

**Rehabilitation of Eastern Gray Squirrels: 2005 Revision**  
**Written by Carol Hardee, Director**  
**Wildlife Rehabilitation Center of Central Florida**  
**21117 Reindeer Road**  
**Christmas, Florida 32709**  
**Phone: (407) 568-3200**

**Basic care and feeding:** Infant gray squirrels can be raised successfully on a number of products. At the WRC, we have used Esbilac, which is manufactured by Pet Ag for all sizes of squirrels, and for squirrels weighing over 80 grams; Esbilac may be fortified with Multimilk (also made by Pet Ag), or heavy whipping cream. Multimilk is preferred because it adds more nutrients to the formula than whipping cream, which adds high fat content. Squirrels may be successfully raised on Esbilac alone. We prefer to weigh every incoming squirrel on a gram scale. The weights are recorded on the patient's intake sheet, and ideally, updated daily. The feeding charts are a handy reference so that babies are not over or under fed.

Before squirrels are fed for the first time, they must be **warm**. "In coming" patients should have their inner core body temperatures brought to normal which can take two hours and longer. At the WRC, we use incubators and heating pads. An incubator can be set to 90-95 degrees F for squirrels without fur and 85 degrees F. for fully furred babies. Heating pads are tricky to set correct temperatures, but with practice, you will learn. When we place a baby squirrel on a heating pad, which is set on "Low", we first warm infant receiving blankets in a microwave for about 30 seconds to get them warm to the touch, but not hot. We place two folded receiving blankets into a plastic container with a tight fitting lid, called a "Playmate" or "Aquatarium". Glass aquariums can also be used if they have a secure lid with a towel cover, but they are heavy to lift. Small digital thermometers with probes can be purchased and are invaluable for determining proper temperature. The probe is placed inside the container beside the baby while the digital readout is outside the container and easily monitored. We also usually place several layers of folded towels on top of the heating pad and under the plastic container, which holds the baby squirrel(s). Heating pads can become very hot, very fast! When first turned on, it is best to check the temperature every 15 minutes or so to avoid overheating an animal.

Once warmed, the hydration level must be assessed. Dehydrated animals should never be fed formulas because they will not be able to digest them. The pinch test can be used to check for possible dehydration. Gently pinch the skin on the side of the squirrel. If it remains "tented up", for more than a second, the squirrel may be dehydrated. The longer the skin remains tented, the worse the dehydration. Sometimes, the squirrel's skin will look wrinkled along the stomach, abdomen, and sides in severe cases. The animal may look thin, and the spine may protrude sharply from the back. Sometimes the pre-admission history can help you to determine the condition of the patient. If a mother squirrel was observed dead along the road four days ago, and now the baby squirrels were seen crawling from the nest and crying, they have probably been without food for 4 days.

In cases of serious dehydration, **rehydrating subcutaneously** with warmed fluids, Lactated Ringers, should be accomplished. Usually 5% of the animal's body weight is the amount to sub-q, 4 X in 24 hours, or 10%, 2X in 24 hours. Usually, you will only need to sub-q once or twice in order to regain normal hydration levels. You will also offer clear fluids orally, Lactated Ringers with 5% Dextrose is the preferred solution. Pedialyte or Ricelyte can also be used. See the feeding charts for amounts, but for the first 12-24 hours, it is better to give smaller amounts more frequently. In severe cases, we have even offered small amounts of fluids every hour for the first 12 hours. Fluids must be warmed to 100-105 degrees to be palatable to the youngster.

You must administer fluids very carefully so that the infant does not aspirate any into its lungs.

**Feeding implements:** We use o-ring syringes (Baxa) with Catac nipples placed on the end of the syringe. A very small hole must be cut at the end of the nipple. We always keep an infant aspirator bulb handy while feeding. If the infant begins to blow fluid out of its nose, the bulb can help you to draw the fluids out and avoid aspiration. Older squirrels seem to do a better job at sneezing the fluids or formula out. Ideally, you will feed without this occurring, but occasionally, it can occur even to very experienced rehabilitators. For neonates (7-19 grams), we use a .5cc syringe and cut the Catac nipple in half, placing the lower half on the end of the syringe. This method has also been useful for feeding neonate flying squirrels weighing only 3 grams and tiny baby mice. For these tiny pinkies, we sometimes get them started by feeding them one drop of formula at a time, holding them in our hand. We hold the older babies, stomach down, and usually against our own chest where the infant can lie in a natural, prone position. When we feed more than 2 babies, we keep the formula in a jar on an electric cup warmer (see glossary for product listing).

