



Original Contribution

RAISING THE EFFECTIVENESS AND MINIMIZING THE RISK IN THE CAPTURING OF CHAMOIS FOR RESETTLEMENT

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ABSTRACT

In 2002 a program for reintroduction of the Balkan chamois (*Rupicapra rupicapra balcanica*, Bolkay 1925) was initiated in Vitosha Nature Park. The capturing of chamois began in 2003 and three different methods were applied: immobilizing from a distance, using specially elaborated nets and using leg-holding snares. The first method was tested in the period of 2003-05. During the year 2003 two animals were captured, and in March 2004 - 4 chamois. There is one mortality case. As a result, there were altogether 5 immobilized chamois - 3 of them captured in the wild and 2 in specialized chamois enclosure. Vertical nets were used for the period 2003-2010 and with over 80 person days and no success in the wild. Subsequently the most successful method has proven to be the one of leg holding snares. Trap lines of leg holding snares were set for 515 trapping days between 2004 and 2009. Altogether 53 chamois were captured and 31 of them transported to the Vitosha Mountains. The current publication presents a general outline of the experience for minimizing the risk (for both objects and executors) and raising the effectiveness in the capturing of chamois for reintroduction. Our aim is to support conservationists, foresters, park rangers and others interested in the realization of similar projects.

Key words: Capturing, Balkan chamois, *Rupicapra r. balcanica*.

INTRODUCTION

Balkan chamois is a subspecies of the *R. Rupicapra* sp. The Balkan chamois occurs in several isolated localities in the mountains of the Balkan Peninsula. In Bulgaria chamois is found on steep slopes with rocky complexes in Rila, Pirin, Stara Planina and Rodopi mountains, and after reintroduction – in Vitosha. The habitats of the chamois are from 600 to 2900 m.a.s.l.

Chamois (*Rupicapra rupicapra* L.) is included in Annex III of the Bern Convention. The Balkan subspecies is included in Annex II and Annex IV (strictly protected) of Directive 92/43 of EU for the Conservation of Natural Habitats and Wild

Flora and Fauna, as well as Annex III (strictly protected) of Biological Diversity Act in Bulgaria. The Chamois is included in Bulgarian Red Data Book as an endangered species.

In the past the chamois inhabited a larger area in Bulgaria and could be found almost in all suitable habitats. After the wars at the beginning of XX century, people obtained long-range rifles, which increased the rates of hunting and as a result - the great decline of the numbers of chamois with about 1000 individuals (1, 2) followed by their disappearance from many habitats. Despite initiation of the hunting season with the Hunting act from 1897 and its gradual decrease over the years reaching to one month in the Hunting act from 1948, a lot of habitats were characterized with a very low density. Because of intensified control of the illegal hunting in the second part of XX century the population began to increase gradually. Probably the greatest number of

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chamois population was reached between the end of 1980 and beginning of 1990, despite by official statistics of a peak near the end of the century (3). The low control and non application of the acts at the end of last and the beginning of the present century resulted in a sharp decline in the number of chamois: from more than 270 to less than 100 in Stara Planina mountain, from 400 to 200 in Pirin and from more than 650 to nearly 300 in Rila (3) only the population in Rodopi rose and occupied new territories. That is because a lot of good-working State Hunting Enterprises were closed in the other places, but remained still functioning in Rodopi mountain.

Besides illegal hunting, which is the main reason for the direct decrease in the number of chamois, there are other threats with anthropogenic character which endanger the prosperity of the population and limit or eliminate the potential for natural resettlement. These are the ski slopes, road infrastructure, dam lakes, tourist pressure, etc. The execution of such activities leads to deterioration and fragmentation of the habitats, destruction of bio-corridors, isolation and disturbance of species.

Because of all the above mentioned factors many suitable habitats still remain unoccupied since they remain inaccessible. Resettlement of the Balkan subspecies in similar areas can be successful provided that it is supported by the appropriate introduction and reintroduction programs. Until 2005 the general number of chamois in the country was between 1 700 and 2 300 individuals. At the same time with more than 200 000 hectares of suitable land in Bulgaria there is an opportunity for a population numbering at least 20 000 individuals (3).

The current publication provides a general synthesized account of the experience for minimizing the risk (for both objects and executors) and raising the effectiveness in the capturing of f chamois for reintroduction.

The aim of present study was to establish the effect of introduced new methods for capturing of chamois and to minimize the risk in the process of resettlement and expanding of the population and to support preservationists, foresters, park rangers and

others interested in the realization of similar projects.

