

# Breeding Rats & Mice

by Karen Robbins

Care and Guidelines

6<sup>th</sup> Edition

## GENERAL

Rats and mice are perhaps the easiest of the small rodents to raise. Their early reproductive ages, short gestation period, large litters, and genetic possibilities combine to make them instructional in teaching children reproductive facts and responsibility, and for the serious fancier who is breeding for specific colors and markings.

## Finding Homes

Before you begin breeding, you will need to establish what you are breeding for and where the excess babies will go. If you don't want the babies being sold for reptile food, then you will need to find homes for each of them. Schools, neighborhood children, and friends are some sources of homes for your pets. You can also put up notices in pet shops, vet offices, feed stores, etc. Most pet shops will only buy from a commercial breeder, so don't expect your local pet shop to buy

your babies even if they sell "fancy" pet rats and mice. Advertisements in your local papers are another source, but be aware that if your babies are free, you may get calls from people who have other things in mind for them other than a good home!

You can join a rat or mouse club if there is one in your area. The shows and events many rodent clubs put on are a wonderful place to find homes for your babies. Some may require a membership fee and/or a seller's fee before you can sell at their event or ask for a percentage of your sales. If you are going to get into breeding your rats or mice on a regular basis, then paying their fees would be nominal considering the many opportunities you will have to sell your babies. Also, by joining a club you can be listed in their network of breeders and get referrals from people calling the club to find that perfect pet or breeding animal. When you get involved in a local club, you can establish a name for yourself as a sought-after breeder of

## GENERAL FACTS

	<b>RATS</b>	<b>MICE</b>
Daily water consumption (milliliters) .....	30–35 (1 oz) .....	4–7 (¼ oz)
Amount of food eaten daily (grams) .....	15–20 .....	4–6
Water/food requirements .....	always available .....	same
Recommended temperature .....	65–75°F .....	68–75°F
Recommended humidity .....	40–70% .....	45–55%
Light requirements .....	12 hours .....	12 hours
Keep males together .....	yes .....	no
Males musky odor .....	no .....	yes
Average life span .....	1000 days/2–3 yrs. ....	1–2 years
Body length (inches) .....	9–11 .....	3–5
Tail length (inches) .....	7–9 .....	3–5
Weight (oz) .....	10–19 .....	1–3
Body temperature (°F) .....	99.5–100.8 .....	96.4–100

## **REPRODUCTIVE FACTS**

	<b>RATS</b>	<b>MICE</b>
Sexually mature (weeks) .....	6–8 .....	4–8 .....
Desirable breeding age		
Female .....	14–16 wks. ....	12 wks. ....
Male .....	12–14 wks. ....	10 wks. ....
(Note: recommended breeding age for female fancy rats is 4–6 months; males over 6 months)		
Breeding season .....	any .....	any .....
Estrus cycle (days) .....	4–5 .....	4–5 .....
Postpartum estrus .....	yes .....	yes .....
Female number of teats .....	12 .....	10 .....
Gestation (days) .....	19–28 (22–23 avg.) .....	17–21 .....
Length of delivery .....	1 hour .....	30 minutes .....
Litter size (average) .....	9–12 .....	8–10 .....
(Note: Litters of 1–22 are possible)		
Sex ratio .....	52%M/46%F .....	same .....
Birth weight (grams) .....	5–9 (6–8 avg.) .....	1–3 (.03–.10 oz) .....
Open eyes (days) .....	12–15 (14 avg.) .....	10–14 (12 avg.) .....
Weaning (stops nursing) (days) .....	28 .....	21–28 .....
(Note: recommended minimum age to sell fancy rats is 6 weeks; fancy mice 5 weeks)		
Breeding life ends		
Female .....	15–18 months .....	12–16 months .....
Male .....	16–20 months .....	

your particular variety of rat or mouse and end up with a waiting list of those wanting your specialized type of rodent!