**Caging:** After the squirrel's eyes have opened and when they weigh more than 100 grams, they usually can be housed in a wire cage. I say usually because we have observed squirrels open their eyes at 50 grams in weight and some not until 130 grams in weight! You must use common sense- if a baby is 120 grams but doesn't have its eyes opened, it should not be placed in a cage where it cannot find its way back into its nest, and a tiny 50 gram baby should remain on a heating pad. The cages we use are easily constructed out of ½" X ½" **wire** with plywood tops and bottoms. (Instructions are at the back of this manual) If you use larger gauge wire, there is a terrible risk for the young squirrels in your care. Wire of 1" X ½" or 1" X 1" or 2" can and has caused broken legs in squirrels. I know of two cases of squirrels which each had a rear leg amputated after being caught and twisted and fractured in the larger gauge wire. In both cases, the squirrels were being kept as pets because they could not be released, and one of these cost the owner \$400 for the ensuing surgery! We hang a sturdy hammock in the cage as a nest, but another word of caution- be sure to use material which cannot unravel into strings. Again, I know of a case where the squirrel chewed the hammock and got the stringy material wrapped tight around its body and died. This was another pet squirrel, and the mortified owner called me for help just before the squirrel died in her hands. Let us learn from other's mistakes! We place newspapers and paper towels in the bottom of the cage, a sturdy ceramic food bowl (squirrels chew plastic ones), a ceramic 3" water bowl-small enough so that the squirrel cannot fall in and drown, a sterilized beef bone for gnawing, and a few fresh branches daily (maple trees are yummy). The branches must be

free of pesticides. Only gather forage where you are certain of the safety for the squirrels.

**Stimulation for urination and defecation:** Until the eyes open, (and for a while after that to keep bedding from being soiled) you will need to wipe the baby squirrels so that they can properly eliminate urine and feces. Gently wipe the genitals with a soft facial or bathroom tissue. Sometimes a dampened tissue works better. If you are having trouble with this procedure, try almost lightly tickling the penis or vulva. This often works better than an actual wiping procedure. Do this prior to feeding each time.

**Solid foods:** You can begin to offer solid food after the eyes open, but the baby will still be fed formula 4X per day until weighing about 180 grams, when we give 3 feedings per day. The solids can consist of the following: rodent blocks or chow (80% of the diet), monkey biscuits, shelled pecans, walnuts, hazelnuts, roasted peanuts (unsalted), sunflower seeds in small quantities, fresh fruits and vegetables: apples, broccoli, carrots, mushrooms, corn, string beans, peaches, etc. Of course, the best foods, if available, are acorns, hickory nuts, and again, squirrels love those tree branches. Many nuts, fruits and veggies are too low in calcium content for a growing mammal unless supplemented with calcium carbonate. This is very important if you wish to raise a healthy squirrel to adulthood-added calcium. We sprinkle ½ teaspoon of pure calcium carbonate on all nuts, seeds, fruits, and veggies. Any spice shaker container once emptied, can be washed and sanitized thoroughly. After drying, you can spoon in your powdered calcium, snap on the shaker cap, and you can easily sprinkle calcium on the squirrel's foods. We have never had a squirrel in our care develop metabolic bone disease with our methods; however, we have treated scores of squirrels with varying degrees of MBD over the years raised by individuals who failed to provide appropriate calcium in the diet. For treatment regimes, see section: MBD (Metabolic Bone Disease).

You can also gather mushrooms from your yard—it's perfectly fine as long as they are free of any contaminants and sprays. By the way, squirrels can and do consume mushrooms which are lethal to man. The wild-growing poisonous mushrooms have no ill effects on squirrels or turtles for that matter, and they eat them with great relish. There have been cases of human death, however, from eating killed and cooked squirrels, which had previously dined on poisonous mushrooms.

We have had two reported cases of juvenile squirrels choking on unpeeled grapes. In each case, the squirrel weighed under 220 grams, and began gagging on grape peels caught in the throat. In both cases, the caregiver successfully extracted the peel, and the squirrels were fine.

When the squirrels are at 180 grams or so, their molars erupt from their hind gum area, and often, they will refuse to nurse for a day or two. This does not mean that they are now weaned, as they will benefit from receiving the formula until they weigh about 240 grams in weight. The formula also contains Vitamin D3, which they need in order to absorb the essential calcium from other foods. Once weaned from the formula, squirrels must be exposed to sunlight every day. Vitamin D3 is in natural sunlight, which does not penetrate through glass but does pass through ordinary window screens. Thus, placing a caged squirrel in front of a closed, glass window will not provide any needed exposure to sunlight, ultraviolet light, and the vitamin D3. Once the squirrels are totally weaned from formula, they must have exposure to sunlight for proper growth and nutrition. To benefit from sunlight, the animal must be outdoors in a cage or even on a screened porch. 30

minutes per day is the minimum amount of time for exposure to sunlight, but several hours is better. Sunlight bounces off of objects, so the cage does not have to be placed in full sun. A shaded area is fine (under a tree, patio roof, or porch roof is fine). We don't want the squirrel to get too hot. We have admitted many squirrels suffering from Metabolic Bone Disease because they did not receive direct sunlight when raised by the public.

**Outdoor Caging:** Once the squirrels are 240-300 grams in weight and weaned, we move them to an outdoor cage/habitat. These are usually 8'X10'X8' or 6'X6'X6', constructed of ½" X ½" wire, with wire also covering the floor and secured to the sides preventing any possible intrusion. The wire floors are filled in with at least 6" of clean fill dirt or builder's sand. The cages have a double door system for added safety and a metal or plywood, shingled roof. Tall tree branches can be placed inside the cage for climbing and chewing. These should be safely secured so that they do not fall over injuring the squirrels. We use bungee straps/tie downs for this, which can be hooked through the wire cage sides and around the branch to hold it firmly in place. Chains can also be used to secure the branches from falling over. Heavy ceramic feed and water bowls can be placed in the cage. A word of caution: don't place these heavy crock bowls very high off the ground on ledges or feeding platforms because a leaping squirrel can knock the heavy bowls on to the ground causing injury to itself or others. We heard of one case in which a large crock dish on a ledge 4' off the ground being knocked over. A squirrel was found curled up under the crock dish. The squirrel recovered from a concussion, and was later able to be released but just as easily could have died in this mishap. Some times we are able to learn from mistakes of others before a fatality occurs!

