



SUSLIK (*Spermophilus citellus*) REINTRODUCTION IN SLOVAKIA

Guidelines

**State Nature Conservancy of the Slovak Republic
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1. INTRODUCTION

These guidelines have to help people, who decide to save protected animals or restore population of native species, where it doesn't live today, or is living on the border of its extinction. It is dedicated to activities aimed for susliks (*Spermophilus citellus* Linnaeus, 1766) protection. Material is limited to facts and experiences with realised reintroductions. Information on biology, ecology or ethology of susliks is not mentioned here. The main aim of the guidelines is to get together experiences, which could help saving or restoring of susliks populations in future.

Right here, it must be mentioned that you could realise transfer of animals just if all other possibilities of local population protection failed. Catching of individuals itself and following transportation and releasing on chosen locality, is drastic impact to susliks' life. If you ignore or miss some procedures, it could have negative impact on population.

1.1. Conservational status of the species

Suslik (*Spermophilus citellus*) is according to decree of Ministry of Environment of the Slovak Republic no. 24/2003 Coll. protected animal of European interest with societal value 15 000,- SKK for individual.

Suslik is included in Appendix II (animal and plant species of European interest and which protection needs designation of Special Areas of Conservation) and Appendix IV (animal and plant species of European interest and which needs special protection) of Directive of the Council of the European Community No. 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitat Directive). This directive is establishing general framework for the conservation of listed species and is creating background for building of ecological network of protected areas of European interest (NATURA 2000) in European Union member states. Its main goal is to achieve favourable conservation status of species and habitats.

Suslik is also included in the Appendix II (strictly protected species) of Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). This agreement is aimed to protection of wild plants, animals and their habitats, especially those which conservation needs cooperation of more countries. Contract parties accept necessary legislative and legal measurements for the protection of fauna and flora species listed in annexes.

In the Slovak national Red list is susliks evaluated as endangered (ŽIAK & URBAN 2001). In the international IUCN Red list is susliks in category vulnerable.

1.2. Necessary legislative minimum

As suslik is protected species and also species which could be carrier of human and animal diseases (zoonoses), there must be realised many legislative duties prior to transportation during preparation process. All activities must be done according to IUCN/SSC Guidelines For Re-Introductions (IUCN 1995).

1.2.1. Necessary legislative minimum in nature conservation

It is obligatory to have exception from principles of Act No. 543/2002 Coll. by Ministry of Environment of the Slovak Republic for the realization of all activities. Specifically, exception is needed from § 35 of Act for catching and transfer of protected animal and from § 36 for using forbidden methods under § 9 of Decree of the Ministry of Environment of the Slovak Republic No. 24/2003 Coll. on implementing Act on Nature and Landscape Protection (list of forbidden methods of measures for catching and killing of protected animals). Forbidden methods concerning susliks are – nooses, hooks, crooks. Exception is issued by Ministry of Environment of the Slovak Republic.

According to Slovak national legislation, the exception is not needed if the catch and transport is realized by state authority or nature protection agency.

Always keep in mind that suslik is protected species and the obligation is to have permission for all activities concerning susliks.

1.2.2. Necessary legislative minimum in veterinary

Veterinary issues of the catch and transport are dealt by Act No. 488/2002 Coll. on veterinary care. Important is to have statement of the State Veterinary and Food Authority of the Slovak Republic, which specify conditions for the realization of transport. Suslik is potential reservoir of difficult diseases pestilentially to humans (zoonoses) or other animals. It is necessary to respect basic hygienic rules and valid legislation for the manipulation with living or dead biological infective material. Always carry out basic virological and bacteriological examination (faeces) of randomly chosen individuals before transfer of susliks to other localities.

Always keep in mind that suslik is potential reservoir of diseases thus the obligation is to respect veterinary authorities and their statement.

1.2.3. Necessary legislative minimum in relation to owners/stakeholders

Written agreement of landowner (stakeholder) of land on release / catch locality is essential condition for realization of all activities. Landowner (stakeholder) must be informed about suslik's biology, possible problems and limitations caused by its occurrence – for example restriction of use of chemicals (artificial fertilizers, pesticides). Also, it is advised to inform them about possibilities of compensations and substitutions from state / government.

Summary of specific substitutes and compensations for landowner / stakeholder could be obtained from nature protection organization. Locality chosen for reintroduction must be managed as permanent grasslands by its landowner. Agreement on future management must be confirmed on paper together with landowner's agreement with suslik reintroduction. Also assess possible problems with dispersal of susliks to surrounding areas and prepare everything for situation how they will be solved. Contracts and agreements with landowners always make in written form, verbal agreements are not enough.

1.3. Genetics

When choosing source population for reintroduction genetic affiliation of individuals to this population must be taken in account. In the case of assumption of susliks releasing to locality where other individuals already occur, it is necessary to found out genetic affiliation of both population before releasing. If affiliation of population is good, transfer could be done (HULOVÁ 2005).

2. CATCHING

2.1. Suitable catching locality selection

Process of transfer is very sensitive question as suslik is threatened species. Each phase of transport require different approach with different technological and methodological procedures.

Susliks could be caught in localities which are threatened by destroying. If there are none such localities at disposal:

- prefer areas where occurring of susliks is not desirable (sport and air fields, etc.),
- isolated localities from which young individuals could not move and disperse to other suitable localities (e.g. localities surrounded by cities, towns, buildings, forests or watercourse).

