestion, leaving the body further depleted of fluids. Water in the stomach is only absorbed after it reaches the small intestines and proves to be insufficient to refill the deficit that has already been created. The digestive demands made by food thus cause a further depletion of body fluids and exacerbates dehydration which can prove to be fatal for the young if not addressed immediately.

Handling small kittens



Holding small kittens

Photograph clicked by Kamalakannan Manokaran

The kittens must be completely supported every time they lifted or carried. Kittens that are supported inadequately will inevitably wriggly due of discomfort and hurt themselves. Smaller kittens may be held in one hand while bigger or older kittens must be held in both hands and preferably, held against the chest for additional support.

Children may be allowed to assist in the care of the kittens (domestic species only – species under rehab must be handled by minimally) but only under adult supervision and they must be carefully taught how to hold, handle and care for the kittens. Young kittens may be especially wriggly and children must always be seated before holding the kittens.

In my experience, allowing children to be involved in the care of young kittens not only gives you an extra pair of helping hands but it also instils a sense of responsibility in the child and encourages a deep and special bonding between the child and the kitten.

Housing new-born kittens

The kittens must always be housed in a warm, dark and quiet place. Kittens under 3 weeks of age can be housed in a cardboard box or a deep basket as it is easier to keep them warm in an enclosed space. Being in a contained space also keeps the kittens from crawling away.

Neonate care: Hand-rearing new born kittens



Housing new-borns in a dark space
Devna Arora



Devna Arora



Kamalakkannan Manokaran

A box that is approximately 2-3 feet in length and breadth will comfortably house a litter of new-born kittens for the first couple of weeks of their life. The box should be at least 1 ½ foot high as the bedding and hot-water bottle will take up nearly half a foot. The top of the box needn't be closed shut but may be kept sufficiently open for ventilation. The hot-water bottle must be placed under the bedding to one side of the box, leaving the remainder of the box without the warmth of the bottle. This allows the kittens to shift around the box depending upon the amount of heat each of them requires.

The kittens, especially neonates, must be kept over a warm blanket. Another piece of cloth, which will be easier to replace once soiled, may be placed over the blanket as it is inconvenient to change the blanket every time it is soiled.

Neonate care: Hand-rearing new born kittens

New-borns may often prefer to be covered for the first few days of their life as it keeps them warmer. Leave a raised portion of the blanket for the kittens to crawl under – they should be able to move freely under and away from the raised hood. There must also be enough space for them to resurface if they feel the need to do so.



Tucked in under a fold of cloth
David Legnon

Kittens from the same litter must always be housed together. They must only be separated if one is suspected to have an infection that may spread to the others. Kittens from different litters may be kept together but only after they have been quarantined. Young kittens are especially vulnerable and must not be exposed to avoidable infections.



Keeping the kittens together not only keeps them warm but also gives them a sense of reassurance. Kittens, when alone, may prefer soft toys around them as it gives them a feeling of having someone nearby. Most kittens become quite attached to their toys, often playing with and sleeping on their toys until they are a few months old.



Kitten sleeping with his stuffed toy
Rodrigo Trovão

Housing older kittens

Older kittens needn't be housed in boxes at all – they can be housed just as you would an older cat but preferably in a constricted space until they are 3-5 weeks old so they don't run out of sight and get into dangerous places. They must have access to the little tray as they will instinctively attempt to use the tray once their eyes open. Their space may be barricaded using cardboard boxes, wooden planks, etc. Kittens are likely to try and climb over the barricade and you must ensure that nothing can dislodge and fall over the kittens.

Kittens of this age are normally only active during meal times. They eat, play for a while and go off to sleep again until their next meal time. They must be given free space to play and run around the house when they are awake and returned to their space once they fall asleep.

Kittens beyond 6 weeks of age may be housed just as you would an adult cat. Kittens are also litter trained by this age.

Quarantining or housing individual kittens

If need be, individual kittens may even temporarily be kept in buckets – this is especially helpful when housing sick kittens that must be quarantined from the rest to prevent cross-infection. Shallow tubs must be avoided as kittens tend to crawl out of them.

Neonate care: Hand-rearing new born kittens

N.B. Hands must be washed thoroughly after handling sick kittens and before handling the healthy ones to prevent the spread of infections.



Fleece material, e.g., yellow dust cloth used for vehicles, or woollens must be completely avoided for kittens that less than a month old. The kittens may look for the mother and try to suckle on the fibres of the fleece material in their sleep. In doing so, they can ingest the cloth fibres and choke to death.

A **hot-water bottle**, heating pad or heating lamp is essential for providing external heat for young. If none of these are available, a soda or drink's bottle may be used as a substitute. The hot-water bottle must always be wrapped in at least 2 layers of cloth (or 1 layer of a thick material) before placing the kittens on or near the bottle. The kittens must be monitored closely to prevent either chilling or overheating.



The kittens must never be permitted to come within reach of an uncovered bottle as they can get scorched. Care must be taken to not leave any space for them to crawl under the bottle. To prevent

Neonate care: Hand-rearing new born kittens

accidental scalding, the hot-water bottle and drink's bottle must be checked for leakage each time before use. New hot-water bottles too have been found to be faulty and must be tested intensively before use.

A **quartz alarm clock** too may be used to reassure the young. The ticking of the clock replicates the rhythm of the heartbeat, simulating the mother's presence and reassuring the young. The clock, with the alarm turned off, can be covered in cloth and placed inside the box.

Feeding bottles and syringes

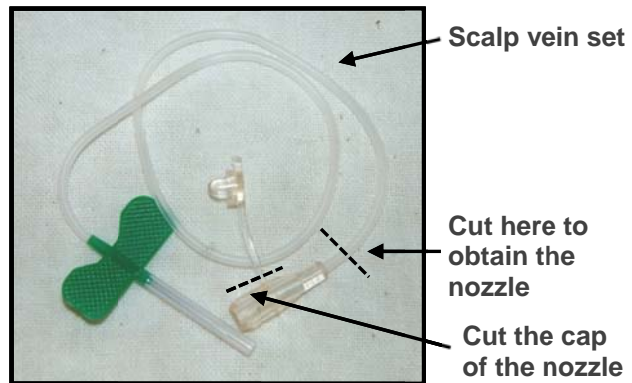
Small sized feeding bottles and teats are readily available at most pet shops and veterinary clinics. These are ideal for small kittens. Unlike milk bottles for human babies, these bottles are soft and pliable making it easier to coax and even force feed kittens that are reluctant to get started themselves.