We hang wooden squirrel bed boxes in the outdoor cages for the squirrels to sleep in. We used to use cloth towels placed inside for bedding, but now use soft fresh hay ever since we heard about someone losing their pet squirrel due to towel entanglement. Our bed boxes have an entrance hole at the front and an escape hole in the back. If you will need to reach in the box to check your squirrels, you may wish to use screws or a hinge on the lid. A rectangular opening large enough to admit your hand can also be used as an opening. They hang from two chains so that the box will not fall if one chain breaks or comes loose from the box. Upon release, you can tape a piece of wood over the openings with the squirrels inside the box and hang the box, squirrels and all in a nice tree. You then remove the taped wood, and the lucky squirrels have a ready-made home. My husband, Ron, has climbed many a tree with his 30' extension ladder to hang squirrel boxes. One study that I read long ago stated that squirrels provided with wooden bed boxes in the wild averaged doubling their life spans.

Diet in the outdoor cage should always include fresh acorns, nuts, and vegetation from the area, besides the regular squirrel fare of rodent chow or blocks, nuts, fruits, and veggies. Don't forget to continue to use the calcium carbonate on all foods offered.

We release squirrels after they have spent about a month or two in the outdoor cage, usually at 5 months of age depending on the individual squirrel's adaptation. A small opening can be made in the wire for the squirrels to come and go from the cage if a soft release is possible on the premises or the squirrels can be loaded up and released at property where permission has been granted. Before hand, check out the location for suitable habitat, oak trees, a water source, no dogs or cats, cars, or hunters which could shorten the squirrel's life. Either way, if it is possible to safely hang the squirrel bed

boxes 25-30 feet off the ground, it provides a safe home for the released squirrels. We do not recommend nailing boxes to trees, which could damage the trees. We hang them with two chains connected to the sides of the boxes with hooks, which can be placed over sturdy branches without harming the trees.

## **Injuries**

### **Wounds, cuts, maggot & bot parasites, and fractures:**

Injuries, which are oozing blood, pus, or have maggot involvement, should be carefully flushed with an appropriate solution, such as Chlohexidine, or Betadine mixed with saline “to look like the color of weak tea”. Saline solutions used should be .9%, which will decrease the chance of drawing bodily fluids out of the surrounding tissues. Now for a word about maggots: although I have been called the “Maggot Queen” at times, I really hate dealing with them. If you can remove all of them by flushing, good and well, however, if there is a chance that some are in deep, or unseen, or in an area that cannot be flushed, Ivermectin kills them. There are several ways to administer Ivermectin. Full strength, the dosage is .10 cc per 10 pounds of body weight. For squirrels, you will need to dilute the 1% Ivermectin purchased full strength. It does not mix with water, and it is recommended that it be mixed with propylene glycol. You mix one part Ivermectin with 19 parts Propylene glycol which reduces the potency to 1/20<sup>th</sup>. Then the dosage rate is as follows for the dilute solution: .05cc to 110 grams body weight, .1cc to 220 grams body weight, .2cc to 440 grams body weight, and so on. This dilute can easily be given orally, which will kill any internal maggots, or a drop can be administered to a puncture containing maggots and it will kill them in the wound. By the following day, the wound should be thoroughly flushed to remove the dead larvae. We have orally treated several animals, which had maggots deep in the rectum that we could not remove by flushing including several white tailed deer fawns and raccoon kits. By the next day, the dead maggots were expelled with the normal bowel movements.

Another dreaded parasite is the bot, also called warble, or cuterebra. The “bot” fly lays its eggs on vegetation; the unsuspecting squirrel breathes the eggs into its nostrils, and into its lung where the larvae hatch eventually making their way to grow under the squirrel’s skin. While growing, a lump can be seen, which soon develops a breathing hole, and the lump will grow very large and oval in shape if left alone. In the later stages you can usually see the face of the larva inside the hole. These nasties can be squeezed out or pulled out with a forceps when they are larger, but in the early stage, have to be removed by incision or killed with Ivermectin dilute. Some literature has stated not to treat bot larvae with Ivermectin as blood infections could result from the dead larvae remaining in the squirrel’s body. We have successfully treated with Ivermectin dilute in the early stage of the bot, and have encountered no problems with blood poisoning or any other ailments. Once extracted, the bot looks just like a big fat maggot! The Ivermectin dilute is also effective as a treatment for mites and mange. Using the same dosage listed above, you can administer it orally. See charts in the back of this manual.

