OBSERVATION ON THE FEEDING BEHAVIOR OF ORPHANED BABY RED SQUIRRELS SCIURUS VULGARIS RAISED IN CAPTIVITY BETWEEN 3 AND 12 WEEKS

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Abstract

The feeding habits of a three orphaned red squirrel Sciurus vulgaris were observed during spring, in Western part of Romania, Arad county. Observations on the behavior of squirrel baby were made from 3 weeks to 12 weeks, when the squirrels were released into the wild. The baby squirrels were found fallen from the tree, together with the nest. At about 3 - 4 weeks of age, the feeding takes place 9 times a day, at 6 weeks of age, the number of feeds begins to decrease, is the period when diversification begins by introducing some seeds and nuts in the diet. In terms of weight, the baby weighed about 50 g when they were found, and will reach a weight of 100 g in week 8, and a weight of about 200 grams at about 10 weeks. The paper provides information regarding feeding pattern the first day after finding an orphaned baby squirrel until release into the wild.

Key words: captivity, feeding behaviour, Sciurus vulgaris.

INTRODUCTION

The Eurasian red squirrel (*Sciurus vulgaris*) is present in both deciduous and coniferous habitats (Stachura et al., 2004; Shar et al., 2008), in primeval stands (Wauters et al., 1992; Shuttleworth, 2000) as well as in small woodlots (Wauters, 1997). It can also be found in suburban and urban areas, including city parks (Babin ska-Werka & Z ółw, 2008). Its diet varies with season (Magris & Gurnell, 2002; Fericean, 2017), but also with habitat type (Bosch & Lurz, 2012; Shuttleworth, 2000) and includes a wide variety such as plants seeds and fungi, as well as animal matter (Bosch & Lurz, 2012).

There is no more controversial topic than the diet of wild animals baby, including squirrel baby. Some caretakers insist that raising baby squirrel could only be successful with Esbilac Powder Milk Replacer for puppies. There are many brands of formulas and recipes. Some mix moisturizers with formulas instead of water, others add colostrum powder, organic egg yolks, honey, glucose, vitamins and minerals powders, rodent powder or cream.

Not having access to existing milk formulas and studying cow's milk that contains less than half

the protein, fat and nutrients needed for a healthy squirrel's chick to be even harder to digest, causing electrolyte loss through diarrhea and dehydration of the animal we tried to we use goat's milk together with calcium and vitamin D3 supplements, to avoid diarrhea we also used probiotics, administered together with milk.

MATERIALS AND METHODS

The baby squirrel (Figure 1) was found in a hilly area in the in Western part of Romania, Arad county, fallen from the tree together with the nest and their mother was found dead near the nest. The chicks were about 3 weeks old.



Figure 1. The squirrel nest

Observations on squirrel baby (*Sciurus vulgaris*) regarding the feeding behavior were made by using our own milk formula consisting of goat's milk, egg yolk and honey (Table 1).

Table 1.	Squirrel	milk	formula	(original)
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No	Ingredients	%
1.	Goat milk	65%
2.	Egg yolk	35%
3.	Honey	5%

The liquid was fed using 5 ml pipettes, for 4-7 week old baby squirrel and a 2.5 ml syringe for the following weeks (Figure 2).



Figure 2. The feeding of baby squirrel

For the proper functioning of the intestinal flora, we administered probiotics together with the milk during a feeding session. To supplement the necessary nutrients for the harmonious development of muscles and skeleton, were administered 1 ml of vitamin D drops and 1 ml of calcium every three days.

RESULTS AND DISCUSSIONS

On the first day (evening) were administered sachets with re-hydration salts for babies. They contain the mineral salts needed to keep the baby away from dehydrating. The contents were administered with a pipette, at the corner of the mouth, but due to the stress he went through, he had a hard time learning to suck. The administration should be done very slowly so that the baby does not aspirate the contents. Aspiration of food or fluids causes pneumonia *ab ingestis*, one of the most common causes of death in infants.