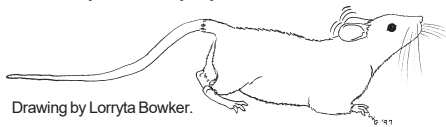
Also, with today's technology, the Internet is becoming a common source for breeders to sell their stock either with their own web site or on the many classified sites and forums available to advertise your stock—some free, some you pay a nominal fee, some you have to belong to. However, if you advertise on the Internet, be aware that you may get inquiries from people in other states or countries wanting you to ship them their new pet or breeding animal. If you do not wish to get into shipping rodents, make sure you specify that in your ads. There is a lot of expense and paperwork involved in shipping rodents, and you have to be a “known shipper” with some airlines before you can use their services. (See the “Shipping Rodents” article in the Winter 2000 *AFRMA Rat & Mouse Tales* newsletter or on the web site [www.afrma.org/shipping.htm](http://www.afrma.org/shipping.htm).)

### **BOYS & GIRLS**

You will need to have a male of the type you are breeding for (or use someone else's as stud service; typically the owner of the male will ask for pick of litter or a fee for this service). Even if you are only breeding for pets, the quality and temperament of the parents are most important. Obtain the very best foundation stock available. Your breeding stock should always be of the best quality you can obtain. Never use small, poor-type animals. A poor-quality sire or dam will produce poor-quality babies. The male will have a greater influence on your colony than the female as he can produce more babies in his lifetime. In my many years' experience breeding show-quality mice and with many rat litters, I've found the quality of the dam usually has a greater influence on type (physical structure) as reflected in the kids, but that doesn't mean you don't breed to the best male possible. When breeding pet shop mice to the big English show-type mice, the first generation will result in an increase in size, tails, and ears from the English parent, no matter which parent is the English.

The female should be of good condition—not too fat nor too thin—as well as the proper age, good size, and good type. Fawn colored mice (dominant yellow) genetically get fat so you will want to make sure you breed this color as soon as possible, otherwise she may be too fat to conceive. Females are most productive between the ages of 3 to 10 months. It is possible for your female to have up to 7 litters during her breeding life if you breed her right after weaning each litter. Don't choose breeding animals that have the same physical fault, or fault in markings at the same place. You can "breed in" that fault to the point you won't be able to get rid of it without doing some serious out-crossing. Also, NEVER use sick animals. A female with respiratory problems will have an even more difficult time with the stress of raising a litter and the babies will catch what she has.

The female has two uterine horns and both rats and mice are spontaneous ovulators. Your female will come into heat every 4–5 days year-round. In rats it can be



Drawing by Lorryta Bowker.

very easy to tell by the way she acts. You may observe her stop, freeze, stretch a bit raising her back end and tail, then vibrating—most noticeably her ears and head. Her vagina will be more open and be a mauvish or purplish color. Her estrus time will be about 12 hours long and this usually occurs at night. This is the time you have been waiting for!

### **BREEDING TIME**

Now that you have decided to breed these small rodents (or perhaps one came to you already pregnant!), you will need to know what to expect. As stated in the chart, they do become sexually mature quite young, although you should wait until they mature and gain size before you begin breeding. On the other hand, you should breed your female mouse for the first time by 4 months of age; rats, by 6 months of age, otherwise you may experience difficulty getting her pregnant or she may have a difficult delivery. Females are best with the second through fourth litter.

Most of the time you will breed only one or two

females at a time with your male. If possible, you should always breed for at least two litters at a time so if something happens to one of the moms (dies or is unable to nurse), there is a very large litter with more than the mom can nurse at once (rats can nurse 12, mice 10), a litter is abandoned, or the mom is just a poor mother, you will have a foster mom available to help out with the babies in need. When putting your pairs together for breeding, always place the female(s) in with the male. If you put the male in with the girls, it will take him a bit to get used to his new surroundings and the females may resent this intruder in their territory and beat him up. He may then be more concerned about defending himself than in breeding the girls.