Injured squirrels will often develop abscesses, which can grow quite large if the caregiver does not realize what that lump is! Abscesses usually need to be punctured with a large sized (18-20 gauge) needle or lanced with a scalpel blade, then drained and flushed with a Betadine or Chlorhexadine solution. This process must be done once or twice per day depending on how quickly the abscess recedes. Treatment with an oral antibiotic is recommended. We have used Clindadrops and Bactrim with good results.

Squirrels may also be admitted with fractures of the legs, spine, skull, or hips. Successful treatment will depend on the type of fracture and resulting involvement. Your veterinarian will probably have to be consulted in many of these cases; however, with experience, you will learn which fractures are in need of treatment and which heal on their own without veterinary care. Simple fractures of the legs and hips often will heal on their own if the bones are well aligned while compound fractures will need to be set or pinned under anesthesia. Sometimes, there is no blood supply to the leg past the fracture point, and therefore, the leg cannot be saved. By feeling the temperature of the normal leg, you can compare it to the injured extremity to see if it is warm or cold. In some cases, the leg will have to be amputated or the animal may have to be euthanized. In the case of a hind leg, we have had success with squirrels adjusting to and eventually being released with one hind leg intact, and survival documented for more than two years. We have not encountered any front leg amputees, but we would assume those to be non-releasable since the front feet and legs are needed for eating and caching foods, and more essentially are necessary for climbing, jumping, and mating.

Spinal injuries are usually a wait and see type of injury. We always give the patient some time to recover as there have been several cases which at first exam, appeared to be paralyzed, yet later regained full mobility. Sometimes by day number 3, it is obvious that the animal is paralyzed, and there is no hope for recovery. When in doubt, our motto is-wait and see. A paralyzed squirrel will not usually have any quality of life and euthanasia is probably for the best.

Sometimes blindness can occur in cases of severe head trauma. We have found totally blind animals to be poor candidates as pets/educational animals. They tend to be startled easily by noises and often will bite aggressively when frightened. These cases must be assessed individually. We have had great success in the release of several one-eyed squirrels, which have survived with normal life spans.

Some adult injured animals are in shock and may need to be placed on a heating pad even though they are fully furred and of adult weight. You can usually feel with your hands if a squirrel is cooler to the touch than the normal warm body temperature, or you can take the temperature rectally or by ear if you have that type of thermometer.

### **Internal Parasites:**

Squirrels can be admitted or develop symptoms while in care from various internal parasites. Most of the squirrels that we have to treat for this problem are admitted to our hospital with ongoing symptoms and were cared for by the public or even from other rehabilitators. They often are bloated and/or cold and were overfed with improper formulas. 50% of these patients die within 2 –8 hours of admittance. If a squirrel is observed with loose, bloody, light colored, or foul smelling feces, or lack of appetite, you will want to have a fecal sample checked or check it yourself if you have a microscope

and training. Squirrels can have coccidiosis, spirochetes, intestinal round or hookworms, yeast infection, salmonella, e-coli, and/or giardia. We treat coccidiosis with Albon, giardia and spirochetes with Flagyl (metronidazole), worms with Ivermectin dilute (Ivomec) or Strongid (pyrantel pamoate), and yeast with Nystatin. See charts in the back. Do not mix squirrels being treated for suspected parasites or diseases with other healthy squirrels until treatment is finished and all symptoms have resolved.

### **External Parasites:**

Fleas and mites can be treated with Adams Spray for dogs, cats, kittens, and puppies. We usually do not spray from the bottle directly onto the squirrel to avoid eye contact with the spray. We spray a very small amount onto a wash cloth or cotton ball, and then wipe the squirrel with that. The bedding must be changed by the next day to remove dead fleas and eggs.

As addressed previously under maggots and bots, mange or skin mites will usually first be observed as crusty, scaly, flaky areas on the edges of the ears, around the muzzle, eyes, and tail. The squirrel will usually scratch itself often, sometimes causing breaks in the skin. Red spots or patches can also be observed, usually on the abdomen and stomach areas. In more advanced cases, loss of hair will occur, sometimes to the point of almost total hair loss. Patches of skin will peel off with the fur. To effectively treat mange and skin mites, we use Ivermectin dilute given orally. Repeat dosage every 7 days, for a total of 3 treatments. Weigh the animal each time, as the dosage will change as the animal grows and gains weight. Change bedding frequently and clean the container or cage by cleaning thoroughly as well after each treatment to remove any eggs. You can spray with Adams, let stand for 20 minutes, and then wash the bedding and cage thoroughly. Isolate squirrels from those, which do not have the parasites to avoid contagion.

### **Illness:**

Unfortunately, there are many illnesses, which can affect squirrels. Those listed here will not present a danger to you except for toxoplasmosis, which you will not contract from the squirrel, but could from the infected cage.

**Upper respiratory infection:** commonly encountered in young squirrels which have suffered from exposure, damp weather, and is easily passed from one squirrel to the next by housing them together, sharing feeding implements, using one feeding dish of milk to draw up formula for all in care, or by placing a squirrel in a container previously used by a sick squirrel without thorough disinfecting.