After consuming about 5-10% of their body weight from the re-hydration formula, should be stimulated to urinate and defecate because they cannot do it on their own.

According to some authors, most of the babies found are dehydrated. These are some signs of dehydration: pale gums, gray, dry mouth, sunken eyes, whites around the eyes that present, rough, prickly fur, dry and scaly skin. Some caretakers use the "tent test" to check for dehydration.

After the baby was warmed and hydrated, milk mixed with such re-hydration salts was gradually introduced (Table 2).

Table 2.	Feeding pattern the first day after finding	g an
	orphaned	

Feeding 1	100% moisturizing liquid	
Feeding 2	60% moisturizing liquid	
_	40% milk	
Feeding 3	40% moisturizing liquid	
-	60% milk	
Feeding 4	25% moisturizing liquid	
	75% milk	
Feeding 5	100% milk	

The adult of *Sciurus vulgaris* has a very varied diet deciduous and coniferous seeds dominate its diet when available. The growth of squirrel populations is related to the abundance and annual changes in tree seeds (Wauters et al., 2008).

Factors influencing body development, reproduction and survival during cold periods are correlated with tree seed production (Bertolino et al., 2004). If the seeds are depleted, the squirrels move to other locations (Lurz et al., 2000; Wauters et al., 2005).

Spring staple food is supplemented with shoots, buds, and flowers, and mushrooms are eaten in summer and autumn. In winter, feeding time is reduced due to high-energy feeding (pine or deciduous seeds) that allow squirrels to meet their requirements in just a few hours. During the spring, the diet is lower in calories and the time spent searching for food is longer (Gryz et al., 2015; Wauters et al., 2008).

Research by Lee (2002) has shown that squirrels are very selective in food, with a preference for food. Seeds of certain species of conifers compared to others and are present on some trees more than others (Molinari et al., 2006).

At about 3-4 weeks of age, the feeding takes place 8 times a day, with a frequency of 2 hours, and at night it is fed only once, depends on the over al health of the squirrel baby. A sickly squirrel will need more attention. At this age, baby squirrel begins to open their eyes and the lower front teeth appear. The reddish fur on the body continues to grow as the tail hair grows longer. The white fur begins to form on the neck and belly.

At about 4 - 5 weeks of age, the frequency of feeding increases to 3 hours, and the interval between feeding at night is 6 hours. Their behavior is very slow in the next few days they continue to eat and will return to sleep immediately.

At about 5 to 6 weeks of age, the number of feeds decreases to 7, and at night the interval between feeds is up to 8 hours. Solid foods were offered, but were unsuccessful.

At about 6 to 7 weeks of age, the teeth develop, they can hold the food in the front paws, but the tail cannot lift it (Figure 3). The number of feeds begins to decrease, is the period when diversification begins by introducing some seeds and nuts in the diet. Walnuts are the first food accepted, and after a few days they prefer seeds. During this period, they refuse to eat any fruits or vegetables.

They are also starting to become more active and trying to climb different surfaces. They can grind hard food.



Figure 3. The tail position at 6 weeks

At about 7 to 8 weeks of age, the frequency of consuming milk is reduced to 4 hours, the food being supplemented with small snacks of seeds and nuts, as well as corn cereals.

At about 8 to 9 weeks of age, the frequency of consuming milk decreases to 4 -5 hours a day, fruits and vegetables being accepted in the diet, strawberries being the favorite fruits. Begin to lift the tail up during feeding or other activities (Figure 4)



Figure 4. The tail position at 8 weeks

At about 9 to 10 weeks of age, the number of milk feeds decreases to 3, the food being supplemented with seeds, fruits and vegetables. At about 10 to 11 weeks of age, consuming milk takes place twice a day, with a 12-hour break between. It is very important to pay attention to them in order to develop the fighting skills that are essential in the wild for their survival. He begins to make different sounds, expressing his joy, curiosity or nervousness.