One of other possibilities is to realize catching of susliks at localities with living and numerous colonies which will not be endangered by the catch and transfer of more individuals. This alternative should be used only in the case if no other mentioned before could be realized.

2.2. Timing and types of catching

Appropriate catching period depends on its purpose and could be classified as:

- rescuing – it is presumable that all individuals are threatened by death if the population is absolutely endangered by liquidation. Such localities could be endangered by constructions (e.g. highway, water reservoir, industry), changes of locality management (e.g. deep tillage, forest plant) with no suitable habitats around,
- intentional – if the locality is not absolutely endangered but it is intention to keep the population at minimal number or area (e.g. airfields, airports, sport areas, cities),
- reintroductional – if individuals are caught for the purpose of re-establishment of extinct population and source area is not endangered.

It is not essential to eliminate the population in every case land-user or owner wants to, as susliks is protected animal. There is no reason for the elimination of some suslik colonies if public interest of suslik protection is not over valued by other public interest.

2.2.1. Rescuing catching

Susliks must be intensively caught during whole suitable period in the case of rescuing catching, as the aim is to catch maximum number of susliks. The best time of catch is from end of hibernation (first woke up individual) until 25th April, if there is no time, material or personal limitation. If some susliks still remain on the locality, decision on next steps is made by the fact, when the locality will be liquidated. If possible, it is advised to stop catching at this time and continue later, from 10th July. Then, catch could continue until the end of their activity. In Slovak condition, this is mostly until end of first September decade. If necessary, catching could be realized also during reproduction and upbringing period – until end of April. Later, only males are selectively caught, in period from May to 10th July.

2.2.2. Intentional catching

Catch only in period suitable for establishing of new population and adjust number of caught individuals for this purpose, in case of intentional catching. Suitable dates for catching are in spring (10th–25th April) and in summer (15th–30th July).

2.2.3. Reintroductional catching

If new population is established from the source which is not threatened or there is no need to eliminate it, the number of caught individuals and time of catching must be adjusted to the best suitable time for establishing new population. In spring, catching could be realized from awaking from hibernation (end of March) until end of April. It depends on time of awaking and thus from period of reproduction, which is mostly the beginning of April. Gravidity length is 25 to 26 days and females need enough time for building suitable underground shelter for giving birth. Females transferred at the end of April shouldn't have enough time for it and could give birth during transportation.

It is advised to catch mostly from 10th to 25th April. In earlier time, not whole colony could be waked up. There is possible risk of unsuccessful reproduction in later time. Release at least 25–30 individuals to establish new colony. Provide more people for catching, controlling and transport in case of catching more individuals. It is not necessary to realise catching and releasing in the same time. More simple and more practical could be, in some cases, catching and releasing of smaller groups. Release at least 10 individuals in one date. It is suitable to release maximum of 50 individuals at one site in spring period during the first release. Minimum of 120 more individuals could be released during summer to colony where at least 50% of released individuals survived from previous year. Select more localities for establishing new colonies if there is planned to catch higher number of individuals at one time. Don't release more than 50 individuals in one area. Number of 50 individuals is optimal also due to capacity of transport boxes used (50 individuals / box).

Summer catching have to be realised in time, when this-year-young ones are already independent and adults are not preparing for hibernation, yet. Still have in mind, how long period they need to build up new shelters and hole system for hibernation. Necessary time for building up the shelter for youngsters is enough if releasing in beginning of August.

But, this time is not enough for adults, as they start hibernation in September, some of them (mostly males) already in August. The most suitable summer catching time is second half of July. Immature individuals caught to snares are not suitable for transport and it is necessary to release them back at the place of catching. The number of released susliks could be five-times higher than the number of susliks in colony, if they are released to existing colony (colony with existing hierarchy relations and existing hole system and corridors).

Mow down the catching area before the summer catching if it is grassland. Realise catching after the mowing. If this is not applicable, count on low effectivity of catching.

Record sex rate of caught and released individuals during all three types of catching, so there is basic information on sex structure of arising population still available. During reintroductional catching suitable is to select sex rate of active males and females to 1 : 2 towards females at established site.

2.3. Transfer of parasites

When transferring caught individuals to locality, where some other individuals from other source area were released before, that means that there could meet individuals from different source areas together in one place, is risk of parasite transmission between two populations. To check the health status of individuals, it is advised to get faces samples of few individuals, from around the holes and make coprological examinations (examination of faces for parasites, germs) before transportation. Number of taken samples depends on number of susliks in colony. But, take so many samples, that the all parts of colony are sampled.

2.4. Methods of catching

2.4.1. Live-traps

There is not known any suitable catching system, which could allow catching as much individuals as needed to live traps. Catching to live traps is used only when live animals are needed. One could find many types of live traps (size, trapping system) on the market. It is recommended to use all traps with theses measurements: width – minimum 150 mm, length 400 mm. The most effective are traps with stepping mechanisms of catching. It is recommended to use the trap, where only one individual could be caught (after catching of one individuals, no other could get inside). That's because of elimination of possibility to get predators into the live-trap (weasel, polecat etc.), which could kill caught susliks. Visually control the colony before the traps placing and place them only in front of active holes. There could be used various grains or granules as bait to increase catching effect. Good experiences are with oat-flakes.

It is important to control traps in proper intervals, not very short, so individuals are not disturbed by human presence. The risk of higher mortality is increased by longer control intervals due to overheat or dehydration of organism of caught susliks.