Symptoms: nasal congestion - runny nose, sneezing, labored breathing, breathing through the mouth

Treatment: you can give children's decongestant (types and dosages-see charts in the back), use a baby nose aspirator bulb to regularly clear mucous from nostrils. We do not treat viral upper respiratory infections with antibiotics. Their use in these cases can lead to bacteria resistant to antibiotics. Keep the squirrel warm, feed regularly, and the disease will run its course. Feeding can be very tricky when a squirrel has breathing

trouble. Sometimes oral tube feeding is necessary (this is covered in a future section). You can smear a thin amount of Vicks Vapor rub on the inside bottom of the squirrel's container, place all of the bedding into the container on top of the Vicks, then the squirrel, and the warmth from the heating pad will help to fill the container with the Vicks' vapors.

**Aspiration Pneumonia:** Fluid in the lungs, often caused by aspiration from improper feeding, especially if someone untrained who used an eyedropper fed the squirrel. It may also occur in squirrels exposed to rain, water, and wet conditions.

Symptoms: labored, raspy breathing, may have nasal discharge, you can hear the gurgle of liquid in the lungs with a stethoscope or by holding the squirrel's chest to your ear.

Treatment: Many squirrels aspirated by the public will die; however, there is some chance for recovery, depending on the individual squirrel's strength and response to treatment. Antibiotic of choice is Bactrim (also called Sulfatrim or Septra) or Clavamox (see back for dosage charts), to reduce fluids, your vet may prescribe Lasix injectible. For prevention of antibiotic-induced diarrhea, be sure to give benebac, lactobacillus, or probios. Animals placed on antibiotics usually develop diarrhea because the antibiotics kill the beneficial bacteria in the animal's intestines. Placing some of these good bacteria in the animal's formula or food will help to replace these necessary bacteria and prevent diarrhea.

**Fibromatosis:** A viral infection, which causes lumps and bumps on the animal's body.

Symptoms: Thickened lumps, which are hard rather than pliable to the touch, as abscesses are. There may be a few, or the animal may literally become covered with them.

Treatment: There is no treatment, and the virus is contagious. We have seen a 50-75% mortality rate in squirrels presented with this disease. If you decide to give supportive care, you must isolate the contagious squirrel from all others. After contact with affected animals, you must disinfect your hands, clothing, shoes, etc. by spraying with a solution of any viricide, which will kill viruses in about 4 minutes. We use Parvolan, which we mix daily, in spray bottles. Again, do not use feeding implements, jars, bedding, or caging for other squirrels without thorough disinfection.

**Klebsiella Pneumonia:** This pneumonia strikes animals whose resistance has been weakened and, in some cases, animals which have just finished antibiotic treatment. The pneumonia bacterium cause breathing difficulties, scarring of lung tissues, and is highly fatal.

Symptoms: rapid breathing and heart rate will be observed. Squirrels will often prop themselves with heads and upper body out of their hammocks or bedding as they appear to have breathing difficulties. They may refuse offered formula and food. No nasal discharge or congestion is usually noted, but "dry" sneezing is frequent. It is easy to miss the symptoms, and the squirrels die within 24-72 hours.

Treatment: In the year 2000, we successfully treated with Bactrim (Sulfatrim) and saved all (12) except the smallest in weight. The symptoms abated within two days, and the squirrels all recovered except the one (the smallest). Unfortunately, in 2004, the Klebsiella pneumonia proved to be resistant to Bactrim. After researching the disease for latest treatments, we used injectible Amikacin (dosed accordingly by weight) and saved

all of the squirrels so treated. Please keep in mind that the drug of choice could change in several years if this disease becomes resistant to Amikacin. Contact us at the Wildlife Center for updates and squirrel manual revisions as needed.

**Toxoplasmosis:** Squirrels can become infected with this deadly disease from exposure to felines; cats or bobcats. Fecal matter of felines often contains the eggs of the toxoplasmosis parasite. These eggs are viable for extended periods of time (months) in the environment and normal methods of disinfecting do not kill the eggs. If a bobcat (or house cat) has been housed in a cage built with any wood framing the base or sides, the eggs can infect the wood and even pure bleach or ammonia will not kill them. Months later, squirrels housed in the cage will become infected and die from the toxoplasmosis infection. All infected wood and soil from a contaminated cage must be removed and replaced prior to using the cage to house other types of animals.

Symptoms: Unfortunately, the symptoms often appear when the animal is near death. Well fleshed, apparently healthy individuals will exhibit heavier than normal breathing, and a lack of appetite 24-48 hours prior to death.

Treatment: There is no treatment. The microscopic larvae invade the entire body, especially the soft tissue organs making removal impossible. Mortality rate in squirrels can be at or near 100%.

**West Nile Virus:** This newly arrived virus is transmitted by insect vectors (mosquitoes), and affects many species of animals including humans. There have already been several confirmed mortalities in the eastern gray squirrel in northern states. The squirrels may become emaciated and lethargic prior to death. There is no known treatment.

## **Other problems**

**Bloat** can occur from over feeding, feeding a hypothermic (cold) animal, internal parasites, and from mouth breathing when suffering from an upper respiratory disease or pneumonia. Most of the cases of bloat that we have treated have been ongoing when the animal is admitted-usually when the public has tried to care for the squirrel with little or no experience, and even less common sense. To help treat the bloat symptoms, administer simethicone. If caused by internal parasites, you will need to treat for that in order to eliminate the bloat. If overfeeding seems to be the cause, feed clear fluids for at least 24 hours to flush the squirrel's system of the undigested milk products. In some cases, bloat can be extensive, and sub q fluids will need to be administered in order to maintain hydration. In order to treat successfully, you must determine the cause of the bloat since it is a symptom, not a disease in and of itself.