MATERIAL AND METHODS

Capturing

Live capture of chamois is not only a challenge which takes time and efforts, but it also requires specific skills. Further obstacles are the peculiarities of the habitats, characterized by rocky terrain and steep slopes, as well as the insufficient knowledge of the animals' social structure and behaviour.

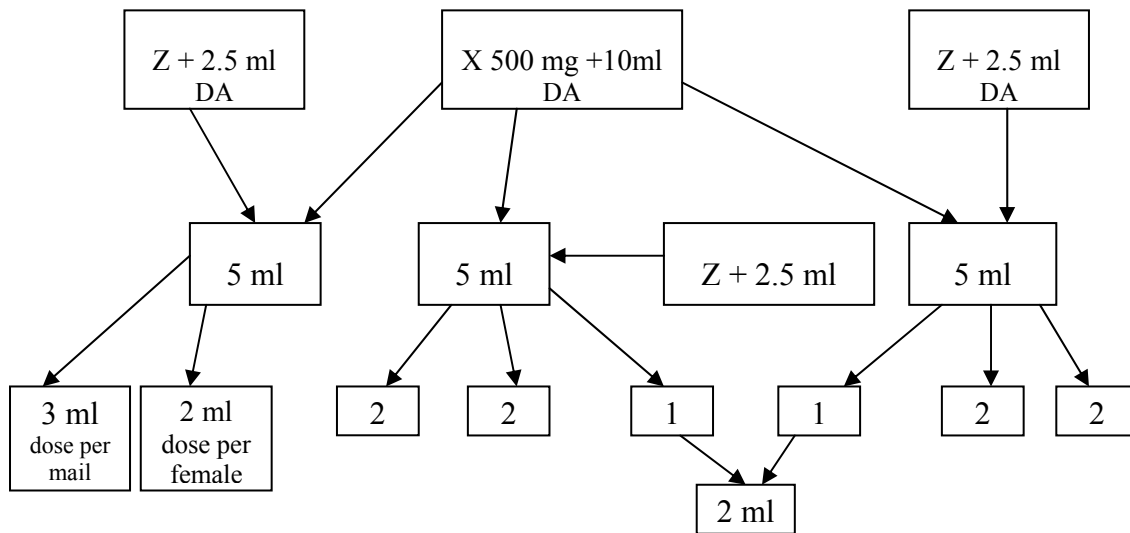
In the current research three essentially different methods have been used

1. Immobilizing animals from a distance
2. Using special elaborated nets
3. Applying leg-holding snares (4).

Immobilizing from a distance: Tellinject GUT 50 rifle with 3 ml plastic syringes was used. Chamois were immobilized with chemical restrain based on a mixture of equal quantities of *Xylazine* and *tiletamine/zolazepam* – 50 mg for females and 75 mg for males.

Procedure of mixing and concentration: 10 ml dissolving agent was added to *Xylazine* in a phial. 2,5 ml from this solution (contents 125 mg dry *Xilazine*) were drawn out and injected in phial to mix with *Zoletil 50*. 2,5 ml dissolving agent were then added to this mixture. The obtained 5 ml contains 125 mg of each of the three components. 3 ml of the obtained mixture contain 75 mg *Xilazine*, *Zolazepam* and *Tilatemin*, etc. The dose for male animals contains in 2 ml 50 ml of those three components - dose for females and young individuals. If 2 ml are drawn out twice – the dose for females, 1 ml will then remain in the phial and it can be used for making the next dose for females by adding another 1 ml to it to get 3 doses of 2 ml (consisting of 50 mg dry substance from each one of three components-schemes). It is desirable for the syringe to be supplemented with a dissolving agent to 3 ml so that it remains steady in flight.

Before use it is advisable the piston of the syringe to be greased with silicon lubricant from the kit of tools- this helps for the easier movement of the sleeve. The needle is disinfected with the solving of ammonium chloride.



Scheme 1. Procedure of mixing and concentration of solution for immobilizing of the chamois

Legend - X - Xsilazine

Z - Zoletil content 125mg Zolazepam and 125mg Tilatemin

DA - dissolving agent

Prowling of chamois takes place during the day when the animals are feeding and resting. After hitting the animal there is no point in attempting to follow it right away. It takes at least 7-8 minutes for the anaesthetic to produce and this requires waiting patiently.