You can either place the female with the male and wait until she begins to "show" about 2 weeks later, or in the case of rats where you may have the males housed together, you can place the prospective pair together in a neutral cage for the evening when you see that the female is in season. Several hours later, or the next morning, you can separate them back to their own cages and repeat again in 4–5 days until you observe the mating has taken place and she no longer comes into season. After you observe that your rat has been bred, then you can start weighing her daily to check her weight gain during the pregnancy [www.afрма.org/pregrat.htm](http://www.afрма.org/pregrat.htm). If the female is not receptive to the male, she will kick at him, scream, and generally let him know she wants nothing to do with him! You may even notice this behavior in females during breeding that have bred several times with the male and are telling him enough is enough!



Drawing by Lorryta Bowker.

Actual mating occurs 12–72 times within the estrus time of the female. The number of matings varies with the age of the rats, the temperature, and the amount of disturbance. After mating you may see a whitish, waxy plug in the female's vagina (most commonly seen in mice). This is a mixture of the secretions of the vesicular and coagulating glands of the male. This is normal



A Silver Blue mouse with a waxy plug starting to come out. Mouse owned and bred by Karen Robbins. Photo ©2008 Karen Robbins.

and will disappear in about 24 hours.

Because rats and mice have a postpartum estrus cycle (meaning they are capable of breeding and becoming pregnant right after delivery of the litter), you will need to decide ahead of time if you are going to leave the male with the female. In rats, 30% usually rebreed; 70% wait until the babies are weaned; mice are usually 50/50. Another thing to consider if you leave them together, the father will be able to impregnate the females in the litter when they are very young. With rats this will sometimes be at 5–6 weeks, some lines of mice at 4–5 weeks, so if you don't want your

babies having babies, the kids will need to be separated out at 5 weeks for rats and 4–5 weeks for mice. With a postpartum estrus, lactation and gestation can occur simultaneously. Lactation can delay gestation because of delayed implantation and this may prolong gestation for up to a week to 13 days.

Occasionally you will put two animals together and not find her getting pregnant and having babies 3 weeks later like expected. If that is the case and nothing happens after leaving them together for a couple months, then try the female in question with a male that has produced with other females, and put the male with a young female that has produced a litter. Also, you can try a younger female with the male (for rats, don't put her with him until the evening she is in season). If your first female gets bred right away with a different male and a female that has produced a litter does not get pregnant with your male in question after several weeks, then he could be sterile or just not liking the females you put with him. Sometimes you can have a male that produced a litter or two not get any other females bred after the initial litters, or males that have had females of various ages with them their entire life not getting any of them pregnant but get one bred right away that is put with him when he is old. Some males are slow about breeding and the females take weeks to get bred where other males get them bred right away. If nothing happens after several weeks, splitting them up for a few days/week then reintroducing when she is in season sometimes helps. Sometimes an aggressive female rat will intimidate a young male (especially if she is put in with him not in season) and cause him to not want to have anything to do with females after that. Other times placing another female in season in the mix helps. Placing rats in a breeding cage (such as an aquarium or plastic tote—one that doesn't have levels) with no houses or hidey things will sometimes work if you get no results in the male's cage. Also, diet could be a factor—for breeding animals you need 24% protein, 4% fat (or 6% fat in the breeding formula). Sometimes weather has an influence—hot weather is not good and they won't breed very well if they are kept too warm, or it may be the time of year—some breeders have trouble getting their females bred during the winter months with the short

### **BABY FACTS (in days)**

	<b>RATS</b>	<b>MICE</b>
Ears open .....	3–4 .....	3–5
Incisors break through .....	8–10 .....	10–12
Young find way to mom .....	9–10 .....	
Response to sound .....		11
Eyes open .....	14 .....	12–14
Genitals covered in fur .....	16 .....	
First molars through .....	19 .....	
Second molars through .....	21 .....	18–19
Third molars through .....	35 .....	28–29
Migration of testicles .....	21–41/15–51 .....	
Opening of vagina .....	42–72/15–72 .....	28–49
Weaning (days) .....	28 .....	21–28

daylight hours (make sure they have equal numbers of light and dark). Sometimes it can be genetic/hereditary if the animals are from a line that has smaller litters and problems with the females getting pregnant. One other thing to add: overweight females are harder/impossible to get bred. Also, older females will sometimes take longer to get bred and are more prone to having problems with the pregnancy/litter/smaller litter size.