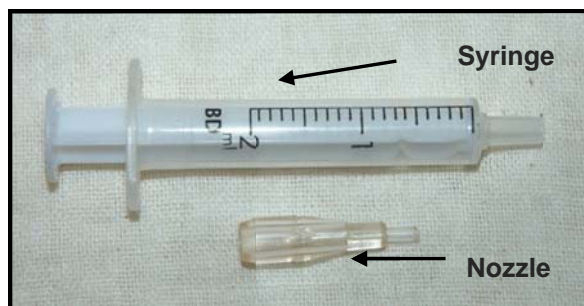
A feeder can be also fashioned either using a pipette or a syringe with an appropriate nipple or the nozzle of a scalp vein set. The syringe should be large enough to hold one entire feed as giving the young a break, even to refill the feeder, often puts them off the remaining of the feed. A 2-5 ml syringe would be ideal for smaller kittens while a larger syringe, 5-10 ml, would be more convenient for older kittens.

Assembling the feeder from a syringe and scalp vein set

1. Cut the part of the scalp vein set that would be attached to the syringe, as per the directions in the photograph alongside, to obtain the nozzle. A 21Gx $\frac{3}{4}$ " scalp vein set is comfortable for the kittens.



2. The nozzle forms a makeshift nipple for the syringe and gives the feeder a softer touch which is more comfortable for the young.



3. Attach the nozzle to the syringe to make a feeder.



Feeders and hygiene

It is extremely important to maintain very high standards of hygiene while feeding the kittens. Toxins from infections in the gastro-intestinal tract can easily seep through the gut wall and cause systemic toxemia or generalized infections in the young as the gut wall of younger animals is much more permeable than it is in adults. The feeders must therefore be sterilized after every meal. A simple steam sterilizer or an ordinary kitchen pan can be used to sterilize the feeders. All parts of the

feeder must be detached and rinsed in clean water, and then immersed in water and boiled for 5 minutes after the water first comes to a boil.

The syringe feeders will need to be replaced periodically especially when using plastic or disposable syringes. The rubber bulb at the base of the plunger of disposable syringes hardens after sterilizing the feeders a few times, jamming the feeders and making them unsafe for use. Consequently, the syringe feeders must be replaced promptly to ensure smooth and safe feeding of the young. Feeding bottles must be cleaned as per the instructions provided and then sterilized after every feed.

Soap must never be used to clean the feeders. The feeders are very small which makes it impracticable to either thoroughly clean them from the inside or rinse them free of soap residue after cleaning. Inadequate cleaning of the feeders would lead to dangerous levels of bacterial growth on the feeders while leaving soap residue in the feeder too would be very harmful for the young. The easiest and safest method of cleaning the feeders is therefore by sterilizing them.

Feed composition

Diet is a crucial factor in the growth and development of the young and it is vital to offer the young a healthy, nourishing and easily digestible feed. A Kitten Milk Replacer (KMR) is ideal for neonate kittens. They are especially manufactured for young kittens, are closest in composition to the mother's milk and therefore easiest to digest. Although it is easily available in all developed countries, KMR is either unavailable or extremely difficult to procure in developing countries, necessitating the formulation of a home-made formula for the kittens.

Formulating an easily digestible feed for the kittens, in my experience, is a little bit tricky. But here are some facts and suggestions which will help you arrive at an appropriate formula. The choice of the formula will depend upon your kitten – some kittens appear to thrive on infant formulas whereas others can be extremely sensitive and require different combinations.

Understanding and choosing the milk base for the formula:

1. The first and foremost thing to remember while making the formula is the composition of the queen's milk – the aim is to substitute a formula closest to this composition.

Percentage of fats, protein and carbohydrates in cat's milk
(Hedberg, G. 2002)

<i>Felis catus</i>	Solids	Fats	Protein	Carbohydrates
g/100 gm	17.7	5	7.2	4.9
% of solids		28	40.5	27.8

Cat's milk is high in fats and proteins when compared to cow or goat's milk, both of which contain less than 4% fat and just over 3% proteins. Both require additional fats and proteins to suffice the nutritional requirements of the kittens.

2. Choose goat's milk over cow's milk – the primary problem with cow's milk is that it is high in the content of lactose which makes it difficult to digest. Goat's milk, although not as easy to procure, contains lower levels of lactose and is therefore easier to digest.
3. Opt for full fat or buffalo milk over skimmed cow's milk – it naturally provides more fat and is suitable for the kittens.
4. Choose human infant formulas (for e.g., Lactogen, Nan or Farex) or puppy milk formulas (for e.g. Esbilac, Lactol) over fresh cow's milk – for reasons unknown, most infants seem to tolerate infant formulas and it is the preferred option when KMR is not available.
5. It is a fallacy to use diluted milk as a formula – people mistakenly believe that using diluted milk will be helpful for animal young. In actual fact, you are further diluting an already insufficient feed and further compromising on the nutritional value of the formula.
6. Refrain from using fresh cow's milk – fresh milk may be used as a last resort but must be supplemented with the enzyme, Lactaid. Often, fish and chicken stock have been preferred over fresh milk. Fresh milk is largely indigestible and must be avoided altogether.

Substituting an appropriate formula:

Before I proceed to suggestions, I must remind you to be judicious in your choice of the home-made formula. Once the kitten has already been offered an inappropriate formula and has indigestion or a bad tummy, she will take longer to settle down and accept a new formula. In such cases, it will be difficult to discern which formula is best as she may still be reacting to a previous formula which may make the current formula seem indigestible. In extreme cases, it may be better to switch her to a rehydrating formula with digestive enzymes and resume with the new formula once she has settled.