Live-traps are low-effective, when used for rescuing catching, as it is necessary to catch as much susliks as possible. During installation and reinstallation of more live-traps in the

field, manipulation is hard and unpractical (dimension, weight). This kind of traps is also quite expensive to obtain (500,- to 1 500,- SKK / trap) dependant on size and material used. Thus, this method is advised to use only as additional method or alternative to quantitatively more effective methods (e.g. “snaring”) or in case that no time limit during catching is. Example of live-trap is on fig. 1–2.

Other possibility of live-trapping could be using of traps with backward lid (fig. 3–5). This trap is slightly narrowed down that it could be placed ca 10–15 cm into the hole and it is enlarged into the cage 30 × 30 cm over the surface. In case that the hole is closed by some stopper susliks often push it out and use the hole again, also in case when stopper is placed deeper into the hole. The same principle is used by Grulich’s monitoring method (GRULICH 1960). Thus, we could assume that susliks could overcome this backward lid and reach the cage in the second part of the trap. It is just theory as it was not experienced yet.

2.4.2. Using of snares

Using of snare is recently the most gentle catching method, which at the same time guarantees the catch of enough individuals for the purpose of transfer. Snare must be made of material which could be chew up by susliks and to escape in the case of its suffocation. System of snare tying must ensure that in case suslik stops trying to escape, the snare become less tight. Well-tried material for snares is sewing-string used for carpet weaving or boot sewing.

Procedure of tying snare and its installation (fig. 6):

1. cut out around 70–80 cm from sewing-string,
2. make snare with solid knot on one end of sewing-string,
3. tie up second end of sewing-string to stick by solid knot,
4. thread the part of sewing-string behind the knot through the snare and make loop near the suslik hole, size of loop adjust to this hole.

When using snare for catching susliks follow these principles. Knot of snare must be solid and could not move (it could not fasten and endanger caught suslik by suffocation). Loop must be placed on found hole – the best suitable is vertical, the less suitable is sloping hole. Place snares to sloping holes only in case of snares surplus when there is no possibility to place them on vertical holes in the locality. Noose must be placed in the way that caught individual has minimum chance to return back to hole. The stick to which noose is attached is placed to opposite side as out-coming paths are. Susliks coming out from the hole will immediately tighten the noose. Place the stick in such distance from the hole that the noose is strained from stick to hole. The best is to place noose on the hole and place stick to distance which length of snare allows. Stick must be obvious, marked and simple observable, the best higher than 50 cm. Such stick is easy observed from the higher grass. Prepare at least 500 sticks for one catching.

Notice: It is not advised to roll up the snare to the stick, if the distance was not well estimated. In such situation you need to pull the stick out and place it in proper place as length of snare allows. Cut down all stems or higher grass around the hole, otherwise the snare could be rolled up around the stem and tighten. Caught suslik could suffocate as escape wont be possible (biting snare off or removing the snare by legs) and individual should die.

Necessary equipment is small shovel for digging out the individuals which get back into the hole as human approach. The individuals caught to hind legs could be as deep as 20 cm underground. The hole is enlarged very gently by small shovel until caught individual is seen. During digging always pay attention that no soil is poured into the hole. The best is to fill the hole by glove. If you could come close to individuals by hand, grasp it to hind legs. Hold both in your hand and pull out slowly and gently. Never grasp individual to skin or tail.

Monitor the area by binoculars during all catching because caught individuals could be seen on low or mowed grass. If no animals could be seen, are must be controlled regularly, at least every half hour. Activity of individuals and thus possibility of their catching in ideal weather conditions, are 1 hour after sunrise till 1 hour before sunset. Catching by snares on the same locality is successful ca two following days, afterwards steeply decrease and it is advised to move them to other area. The best is to move them already next day.

Catching effectivity

Suitable is to divide the area to catching sectors, with one or two persons, responsible for snares placing and controlling in each sector. Such way, you will find which persons are catching seriously and are working effectively, but also you will find what mistakes are done. The most common mistakes decreasing catching effectivity are:

- snares placing on holes of other rodent species (voles, hamster);
- not proper straining of snares. This could cause necessity of frequent digging up of caught susliks from the holes, and thus increasing risk of death when caught by neck. If snare is well strained individual caught by neck could not get deep into the hole and it could be rescued immediately;
- very long interval between controls, thus increasing number of chew up snares. This method is based on the possibility of escape of the suslik, if it is threatened somehow. If susliks are caught to neck and snare begins to tease it, individuals could pull off the snare by paws. Snare is tied up the way, suslik could escape in case of possible suffocation;
- forgetting of some snares control if the area is not divided to sectors. Controls are made in extended order and some snares could be overlooked, because controller thinks that the snare was controlled by someone else.

Advantages of locality division to sectors are beside the identification of mistakes also in overview on area and effectivity of snares spreading. Controller will trace individuals on places, where no snares are placed, by frequent observation of the same area. Or controller will find which snares are not placed effectively, on holes without any activity. Based on such obtained information, snare could be replaced from inactive holes to active. Ascertain the number of active holes and number of place snares in each sector, before the beginning of catching. This information is useful for some quantitative population characteristics and evaluation of catching success by standard statistical methods. Don't forget to record caught individuals in regular time-line in each sector.

Essential equipment during catching is binocular, gloves, small shovel, hammer or axe for sticks nailing, and small transport boxes for transport of susliks from the locality to transport box.

You could catch ca 50 individuals during one day with 600 used snares. After each 50 caught individuals, transport susliks to releasing locality and release them. Never keep susliks in transport boxes more than 3 days.