Use of special elaborate nets

Vertical nets: Vertical nets have been used for capturing chamois and small to medium size ungulates (5, 6). For the capturing of chamois in the present experiment special elaborated nets have been applied with 2,5 meters in height and 50 meters in length. We used a fishing line with a diameter of 1 mm so that it would be invisible for the animals. The net was supplied with two ropes on the top and the bottom end. The bottom rope was fixed to the ground and the top was hung on nails perpendicular to the poles supporting the net. The nails were nailed to the side opposite to the direction the chamois were expected to come from in order for the net to fall behind on impact. The net was usually set a couple of hundred of metres away from a herd in previously selected suitable place. Two persons lied hidden near the ends of the net in order to react quickly if an animal was caught. Then several people moved towards the herd trying to drive the chamois into the net (the necessary numbers of people were decided approximately and in accordance with preliminary view of the terrain).

Drop nets: This is a trap, made of wooden frame with a stretched net. One end of the construction is taken up with the help of a stick with a rope affixed to it, the other end of the rope is in the hands of a member of a team (under cover), who pulls it, when the chamois is under the net.

Leg-holding snares: This method proved to be the most effective one. Since 2004 the use of leg-holding snares has been established as the basic method in our work. The main point of the method is that it fits one or more trap-lines (in our case - two), comprising 15-30 traps, with two snares each, connective ropes between snares and the spring, trigger and starting mechanism. Furthermore, each line is supplied with an autonomous alarm system, there is an alarm signal when a spring is triggered and a snare is activated.

Working of traps: Trap-lines have been installed in preliminary selected areas, where the chamois pass frequently – there are clear obvious animal paths, fresh excrements, observed animals, etc. There are favourable conditions for availability of high woods to pull the springs.

Another necessary condition requires that the trap lines are not too far from one another. In this way it is possible to use one source of power if the battery is low. Wires of alarm systems reach to the base camp. For a base we select an object (hut, cave, tent,

etc.) that is situated from several hundred meters up to 1 km away.

If there is possibility, it is good for the trap-lines to be observed for a period of 24 hours, but provided such an opportunity does not exist, the duration of observation needs to be from sunrise to nightfall. Instead of an ordinary electromagnetic alarm system, a GSM module with a possibility to call and to send messages can be used to support monitoring round the clock. During the winter months if there is heavy snow cover it is necessary to the control trap-lines every day and clean the snares from the drifted snow. Nooses need to be checked against freezing.

Upon capturing the chamois, three of the animal's legs are fixed (If all four legs are fixed, the stress is bigger than if one leg remains free). Putting on a face-mask and an anaesthetic (we use "Neurotranc" because of its therapeutic range - 0,2-0,3 ml/ 10 kg weight). The animal is carried with a tarpaulin cover to the vehicle and fitted in a special transport box. Before placing the animal into the box body size measures and a DNA sample have to be taken.

Transport

The transport of the animals to the acclimatization enclosure in Vitosha was conducted with a vehicle not-specialized for transport of wild animals, and for the last 6 to 7 km we used either a 4-wheel-drive vehicle or a snowmobile in the winter months.

During the transportation the animals were fitted in special wooden boxes corresponding to the size of the chamois (130/70/50 cm). Each box was constructed in such a way so that all the inside surfaces remain flat to minimize the chance for traumas. The box also includes an opening for providing fresh air. It was covered with hay to provide further comfort for the chamois. In order to reduce the stress during the transportation a relaxant can be used. The transport times varied between 4 and 23 hours depending on the distance, accessibility, road condition, etc.

RESULTS

The chamois capturing was accomplished in the area of the Central, Western Rodopi

mountains and "Rila" NP between 2003 and 2009.

The first method was used during 2003-05. In 2003 two animals were captured, and until March 2004 - 4 chamois in total. During November and December 2005 for 17 days we attempted to catch chamois using an anaesthetizing rifle without success. There was one mortality case. A three-year-old male was darted between the ribs and despite the quick response of the veterinarian and the antidote applied the animal died. Thus, the effectiveness of the method can be estimated as low. It was used over 90 person days with two people involved. Twenty five syringes were launched in order to immobilize chamois. As a result there were altogether 5 immobilized chamois, 3 of them in the wild and 2 in a specialized chamois enclosure.