There have been a couple times where I've put two animals together and she has a litter as expected; however, that litter has problems—there are only a couple babies, they are thin and don't look well when born, some die, and after a few days any left are not thriving and growing as expected and have to be euthanized. Doing a repeat breeding of the same two animals will then result in a litter with a normal number of babies, they all look good, are in good weight when born and afterwards, and grow up fine. Now if the second litter still has problems, then you could try a third attempt with a different male to determine if it is just that particular combination that didn't work or a problem with the female.

## **2 Fathers Sire 1 Litter???**

*(Answer by Carmen Jane Booth, D.V.M.)*

**Q** *We had a situation come up recently where two rats I had sold someone were pregnant (accident—long story) and there were two males that could possibly be the father. Each male was different enough from the females that we should have been able to tell by the coloring/markings of the babies as to who was dad. Problem is, the babies came out colored/marked as if both males sired some of each of the litter. I heard it was possible in dogs to breed your female to two different males at the same time and get puppies in the one litter that would be from different fathers (DNA would then be used to determine who sired the puppy). Is this possible in rats (or mice for that matter), to have two fathers for one litter? I don't remember reading it in any of my books. Thought you might have a clue on this one. Thanks! Karen Robbins*

**A** In any animal that has litters, it is possible if the female was bred by two males, that there could be pups from both fathers in the litter. As far as DNA

testing, yes there is a place that will do parentage determination on offspring whether it is human, dog, etc. I bet that they would do it but I bet it is expensive. I don't know the name offhand but they are located in Davis or Woodland (next town over) in California. I had a friend who worked there for a while. One of the human paternity DNA places suggested calling U.C. Davis. If you really want to know, I bet there are places that will do it. I would suggest searching under paternity testing on the Internet. I just know with what is involved, that it is likely to be \$100 per rat.

## **FERTILE MICE**

*(Answer by Carmen Jane Booth, D.V.M., Ph.D.)*

**Q** *I just had two pet mice neutered and was told they can still have sperm for 2 weeks after the neutering. Also, that females can hold sperm for 2–3 weeks before they become pregnant. I've heard of this in hamsters where the females can be with males then separated for several weeks then suddenly become pregnant. I know in rats and mice there is the delayed pregnancy when a female gets bred immediately after delivering that she won't deliver for 4 weeks instead of the 3 weeks. Is this correct?*

**A** In general, in any species after a neutering or vasectomy, you have to wait because sperm do survive in the vas deference. As for the females holding sperm, some rodents do this, but I am not sure about mice. I emailed this to one of my friends who is the manager of reproductive services at The Jackson Laboratory. She says, "I can tell you that there will be a few from good sperm samples that are still alive after 24 hours in the IVF drop . . . not many and they are not very lively but still moving." There is just nothing on females holding sperm.

## **METHODS OF BREEDING**

One male can be used with up to 10 females at one time. However, in most instances you will only have one trio per cage if colony/harem breeding. You can either leave the trio together for their lifetime or separate the pregnant females to their own cage.

Monogamous mating would involve a single pair of animals. These are left together throughout their lifetime. Some other types/forms of breeding are inbreed-

ing, line breeding, and crossbreeding.

### ***Inbreeding***

Inbreeding involves related animals such as father/daughter, mother/son, brother/sister, etc. Inbreeding will produce the fastest and most dramatic results. It can also ruin a colony if not closely monitored by “setting in” faults.

### ***Line Breeding***

Line breeding is similar to inbreeding but you don't use as closely related animals. Use cousins, uncles, aunts, etc., or animals with the same background grandfather but different in the rest of the lineage. Line breeding involves having at least two different inbred strains of animals of the same color or marking. This way you can use animals from the other line when you need to outcross. This is most often used with fanciers.

### ***Crossbreeding or Outcrossing***

In crossbreeding you take unrelated stock and breed them together to introduce types wanted in the stock being crossed, such as crossing an American type mouse with an English type mouse to improve the size and conformation of the American.