N.B. You must consider that the use of unsterilized equipment will lead to a tummy upset due to a bacterial infection. Please ensure the use of sterilized feeding equipment to rule out the only factor you can control.

1. Adding egg yolk – when using simply a combination of egg yolk and milk substitute, it is recommended that egg yolk comprises $\frac{1}{4}$ of the formula. Egg yolk contains many essential minerals and fats which increase the nutritive value of the feed. Egg yolks are also a good source of Taurine which is essential for felines.
2. Use boiled egg yolk instead of raw – Raw eggs can carry the bacterium, *Salmonella Enteritidis*, which can lead to severe food poisoning and pose a serious threat to the young. Pasteurised eggs, if available, may be used raw, but only fully boiled eggs must be used otherwise.
3. Adding fresh curds – curds contain many beneficial bacteria which aid digestion. Adding 10-15% of fresh curds to each feed or alternate feeds, as per the needs of the kitten, is very helpful.
4. Adding infant cereal formulas to aid digestibility – adding infant cereal formulas (for e.g., Nestum) is helpful and recommended but may be best avoided for kittens under the age of a week.
5. Use of probiotics and digestive enzymes – The addition of probiotics and digestive enzymes is crucial for kittens that are being fed milk formulas. Specialized veterinary probiotics, for e.g., Purina's Fortiflora FELINE, Pet Ag's Bene-Bac Plus, Gutwell, or Protexin's Pro-Kolin, Pro-Solubale, Bio-Premium or Professional may be used for the kittens. MillPledge Veterinary's KittyStim may

Neonate care: Hand-rearing new born kittens

be used for new-borns as it also contains colostrum. The next best alternative to veterinary probiotics would be human probiotics like Sporlac, Bifilac, Vibact, etc. that mainly contain the beneficial bacteria, lactobacilli. A pinch of probiotics added to the kitten's feed 2-3 times a day suffices most kittens. Chews like Vetri-Science's UT strength feline, Protexin's Synbiotic chewable tabs, etc. may be given to older kittens and cats.

6. Adding vitamins and calcium – While most kitten milk replacers have sufficient vitamins and minerals, home-made formulas require additional vitamins. Infant veterinary or paediatric vitamin drops can be added but must be done carefully as an excess can cause diarrhoea. Calcium, too, may need to be supplemented in accordance with the formula being given.
7. Adding Taurine – Taurine is an amino acid that is essential for normal vision, heart muscle functioning and reproduction in felines. Felines cannot produce adequate Taurine through metabolic processes and often require supplements for the same. Taurine is primarily obtained through meats, and in the case of kittens, through egg yolk. Supplements must be added if the diet appears to be deficient.
8. Using fish and chicken stock as a base – I have often resorted to fish stock for kittens over 5-7 days old and chicken stock for kittens over 10-15 day old. This is fairly easy for them to digest and brings in added nutrients and fats that are missing in milk-based diets. Ideally, the milk formula may be prepared using fish or chicken stock instead of plain water.
9. Switching to blended/pureed meats – blended meats (fish, chicken and turkey) can be introduced in the feed once the kittens cross 3 weeks of age. Introduce up to 25% per feed, gradually increasing the proportion over the next few weeks until the kittens switch to a meat-based diet. The kittens will also attempt to eat out of a bowl by 3 weeks of age and pureed or mashed meats can be offered to them in a bowl.
10. Using cream, butterfat or mayonnaise to increase the fat content – the use of cream, butterfat and mayonnaise has been suggested and used by many. Please do so very cautiously if you choose to.

N.B. Dosages of calcium, vitamin, probiotics and digestive enzymes will differ according to the size and age of the kitten, the formula being used, the kitten's own digestion and acceptance of the feed and of course, the supplement being used. If unsure, it would be best to consult a veterinarian for the exact dose and frequency.

Using curds and whey (*dahi ka pani*)

Curds are often added to the formula to aid digestion. When absolutely necessary, the kittens can simply be offered whey (*dahi ka pani*) for a couple of feeds until their stomach settles down. Once better, feeding must resume slowly with subsequent feeds being a mix of whey and curd, followed by a combination formula and curd. If excessive water loss is suspected, a pinch of electrolytes must be added to each feed and discontinued once the kitten appears better.

The problem is that warming curd tends to curdle both the curd and the feed. Fresh set curd is ideal for use as it is warmer and easier to mix with a warm feed. The best way to warm curd is to take some curd in a bowl and then place that bowl in another bowl of warm water. This procedure must be repeated twice, the second time with warmer water. This prevents the curd from curdling. Curdled curd must never be used for the kittens.



Feed consistency

Cat's milk contains nearly twice the amount of solids than cow's milk and is therefore of a thicker consistency. The formula must be prepared to a similar consistency and will be thick like a milkshake. New-borns and fresh rescues may be given a slightly diluted formula until they stabilize. The feed must be prepared to the right consistency as thicker feeds provide inadequate water and can prove to be heavy to digest. Diluted feeds, on the other hand, may not provide enough nutrition and would affect the growth and development of the kittens.

Using formula milk

Only boiled water must ever be used to prepare the feed. Refrain from preparing the feed in plastic containers as they are concerns over chemicals like BPA leaking into the formula if stored and heated in plastic containers. A fresh batch of feed must be prepared every day as using stale feed can lead to infections. Feed prepared for the day must be immediately refrigerated upon preparing and only the quantity required per feed must be heated each time. The remainder of the feed must be discarded after feeding the kittens.

N.B. The feed must never be reheated more than once as it promotes bacterial growth and can lead to severe food poisoning.

Feeding kittens

The kittens must always be given a warm (never hot) feed simulating the temperature at which the young would receive milk in nature as it is soothing, easier to digest and they feed better. Cold milk on the other hand must be avoided altogether as it can chill the young and even cause cramps. The kittens must be given small feeds frequently as larger feeds prove to be heavier to digest and longer gaps between the feeds tend to weaken them.



