

**POSTNATAL DEVELOPMENT OF SPECKLED GROUND SQUIRREL  
(*SPERMOPHILUS SUSLICUS* GÜLD, 1770) (SCIURIDAE, MAMMALIA)  
IN CAPTIVITY**

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The catastrophic decline in the number of the speckled ground squirrel (a previously numerous, now-threatened species) requires the adoption of urgent measurements to protect and restore its local populations. The paper presents the results of our observations of the development of pups in the postnatal period, which is necessary for the development of an integrated approach combining the creation of semi-natural reserve populations of the species in natural mega-enclosures with raising litters in *ex situ* conditions. Pregnant speckled ground squirrel females ( $n = 8$ ) mated in nature (*in situ*) were captured at the Kosyrovsky cemetery (Lipetsk City) in April 2017. The females were observed from their trapping until delivery, pups ( $n = 32$ ) were observed from their birth to 64–77 days. The survival rate of pups was 59%. The obtained data on the dynamics of body mass and the timing of the appearance of some morphological features allow using the devised scale to estimate the age from birth to one month of age with an accuracy of two–three days. After the age of one month when pups start feeding by their own, their keeping in cages favors fat accumulation, and at the age of 7–8 weeks the weight of the animals from cages and nature becomes similar with the further better advance of the first ones. Further improvements in the methods of keeping pregnant females and their litters *ex situ* are necessary for more successful growing *squirrel* pups during the first weeks of their life.

*Key words:* speckled ground squirrel, weight, conservation of endangered species, reintroduction, postnatal development.

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## **INTRODUCTION**

At present, an abrupt decrease in a number of speckled ground squirrel (*Spermophilus suslicus* Güld, 1770) is registered throughout its range (Titov, 2001; Shilova et al., 2010; Rusin, 2011; Ziółek et al., 2017). The species is included in the Red Data List of Poland as “endangered” (Głowacinski et al., 2002), in the Red Data Book of Belarus Republic as “vulnerable” (Demyanchik, 2006), in the Red Data Book of Ukraine as “vanishing” (Mezhzherin, 2009), in the IUCN Red List of Threatened Species (Zagorodnyuk et al., 2008),

and is suggested for the Red Data Book of Russian Federation as endangered species (Ilyashenko et al., 2018).

In the Central Black Earth Economic Region where the first description of the species has been made by individuals caught close to Voronezh (Gueldenstaedt, 1770). Now it is included in the Red Data Books of Belgorod (2 category) (Shapovalov, Prisnyi, 2005), Voronezh (1 category) (Klimov, 2018), and Tambov (1 category) (Sokolov, Lada, 2012) regions. But this did not prevent progressive abundance decline of speckled ground squirrel. Over the most part of the Black Earth Region the decline and disappearance of the species populations progress (Nedosekin, 2007; Marchenko, 2003; Vlasov, Brandler, 2011). Occasional discoveries of small settlements in the region (Rodimtsev, 2012; Smykova, Rodimtsev, 2014) did not indicate restoration of the species and demanded their special investigation.

The only viable population of speckled ground squirrel within the Black Earth Region is now preserved at the man-transformed area – at Kosyrevskoe Cemetery close to Lipetsk City (Pivanova, Shubina, 2010 a; Proyavka, Shubina, 2011). But its stability and survival are questionable because of intense overgrowing by trees and the influence of some other factors (Pivanova, Shubina, 2010 b).

Special programs developed in several countries of Europe for preservation and restoration of closely related species, European ground squirrel (*Spermophilus citellus*), may be an example of preservation management. One of the main components of these programs is the development of measures for a reintroduction of European ground squirrel to favorable natural biotopes from areas where this species is harmful (Shilova, 2011). Such programs agree well with the policy of rare species preservation developed by Prof. V. E. Flint (Flint, 2000). It is based on the creation of the gene bank of rare species and reserve populations made of individuals born under artificial conditions (*ex situ*). Practical implementation of this policy is being performed for many years by the Eurasian Regional Association of Zoos and Aquariums (Ostapenko, 2017). But the same methods cannot be applied to speckled ground squirrels just as it is, because they are not reproduced in zoos and do not live long.