The obstacles relevant to the applied method were as follows: first - after firing the shot the animal could not be found and it was not possible to judge whether the animal was hit or not; in 3 separate cases when we assumed the chamois were hit the syringes were not found and no immobilized chamois were registered. There were also several cases when the chamois were darted successfully but the medicament was not properly injected. The above examples illustrate the general inefficiency of the method. Hence, during the application of the method the capturing of one chamois required over 18 person days on average, but if only animals in the wild were included – the period extended to over 30 person days.

The method of the nets implied the use of a vertical net (2,5 m in height, 50 m in length, squares 20/20 cm). We applied this method for the period of 2003-2010 with over 80 person days and no success in wild and only two captured chamois in a special enclosure in the Rodopi. Hence the effectiveness equals 40 person days for one animal. The method of the drop net also indicated low effectiveness. That net was used experimentally during the year of 2006 at an acclimatization enclosure with no success whatsoever.

In comparison to the methods described above, **the method of leg holding snares** appears to be the most successful one. The equipment was provided by WildARK,

Circle of Wildlife Research (Switzerland). It comprised 37 traps and additional 57 sets were elaborated in Bulgaria. The system is especially adapted for chamois capturing.

The capturing began in 2004. In 2005-2006 at first we used a GSM devise and the monitoring of trap lines was permanent in practice, but during the night snares were activated only by martens, foxes and wild boar (7).

Trap lines of leg holding snares were set for 515 trapping days between 2004 and 2009. At different times and locations the lines

contained between 18 and 55 traps with 2 snares each. The average number of snares set per day for the whole period was 37. Altogether 53 chamois were captured (**Table 1**). Males got captured approximately twice as often as females.

At least 12 cases of gnawed ropes were registered, probably due to predators and wild boar and 6 cases of straightening the spring by animals stronger than chamois were indicated, most likely - red deer and wild boar.

Table 1. Efforts for capturing chamois using trap lines of leg holding snares 2004 – 2009

Trapping days	snare/days	person days	Captured individuals			person days per capture	snare/day per capture
			male	female	total		
515	19 055	918	34	19	53	16,4	359,5

During the 30-day period in 2004 there were 42 activated traps without any captured chamois. In 26,19% of the cases the reason was unknown. 23,81% snares were activated from the falling snow, 33,33% from wild boar, 7,14% - other unknown mammals and in 9,52% of the cases the passing of chamois was determined, but snares remained blocked due to the drifted snow.

During the trapping there were two mortality cases both of them the result of technical failure in the alarm system. In one of the cases the animal that was caught for the hind

leg was hung head down from a rock (1.7 m high) near the tree to which the snare was fixed.

From 2003 to February 2009 twenty seven chamois were transported to Vitosha, while in February 2010 – there were altogether thirty one individuals.

In **Table 2** and **Figures 1** and **2** different methods for the capturing of chamois have been compared, taking into consideration only the results obtained in wild.

Table 2. Comparison of different capturing methods

Method	person-days	capture d chamois	Person-days/ chamois	mortality	
				number	percentage
Immobilising	90	3	30	1	33,33%
Driving net	80	0	>80	0	0,00%
Leg holding snares	918	53	16,4	2	3,77%