2.4.3. Washing-up

This method was used during transfers in Eastern Slovakia: Košice basin in early 1990's (BUDAYOVÁ 1995), during summer in 1996 near Košice at Grajciar locality and at Košice airport in 1998. Washing-up is one of the less suitable methods and is recommended only in case of acute threat of locality, when not enough time for better methods is. In case, this method is used, always take into account the higher losses of susliks by drowning. Individuals caught by washing-up very often die later after catching because of drowning, as water gets into their lungs. The same, caught individuals are more stressed, don't accept food well, are less active and they spent more time in pre-made holes without any activity.

Washing-up as catching method could be used in areas where susliks are easily monitored. They are permanently monitored, and next to each hole where suslik occurs put some sign or mark or directly place live-trap there. Afterwards, start to pour water inside the hole. The water must be poured continuously that no interruptions in pouring are, because water is absorbed to surroundings and susliks are stressed longer. Pour the water into the hole and continue to pour it onto the individual until he pass over the backward lid. If pouring of water is stopped, individual will return back to hole.

Suitable traps that were tried out for this purpose are cylinder-shaped traps from dense mesh 30 cm long with diameter of 7 cm. One side of trap is closed, the other side is ended with backward lid – moving wire lid connected to the trap, which is closed by spring or spring wire. Washed-up individual pass over the lid into the trap and the lid will close the trap. The trap is accessible only one-way. This type of trap is showed on fig. 3–5.

Catching of washed-up susliks could be done by hands, if no traps are at disposal. In this case, always use gloves!

Dry up caught individuals as soon as possible, due to possible hypothermia (during spring catching, place them into the car, where heating is on).

2.4.4. Using of ferret (ferreting)

Ferreting is one of special or alternative methods of susliks catching. Ferreting is using of ferret (*Putorius eversmanni furo* – domesticated form of polecat) for catching susliks. This method was used as one of techniques to hunt rabbits.

Some authors (e.g. DUNGEL & GAISLER 2002) mention that polecats could inhabit hole systems of susliks or hamsters, thus these hole systems are accessible for them. That means that ferreting could be used for suslik catching. This hunting technique is suitable for the catching of living susliks as the aim of ferreting is to chase out animals from their burrows and not to kill them. Chase out susliks are not shot, but caught to the nets which cover the holes' entrances. Ferreting is in comparison with other methods (snares, washing-up) relatively less drastic and according to our legislation is not forbidden method. The primary condition is to keep one domesticated and trained ferret.

The necessary requirements, principles and other rules of ferreting and ferret-keeping and breeding are well known and in Slovak conditions described in literature (HELL 1972).

Due to bionomics of susliks is advised to use ferret during catching in early spring (1. to 20. April) or late summer (1. to 20. August) dates, thus in the period when yet or already no offspring dependent on mothers occur in the burrows. Observe the locality and mark active holes with susliks' occurrence, before releasing of ferret into the holes. All holes around the one into which ferret is released cover by nets. Two types of nets could be used and both are used for wild rabbit catching:

1. covering net – net with leaden weights at the edges, to which susliks are entangled by rushing out of holes;
2. sack – net pushed as sleeve into the hole. This net has snare strongly tied to the stick, so the net is closed when susliks run into it.

Based on experiences obtained by rabbit ferreting, it is advised to feed up the ferret and put muzzle before releasing it. Also use collar with small bell to track the movements of ferret in the hole system.

2.5. Protocol on catching

To know the population structure and some other aspects of population, prepare protocol with all necessary information from catching. Fill also the protocol on died individuals including reasons of death, from the practical point of view. This information could be used in future. Record following information on each individual to the protocol:

- locality
- date and time of catching
- sex
- age group
- basic biometry
 - a) weight
 - b) body length
 - c) tail length
 - d) hind leg length

2.6. Taking care of caught individuals

2.6.1. Manipulation

Always use gloves when manipulating with susliks. Directly after catching place caught suslik into small transport box (fig. 7), from which susliks are replaced to large transport box (fig. 8–9). Susliks will stay in this large box until released at new locality. It is advised to place something under the large box. This will cause that suslik's urine will run out from the transport box through meshed side of the box. Individuals mostly stay at the compact side of the box (full wall) where doors are. In the case of the windy weather turn the transport box by full wall side against the wind and other side (meshed side) to lee.

2.6.2. Feeding

Susliks must always have access to fresh food (grass). It is source not only of food but also of water. Place fresh grass into the transport box at least 2 times per day. Amount of fresh grass should not be large, so the suslik could move (turn) freely in the box. Always select one person, who will be responsible for taking care of caught individuals.

2.6.3. Placing

Each individual must be placed individually. Place individuals by their sex – in one part of the box place females, in the other side place males. Other possibility is to number all small transport boxes and write down these numbers together with other information to protocols. This makes controlling of susliks more easy. Keep watching males more consistently during spring time, when they are in worse condition because of energy loss due to females searching and fights with other males. Numbering of boxes is helpful also when releasing susliks, so both sexes are released regularly on the releasing locality.

Control the temperature of the transport box regularly during whole day. In the case of overheating, cool the box down and shade it. When temperature is really high, pour the box by cold water.