Scientists from Lipetsk suggested resettling some animals from the city cemetery to other natural biotopes (Pivanova, Shubina, 2009). It was made in 2015 – 2017 using the territory of the natural park “Olenii” in Lipetsk Region. Animals were released into either common enclosure 15 by 15 m or into individual smaller temporary enclosures or were released directly into natural habitat. In all instances, some part of animals settled at the place of release, spent the winter, reproduced and gradually disappeared by the next winter. Main reasons were spontaneous migration and predation, especially by booted eagles (*Hieraaetus pennatus*) (Sapelnikov, Dolgoplov, 2016 a, b). The same problems are typical when one work with European ground squirrel (Piskorski, 2004; Próchnicki, Styka, 2008).

For normal metabolism, this species needs natural habitat which regulates its seasonal life. To arrange their partly restricted keeping the use of big enclosures with the area of more than 1 ha was suggested (Sapelnikov, Dolgoplov, 2017). It would provide the necessary biotopes and protection from predators. But advantages of *ex situ* approach cannot be utilized under such conditions, because it is impossible to control the postnatal development of young animals spending more than three weeks in deep holes. The main point of our approach is the capture of pregnant females and keeping them in individual

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cages with warm shelter for delivery and raising young under the observation of zoologists. After the young reach required weight and behavioral reactions for independent life they should be released in large natural enclosures to prepare for wintering in a natural environment.

The data on postnatal development of speckled ground squirrel under laboratory conditions are scarce (Lobkov, 1999; Oleinik, Lobkov, 2003). Much more data could be found for other species, European ground squirrel (Tacu, 1978; Ozkurt et al., 2005; Ramos-Lara et al., 2014), but they cannot be extended to closely related, but another species.

The objective of this study was to obtain data on the weight dynamics of young speckled ground squirrels and on the development of some morphological and behavioral features during the postnatal period and first months of life to assess the possibility of using some characters as age indicators.

### MATERIAL AND METHODS

Pregnant females of speckled ground squirrel, mated in natural conditions (*in situ*), were caught at Kosyrevskoe Cemetery (Lipetsk) in April 2017. They were kept under observation from the moment of capture till delivery, and their litters – from birth till the age of 64–77 days.

The birth of gophers and the first days of their life took place in 5-liter transparent plastic containers with a diameter of 17 and a height of 25 cm in height with perforated covers, where mothers and their litter were kept for several days. Females in turn of delivery were named alphabetically except the first one which already had № 164.

According to published data, the pregnancy in speckled ground squirrel lasts from 24 (Lobkov, 1999) until 27 days (Tikhvinsky, Sosnina, 1939). By convention, the duration of pregnancy was accepted as 24 days. The dates of mating were back-calculated by dates of delivery.

Females with their litters were kept in separate net cages 50×50×100 cm with wooden cage 19×24×27 cm inside as a shelter with the entrance opening 6.5 cm in diameter and with removable cover. Hay was used as bedding within both cages. During several first days, cages with parturient females were kept in the heated room and later in May they were moved outdoors. All cages were protected from rain. All animals were in direct visual contact.

Weighing of young was made daily till the age of one month then periodically till the end of the experiment using an electronic scale with an accuracy of 0.01 g.

The program Excel 2013 and the package Statistica 13 Trial were used for the data treatment. Average values ( $\bar{X}$ ) were compared with the use of Student's *t*-test. Increasing of the body weight depending on the age was analyzed by nonparametric Mann-Whitney *U* test.

### RESULTS

In our experiment, 32 young animals were obtained from 8 gravid females (Table 1).