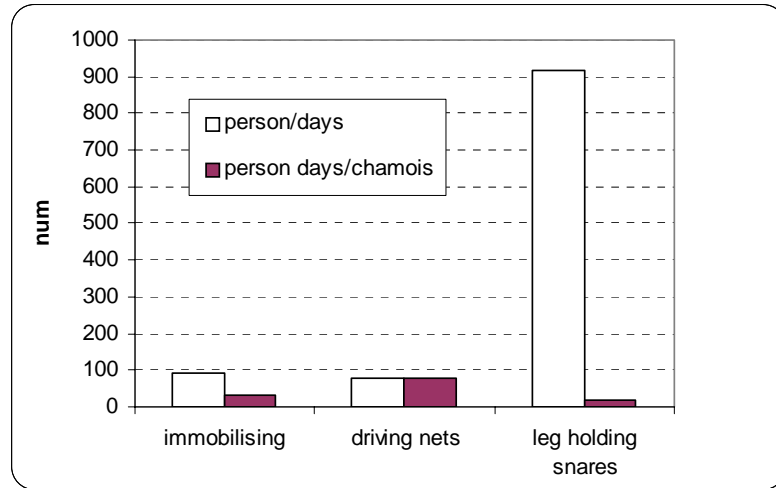


Fig. 1 Efficiency of the tested methods

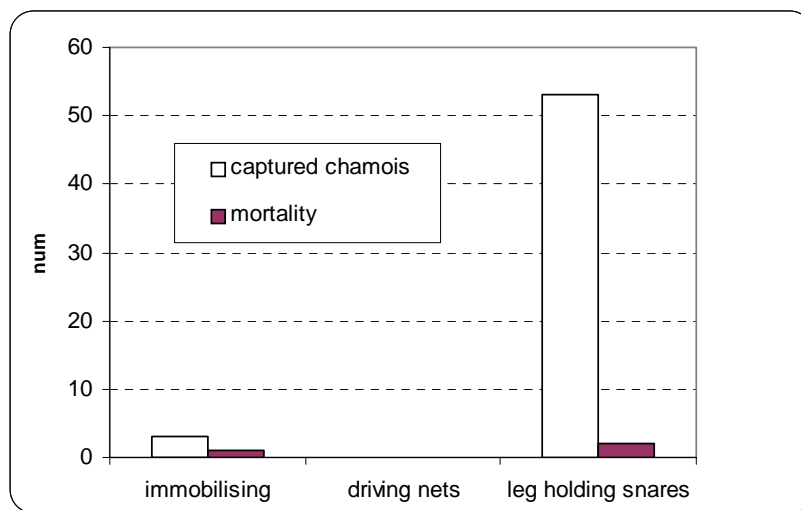


Fig. 2 Effect of the tested methods on mortality and total number of captured chamois

There was one mortality case during the transportation due to a 23 hour delay of the vehicle (resulting from car damage) and all that time the chamois was confined in the transporting box.

In February 2010 three more deaths were registered approximately 24 hours after the transportation of the chamois to “Vitoshka” NP. Those animals were intended for introduction to Serbia, but following a subsequent refusal, their release in Vitoshka was indispensable. Before their immediate transportation the animals spend respectively 20 days for the male and 5-6 days for the females in an enclosure of 50-60 m². According to the conclusion of necropsy, anamnesis data is insufficient to create an overall picture of the prime cause of death. A veterinary expertise, however, emphasizes the fact that “*The animals have spent a long*

time in circumstances untypical for them most probably resulting in their being under deep stress and taking insufficient amount of food and water. Evidence for that is the kahexy observed in each of the three animals – with their weight being around 20-24 kg which is quite low compared to the normal body weight of chamois at this age.” (8).

Overall mortality incidents during transportation amounted to 3,7% disregarding the cases from 2010 due to the impact of other additional factors.

DISCUSSION

Capturing

When determining suitable locations for capturing, the operation needs to be coordinated with the local structures - State forest or hunters departments and National parks and a license has to be submitted.

The basic advantage of **immobilizing from a distance** is the opportunity for selectivity provided. This allows for the animals to be chosen according to the needs of the selection herd. Another advantage is the fact that the immobilized animals are not put under additional stress during the carrying and transportation. A certain disadvantage is the launch precision which is 20-30 m with no wind blowing. When the weather is windy the syringe can be diverted from its correct trajectory. This makes stalking hard and creates a relatively high risk of traumas and/or mortality even with small deflections of the trajectory.

The target zones are in areas with thick musculature, but because of the size of chamois and the operating distance there is a high risk of making mistakes.

When the above method is to be used animals need to be approached very carefully to reach the rifle's operational distance. Since chamois rarely allow people to approach them especially when in a herd and hunted populations, the method could be quite difficult to apply. There is period of 5-6 minutes until the tranquilizer takes effect after the injection. Within that period the animal can cover a large distance and in forest conditions it can be hard to trace.

When the temperature is under 0°C the method can not be applied because the medicament freezes in the needle and cannot be injected (9).

The vertical net is suitable for capturing other ungulates which inhabit areas that are not so steep and rocky. For the chamois it proves inefficient because of the difficulty in installing the net, lack of suitable places, the specific characteristics of the landscape, as well as the need for a coordinated guidance of the animals towards the net by the drivers. An additional difficulty is indispensability of other complicated preliminarily arrangements and the expected engagement of many participants.

The use of leg holding snares appears to be the most productive of the three methods. The utmost advantage of this method is its proven effectiveness in woodland areas such as the chamois habitats in the Rodopes. A disadvantage of the method is the fact that it

is not selective and other species might be captured.