Correct feeding position
Photograph clicked by Saleem Hameed

Neonate care: Hand-rearing new born kittens

The kittens must be fed slowly while maintaining a steady pressure on the feeder and allowing them to suckle. If unsure about how to feed the young, it is safer to drop tiny droplets of milk on their tongue and allow them to lick it. Never use excessive force whilst feeding the kittens if the feeder appears to be stuck – this may happen if the formula hasn't been mixed sufficiently. The feeder must be removed from the kitten's mouth and readjusted until the obstruction has completely been removed before continuing to feed. This prevents accidentally squirting too much feed into their mouth and aspirating the young.

Kittens that refuse to feed

It is normal for all freshly rescued kittens to protest to the feed and the feeder for the first few feeds as they do not recognize it. It is unnatural for them to drink from artificial feeders and they have to learn to accept the new feeder. Once fed appropriately for the first few times, the kittens will readily accept the feeder whereas struggling with the feeder will only lead to negative conditioning and rejection of the feeder.



Recently admitted kittens are reluctant to feed
Photograph clicked by Kamalakannan Manokaran

A kitten must never be fed with force even if it is crucial to keep her alive. It is usually more effective to give the kitten a few drops at a time and then pull the feeder away, giving her enough time to swallow the feed. The feeder must never be pushed into the mouths of kittens that refuse to suckle. Instead, slide a finger in through the side of the kitten's mouth and then offer the feeder (like in the picture above). The

finger can remain in the kitten's mouth if it helps him/her feed. It is just as important to give the kittens some space to move a bit between the drops of feed rather than holding her firm and constricted. Once feeding continues in a pleasant manner, the kitten will soon accept the feeder.

Aspiration pneumonia

The repeated inhalation of either oropharyngeal or gastric contents, for e.g., milk, into the lower airways can lead to an infectious process causing aspiration pneumonia. Aspiration pneumonia is one of the most common causes of mortality in hand-raised animal young and every care needs to be taken to minimize this risk. It is vital to ensure the use of the correct teat with an appropriately sized hole, correct feeding position and handling, correct milk temperature, and avoidance of overfeeding or force feeding to prevent aspiration pneumonia. If it is suspected that the kittens have aspirated the feed, for e.g., if the kittens sneeze or cough up milk after a feed, a veterinarian must be consulted to begin the preventive treatment without delay.

Ano-genital stimulation

The muscle and control of the gastric tract are poorly developed in the young and it is essential to stimulate the ano-genital area very gently with a warm, wet cloth after every feed for the first 3-4 weeks of the kitten's life. A gentle body rub, with emphasis on the bottom half of the body, the upper thighs and the buttocks, also encourages urination and defecation. Stimulating the kitten for a few minutes after a meal will ensure that the kitten relieves itself. Once the kitten relieves itself, it will immediately go off to sleep. Failure to do so results in constipation, bladder problems, uraemia and even toxemia.

Another major advantage of proper stimulation is that the kittens pee and poop outside the box which makes it easier to keep the box clean. Young kittens don't have the sense of judgement to avoid the soiled area of the box and may walk over the soiled area. Even if one kitten poops, all kittens will inevitably walk/roll over it, necessitating a thorough cleaning for everyone!

Sponging

It is a good practice to gently sponge the kittens with a soft cloth dipped in warm water 2-3 times a week as it helps keep them clean. Giving them a warm sponge also simulates the mother's licks, adding to a feeling of security.

The kittens must only be sponged (never bathed) during the day and dried immediately using a dry towel. They must never be sponged at night as it can rapidly chill the young. A hairdryer must never be used to dry the young – they must be allowed to dry naturally or be exposed to mild sunlight.

A drop or two of a mild shampoo may be added to a small bowl of water for sponging kittens that appear to be rather dirty, for e.g. those that have been recently rescued and are unclean and smelly, or kittens that have soiled the box and rolled over in the poop. The shampoo helps to clean them up and leaves a sweeter smell. If using shampoo, ensure to wipe them up with another wet cloth so as to leave minimal residue on the kittens. Excessive residue might go into the eyes of the kittens or cause allergies.

Kitten poop

Poop is a good indicator of digestion. It is essential to keep an eye on the kitten's poop to make sure they digest their feed well. The poop should be well formed. The poop shouldn't be too sticky and you should be able to lift it with a piece of tissue without causing any staining.

Poop that is watery, pasty or excessively sticky indicates that the kitten isn't digesting the feed well and hence also not absorbing adequate nutrients out of the feed. Changes must be made to their diet if they don't digest their feed well.

Warmth and well-being

Mammalian young thrive on warmth and touch. They love to be held and stroked. This is especially important when handling lone youngsters. Holding small kittens close to your chest gives them a

Neonate care: Hand-rearing new born kittens

feeling of reassurance as they listen to the rhythm of your heartbeat. Babies of mammals always huddle close to their mother's chest and tummy and feel reassured when held in a similar fashion.



Kitten wanting to be fed

Animal young rarely vocalize unless they need something. The kittens will vocalize when they are hungry or need to relieve themselves or if the temperature of the box is either too warm or too cold. Often, the kittens will even vocalize when they just want to be held. It is important to check on them once they vocalize as ignoring them for prolonged periods will lead to a feeling of neglect and insecurity.

Sexing kittens



Male Kitten

Female kitten

Neonate care: Hand-rearing new born kittens

In the male kitten, both the anal opening and the prepuce appear as a tiny dot. The testes are placed over the penis (and under the anus) and the penis is therefore spaced further apart from the anus. The testicles are prominently visible after 3-4 months of age.

The vagina, on the other hand, is a vertical slit and placed closer to the anus – resembling an inverted exclamation mark.

I apologize for the tacky drawing but I hope it makes the point.

Ectoparasites

New-born kittens are quite unlikely to be infected by external parasites, i.e., fleas. While those found at a later stage might have severe infestations. Although it is not recommended to bathe small kittens, I prefer using an anti-flea shampoo for the kitten's bath and find the combination of using a good shampoo with manually removing the fleas immediately after a bath quite effective. The kitten must be dried immediately and placed on warm bedding thereafter.

An alternative is to use a spray or powder. Frontline or Protektor spray (containing Fipronil, a broad spectrum insecticide) has been used successfully to treat severe infestations of fleas. The instructions for using the product are given in the literature provided, which must be followed strictly for optimum results and the safety of the kittens.