**Table 1.** Parameters of gravid females of speckled ground squirrel and their litters are kept in cages in 2017

Female code	Date of catch	Weight when caught, g	Weight for 30.06, g	Date of the birth / date of mating	Litter size	The average weight of pups at first observation, g / date	Number of survived pups*
164	18.04	262	247	<b>20.04</b> 26–27.03	3♂ 2♀	8.6 / 22.04	5
A	25.04	249	253	<b>2.05</b> 7–8.04	1♂ 3♀	5.7 / 2.05	3
B	23.04	256	294 19.06	<b>2.05</b> 7–8.04	2♂ 1♀	7.6 / 4.05	3**
C	25.04	246	289	<b>3.05</b> 8–9.04	2♂ 1♀	5.8 / 3.05	1
D	23.04	215	275	<b>3.05</b> 8–9.04	2♂ 1♀	7.5 / 4.05	1
E	24.04	268	214	<b>4.05</b> 9–10.04	3♂ 3♀	5.0 / 4.05	6
F	23.04	221	247 19.06	<b>4.05</b> 9–10.04	2♂ 3♀	7.5 / 4.05	0
G	25.04	191	244 19.06	<b>5.05</b> 10–11.04	2♂ 1♀	3.9 / 5.05	0
Total					17♂ 15♀		10♂ 9♀

*Note.* \* – the number of pups becoming self-dependent; \*\* – female stopped lactation, pups were added to other litters.

*Litter survival.* Of 32 born pups during all the rearing period 13 have died (41%), including eight pups which died during the first week. The main reason for the death most likely was low tolerance to stress in some females.

Entire survival of two largest litters in females 164 and “E” (Table 1) is explained by their quiet behavior during first days after delivery, at that female “E” was transferred into the cage from the 5-liter plastic container only by five days. In litters of stress-resistant females out of 24 born pups survived 19 young animals (79%).

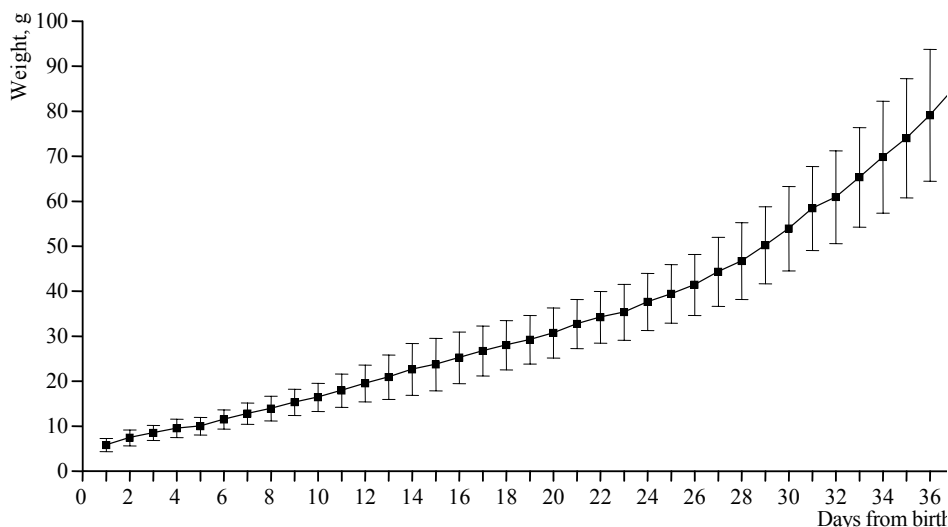
At 14 day after the birth, the weight gain began to decrease in pups of female “B,” possibly, because of lactation deprivation. Considering the average weight of pups, they were added to litters “A,” “C,” and “D.” All of them survived.

Some skin sicknesses were observed in pups. All pups of female “A” had damaged tails, and skin necrosis started at the age of 2 days. As a result, some pups had shortened tails (by 1/2 or 1/3 of their length). One young female completely lost her tail. This fact is part of the reason for the frequent occurrence of animals with short tails or without a tail at all.

*Weight during the postnatal period.* Fig. 1 illustrates changes in weight from birth until the age of 37 days (mean values with standard deviations). During days 1 to 5 by 11, 19, 14, 19, and 14 pups have been weighted, during days six till 37 – by 19 pups.