During the installation of the trap lines (which require 1-1,5 days per one line of 20-25 traps with two people involved), the noise and human's presence can to potentially chase the chamois away for a few days. Therefore, we recommend making the installation of the traps one week before their activation so that the chamois get accustomed to passing through I inactivated traps, which will increase the effectiveness of capturing after the activation of the traps.

To minimize the risk of mortality and serious traumas it is necessary for a permanent monitoring to be organized during the day from sunrise to complete nightfall. If possible 24 hour observance is recommended. On activation the team needs to react immediately. The traps must not be mounted near vertical strips even when height is no more than 50 cm. In the worst scenario the animal will not be able to stand on its legs if it falls down and that can be the reason of its death. Approaching the captured animal has to be done carefully, the horns need to be secured from a member of the team while the other one fixes the legs in the right way. When the chamois is put to the ground to be fixed it is absolutely necessary to try to protect the animal from any possible injuries. The face mask has to be placed on the head following the initial fixation of the animal to avoid the possibility of the chamois running away with its eyes blocked. The relaxant needs to be injected at that time. After the fixation and during the transportation of the chamois to the vehicle the animal has to be disposed on a blanket in a position similar to its natural posture when lying flatways. The head has to be kept higher to the body level so there are no obstacles and the chamois can breathe freely.

Transportation

The best situation is for the vehicle to be available permanently at hand. However, if this is not possible, the people responsible for the transport have to be informed immediately when a chamois has been captured. In case there is no GSM coverage near the traps, the nearest point with good coverage should be found prior to capturing and various SIM cards of different providers should be available. In a situation like that

one of the team members holds the chamois whereas the other goes to coverage spot to arrange for transportation and co-ordinate the activities with the relevant authorities (foresters, park rangers, hunters). With good co-ordination and organization of the whole operation, the overall time period from the capturing of the animal to its subsequent release can take no more than 7 to 8 hours with the chamois staying in the box for no more than 5 to 6 hours. If a vehicle is available at hand this can save up to two hours and reduce the time for transportation to 6 hours with the animal remaining in the box for no more than 4 hours. A commission to estimate and transfer and a veterinarian to examine the animal have to be ready to work immediately on arrival of the vehicle to avoid further detention.

Minimizing the risk or mortality and traumas

In order to minimize mortality incidents the period between capturing or anaesthetizing the animals and its subsequent release needs to be reduced to the technological minimum as much as possible, anti-stress procedures should be conducted and the work with anesthetics has to be performed very carefully – adhering to the doses specified by a veterinarian. Using medicaments with a therapeutic range is good because it decreases the risk of overdosing. Indexes for a relative determination of the body weight on the basis body dimensions have to be elaborated.

At the time of fixation, especially with wild individuals, there is a high risk of fracture of the legs or ribs. To prevent this from happening one needs to be cautious in the process of binding the legs (to avoid their breaking or spraining) and during fixation of the animal – one must not rest their weight on the animal to avoid causing chest traumas.

Captured animals must not be kept in confined spaces (permanent traps, premises etc.), least of all gathered together in groups with the aim of reducing transport prices, even for a relatively short time, because this increases the risk of pathologic changes and mortality cases.

CONCLUSION

As a result of the experience acquired in the last seven years we ascertain that capturing holds the most important place in the realization of resettlement projects. Its effectiveness can be increased by means of applying methods and good practices which have proven efficient and some of which have been described in the current paper. Choosing an appropriate method requires precise estimation not only of its effectiveness, but also of its safe application.

Therefore, deriving from our experience gained in the process, we recommend the use of leg holding snares as a basic method.

The team members need to be motivated and qualified with at least one member having solid preliminary experience in the field and the rest being well versed in theory.

In order to increase successful capturing two trap lines with 40-50 traps in common need to be installed, each with an autonomous alarm system, and a spare battery. For immediate reaction the necessities kit of tools should be prepared in advance: a face mask, an anesthetic, sterile syringes and needles, spare ropes and snares, a turnscrew, a multimeter, spare jacks, adhesive tape, pinchers, fishing line, nails, measurement roulette and a small knapsack suitable for keeping the instruments.

Quick reaction is essential for minimizing the stress factor for the captured animal. Other essentials involve - proper working at fixation, carrying and transportation.

When immobilizing from a distance the rifle needs to be preliminary tested. It must not be used when it is windy.

At eventual capturing with a vertical net the team has to react quickly to prevent possible self-release of the animal.

At applying a drop net one needs to admit and avert the possibility of the wooden frame to fall down and traumatize the chamois under the trap.

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