**Diarrhea** is another symptom of something that is wrong, internal parasites, over feeding (the most common cause), feeding a hypothermic animal, and so forth. We receive many animals from the public with such problems, and must then attempt to undo the harm that has been done. In order to successfully treat the diarrhea, you will have to treat the cause. After admitting an animal, which has been overfed, fed an improper formula, or fed while hypothermic (cold), there is often loose, light colored stool. The animal should be given only clear fluids for 24 hours, no milk formula. After 24 hours, the formula can be gradually reintroduced by adding 1 part to 3 parts fluids for the first feeding, then half

formula, half fluids for the second feeding, then 3 parts to 1 part, and finally the squirrel is offered full strength formula. Positive fecals may determine which medications are needed for treatment. (See Internal parasites).

**Sore penises** can develop from littermates or even a male squirrel himself sucking on a penis to the point that it forms a scab. This can develop into a very dangerous situation if not prevented very early. Sometimes squirrels will even suckle on a female causing a sore vulva, and in one observed case, the abdomen skin was sucked, leaving small red marks and bruising. Occasionally, a squirrel is admitted for care with an advanced case, and urination is not even possible.

Littermates causing the problem can be moved to another cage or container. Bad tasting products such as Bitter Apple, Triple Bitter, or good ol' Louisiana hot sauce can be dabbed around the base of the penis, and must be applied regularly, such as at feeding times. These bad tasting products will often prevent further injury and if caught early, will do the trick. One-squirrel caregiver uses Vitamin E dabbed on from a capsule to help heal the area, others have used triple antibiotic ointment. Tiny collars have been made from Dixie cups and socks have been placed over the abdomen to prevent an animal from chewing himself. The sore penis can be soaked in warm water and may have to be squeezed to expel urine. Scabs at the tip may be carefully removed to reexpose the urethra opening. In severe cases when scar tissue has built up, the penis opening can close up, and surgery is the only hope. Under anesthesia, the end of the penis skin can be cut into fourths, and each flap of skin sutured back like a banana peel. Another method cuts the tip straight across and each side of skin is sutured. It is easier to nip this problem early with bad tasting concoctions, however, each year, we seem to admit one or two squirrels which come in with advanced cases of sore penises. The surgery has been 100% effective in saving these animals from a painful death.

**Electrocution:** A pet squirrel was brought to us for treatment after receiving a nasty electrical burn on either side of her mouth from chewing an electrical cord. Her owner thought that it would be safe to let the squirrel run around the house as long as someone was there in the house. The squirrel was treated with fluids, antibiotics, and survived the injury; however, she could have lost her life.

**Crushing injury:** We also treated another pet squirrel, which was admitted with a severe injury to the skull and one eye hanging out of the socket. The squirrel ran under a recliner, and when the owner put the footrest down, he heard a scream as the squirrel's head was being crushed in the mechanism. We could not save the eye, but did save the squirrel's life, and he later was good as new much to his owner's delight. The moral to these two tales is obvious; don't let squirrels have the run of your house or even one room. Your immediate presence will not necessarily prevent a fatal or severe mishap.

**Bloody mouth while feeding:** Blood is often seen in and around the mouth during feeding when squirrels are between 90-120 grams. We have received many a frantic call from volunteers whom we forgot to warn. The bottom teeth erupt at three weeks of age, then the top teeth at five weeks. When the squirrel baby nurses with these new top teeth, he will invariably bite his own tongue a few times until he learns how to suck properly. It can be quite alarming to a beginner squirrel mom or dad, though, to suddenly observe blood in the baby's mouth while feeding it.

**Malocclusion of the teeth** can occur whereby the top and lower incisors do not align properly. When this happens, the teeth continue to grow rather than trim each other in a normal fashion. Squirrels with permanent malocclusion should not be released as they may face a terrible death of starvation or injury from the teeth themselves. Squirrels admitted with injured mouths from falling should be monitored carefully. In some cases, when we have noticed the problem early, we have cut the teeth back to a normal length and they have regrown in correctly. This problem must be treated early to be successful so routine exams should be conducted while the animals are in care. To cut the teeth, fingernail clippers or small metal snips can be used carefully. Snip a fraction of an inch at a time until the teeth are normal in length. Check another squirrel to see what the teeth should look like. The bottom teeth are quite long in squirrels. This method can also be used in cases of teeth, which never grow right, and the squirrel is kept in care. The teeth should be trimmed every other week or so throughout the squirrel's life.