Keep records! Even if you are only breeding for pets, record keeping is very important. You can keep an account of whom each animal is bred with, how many babies are produced, how many live, the number of males and females per litter, if you cull any out and why or if you foster any to another mom, how the mothering ability is, if you keep any offspring and what they are, how many and to whom you sell the babies to, as well as the background lineage of each individual breeding animal, including their date born, parents, color/markings, etc.

### ***CARE OF THE EXPECTANT MOM***

When your female is obviously pregnant (swollen belly; they will start to show when they are about 2 weeks pregnant), take her out and place in her own cage (unless you want babies every 3 weeks as they have a postpartum estrus; some rats will not allow the male near them during this time, thus avoiding this

from happening). Once you separate the male and female, do not put them back together. If the male is separated then placed back in the cage, he can kill the babies. If you do leave them together, the male will help care for the babies and many will even help clean and “nurse” them, making excellent fathers. Just remember that he can impregnate the young females if they are left together. Leaving two or three female mice together to raise their babies can be beneficial as they do very well in a community situation. They will nurse each other's young leaving all the babies in one big pile. This way, if one female has a lot of babies and the others only have a few, then all the babies will have a more even chance at the milk supply. However, if you do this, it is best to have all the litters born within a couple days of each other, otherwise the new ones will get pushed away by the older littermates and may die. This method would only be recommended if you were very careful with the record keeping or had different colored females together and knew what they should be producing. With rats, it is best to separate the female to her own cage. Too many times you will find one rat wanting to hoard all the babies to herself and keeping the other mom away. Also, two female rats could get in a tugging war with a baby and injure or kill it. Ideally, it is recommended that you *always* separate each mom to her own cage, not only for the record keeping, but also this way you will see how her mothering ability is (milk production, size of babies,



A pregnant female mouse, owned and bred by Karen Robbins. She had 10 babies the day after this photo was taken. Note the nesting material of shredded napkins. Photo ©1994 Craig Robbins.

quality of care given them, etc.), what colors/markings she produced with the male she was bred to, and how many babies she had.

If the male is by himself after taking out the female, give him another female to breed or an old female so he has company. In the case of rats, you can try placing him back with his group of males though it may not work if he has been away from his group longer than a couple weeks.

Now that your expectant mother has her own home—a 10- to 15-gallon size tank for rats is fine or a 5-gallon size tank for mice—you will want to add some extra protein to her diet (she should be getting at least 24% protein; for more on protein requirements, see [www.afрма.org/bc\\_nutritreqrats.htm](http://www.afрма.org/bc_nutritreqrats.htm) and [www.afрма.org/bc\\_mineralproteinmice.htm](http://www.afрма.org/bc_mineralproteinmice.htm)). This can be given in the form of a good quality dry cat/dog puppy/kitten food (from pet shop/feed store) in small amounts each day. You can also give her extra treats. However, don't overfeed her as you don't want the babies to be too large when born thus causing complications. Try to avoid handling her in excess, and when you do, be very gentle with her. Make sure the cage is not in any drafts, sunlight, or exposed to fluctuations in temperature.

Mice are capable of a pseudopregnancy (false pregnancy) which can last 1 to 3 weeks. It would be best to breed the female to a different male if you observe this in any of your mice. It is very rare to find this in rats, but it can occur and will last approximately 13 days. Some rat breeders have had problems with their females getting bred, looking pregnant about 2 weeks along, then one day they are slim again and the babies have been reabsorbed. This could be caused from an inadequate diet, a virus, or infection. Also, babies with two copies of a lethal homozygous gene will die in utero.

### **Parturition**

When it is time for the “kittens” to arrive, she will make a nest and do a lot of rearranging of her home. It is not necessary to give any kind of house as they can become overly protective of their babies this way. Moms need extra nesting material such as torn up paper napkins for their coming brood. Make sure you clean the cage a couple days before the birth so you

won't need to disturb her for a few days.