The solution must not be allowed to come in contact with the eyes. The kittens are required to dry up themselves after using the spray; it must therefore be used during the day. It takes a while for the kittens to dry up and they might catch a chill if left sodden for long at night.

The fleas tend to multiply in the kittens' bedding as well and will repeatedly climb onto the kittens from their bedding. It is therefore essential that the fleas not only be eliminated from the kittens but also from their bedding. Although it is ideal to use a fresh set of bedding after the application of the spray, the spray may also be applied to the bedding to eliminate the fleas.

Caution: Flea sprays are very toxic. The spray must be used cautiously. I recommend you consult a veterinarian if unsure about its usage.

Stages of growth and the corresponding care for the kittens

There is a fair variation in the size and weight of different breeds of cats with the smallest of breeds weighing as little as 2 kilos while the heavier ones may well weigh around 10 kilos. The weight difference may be even more pronounced when taking wild cats into consideration. The smaller the breed, the smaller will be the kittens. It must be noted that smaller sized kittens may require more warmth than bigger sized kittens as smaller bodies tend to lose heat a lot faster than bigger ones.

This document has been made keeping in mind an average sized kitten (of cross-breed domestic cats) that would weigh roughly 90-100 grams at birth. Bigger kittens would obviously require more feed while smaller ones would require less but the feed concentration would remain roughly the same. Fresh arrivals also tend to accept smaller quantities of feeds until they have stabilized, and have settled down and adjusted to the handling and feeding. Each individual foster may prepare the feed differently, using different formulas and dilutions – this too would affect the quantity required. It is therefore impossible to outline specific quantities and the best way to gauge your kitten's requirements would be by monitoring it – the kitten must look healthy and satisfied. The average kitten would gain roughly 10 gms of weight each day.

A word of caution: Enthusiastic kittens may easily overfeed and beg even on a full tummy. They must not be overfed as this will immediately cause diarrhoea. Over-feeding may also make them regurgitate. The suckling reflex of most kittens isn't easily satisfied because they get a tummy-full a lot faster through a feeding bottle or syringe than they would when suckling on the mother.

Kittens have a strong suckling reflex and will suckle on your hands and fingers even after they have been fed. Although this might seem quite endearing for most people, it is not hygienic for the kittens and they must NOT be encouraged to suckle on your hands.

New born kittens that haven't been stimulated adequately during meal times are likely to soil the box. If the bedding has been soiled, the kittens must be cleaned immediately and their bedding changed.

Neonate care: Hand-rearing new born kittens

Week 1 – New-born kittens



2 days old kitten

Kittens are born with a short, sparse coat of fur, their eyes and ears closed and ears folded back. They also appear quite pink – mostly visible when you look at the underside. Their sense of smell gradually develops over the first couple of days which helps them in finding their way to the mother's teats. They also start responding to your touch within the first couple of days itself. Kittens are extremely delicate at this stage of life and need rather tender handling and care. They will sleep all through the day and only wake to feed.

New-born kittens must be fed carefully with their bodies supported when feeding them. Their suckling reflex is poorly developed and they may take 10-15 minutes per feed. New-born kittens always lie on their stomach. They must NOT be rolled onto their back as it makes them very uncomfortable and they don't have enough strength to roll over which adds to an unnecessary struggle. Holding or forcing them into unnatural positions could also make them regurgitate and choke.

As a general rule of thumb, neonates must never be given more than 5% of their body weight in any one feed. Giving larger quantities of feed in one go easily results in diarrhoea. They must therefore be given several feeds throughout the day to achieve their daily requirements.

Feed: Kitten milk replacers (KMR) are ideal for neonate kittens. If KMR is unavailable, a home-made formula using infant formula milk and egg

Neonate care: Hand-rearing new born kittens

yolk with added vitamins and supplements must be used. Egg yolk must comprise $\frac{1}{4}$ of the formula. The feed should be prepared as per the instructions given for the feed (and the yolk added) and then diluted to a concentration of 70% formula and 30% water for the first few days of the kitten's life. This makes the formula easier to digest and addresses any concerns of dehydration. Probiotics and digestive enzymes must be added to the formula from the first day itself.

[For more information, please refer to Feed Composition, pg. 14-18]

Quantity per feed: The kittens will consume 3-4 ml per feed for the first few days of their life. The quantity must gradually be increased by 0.5–1 ml per feed every day or every other day. The kittens should consume roughly double the quantity of feed by the end of the first week. The kittens must be allowed to have a tummy-full if they prefer to feed more but they must never be forced unnecessarily as it only does them more harm. Kittens at this age are rarely greedy and it is best to let the kitten feed until it falls asleep. The kitten's health and behaviour is the best guide to its nutritional requirements and fulfilment.

Feeding frequency: New-borns require 8-10 feeds per day. Each feed should be 2–2½ hours apart. They can be given a 4-6 hour gap between their feeds at night. Each feed must take at least 5-10 minutes and the flow of the feed must be adjusted accordingly. It is vital not to hasten the speed of the feed as it can easily result in aspiration in the young of this age.

Special care: The normal body temperature of a young kitten is 100-102°C whereas the normal temperature of a new-born kitten would be about 97-99°C. They are unable to thermoregulate at this age and must be kept at room temperatures of about 90°C. A room thermometer may be used to gauge the temperature.

Simply put, new-borns require a warm (never hot) hot-water bottle throughout the day even at normal room temperatures. The hot-water bottle must be checked every time the young are fed as it will need to be refilled with warm water every 2-3 hours. Even though the new-borns need not be fed through the night, their hot-water bottle must be changed once mid-way through the night, around 2-3 am.

Neonate care: Hand-rearing new born kittens

Week 2



8 Days old kittens snuggled together
Lynnette Henderson

The kittens rapidly put on weight in the first few weeks of their lives, their fur becomes darker and denser and their sense of smell sharpens – they will be able to smell you out in a room especially if they can smell their feed. The kittens are stronger and begin to lift themselves in the second week. By the end of the week they will even be able to pull themselves out of the tubs and boxes of lesser height. The kittens will sleep all day unless disturbed and continue to wake up only for meals. The kittens will now suckle very well and should suck the feed from even a syringe, much as they would from a milk bottle. The use of the plunger would now be unnecessary but to slow the flow of the feed.