Under cage rearing the average weight, increments were: 1.1 g per day during first ten days, 1.4 g per day during 11–24 days from birth, and 3.7 g a day for days 25 to 65. Diversity by weight was very high already in early pups which differ by 42% during first ten days, later (during 11–24 days) the variation coefficient decreased to 13%, and in-

creased again to 45% at the age of 25–65 days. Intra-brood diversity in body weight depending on the age was not significant within the litters of females “164”, “A”, “C”, and “D.” In progeny of female “E” the weight dynamics of three larger pups significantly differed from the dynamics of the smallest male (Mann-Whitney criterion,  $U = 1019$ ,  $p = 0.015$ ;  $U = 1037.5$ ,  $p = 0.0206$ ;  $U = 1098$ ,  $p = 0.0532$ ). At the end of the experiment, the average weight of young animals aged 65 – 77 days was  $183 \pm 6.5$  g ( $n = 18$ ). Among the oldest pups (77 days from birth) the male born by female “164” has the maximum weight, 238 g. Among youngest pups aged 64 days, the smallest weight of 136 g had a male from litter “E” and the biggest weight of 217 g had “adopted child” of female “A”. The largest pups did not differ externally from their mothers.



**Fig. 1.** The average weight of speckled ground squirrel pups depending on the age

Extreme weights of young animals from different age groups clearly indicate that depending on the sex and individual peculiar properties the variability in weight may be significant, and values of weight in adjacent age groups may overlap considerably (Table 2).

This leads to the conclusion that during the first 2.5 months of life the age of young animals should be indicated in days but not in weeks. For example, a young male weighing 10 g may be one or two weeks old, weighing 18 g – 2 or 3 weeks old, weighing 28 g – 2, 3 or almost four weeks old (Table 2). The difference may be 1.5-2 weeks. These data of *ex situ* experiments agree well with field data for various years.

Among animals caught at Kosyrevskoe Cemetery in 2016 were young individuals of the current year. Average weight of young animals caught in June 1-3 was  $76.5 \pm 19.7$  g ( $n = 15$ ), caught in July 2-3 –  $152.3 \pm 21.7$  g ( $n = 43$ ). The older pups, caught in July, were separated from adults by the body length (less than 18 cm). Their age was determined considering the date of appearance after wintering (March 31, according to information of sextons), the date of mass appearance (April 6), the length of pregnancy (24

days), and the first appearance of young animals (24–25 days old). Age of animals caught at June 1–3 was determined as 24–32 days. For animals caught on July 2–3 – as 49–63 days, supposing that mating period could last about 14 days. Comparison of weight of young animals caught in 2016, and experimental animals of the same age revealed that the last ones aged 24–32 days ( $48.1 \pm 11$  g,  $n = 171$ ) were lighter than their congeners ( $t = 5.5102$ ,  $p = 0.001$ ), and animals aged 49–63 days ( $160.6 \pm 25.0$  g,  $n = 173$ ) were significantly heavier ( $t = 1.9870$ ,  $p < 0.05$ ).

**Table 2.** The average weight of males and females by weeks

Days	<i>n</i>	Males, g $\bar{X} \pm \sigma$ , $N = 10$	Lim <i>min – max</i>	<i>n</i>	Females, g $\bar{X} \pm \sigma$ , $N = 9$	Lim <i>min – max</i>
0–7	62	$9.7 \pm 3.05$	3.8–15.9	58	$9.2 \pm 2.5$	4.3–14.7
8–14	70	$18.4 \pm 5.0$	7.6–29.9	63	$17.7 \pm 3.9$	10.5–27.2
15–21	70	$28.1 \pm 6.8$	12.9–39.0	63	$28.0 \pm 5.6$	15.4–40.8
22–28	70	$40.3 \pm 8.2$	23.0–58.5	63	$39.4 \pm 6.9$	27.3–57.0
29–35	70	$61.4 \pm 12.8$	32.0–93.0	63	$62.2 \pm 12.4$	40–92
36–42	43	$93.7 \pm 20.2$	49.0–144.0	38	$94.1 \pm 16.7$	64–143
43–49	42	$124.9 \pm 23.9$	68.0–163.0	42	$125.7 \pm 18.3$	96–173
50–56	53	$158.5 \pm 25.8$	99.0–195.5	52	$157.6 \pm 20.6$	125–199
57–63	25	$181.8 \pm 23.7$	124.5–216.5	25	$167.6 \pm 18.2$	140–207.5
64–70	19	$197.8 \pm 24.2$	136.0–229.0	19	$174.4 \pm 14.3$	143–208
71–77*	6	$216 \pm 20.9$	192.0–238.0	6	$186.8 \pm 6.5$	180–198