3. TRANSPORT

3.1. Transport box

Transport box must implement these requirements:

- adjusted for transport of more individuals
It is experienced to use two transport boxes, each for transport of 50 individuals. Number of caught susliks during one day is about 100, as show recent experiences. It is advised to transport individuals to the releasing locality after catching of first 50 individuals. All susliks caught after place to second transport box. By such procedure continue to rotate transport boxes through all catches. Good transport box is with front side made of plywood and back side from dense mesh.
- each individual have to be place in transport box separately
Regardless, susliks are sociable animal, sometimes happens that two individuals are fighting and combating when placed together in transport box. This could result in hard injuries. Individuals are not always aggressive, and in few cases two animals were accidentally placed together and nothing happen. Anyway, it is the best to place each individual separately.
- each individual must have suitable living space
Transport box have to be large enough that individuals could turn around inside. Beside an individual, food will be placed inside and thus it will produce urine and faeces. Advised measures for transport box are 10 cm width, 10 cm height and 40 cm length.

- transport box could be easily placed into the transport vehicle
Transport boxes are mostly transported in trunk of vehicle, thus from the practical point of view, always check the space of trunk and adjust transport box measures to it.
- transport box must be easily moved.
Always keep in mind that transport box will be transported, loaded, unloaded from/to the car trunk many times by hands.

3.2. Cleaning of transport box

Clean and disinfect transport box after each transport. Common cleaning equipment could be used to clean transport box. Preparation that doesn't have toxic influence on mammals could be used for disinfection (e.g. Desprej). It is suitable to get faeces from some individuals for the coprological examinations (parasitological, bacteriological).

Example of transport box is on fig. 8 and 9.

4. RELEASING

4.1. Locality characteristics suitable for reintroduction

Evaluate the locality where releasing and establishing of new colony is planned from more points of view. The main aim of the transfer is the renewal of the population of important animal species. Suslik is important food source for many predators, mainly Saker Falcons, Golden Eagles, Imperial Eagles, weasels, stoats, polecats, etc. Suslik is also species which is preparing living conditions for other species living under ground in holes and tunnels systems (e.g. toads, bumble-bees, some other insects). Occurrence of susliks in the area could have influence on existence of these species in the area. Thus, always evaluate habitat, extent of suitable land, its isolation and surrounding of potential colony, recent function and management of the locality, before the transfer and releasing of susliks.

4.1.1. Occurrence area

Release susliks only on localities, where it is evident that they are occurring or they occurred in the past.

It is not admissible to release susliks at localities where no data on their occurrence exists – that means, to release them in new area – introduction.

4.1.2. Habitat

Suslik is typical species of open steppe country of lowlands and hills. It is not as well adapted to steppe habitats as its more eastern relative – spotted suslik (*Spermophilus suslicus*). Suslik prefers habitats with soft soil, preferably sandy, with low level of underground water and low capillarity, in Slovak conditions. During 50's suslik inhabited mostly borders of

fields (ridges), grassy meadows with low herbs, dry pastures and grazing lands, and some habitats made by humans (water dams, railroad mounds, road bodies, etc.). Due to population expansion and food source decrease, susliks start to inhabit also suboptimal habitats with harder soil and occasionally flooded areas.

Recently, when degradation of their original habitats occurs (ploughing, changing of suitable management), susliks are using areas managed by humans. Such areas are for example airfields, golf courses, sport areas, horse race course. Suslik's occurrence was found also on high-grassy areas and old grazing areas with high herbs and bushes. High grass is used by individuals probably as shelter or hideout for the hole entrances. Instead of tread out paths susliks use tunnels from herbs for walking among holes on areas with high grass. In region of Western Carpathians susliks are moving ahead to areas with suitable tropical and pedological conditions up to top forest border level. The highest known locality with suslik occurrence was south-eastern slope of Kráľova skala (Central Slovakia, Low Tatra Mts.) (1250 m a.s.l.). The highest recently known (1977) locality is (900–950 m a.s.l.).

4.1.3. Size of area

The size of area where susliks will be released is selected on the basis of amount of susliks aimed for release. Based on our experiences, the area which achieves the topic and tropical demands of susliks must be at least one hectare large, if more than 60 susliks will be released.

4.1.4. Potential colony isolation

Keep in mind possibility that after the adaptation of susliks in the area, the population starts to grow and expand to surrounding habitats suitable for them.

4.1.5. Surrounding of potential colony

To assess character of surrounding of potential colony is very important. Potential risks could be prognosticated by type of surrounding habitat.

4.1.6. Function of locality chosen for reintroduction

Chosen locality must enable permanent vitality and survival of the population. It is purposeless to reintroduce susliks to locality of pasture habitat in succession stage. Also information of suslik occurrence in the past is important. Always ensure what is the reason of susliks disappearing from chosen area, otherwise reintroduction is not advised.

4.1.7. Locality management

For releasing susliks, always select the area with good perspectives for surviving and future development of the population. Long-lasting management must be secured at the area of suslik releasing, e.g. regular mowing or grazing.

4.2. Risk evaluation

4.2.1. Risk evaluation towards land users / stake holders

Cultivation and taking care of the target land is one of important potential impacts on the establishing of susliks colony. The most important of them are:

- way of locality management – land on suitable locality is cultivated as pasture, mowed meadow or combination of these two. The important is to continue in the same way of land cultivation also in the future, when susliks will be released here. Talk with land-owner about his future plans on this area, check his economical situation (if he will be capable to continue on this).
- intensity of locality management – not every locality is used each year. Some pastures are grazed just in case of land loaning, when contracts between interested subjects on land use are prepared on annual base. In such case, always try to secure suitable management of the area, or otherwise remove the area from the potential reintroduction list.
- surrounding cultivations – these have to enable continual spreading of population. Never use as such areas cultures where susliks could cause some damages (e.g. cereals) or problems. Possible problems need to be discussed with stakeholders prior to release.
- artificial fertilizers using (e.g. ammonium nitre) – strictly forbid it in chosen area. Using of artificial fertilizers is in many cases stated as reason for suslik colony disappearing.
- illegal catching – potential threats are also illegal catching of susliks by local people, using caught animals as food source (mainly in poor parts of the country).