Most baby rats and mice are born in the evening, though a lot are born in the afternoon, and it is a very quick process. Parturition is heralded by pronounced postural stretching and rear leg extensions. A vaginal discharge may be noted a short time before the actual birthing. The first-born usually arrives head first, with the rest following either by head or breech. She will clean each one and eat the afterbirth (the placenta apparently furnishes a growth-promoting substance to the milk) as they come out. The babies will be a bright pink-red in color, hairless, blind, and have closed ears. They do have whiskers and you can tell if you have any Rexes by the curly whiskers; Satin rats have long wavy whiskers. You will also see the eye colors—black or pink. If you see any babies that are a blue-purple body color, it could be they were deprived of oxygen for a bit and the mom will revive them, or they are dead. Any dead babies may be eaten by the mom. When all the babies are born, she will then proceed to nurse them. If you are fortunate to view this event, be very quiet and don't interfere unless there is a very definite problem. They need mom for food and warmth and to stimulate their urination and defecation. For the first couple of weeks the babies will remain in the nest. If any are found outside the nest,



A mother mouse with her 3-day-old Siamese/Himi babies, owned and bred by Karen Robbins. Photo ©1994 Craig Robbins.



A litter of six newborn baby mice owned and bred by Karen Robbins. These all have black eyes and will be Pearl. Photo ©2012 Karen Robbins.

mom will carry them back. Some moms will “bury” or cover up the babies with almost all of the bedding in the cage. She will only do this on newborn/young babies before they get fur. She is not trying to suffocate them or hurt them in any way, but rather she does this to keep them warm and to protect them.

### ***Abandonment/Killing***

Occasionally a first-time mom will abandon her litter after they are born. You can try placing her in a small carrier—one just big enough for her body—so she has no choice but to be on top of the babies. Leave her in this carrier for a few hours or until you see the babies have nursed and she is showing signs of caring for them. Hopefully the babies aren’t too weak to attempt nursing. If this doesn’t work, then you will have to foster the babies onto another mom with babies the same age. Give the first-time mom another chance at having a litter. If she does this a second time, cull her from your breeding program.

You may find two or three female mice housed in a harem system where one female kills the other babies that are born. This is usually a female that hasn’t had her litter yet and is the last one to deliver. Once she

has her babies, then everything is fine and all the females take care of her babies. If this same female repeats this behavior, cull her from the group.

On rare occasions a mom may kill her young litter (usually happens in mice). This may be caused by loud noises, a cat or dog bothering the cage, a stranger handling the babies, inadequate food or water, or some other event that scares the mom and she instinctively kills them. If this happens, check to see if there are any that only have minor injuries. There may be a chance of fostering them onto another mom if the real mom is totally ignoring the remaining one(s). Usually they are so badly injured that the best thing is to euthanize them.

On very rare occasions a mom will kill her litter (most or all) when they are 3–4 weeks old. One breeder I know had it happen once with a rat litter, and I’ve had it happen a couple times with mice. The cause is unknown but a female that does this should never be bred again.

### ***Checking The Babies Out***

Some time after the mom has nursed the babies and comes off the nest to get a bite to eat, you can give her a bit of bread soaked in milk or some other favorite treat. While she is eating her treat you can look in on the babies and make sure there are no dead ones. If you are not sure how she will react, take her out of the cage, put her in a holding cage, and give her the treat. You can then carefully look over all the babies and check them out making sure all have nursed and dispose of any dead ones. Don’t take very long doing this as she may get nervous if left out too long away from her new family. During these first few hours, don’t disturb the female unnecessarily. Any female rat or mouse that bites you at any time while she has babies should not be used for breeding, as this can be passed down to the offspring. Remember, many animals you sell are for pets, and biters do not make good pets.

After you put the babies back, you can put mom back if she is out and give a second treat. You may handle the babies each day to socialize them to people, just don’t take them out too much or too long at a time! Some people think that if they handle the babies, the mom will kill them, but that is not the case. Make



sure mom always has plenty of food and water available. The diet is most important to insure you get the best quality babies possible. If you skimp on the food or don't feed a good diet (high-quality lab blocks should always be available as the main diet), this will show up in the youngsters. Some extra items you can give in addition to the lab blocks are scrambled egg, dry dog/cat puppy/kitten food, dog biscuits, Ensure or Boost or other equivalent liquid nutritional drink supplement (Walgreen's has one), and other healthy treats. You will notice the mom eating and drinking much more now than before and the cage will need cleaned more frequently. Cleaning the cage is **very** important. Don't be afraid to handle the babies or you may end up with some very sick or dead animals if you neglect cage cleaning.