Note. \* – only for pups of female “164”; *n* – the number of weightings.

*Morphological characters.* During this study special attention was paid to the registration of appearance of well-marked morphological characters. Newborn pups are hairless, pinky-grayish in color, eyes, and ears are closed, fingers at the front paws and hind legs are adherent. Four or five days later skin becomes dark gray-pinkish, barely noticeable vibrissae appear. From this moment on rather rapid development of specific characters begins. Because descriptions of the external appearance of young speckled ground squirrels of known weight are very few in literature, we are presenting our data as a kind of developmental scale which may be used for age determination of young animals (up to 1 month) in the laboratory and during field studies (Table 3).

**Table 3.** The scale of an appearance of some morphological characters and behavioral reactions in pups of speckled ground squirrel of variable age and weight

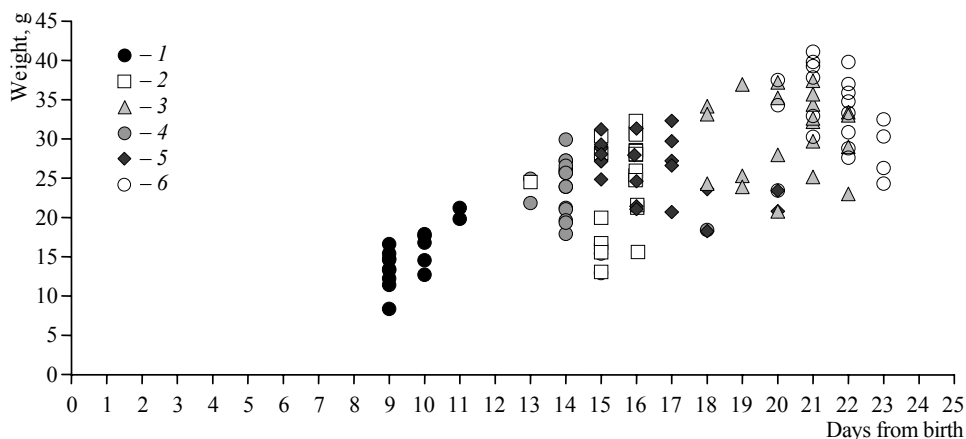
Days $\bar{X}$	Characters and reactions	Earliest appearance, days	Latest appearance, days	Weight, g $\bar{X} \pm S_x$	Weight, g Lim	<i>n</i>
1	2	3	4	5	6	7
4	“Chirrs” inside the nest	2	5	$8.8 \pm 0.4$	5.8–11.4	14
5	Darkening of skin, short lanugo hairs on the snout, vibrissae 2–4 mm long	5	6	$10.6 \pm 0.6$	5.8–14.8	16
6	Fingers begin separation on front paws	4	7	$11.4 \pm 0.5$	8.7–15.1	12
9	Dark spots are visible through the skin	8	9	$13.9 \pm 0.9$	8.3–17.5	11
10	Velvety skin over the whole body	9	11	$14.5 \pm 0.8$	8.3–17.9	12
10	Fingers of the front paws separated entirely	9	11	$15.0 \pm 0.8$	8.3–21.2	16
10	Crawl, using front paws	9	10	$15.6 \pm 0.8$	12.5–17.9	7