4.2.2. Risk evaluation towards social structure

During attempts for the reintroduction of Black-Tailed Prairie Dogs (*Cynomys ludovicianus*) (SHIER 2006) important role was social structure of source population and social structure of population on releasing site. The most suitable and the most successful is to release at one locality individuals from the same source population, which means individuals, which know each other and already have established social relations. If susliks are released at the locality where already susliks were released in previous periods, it is suitable that also new susliks come from the same colony as those already released. In spite of that these individuals probably never met each other, they found out by odour that they come from the same colony and thus they easier get the position in social structure.

Ideal is to release relative individuals (individuals caught in the same part of the catching area) together on the same locality.

When in one locality releasing susliks from different source areas, they firstly need to establish their social relations and good position in social structure. Due to this they could spend more time by establishing their social position than by building new tunnels and holes (what is the aim).

4.2.3. Risk evaluation towards predators

Always keep in mind important role of relations between susliks and their predators during reintroductions:

- a) suslik as food source for predators,
- b) predators as reason of unsuccessful suslik reintroduction.

4.2.3.1. Suslik as new food source

Suslik could be released with the purpose to increase food supply for target predators already occurring in the area, thus suslik as new food source. This aim could be reached by establishing one successful colony.

Second possibility is to establish trophical base in the locality, where target predator occurs in past, and because of lack of food sources it disappeared. In this case, the aim is to establish population, which could be limited factor for predator occurrence. One colony is not enough for return of predators to the area. There must be more colonies with thousands of individuals on relatively small area – the territory of the target predator. Thus, before such restitution, more areas have to be assigned with owners.

4.2.3.2. Predators as threat of failure

Released individuals are very threatened by predators occurring in the releasing area for first few days. During first days also predators which prey on susliks only occasionally may cause problems. Example of such predator is common buzzard. Always try to get information about predators in releasing area, which species and their quantity. Based on this information, failure of the releasing attempt could be avoided. One of possible solutions are scaring of predators and guarding of area. If density of predators is high, possible is also to reduce their number actively by their catching and transfer to other localities. Such procedure is mostly assumed with weasels, ermines or polecats, which could follow susliks also underground. By our experience, susliks were predated only by common buzzard, golden eagle, weasel, fox, badger and shepherd dogs. In some special cases, additional arrangements are needed, e.g. in one area badger specialized for suslik catching and during few nights intensively dug out susliks from the holes, thus intensive guards were placed on the area.

4.2.4. Risk evaluation towards releasing timing

Based on our experiences, it is not possible to make exact decision when is the best time of the day to release individuals on the new locality. Releasing in each time of the day has its advantages and disadvantages (tab. 1). We could assign these principles, which need to be followed when releasing to locality where no holes and underground system exist:

- don't release shortly before sunset – the minimum is to have at least 3 hours of sun light,
- don't release during whole-day showers or before storms.

Tab. 1 Advantages and disadvantages of releasing susliks in relation to the day time period

day time	advantages	disadvantages
morning	<ul style="list-style-type: none"> – possible visual control – control on diurnal predators 	<ul style="list-style-type: none"> – stressing of individuals by human presence
	<ul style="list-style-type: none"> – possibility to monitor ethology of individuals 	
evening	<ul style="list-style-type: none"> – longer time for adaptation (during night) – small dispersal of individuals – less odour-prints for predators 	<ul style="list-style-type: none"> – for individuals which stayed on the surface (escaped from pre-made holes, did not dig holes) are endangered by nocturnal predators

4.3. Releasing methods

Choose suitable releasing method by fact if releasing to functioning suslik colony or to new locality, where susliks have not been before.

4.3.1. Releasing in locality where susliks were not occurring before

If susliks are released to locality where they did not occur before, use some of following methods:

- free release,
- using of palings,
- pre-made holes,
- combination of methods.

4.3.1.1. Free release

Susliks always dug out holes outside of flat surfaces near field formations, during free release. They looked mostly for grassy anthills, stones, rocky mounds made by farmers, solitary bushes, ridges, etc. Necessary is to evaluate hardness of substrate. Mostly after dry spring, soil is very hard during summer release and released susliks are not able to dig their holes.

This method is recommended only marginally together with other methods. Released individuals are disoriented, often they ran out into unsuitable habitats (streams, roads, bogs, marshes, forests, bushes), where they are killed or die. It is advised to prepare piles of branches or twigs where susliks could hide after release and where they could dig their holes. Branches and twigs are removed after holes are dug. Place branches close to old grassy anthills (*Lasius flavus* in Slovak conditions, not the large ants from genus *Formica*). Stick branches to the ground or support them by stones that the open space between ground and branches is at least 10 cm high. Branches are protecting susliks from predators, they calm down under them and they start digging faster.