### **Metabolic Bone Disease (MBD)**

You may receive a squirrel from the public after they have raised it for awhile either having convulsions and/or dragging its hind legs. Of course, these can be symptoms of a concussion or a back injury, but when either of these symptoms is presented to us, we always ask about the diet and direct sunlight. Has the squirrel been weaned from formula, and if so, when and at what age? If weaned, what solid foods have been provided, and has calcium been added to these foods? What formulas were given, and has the animal received natural sunlight? Unfortunately, many such animals raised by the untrained have developed metabolic bone disease. Usually, a furry squirrel even at 100-150 grams and 4-6 weeks of age looks "grown" to the public, and so they discontinue formula feeding and begin to give a diet of nuts, seeds, and fruits. Even if the squirrel is age appropriate for weaning, if the diet is not balanced with sufficient calcium, the juvenile squirrel will rapidly develop MBD. Natural sunlight is also required if the youngster is going to metabolize the calcium. The ultraviolet rays needed to provide Vitamin D3 do not penetrate through plastic or glass, and Vitamin D3 is necessary for proper calcium absorption. Vitamin D3 is in the Esbilac formula, so that this problem occurs in animals already weaned.

We have had very good success in treating MBD by immediately placing the patient on a regime, which provides a high calcium intake. We place the squirrel back on formula (Esbilac), and orally give calcium glubionate at each feeding. (See tables and charts for ordering and dosages). If the squirrel is old enough to eat solids, we also sprinkle the

calcium carbonate powder liberally on all solid foods offered, avoiding offering foods high in phosphorous. We also provide a minimum of 30 minutes of sunlight daily. These patients should be kept in the indoor-sized cages rather than outdoor cages to minimize overt exercise and possible stress fractures. Be sure to check the teeth for possible overgrowth also as this often occurs as well.

Over the years, we have saved dozens of squirrels that were admitted with seizures, dragging their hind legs and unable to walk, and were on a path of destruction caused by ignorance on the part of the caretaker. This disease is totally preventable, curable in all but the final stages, and the treatments are easily administered. It is a disease frequently misdiagnosed even by expert medical personnel.

## **Oral tube feeding**

It is always best to receive this training from an experienced veterinarian, vet technician, or wildlife rehabilitator. For oral administration of fluids, you may use warmed Lactated Ringers with 5% Dextrose, Pedialyte, or Ricelyte. Regular formula may also be used for an animal which has been fed formula and whose hydration is normal. Depending on the size of the squirrel, a 3 ½ French catheter can be used for very small babies under 30 grams, a 5 French catheter for larger squirrels. Hold the tip of the catheter at the base of the rib cage and gently stretch it along the animal's chest, neck and head to the tip of its nose and mouth. Be sure to follow the full curvature of the neck. With a permanent marker, mark the point of the catheter that corresponds to the very tip of the mouth. Attach the catheter to the end of the feeding syringe, and draw up the amount of liquids needed. Hold the squirrel in one hand in a flat position horizontally, not vertically, (lying flat in a prone position). With the other hand, slowly insert the end of the syringe into the squirrel's mouth carefully working it down into the stomach until the marked area on the syringe is at the squirrel's mouth. You may be able to feel the end of the syringe in the stomach. If there is any doubt about proper placement, do not administer the fluids.

## **Administering Fluids Subcutaneously**

This method of providing fluids to a dehydrated or unconscious squirrel is relatively simple, but again, it is safer for the patient if you observe someone else experienced in the procedure before you try it yourself. This is a safer method than oral tube feeding. Begin by warming a bag of Lactated Ringers (plain, with no dextrose) in the microwave, checking it frequently until it is warm but not hot (100-105 degrees F.) Draw up the amount of fluids needed using a syringe and needle appropriate for the size of the squirrel. (See charts). You are going to administer the fluids in four locations, two on the hips and two at either side on the shoulders. Gently pinch the skin of the squirrel between your fore finger and thumb, insert the hypodermic needle ¼ - ½" into the tented skin, and inject one quarter of the amount of total fluids to be given. If fluids come out rapidly, you probably pushed the needle through the skin and out the other side. Move to another site and try again. Complete this at all four injection sites. Sub-Q fluids can be given two or four times per day depending on the severity of dehydration, and age and size of the animal.

If you are admitting squirrels for care on a regular basis, there will be times when using this method will mean the difference in whether the patient survives or not.

## **Glossary of Products**

### **Feeding Implements:**

**Catac teats or nipples** are very small, latex nipples, which fit nicely on the end of a syringe in order to feed properly. There are a number of ways to buy them. Direct from the manufacturer, contact CatacProducts, e-mail: [catacprods@aol.com](mailto:catacprods@aol.com), website: [www.catac.co.uk](http://www.catac.co.uk). For smaller quantities, order from UPCO, call 1-800-254-8726 or for a catalog, call 1-800-444-8651 website: [www.upco.com](http://www.upco.com)

**Feeding tubes:** # 3 ½ and # 5 French catheters: vet offices, medical supply comp.

**O-Ring syringes**, order from BAXA corp, phone: 1-800-525-9567, minimum order, 100 syringes per box

If you only need a few at a time, you can purchase from Wildlife Rehabilitation Today magazine, call 1-888-WRT-1020.