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**Table 3. Continuation**

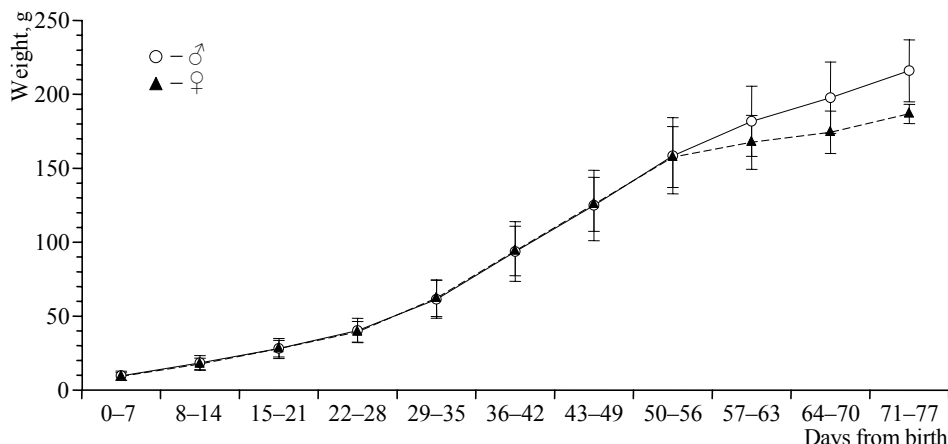
1	2	3	4	5	6	7
12	Light speckles are well-marked over the head	11	13	19.9±0.8	14.3–25.3	16
14	Pronounced speckles over the whole body	13	18	22.4±1.0	12.9–29.9	21
15	Lower incisors are cutting	13	16	24.0±1.2	12.9–32.1	19
15	Appearance of defense reaction	13	17	24.1±1.4	12.9–33.0	16
16	Complete separation of toes	15	20	26.0±0.9	18.2–32.3	21
18	Uterine gland buds develop and smell musk	17	18	30.1±1.0	22.9–35.0	14
20	Eyes open	18	22	31.0±1.2	20.8–39.0	21
22	Upper incisors are cutting	20	23	32.9±1.1	23.1–40.8	21
23	Ears open	22	24	35.9±1.8	22.7–44.6	14
24	Leave their homes without assistance	22	25	39.0±1.5	30.6–45.5	10
25	Squeaking similar to adult one	23	25	40.1±2.1	30.0–46.0	7
25	Can sit on hind legs and able to rise and stand fully erect	25	25	40.9±1.6	36.2–45.5	5
27	Start feeding by their own with grass and seeds	27	27	47.4±1.9	41.3–52.0	5
35	Patterns of exploratory behavior appear	35	35	78.4±2.8	70.6–85.5	5

The connection between the appearance of some character, such as separation of fingers, development of light spots, cutting of upper and lower incisors, an opening of eyes, which are registered easily, and age and body weight is not linear. In other words, such characters not always appear earlier in larger pups than in smaller ones (though the delay may indicate emaciation) (Fig. 2).



**Fig. 2.** The connection between the appearances of some characters, age, and body weight in pups of speckled ground squirrel: 1 – separation of fingers on the front paws, 2 – cutting of lower incisors, 3 – eyes opening, 4 – pronounced speckles, 5 – separation of toes, 6 – cutting of upper incisors

It has been shown earlier that difference in body weight between immature males and females of speckled ground squirrel becomes evident only at the age more than three months, preserving in mature (overwintering) individuals (Oleinik, Lobkov, 2003). We did not reveal significant differences in body weight of heterosexual pups aged 65–77 days, though the tendency was obvious (Fig. 3).



**Fig. 3.** The weight of young males and females of a speckled ground squirrel by weeks (mean value  $\pm$  standard deviation)

## DISCUSSION

It had been shown earlier that during keeping litters of speckled ground squirrel in the laboratory the death of young animals is frequently observed. According to V. A. Lobkov (1999) in several days after successful delivery and lactation nests proved to be empty. Lactating females with litters were kept in metal cages  $35 \times 23 \times 27$  cm with a nest of hay or with wooden shelter for the female. The author describes that very few litters survived until one month of age. In nature survival rate of young speckled ground squirrels was 34–74% after leaving the burrows, and more than half of the recruitment dies during two months of independent life. For biologically close small (*Spermophilus pygmaeus*) and long-tailed (*S. undulatus*) ground squirrels, by the time they go to sleep, the safety of young animals is only 15–20% (Lobkov, 1999). In our experiments, 59% of all born pups reached the age of 65–77 days and were transferred to the Lipetsk Zoo.