4.3.1.2. Small enclosures (paling)

Using of palings for suslik releasing is very effective, but challenging method (fig. 10–12). Susliks are released to prepared palings of minimum size 2×2 m. Size of mesh of palings have to be small and must be placed few centimetres under ground (depends on surface). If the mesh could not be placed partly underground, attach them to soil by sticks. This is due to minimize escape of susliks under the paling. Upper part of paling's mesh incurve inside because susliks sometimes try to creep over the paling. It is appropriate to combine it with method of pre-made sloping holes in paling. Distance of pre-made holes is 1×1 m to 2×2 m, dependent on paling size. Release two or more individuals to each paling, again dependent on paling size. Always find the way of escape, fix it and place more individual to paling if some individuals escape.

Free roaming individuals often came close to paling, where are attracted by constant occurrence of individuals placed in paling. It is advised to place the paling next to field formations often colonized by susliks when freely released. Than means near the paling could be anthills of ground ants, solitaire bushes or rocks. In case that some of released individuals escape, it can stay in optimal environment.

4.3.1.3. Releasing to pre-made holes

This method is based on the active support of released individuals by pre-making their holes. Method was used during actions near Košice (Eastern Slovakia) in early 90's (BUDAYOVÁ 1995). The main part of this method is to drill sloping hole (under ca 45° angle) at least 40 cm deep. Drill holes each 2×2 to 10×10 m and to each pre-made hole release one individual. Use hand drill with diameter 7 cm (fig. 13–14), but more effective is use of motor drill (fig. 15). After suslik is released to the hole, close the hole on its top by prepared grass (mowed or plucked). Use as much grass that no sun-light will reach inside the hole. By this, susliks will better and sooner be able to reduce their stress. Covering grass shouldn't obstruct susliks to leave the hole, or to dig up the soil out of the hole. Anyway, covering hole by grass is recommended.

It is advised to release susliks to the hole by placing small transport box onto the hole and leaving it there for a while. The individual has enough time to calm down and to discover new living space (fig. 16–18).

Leave guard near the holes with 2–3 released individuals which will monitor the behaviour of individuals, will stimulate them when getting outside to return to the hole. Follow these steps:

1. phase – directly after the releasing bang around the hole to stimulate the susliks to dig more intensively. Repeat this for first 10 minutes.
2. phase – leave susliks to calm down and look after them, watch how they come outside the hole and graze. When susliks are out for a while, scare them to return back to hole. By this, suslik imprints the hole as safe shelter during the danger. This procedure is repeated, but individual must have chance to feed itself.
3. phase – monitor the individuals until they actively begin to dig the hole and rake out the soil out of the hole.

It is suggested to try induce the situation that two susliks will be released into one hole and monitor their behaviour – they could start to dig fast because of escape one from the other as fast as possible, or the possibility of cooperation.

4.3.1.4. Combination of methods

The best way to release is combination of all three methods. Each of them has its advantages and disadvantages (see tab. 2). Their disadvantages could be minimised and effectivity could be increased by combining them and by using social behaviour of susliks. All released susliks tended to establish couples or small groups and meet together.

The best combination of releasing is making of two smaller palings (size 6 × 4 m), each for 6 individuals. Drill sloping holes each 2 × 2 m in paling. Place palings that their distance is not more than 20 m. Pre-make around 20 sloping holes each 2×2 m near palings (always drill more holes than release susliks). There could be placed some branches over field formations (mentioned in chapter 4.3.1.1.) near palings. Always assure some guard near place where releasing to sloping holes (chapter 4.3.1.3.).

Tab. 2 Advantages and disadvantages of different methods

Method	Advantages	Disadvantages
free release	low laboriousness, low material requirements, fast release	high dispersal of released individuals, high mortality
palings	absolute protection against predators, certainty in releasing place, certainty in establishing core of population, low mortality	high laboriousness, high financial requirements on material, difficult use in rocky terrain, unsuccessful in case of unsuitable choose of place for palings
pre-made holes	fast creation of underground hole systems, high success of released individuals adaptation, low mortality	high laboriousness, high requirement for personnel (guards of released individuals)

4.3.2. Releasing near existing population or short-before extinct population

Individuals are released to existing hole systems. There could be released more than 5 individuals to system with three vertical and one sloping hole. If individual is chased out by the native suslik, release him to other hole system (this was observed only in very few cases). Released individuals mostly stay in the hole systems and they are observed after few weeks together with native individuals (this was confirmed by visible marks of released individuals). Individuals released during summer stayed near the systems, where they were released, until the autumn and probably hibernate there. This is the most effective way of release.

First and basic step is to colonize locality by smaller number of individuals with very intensive protection and management. These individuals will prepare the locality for the future releasing of more individuals during next phases.

4.4. Protocol on releasing

Make protocol on releasing to get important information on the future development of the population, ethology of individuals after their release, and many more characteristics. Releasing protocol is made for different sector of releasing locality or for each released individual, in relation to followed characteristics.

4.5. Process of colonization

Susliks have to be released in two (better three periods) to secure successful colonization of chosen area:

Spring release – during first release is optimal to release 25–30 of individuals and maintain their protection and care of them. Best method of releasing is using of palings in combination with pre-making holes around it. As the aim is to establish colony, individuals must be kept in small area so they could be in contact and establish new relations. It is necessary to have enough personnel for monitor individuals released to pre-made holes. The success of release depends on the result of this first phase. Released individuals are threatened by predators mostly badger and fox. Always non-stop secure the area by guards during first two – three days who will mostly in night controlling the area with released susliks. Well tried method is to light few fires around the area to scare the predators away. Susliks are threatened all time, until they dig their first vertical holes. After this event, only some cases were monitored that badger dug the holes with susliks. During next period monitor the locality at least once per month.