### **Formulas, Foods, and Additives:**

#### **Formulas:**

**Esbilac Puppy Milk Replacer (Pet Ag)** - call UPCO at 1-800-254-8726 Or Jeffers at 1-800-533-3377 or website: [JeffersPet.com](http://JeffersPet.com)

**Multi-Milk (Pet Ag)** - call UPCO

#### **Beneficial Bacteria:**

**Probiotics, Bene-Bac**, - call UPCO

Or Jeffers at 1-800-533-3377 or website: [JeffersLivestock.com](http://JeffersLivestock.com)

#### **Foods:**

**Rodent Chow:** Feed stores (usually comes in a 50# bag and must be ordered)

**Sunflower seeds:** Walmart, Feed stores

**Nuts:** pecans, walnuts, hazelnuts, and unsalted roasted peanuts-Costco, Walmart, grocery stores

**Acorns and Hickory nuts-** collect these **only** at locations where no pesticides have been sprayed

**Fruits/Vegetables:** Costco, Walmart, grocery stores

#### **Food Additives:**

**Calcium carbonate-**Pet stores, sometimes as a reptile supplement, on the Internet, we found a company to order 50-pound drums from (for large Centers)

**Calcium glubionate:** local drug store may be able to order for you, or vet offices, Sussex Drugs phone 1-800-255-7733 or [www.SussexDrug.com](http://www.SussexDrug.com) Sussex only sells to licensed veterinarians., or medical supply comp.

**Calcium gluconate:** Jeffers, vet offices, Sussex Drugs, medical supply comp.

## **Meds and Wormers:**

**Albon (sulfadimethoxine):** vet office, Sussex, medical supply comp.

**Bactrim also called Sulfatrim or Septra** (sulfamethoxazole 200mg/5ml and trimethoprim 40mg/5ml)- veterinarian or vet can order from Sussex Drug Company

**Chorpheniramine Maleate-** a decongestant to use for squirrels with upper respiratory. 4 mg tablets, to one crushed tablet, add 40 cc of water, and then dose at .1cc per 50 grams body weight. Works really well. Vet office or order from Sussex Drugs

**Chlorhexadine solution 2%-** vet's office or Sussex Drug Company or medical supply comp.

**Clavamox (tablets 62.5 mg add 1 crushed tablet to 5 cc water, then dose rate = .1cc per 100 grams body weight PO oral, BID)-** veterinarian or vet can order from Sussex Drug Company

**Decongestant/Antihistamine (pediatric):** for body weight 25-30 grams-2-4drops, 30-50 grams-4-5 drops, 50-70 grams-.05cc, and so on. Start with a low dose, and increase in small amounts as needed. Can be given 4-6Xover 24 hours every 4 hours

**Flagyl (metronidazole):** UPCO, vet office, Sussex, medical supply comp.

**Ivermectin 1%-** UPCO or Jeffers

**Lactated Ringers solution; Lactated Ringers with 5% Dextrose-**vet's office, UPCO, Sussex Drugs, medical supply comp.

**Nasal drops/spray-** Walmart or drug store-we use the generic brand

**Propylene glycol-** Jeffers, local feed store, or veterinarian's office

**Providine or Betadine Solution-** vet's office, or Wal-Mart

**Simethicone-**for gas relief in human infants, 1-2 drops

**Sodium chloride solution .9%-**vet's office, Sussex Drugs, medical supply comp.

**Strongid (pyrantel pamoate 50mg/ml):** UPCO, Sussex, vet offices

**Triaminic decongestant** – Walmart pharmacy or any drug store-we use the generic brand. Use a drop or two for squirrels less than 50 grams, .05 cc for squirrels 50-75 grams and so forth.

**Triple Bitter:** UPCO, JEFFERS

**Vicks Vapor rub-** Walmart pharmacy or drug store

## **Equipment/Supplies:**

**Adams flea and tick spray for puppies and kittens, cats and dogs** –UPCO or Jeffers

**Bitter Apple or Triple Bitter-** UPCO or Jeffers

**Crock Bowls:** UPCO, pet stores

**Electric cup warmers:** thehomemarketplace.com, Walgreen's

**Gel heat pacs,** which warm in the microwave to keep animals warm during transport- Walmart in the pharmacy section

**Gram scale:** Wal-Mart, UPCO

**Heating pads,** electric, Walmart in the pharmacy section

**Hypodermic syringes, needles:** UPCO, Jeffers, vet offices, feed stores

**Nasal aspirator bulbs:** Dollar General, Walgreen's, etc.

**Plastic containers** with lids, called "Playmates"-UPCO or local pet store

**Infant receiving blankets:** Walmart

**Wire** (½" X ½") for cages, lumber and plywood: feed stores, Home Depot, Lowe's

**The Squirrel Store** carries many squirrely items: 1-877-717-7748 or website [www.thesquirrelstore.com](http://www.thesquirrelstore.com)

The magazine, **Wildlife Rehabilitation Today**, offers many items including books, manuals, and supplies. Call 954-977-5058.

If you haven't already, consider joining the National Wildlife Rehabilitator's Association and the International Wildlife Rehabilitator's Council

Ivermectin Dilute=one part Ivermectin 1% to 19 parts propylene glycol  
(This mixture must be shaken prior to use) Give orally to treat mange, mites, to kill maggots. For mange and mites, give 3 doses, 7 days apart.

weight of squirrel	amount of dilute
50 grams	.025 cc
100 grams	.05 cc
200 grams	.1 cc
400 grams	.2 cc