### Milking Time

The female will produce colostrum—the first milk—which is high in antibodies. In rats, the milk production will reach its peak 10 days after delivery of the babies and gradually decrease until the mom dries up about 28 days later. Some rat females have been known to nurse their litter up to 5–8 weeks. In mice, milk production increases up to 12 days postpartum, then declines until weaning.

You can tell if the babies have nursed by the white patch under the skin on their left middle of the belly

because without fur their skin is somewhat transparent so you can see the milk in the stomach. The first few days this is a good way to see who has nursed and how much.

### Colostrum

(Answer by Carmen Jane Booth, D.V.M.)

**Q** How long does a mother rat/mouse produce colostrum for her newborns. If

*there are two mothers in a cage and the #1 mom has her babies and #2 doesn't have hers for a couple of days but starts to nurse the newborns from the #1 mom, will the newborns take all the colostrum intended for the unborn babies?*

**A** Mice continue to produce antibodies in their milk throughout lactation according to *Laboratory Animal Medicine*, by Fox, Cohen, and Loew. Although colostrum is highly concentrated in antibodies, the pups should still be adequately protected as long as they nurse after birth.

In rats, maternal antibody is transferred *in utero*, via the yolk sac and by intestinal absorption of colostrum by the neonate up to 18 days after birth.

Another interesting fact about rodents and reproduction: most rodent species have the same number of tissue layers present in their placenta as humans (3) as compared to all hoofed mammals that have 6 layers. With only 3 layers, there is some transplacental protection prior to birth, in contrast to animals with 6 layers where it is crucial that they receive colostrum within 12 hours after birth.

### Sexing

With experience sexing these rodents is fairly easy. Newborn males will have a greater anogenital distance, larger genital papilla, and the pale testes will be visible through the abdominal wall. The females will have a



"But Mom, I wasn't finished yet!"



Baby mice. The female is on the left, the male on the right, owned and bred by Karen Robbins. Photo ©1994 Craig Robbins.



... and another view with the female on the left and the male on the right. Note the white patch on the female's middle—this is the stomach with milk in it. Photo ©1994 Craig Robbins.

shorter distance between the anus and the top of the urethra. As the young get fur, you can see a double row of nipples on the female's underside at 8–15 days and fur between the anus and urethra in the male. To gain experience, the best thing to do is to lift the tails and compare the littermates! The males grow much faster than the females. This is especially noticeable after they are 14 days old.

### ***The Babies Grow Up***

The babies will start to get their color shortly after birth depending on what color they are. You may see the dark colors such as Black and Agouti even on the day they are born; the light colors you may not see until they actually get some fur. The fur really starts to come in about 8 days after birth. By the time they are 10–12 days old, you should be able to make out any white markings on the body.

After the babies open their eyes, they will be ready to start nibbling on solid food. In addition to the main diet of lab blocks, you can give bits of bread, dry cat or dog food, mixed grain, oatmeal, cereal bits, dog biscuits, etc., or other healthy treats you normally give the mom. They will taste anything you put in the cage including your fingers. Place your hand in the cage with treats on it and let them come up and see what you have. This is a good age to get them to start taking treats and bits of food from your fingers and do some early training. Make some kind of sound for rat babies (kissy/razberry/tsk) when you have goodies for them.