At about 11 to 12 weeks of age, the amount of milk consumed decreases up to once a day.

At 12 weeks squirrels have an active behavior of about 10 hours each day, the beginning and end of the activity corresponding to sunrise and sunset. This behavior was similar to that observed by Wauters (2000) and Gryz (2009).

In the case of additional feeding, hazelnuts were the most important food source (Shuttleworth, 2000).

As for the amount of milk consumed, it was 5 ml every 4 weeks, increasing in week 12 to 16 ml (Figure 5).

At about 5 to 6 weeks of age the amount of milk gradually increased to 7 ml, and the frequency of feeding should be gradually reduced to 6-7 meals a day, 2.5-3 hours away from 8-10 hours between feedings at night.

Age	Number of feeds	Frequency	Туре
3-4 weeks	8	2 hours + 1 night	Milk
4-5 weeks	8	2.5 - 3 hours at night sometimes	Milk
5 to 6 weeks	7	3 hours - not at night	Milk
6 to 7 weeks	6	3 hours - not at night	Milk / start of diversification
7 to 8 weeks	5	3-4 hours - not at night	Milk / solid food
8 to 9 weeks	4	4-5 hours - not at night	Milk / solid food
9 to 10 weeks	3	6 hours - not at night	Milk / solid food
10 to 11 weeks	2	12 hours - not at night	Milk / solid food
11 to 12 weeks	2	12 hours - not at night	Milk / solid food
11 to 12 weeks	1	once a day	Milk / solid food

Table 3. Number and frequency of feeding (3 - 12 weeks)



Figure 5. The amount of milk consumed 4 to 12 weeks

In terms of weight, the baby weighed about 50 g when they were found, and will reach a weight of 100 g in week 8, and a weight of about 200 grams at about 10 weeks. A squirrel weighing 100 grams should be fed every 4-5 hours (Figure 6).



Figure 6. Baby squirrel weight 4 to 12 weeks

In some cases, squirrels may ingest small amounts of bark. The bark is sometimes removed to reach at of cambial tissue. Some tree species are preferred for example spruce, Scots pine, beech, spruce, silver birch (Wauters, 2000).

Squirrels also feed on the mycelium of fungi that grow under the bark (Holm, 1990). Occasionally are introduced into the diet other plant substances like lichens and mosses (Sulkava & Nyholm, 1987). Nevertheless, animal matter does not play an important role in the diet of squirrels. Very rarely they may prey on eggs or even young of birds (Shuttleworth, 1996).

Sometimes the soil can be digested by squirrels in response to mineral requirements (Holm, 1990; Shuttleworth, 1996).

Due to the fact that squirrels have managed to adapt very well to the environments populated by humans, it can be said that they have become the rodents with which people are most familiar. In some very large cities, squirrels may even be the only wild mammals that humans have a chance to see (Wauters et al., 2005).

The European squirrel (*Sciurus vulgaris*) or the native squirrel, as it is called in our country is present in Great Britain, Europe and Asia, and is considerably smaller, measuring between 19-23 cm, with a tail between 15-20 cm. The fur color of squirrel changes with the seasons, ranging from reddish to black, with tufts of fur on the ears; but all European squirrels have white bellies. They normally can live up to 3 years in the wild and up to 10 years in captivity (Bosch, 2012).

Peeled walnuts offered in squirrels in parks were eaten regardless of the season in most cases. The squirrels hid the reserves and consumed them in the following days.

CONCLUSIONS

We can conclude that the use of our own milk formula consisting of goat's milk, egg yolk and honey had a beneficial effect on the growth and development of baby squirrel.

At about 3 - 4 weeks of age, the feeding takes place 9 times a day, at 6 weeks of age, the number of feeds begins to decrease, is the period when diversification begins by introducing some seeds and nuts in the diet.

In terms of weight, the baby weighed about 50 g when they at week 4, and will reach a weight of 100 g in week 8, and a weight of about 200 grams at about 10 weeks.

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