In our experiments males to females ratio in 8 litters was 1.1 (53%) which agree with published data. In 18 litters of speckled ground squirrel 54 males and 46 females were found (Ognev, 1947). According to other data, the number of males in several populations was from 51 to 55% (Popov, 1960, cit. after Lobkov, 1999).

Observations on the increase in weight during the postnatal period revealed that the weight of pups might be successfully used for determination of their age only during the first month of life.

Based on the presented data on pups' weight in 2016 and 2017 for the same population it is obvious that for pups older than one month their age cannot be exactly determined by their weight without knowledge of terms of seasonal development of the population. Our data support pronounced variability in age groups of young animals in natural populations. It may be connected with both long mating period and individual processes of growth. Further accumulation of experimental data during the raising of speckled ground squirrels in captivity and utilization of additional metric parameters will bring comparable and more precise data.



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We also compared our data on the weight of pups of the same age with similar data obtained earlier under laboratory conditions (Lobkov, 1999; Oleinik, Lobkov, 2003) (Table 4).

**Table 4.** Changes of body weight in pups of the speckled ground squirrel from Lipetsk and Black Sea coastal area populations during the postnatal period

Age, days	Lipetsk, our data			Odessa (after Oleinik, Lobkov, 2003)		
	<i>n</i>	$\bar{X} \pm S_x, \text{g}$	$\sigma$	<i>n</i>	$\bar{X} \pm S_x, \text{g}$	$\sigma$
5	14	10.0±0.6	2.1	10	7.2±0.4	1.2
10	19	16.4±0.7	2.9	19	11.5±0.4	1.5
15	19	23.7±1.3	5.8	—	—	—
20	19	30.7±1.2	5.4	12	16.1±1.1	3.8
25	19	39.4±1.5	6.4	7	21.9±0.4	1.1
30	19	53.9±2.0	8.5	25	57.9±4.0	20.2
61 (2 months)	16	175.2±5.7	22.7	49	159.2±4.0	28.2

Comparison of the weight of pups of the same age from two populations using Students' *t*-test revealed that animals from Lipetsk of the age of 5, 10, 20, and 25 days were significantly heavier than their age-mates from Odessa region ( $t = 4.6; 7.9; 8.7; 13.1$  at  $p < 0.05$ ). Pups aged 30 days did not differ significantly, and pups aged 61 days had only tend to differ ( $t = 2.0$  at  $p = 0.05$ ).

Thus, while raising in captivity the body weight of young speckled ground squirrel from the northern region of a specific area up to two months of age, on the whole, was bigger than the animals from the southern region of the area – North-Western Black Sea coastal area. It may be suggested that differences are connected with unequal keeping conditions, but most likely the reason is geographical heterogeneity of the species.

Using extensive museum collections it has been shown earlier that within the area of a speckled ground squirrel the directional variability of morphological characters becomes apparent, and animals from southern populations are generally smaller than animals from northern regions; enlargement of animals from west to east was also noted (Zagorodnyuk, Fedorchenko, 1995). Other authors demonstrated the existence of regional distinctions of morphometric parameters in adult speckled ground squirrels: individuals from steppe populations (Nikolaev region) were smaller than animals from the forest-steppe zone (Poltava region) (Sokur, Filipchuk, 1977). Animals from Lipetsk population are larger by linear parameters as compared to individuals from Bryansk and Kursk regions (Proyavka et al., 2017) and are similar to animals from Tambov region (Proyavka, Shubina, 2016).