Eyes just opened – notice the bluish film on the eyes
Joanne Bartell

Neonate care: Hand-rearing new born kittens

The kittens' eyes start to open by the end of the 2nd week, typically around 10-14 days of age. Hand-reared kittens rarely open their eyes at an early age – perhaps due to nutritional inadequacies or due to the lag between being rescued and put on an appropriate diet. You will first notice a teeny slit in the eyes and the eyes open completely in another 2-3 days. There is a bluish film covering and protecting the eye for the initial few days and there is little visibility at first. This gradually fades and the kittens begin to see.

Feed: Same as the feed for week 1 but you will no longer be required to dilute the feed anymore. Minute amounts of infant cereal may also be introduced to the feed 2-3 times a day. The formula may also now be prepared in fish stock instead of plain water. A drop of Digiton (digestive drops) or gripe water can also be started once or twice a day.

Quantity per feed: The kittens would consume 6-8 ml per feed (or less if given concentrated feeds) by the beginning of the second week. The feed must gradually be increased by 1 ml per feed every day or every other day. As the frequency of the feeds reduces, the quantity of feed must be brought up to roughly 10 ml of undiluted feed per feed by the end of the second week.

Feeding frequency: The young require at least 7-8 feeds a day. Each feed should be 2½–3 hours apart and the kittens can be given a 6 hour gap at night.

Special care: The normal body temperature of a week-old kitten would be about 98-100°C and they would require the same care as that required by new-born kittens. However, as they are adequately furred by the second week, they may require less warmth during the day. The use of the hot-water bottle may be reduced or discontinued (for example, discontinued only during the warmer afternoons of the Indian summers) depending on the weather conditions and the kittens' requirements. Kittens kept with their siblings may also require less warmth during the day while lone youngsters are more likely to require a hot-water bottle throughout the day. In most cases, the kittens may only require the hot-water bottle in the morning, late evening but definitely at night.

Neonate care: Hand-rearing new born kittens

Week 3 – 4



16 Days old kitten
Christine Gittings

The kittens slowly start responding to visual stimuli in the 3rd week. Their ears also begin to open in the 3rd week and they slowly start responding to sounds. Their muscles develop rapidly at this stage and they are able to take their weight on the legs and even if wobbly, will attempt to walk around. The kittens also start rolling on their backs in the second week and comfortably roll over in the 3rd week. It will be safe to give them a belly rub at this stage and play with them while they are lying on the backs but you must let the kitten decide when it wants to roll over.



4 weeks old kitten
Meli Souter

Neonate care: Hand-rearing new born kittens

The kittens feed vigorously and may claw you in the excitement as their claws are very sharp at this stage. Some fosters prefer to wear gloves or cover your hands with cloth while feeding them to prevent scratches.

The first set of incisors erupts by the time the kitten is 3-4 weeks old. By the 4th week, the kittens will also attempt to feed out of a bowl. They must be offered small quantities in shallow bowls initially until they learn how to eat out of a bowl. Soft meats like cooked fish, chicken or turkey, and processed kitten foods, for example, Whiskas or Eukanuba Kitten – in jelly form, may now be introduced to their diet and will comprise of 20-25% of the kitten's diet. Although most kittens are naturally attracted to the smell of the meats, they may be given formula mixed with the meat/kitten feed if they seem reluctant to feed.



Introducing feed in shallow bowls

Feed: The proportion of infant cereal may gradually be increased to 10-15% per feed. The formula may also now be prepared in fish or chicken stock instead of plain water. Cooked and blended meats may also be introduced in minute quantities – not exceeding 10% in the 3rd week and 25% in the 4th week. The vitamins, probiotics and digestive enzymes must be continued. Each kitten will require about 2 pinches of probiotic powder 2-3 times a day. 1-2 drops of Digiton or gripe water can also be added to alternate feeds.

Quantity per feed: The quantity of formula consumed will gradually increase of 15 ml per feed in the 3rd week but may not increase

Neonate care: Hand-rearing new born kittens

substantially as the kitten's reliance on meats and processed foods increases. The kittens may either be given a mix of formula and feed/meat in each feed, or they may be given alternate feeds of formula and feeds/meats depending upon your convenience and the kitten's acceptance.

Feeding frequency: At 3 weeks of age, the kittens can be given 6 feeds a day with an 8 hour gap at night. Each feed should be 3 hours apart. At four weeks of age, the kittens may be given 5 feeds a day with 3 ½ - 4 hour gaps between feeds and an 8-10 hour gap at night.

Special care: The hot-water bottle may be completely discontinued during the day and also at night unless the nights are cold. The kittens must be kept in warm spaces with adequate warm bedding nonetheless.



3 ½ weeks old kittens

Kittens have a natural tendency to relieve themselves on soil/sand and will readily accept a litter-tray. The kittens will attempt to move away from the bedding and sleeping area when they want to relieve themselves. They are fairly mobile by this age and must simply be placed on the box once they are about to relieve themselves so they get the idea. The litter-tray must only be a couple of inches deep so the kittens can climb it easily at this age and it must be kept in their vicinity. The litter must be changed every 2-3 days (or more frequently if using a smaller box initially) as the kittens will avoid a soiled tray.

Neonate care: Hand-rearing new born kittens

Water

As the kitten's reliance on solid foods begins to increase they require additional water to maintain their hydration levels. This will be particularly important once dry kibble is introduced. Kittens will start to drink water from a bowl by 4-5 weeks of age and there must be a bowl of fresh drinking water for them at all times.

1 – 2 months

The kittens will be confidently eating out of a bowl by the time they are a month old. Their reliance on solid foods too will have increased. The kittens will now play for a longer duration after their feed and then fall asleep again. They will also now start climbing and often curl up in warm, soft and comfortable spaces like sofas, pillows, blankets, etc.