Guards must permanently monitor the area, record the advance of holes digging by susliks and visually monitor the movements of susliks through the locality.

If the release is realised properly, individuals released to sloping holes are not threatened by predators, but are threatened those released to palings.

Summer release – optimal is to release 70–80 of individuals. During second phase continue to release in the same locality, if the first phase was successful and at least 10 susliks survived on the locality and made their underground system with more exits. Individuals are released to the existing systems by 5–10 individuals to each system with at least 3 exits. Release is realized to palings or sloping holes, based on the number of releasing individuals and number of suitable hole systems. In this case, use of guards is enough for 24 hours after releasing. Afterwards, locality is controlled next two days and then once per week.

Next year spring release is realized only in case that not enough individuals were released in previous seasons or number of individuals observed in spring was lower than 40.

5. MONITORING OF RELEASED SUSLIKS

5.1. Locality guarding

Guard the area at least 2–3 days during first phase of releasing and 24 hours after each next releasing. The role of guards is to walk around the area and record all efforts of digging. They also observe the movements of individuals on the area, scare the predators and protect released susliks against other negative factors and impacts (e.g. illegal catching).

Continue to monitor the area at least once per month to get information on predators, way of locality management by land-owners and users, other human activities and situation at the colony (movements, abandoned holes, etc.).

Future monitoring has to follow spatial distribution of susliks (size of occupied area) and also survey the reproduction success.

Monitoring of spatial distribution is realized in two periods:

- in spring, after awaking of whole colony from hibernation, circa from 15th April to 5th May,
- after cubs get independent, circa from 25th July to 10th August.

5.2. Spatial distribution

This method is showing spatial distribution of susliks on the area. It is made each year at the same time by the same method. This method is not showing information on population number, as this could differ annually. The size of study area could be measured and compared in time.

Mapping of area is made by GPS and assessed to polygon on perimeter. By reconnaissance of area locate the bordering holes, which are located as points of polygon.

5.3. Success of reproduction

Method is aimed to quantify size of growth and exact assessment of number of females with successful reproduction. Non-reproducing females are not detected by this method (young, last-year old females, ill females, females invaded by parasites and also females which lost their offspring at the beginning by spring floods or were caught by predators, etc.). Dependant on area size and its lucidity, number of reproducing females could be assessed to 100% and number of this-year cubs over 50%, by this method.

Observation of reproduction success is realized in the time when cubs come out from the holes, but still appear close to it. Suitable time begins at the beginning of June. Difference of births dates in one colony should be three weeks (GRULICH 1960). Mark each hole with cubs by stick with sign and number. Sign and number have to be large and sharp enough so they are easily read by binocular during observations. Record the highest number of simultaneously monitored cubs and presence of female. The best is to realize observations few following days, which will cover more observations of cubs from different holes, as they

are of different age and come out from holes in different time of the day. Observations of reproduction success are realized just during ideal weather conditions.

5.4. Additional methods of newly-established colony monitoring

Visual observation

Visual observation is realised by counting all active individuals during optimal weather conditions shortly after end of hibernation. This method could be used if the monitored locality is not very large and could be observed whole from one point. Only some sectors could be observed by this method if the monitored area is large and population plentiful. For the observation is not good weather with clouds, showers and windy days. Also, do not monitor during cloudless but windy weather. Suitable day period is from 9 AM to 11 AM and from 1 PM to 4 PM. The result could be skewed in other day period.

Method of hay stoppers

This method is suitable for knowing the activity of bordering holes on study area, which are pointed by GPS. This method is called method of hay stoppers (GRULICH 1960). Holes found are closed by plucked grass (hay) in the evening after the finishing of diurnal activity. Next day, between 07.00–08.00, number of hole entrances is counted which were opened from inside during the night, which shows number of susliks in study area. Problem of this method is different activity of each individual. It was not proved, that all individuals leave the hole at least once, during observation period. But, it was found out that in some holes more individuals were moving through the same entrance.

Counting of inhabited holes

This method is based of counting of sloping and vertical active holes on given area. These holes must be active, that means without cobwebs, with footprints, faces near the holes, food leftovers and freshly raked dirt. The same as mentioned in first two methods, data obtained are not absolute information, only exact assessment of population status.

6. FINISHING OF REINTRODUCTION

It is necessary to state some border limit when you recognize the population as stabilized and no more catching and releasing activities have to be done. This border limit is needed because of future trend of population. It is advised to continue with such activities until the population in locality is not as large as 100 individuals in spring, after hibernation.

7. BREEDING IN CAPTIVITY

Recently, most preferable source of suslik for releasing in reintroduction process is in captivity – individuals bred in captivity.

Establishing of new suslik's breeding in captivity needs many experiences, suitable space and other necessary conditions. To establish viable and numerous population with regular production of offspring is the most important question. Such individuals are released by same methods as individuals caught in wild.

The genetic point of view must be always at attention when establishing new breeding (affinity of individuals, taxonomical status etc.).

Using of individuals bred in captivity is increasing effectiveness of reintroductions because there is no need for expense, uncertain and tiring catching of individuals in wild. Breeding of susliks in captivity could be realized:

- a) in artificial conditions in aviary built for their breeding where no other species occur. The regular management (mowing or grazing) must be assigned in such places.
- b) in semi-wild conditions in ungulates enclosures – the management of locality is assigned.

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