By the timing of morphological changes, our data agree well with results obtained under laboratory conditions (Oleinik, Lobkov, 2003). In pups from the Odessa region, raised in the laboratory, eyes are opening during 22–23 days of development under the body weight of 27–33 g (Lobkov, 1999). According to our data, it happens on average at 20<sup>th</sup> day ( $n = 21$ ). The first eyes opening was registered at 18<sup>th</sup> day of development (in 14% of pups) under the body weight of 24–34 g and the last pups opened eyes at the age of 22 days (19% of pups) weighting 23–33 g. In large litters eyes opening was nonsimultaneous – heavier pups usually opened eyes earlier. In pups of similar weight from dif-

ferent litters, the distinction in eyes opening may reach two days. In pups from small litters, which usually are some bigger, eyes opened earlier than in pups from larger litters. One may speculate that this character is connected both with housing conditions and hereditary factors.

Our observations on the timing of some morphological characters differ in part from the data for European ground squirrel in Turkey (Ozkurt et al., 2005). For example, the upper and lower incisors are cutting in pups of European ground squirrel between 25 and 27 days from birth. According to our data in speckled ground squirrel lower incisors come out from the age of 13 days, and upper ones – from day 20 (Table 3).

## CONCLUSIONS

The experiment with keeping gravid females of speckled ground squirrel inside the individual cages demonstrated that the survival rate of litters till the age of 2.5 months might be as high as 59%. Results on the body weight during the postnatal period together with the timing of some morphological and behavioral characters permit to determine the age of pups with the accuracy to 2–3 days. A developmental scale is compiled for age determination by these parameters.

At the age of 3.5–5 weeks, experimental animals had smaller weight as compared to pups of the same age from natural populations. Possibly, it was due to complications during the experiment when four poorly developed pups were safely transferred to other females with small litters to save their lives. After the age of one month when pups start feeding by their own, keeping in cages favors fat accumulation, and at the age of 7–8 weeks weight of animals from cages and nature becomes similar with the further better advance of experimental animals. Further improvements in methods of keeping gravid females and their litters *ex situ* are necessary for the enhancement of pups' development during the first weeks of their life.

The rather high survival rate of pups under good conditions provided for gravid females and positive practice of transferring pups to other females as appropriate indicate availability for reintroduction this complex approach combining the creation of reserve populations of speckled ground squirrel in large open-air enclosures with preservation of litters *ex situ*.

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**ПОСТНАТАЛЬНОЕ РАЗВИТИЕ КРАПЧАТОГО СУСЛИКА  
(*SPERMOPHILUS SUSLICUS* GÜLD, 1770) (SCIURIDAE, MAMMALIA)  
ПРИ ВОЛЬЕРНОМ СОДЕРЖАНИИ**

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Катастрофическое снижение численности прежде многочисленного, ныне угрожаемого вида – крапчатого суслика – требует принятия срочных мер по его охране и восстановлению локальных популяций. В работе представлены результаты наблюдений за развитием детенышей этого вида в постнатальный период, что необходимо для разработки комплексного подхода, сочетающего создание полувольных резервных популяций вида в природных мегавольерах с выращиванием и сохранением выводков в условиях *ex situ*. Самки-роженицы крапчатого суслика, спарившиеся в естественных условиях (*in situ*), были отловлены на Косырёвском кладбище (Липецк) в апреле 2017 г. За беременными самками ( $n = 8$ ) наблюдали от момента отлова до родов, за детёнышами ( $n = 32$ ) – от рождения до 64 – 77 дн. возраста. Выживаемость детенышей составила 59%. Полученные данные по динамике веса тела и срокам появления ряда морфологических признаков вида позволяют с помощью шкалы определять возраст от рождения до месячного возраста с точностью до двух–трех дней. После месячного возраста, когда сеголетки начинают питаться самостоятельно, вольерное содержание способствует интенсивному накоплению жира, при котором в возрасте 7 – 8 недель веса зверьков *in situ* и *ex situ* становятся близкими по значению с последующим опережением в вольерных условиях. Для более успешного выращивания сусят в первые недели их жизни необходимо дальнейшее совершенствование методики содержания самок-рожениц с выводками в условиях *ex situ*.

**Ключевые слова:** крапчатый суслик, вес, сохранение редких видов, реинтродукция, постнатальное развитие.

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