**Kittens atop their scratch post
Meli Souter**

Kittens must be given plenty of space and freedom to run around and play in order to get exercise and for the muscles to develop well. Exercise is also important for co-ordination, gastro-intestinal tract functioning and learning, and the kittens must be given ample play

Neonate care: Hand-rearing new born kittens

time. Sunlight too plays an important factor in the development of the young and lack of the same can result in rickets.

Feed: Similar feed as that given in week 4 but the kittens may be offered an entire boiled egg, including the white, if they like it. Weaning begins at this stage and the quantity of formula can now be decreased. The kittens must be completely weaned by 6-8 weeks of age, with milk or formula only given as a treat to kittens that both enjoy and digest it. The kitten's diet will primarily comprise of boiled fish, chicken or turkey with stock and other commercial kitten foods. Entire pieces of chicken and fish may be offered to the kittens as they will now carefully eat around the bones without any danger of choking. Dry kibble or dried fish and shrimp may also be introduced in small quantities to the kitten's diet. Fresh drinking water, esp. when offering dry kibble, must be available for the kittens at all times.

Quantity per feed: 1 small sized bowl as per the kitten's requirements and energy expenditure. It is much easier to judge the kitten's requirements at this stage than it is when they are younger. The kitten must be fed as much as it will eat in one go and must be offered a fresh feed at the next scheduled time. Small amounts of dry kibble may be kept in a separate bowl for the kittens to snack on between their meals.

Feeding frequency: 4-5 feeds a day with an 8-10 hours gap at night.

Special care:



Neonate care: Hand-rearing new born kittens

The kittens will be inquisitive and will want to thoroughly explore their surroundings. It is extremely important to “kitten proof” the house at this stage. The kittens will want to climb onto everything and you must ensure that nothing can dislodge and fall on the kittens. You must also be particularly careful of loose wires as they will attempt to nibble on them. Keep anything dangerous like knives, scissors, glues, chemicals, cleaning liquids, etc. well out of the kitten’s reach. If the kitten can reach it, it will likely end up in its mouth at some point of time!

Homing kittens

The ideal time to home kittens is just when they are weaned, which is at roughly 6 weeks of age. There is no substitute for mother’s milk and the kittens must never be separated from her whilst still feeding from her. Small kittens also require a lot of attention and care which is best given to them by the mother.

Hand-reared kittens, on the contrary, can be given to good homes at any point of time as long as the new home can commit to the extensive care required by small kittens. Neonates must preferably only be homed after 3-4 weeks of age as very few people will be able to give them the required time and care.

Minimizing imprinting – relevant only for wild felids

Imprinting is a process by which a young animal learns and impersonates the behaviour patterns of the surrogate parent, human or other animal, thereby forgoing behaviour patterns essential for its survival in the wild. The young must therefore only be handled by as few people as required. This ensures that they will only look upon the handler as their foster parent and not seek security from humans in general. Refrain from housing the young with animals of different species as the young may begin to impersonate the behaviours of the other species, which might not be conducive for their survival as well.

2 months onwards

The kittens are full of energy, extremely inquisitive and naughty by this age but are mostly only active in short bursts. They must have adequate toys to entertain them. They need a lot of play time when awake but will sleep for about 18-20 hours a day on average.



Nap time
Pranav Arwari

Meals per day for growing kittens:

<u>Age</u>	<u>Meals</u>
------------	--------------

1-2 months	– 5
------------	-----

2-3 months	– 4
------------	-----

3-5 months	– 3
------------	-----

5-8 months	– 2
------------	-----

8 months and over	– 1-2
-------------------	-------

Adequate vitamins and supplements must be given to growing kittens. Adult kittens may be given one snack and one meal every day.

Deworming schedule

The kittens need to first be dewormed when they are 4 weeks old and again when they are 6 weeks old. Growing kittens need to be dewormed periodically and it would be best to consult your veterinarian for a deworming schedule.

Vaccinations schedule

The kittens will require Feline Distemper combination (Panleukopenia, Rhinotracheitis and Calicivirus), Feline leukemia, anti-rabies vaccinations and their boosters which will begin once the kitten crosses 1 ½ to 2 months of age. FIV, FeLV and Bordetella vaccinations may also be recommended. The vaccine schedule may differ according to the country you are based in and it is best to get a current schedule from your veterinarian.

Please note: This document is targeted at hand-rearing alone and does not address or substitute any veterinary procedures. For any medical concerns, please consult your veterinarian at the earliest.

For amateurs or people handling a new born kitten for the very first time, please keep in touch with a trained and experienced hand for guidance and regular progress updates.

Acknowledgements

I thank Dr. Deepak Tulpule for caring for my kittens through the years and giving them the best veterinary care that they can get.

I thank my dear friends Sujitha, Suhridh, Sujaya, Shanti auntie and Varsha for always being there selflessly every time I need a hand and helping with all the adoptions. Bless you!

Christine, David, Joanne, Lynette, Meli, Pranav 'n Rodrigo, thank you for your good wishes and the permissions to use your photographs. Kamalakannan, Saleem 'n Varsha, thank you for being there at the right time and helping to click the photographs – they were a vital part of this document.



Fast asleep on the tree
Devna Arora

Photographs used

Christine Gittings – 16 Day old kitten

<http://www.flickr.com/photos/gittingsc/6869703530/in/photostream/>

[Accessed: 29/01/2013]

David Legnon – Tucked in under a fold of cloth

<http://www.flickr.com/photos/donniedark0/3130121414/in/photostrea>

[m/](#) [Accessed: 29/01/2013]

Neonate care: Hand-rearing new born kittens

Joanne Bartell – Eyes just opened

<http://www.flickr.com/photos/junglelure/3509570090/>

[Accessed:

29/01/2013]

Lynnette Henderson – 8 Days old kittens

http://www.flickr.com/photos/lynnette_henderson/3810936809/

[Accessed: 29/01/2013]

Meli Souter – 4 weeks old kitten

<http://www.facebook.com/media/set/?set=a.11867796551.19551.607866551&type=3> [Accessed: 04/02/2013]

Meli Souter – Kittens atop their scratch post

<http://www.facebook.com/media/set/?set=a.11867796551.19551.607866551&type=3> [Accessed: 04/02/2013]