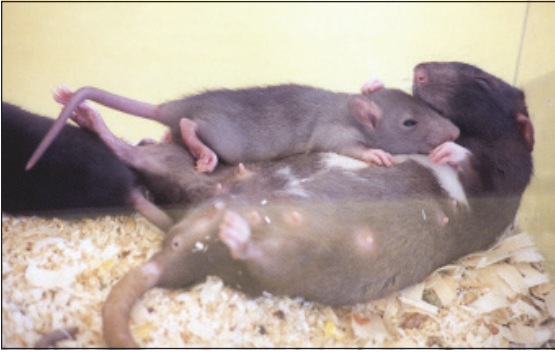
In some mouse litters (most usually seen in pet shop mice) at around 2½ weeks of age, they will go through a “popcorn” stage where they are “wild” and jumpy and will jump and scatter just by the opening of the cage or placing your hand in the cage. When one starts doing this, it gets everyone going and makes it very hard sometimes to catch them. You have to be very careful with them at this age as they can very easily jump out of the cage and disappear behind cabinets, etc. This only lasts a few days and they will outgrow it. It has nothing to do with how much they were handled prior to this time, and I've seen no effect on their temperaments being more skittery or wild after this point. On the other hand if you have a single baby in a litter that is jumpy and bitey at the ~4 week age, these should be culled.

There are some mouse babies that a few days after they open their eyes, will stop growing at the same pace as their littermates and sometimes don't do well. These are usually culled if they don't die, and if kept, should never be used for breeding purposes.

When rats reach about 3–4 weeks old, they will re-



Baby rats almost ready to open their eyes, owned and bred by Karen Robbins. Photo ©1993 Karen Robbins.



It's tough raising these kids! Rats owned and bred by Karen Robbins. Photo ©1993 Karen Robbins.

ally be playing and wrestling with each other (mice don't play like this). You can have a lot of fun by playing with them too. You can grab and poke them gently in their sides like the other babies would and in a matter of seconds have the whole cage wrestling and tumbling with your hand and each other.

Mom rat may appreciate some short times away from the kids at this point and will enjoy some special lap time with you. If you have a large cage (15 gallon or larger for rats and 10 gallon or larger for mice), you can create a little playground for the youngsters. Make shelves and ladders, put in boxes and tunnels, and give a wheel for them to run on. If your cage is on a table or shelf, rat kittens will want to follow mom out of the cage and start exploring the world around them.

Rat babies will be ready to go to new homes when they are 6 weeks old (5 weeks for mice). Your time spent with them during their baby stage will make a big difference in the quality of pet the new owner receives, but remember temperament is genetic so always start with good friendly, calm stock. You will need to separate the sexes at this time. You don't want your babies having babies!

Wait a couple of weeks before breeding the mom back to a male. If you place the female in a cage with other females until you are ready to breed her again, pecking order will have to be established. If the fighting doesn't stop after a short time, you will have to find new quarters for the returning female. Sometimes placing females together that have all just finished rearing a litter will work out with little fussing, otherwise if they are fighting, you may find rearranging the

groups will eliminate the problem. When keeping any young animals, remember that male mice will fight if left together longer than 4–8 weeks unless they are pure English. With these, you may find the littermate boys will get along with minimal fighting until you are ready to begin using them for breeding, although some pure English will begin fighting as youngsters, some not until they are older. Any young females may be kept with the mom or placed in a new cage with other weaned females.

### **Eyes Open Early in Rats**

**Ken & Connie Van Doren, Happy Go Lucky Rattery (HGLR), Whittier, CA, e-mail**

**Q** *One of our rats, Phoebe, was bred on 3-10-08 between 10–11 P.M. and the following morning between 6–7 A.M. As of 7 A.M. this morning 4-3-08 (day 23, 24), she has not given birth. She's nice and fat and looks like she's ready to explode! Yesterday morning, we noticed a bulge/lump (the size of a baby) down between her legs. Could it be a baby lodged in the birthing canal? I went to check on her this morning—I went to gently pick her up (to look at the bulge), she squeaked and ran away, leaving a spot of blood behind.*

*This is her second litter, the first one was on 5-9-07. She was born on 11-9-06. She's eating and drinking normally.*

*Should we be worried? And if so, can you recommend a vet to help us? Can a rat still care for a litter*



The Russian Blue Agouti babies in question at 12 days old. Photo ©2008 Ken and Connie Van Doren, Whittier, CA.