Pranav Arwari – Nap time

[Emailed photograph on 29/01/2013]

Rodrigo Trovão – kitten sleeping with his stuffed toy

<http://www.flickr.com/photos/rodrigotrovao/4245998404/in/photostream/> [Accessed: 29/01/2013]

Kitten milk replacement formulas and supplements

Beaphar's Kitty milk

http://www.vetuk.co.uk/dog-supplements-cat-supplements-early-pet-care-c-5_270/beaphar-kitty-milk-200g-p-8506

GNC Premium milk replacer for kittens

<http://www.gnc.com/product/index.jsp?productId=4448051>

Hartz Milk Replacer for kittens

http://www.hartz.com/Hartz_Products/Cat_Products/Health_and_Wellness/Milk_Replacers.aspx

Neonate care: Hand-rearing new born kittens

MillPledge Veterinary's KittyStim

http://www.millpledge.com/Products_Range/Nutraceuticals_Pharmaceuticals/Colostrum_Probiotic_Absorptive/Nutraceuticals_KITTYSTIM.html

Pet Ag's Kitten milk replacers

<http://www.petag.com/product/cat-milk-replacers/kmr-powder-2/>

Pet Ag's Taurine tablets

<http://www.petag.com/product/cat-nutrition-supplements/taurine-tablets/>

References

Arora, D. (2013) Neonate care – hand-rearing new-born puppies, *Rehabber's Den*. [Online] Available from:

<<http://rehabbersden.org/Neonate%20care%20-%20Hand-rearing%20new-born%20puppies.pdf>> [Accessed: 25/12/12]

Bosworth, A.W. and Van Slyke, L.L. (1916) A comparison of the composition of cow's milk, goat's milk and human milk. [Online] Available from: <<http://www.jbc.org/content/24/3/187.full.pdf>> [Accessed: 30/01/13]

Hedberg, G. (2002) *Exotic felids In: Gage, L. J. (2002) Hand-rearing wild and domestic mammals*, Iowa State University Press, Blackwell Publishing Professional

Hines, R. (no date) Bottle feeding orphaned kittens [Online] Available from: <<http://www.2ndchance.info/orphankitten.htm>> [Accessed: 23/01/13]

Roach, P. (1995). *The Complete Book of Pet Care*. Revised and Updated. Australia: Lansdowne Publishing Pty. Ltd.

Summers, L. (2002) Domestic kittens *In: Gage, L. J. (2002) Hand-rearing wild and domestic mammals*, Iowa State University Press, Blackwell Publishing Professional

Trendler, K. (2005). The Principles of Care and Rehabilitation of Orphaned Wild Mammals. In: Menon, V., Ashraf, N.V.K., Panda, P., and Mainkar, K. 2005. *Back to the Wild. Studies in Wildlife Rehabilitation*. Conservation Reference Series No.2. Delhi: Wildlife Trust of India. pp. 46-53.

Further reading

American Bird Conservancy (2013) Cats, Birds and You [Online].

Available from:

<https://www.abcbirds.org/abcprograms/policy/cats/materials/cat_brochure.pdf> [Accessed: 06/02/13]

Andrews, P. (no date) Hand-rearing of small felids [Online]

Available from: <<http://www.gailhedberg.com/storage/Hand-Rearing%20Small%20Felids%20Penny%20Andrews%20Hexagon%20Farms.pdf>> [Accessed: 25/01/13]

Blaht, Jr., W.H. and O'Connor H.M. (2010) Rehydration drinks [Online]

Available from: <<http://www.webmd.com/hw-popup/rehydration-drinks?navbar=hw86827>> [Accessed: 27/01/13]

Blue Cross UK – Looking after your cat [Online] Available from:

<<http://www.bluecross.org.uk/1957/looking-after-your-cat.html>> [Accessed: 23/01/13]

Breed, M.D. (2010). *Both Environment and Genetic Makeup Influence Behavior*. [Online] Available from:

<<http://www.nature.com/scitable/knowledge/library/both-environment-andgenetic-makeup-influence-behavior-13907840>> [Accessed: 18/10/10]

Neonate care: Hand-rearing new born kittens

Dugdale, D.C. (2012) Lactose intolerance. [Online] Available from: <<http://www.nlm.nih.gov/medlineplus/ency/article/000276.htm>>

[Accessed: 31/01/13]

HDW Enterprises and Foothill Felines Bengals and Savannahs (no date) Kitten/Cat care basics: Glop recipes [Online] Available from: <<http://www.hdw-inc.com/glop.htm>> [Accessed: 23/01/13]

Eukanuba (no date) Taurine and its importance in cat foods [Online] Available from: <<http://www.eukanuba.com/en-US/cat-guide/Taurine-and-Its-Importance-in-Cat-Foods.aspx>> [Accessed: 01/02/13]

Kittens Lair (2008) Cat water requirement [Online]

Available from: <<http://www.kittens-lair.net/cat-food-and-nutrition/cat-water-requirement.html>> [Accessed: 01/02/13]

Levy, J.K. (2001) Use of adult cat serum to correct failure of passive transfer in kittens [Online] Available form:

<http://www.unboundmedicine.com/evidence/ub/citation/11724178/Use_of_adult_cat_serum_to_correct_failure_of_passive_transfer_in_kittens> [Accessed: 25/01/13]

Milk facts (no date) Milk Composition. [Online] Available from: <<http://www.milkfacts.info/Milk%20Composition/Milk%20Composition%20Page.htm>> [Accessed: 30/01/13]

Rainbow Wildlife Rescue (no date) How to raise an orphaned kitten [Online] Available from: <<http://www.kittenbaby.com/>> [Accessed: 23/01/13]

The Hartz Mountain Corporation (no date) Hartz Nursery – Kittens [Online] Available from:

<http://www.hartz.com/Cats/Hartz_Nursery/Kitten_Articles.aspx> [Accessed: 23/01/13]

Wikipedia (no date) Cat [Online] Available from:

<<http://en.wikipedia.org/wiki/Cat>> [Accessed: 27/01/13]