

# Spatial and vertical distribution of chamois (*Rupicapra rupicapra tatrica*) in the Western Tatra Mountains

M. BALLO

*Institute of the High Mountain Biology, University of Žilina, Tatranská Javorina 7, SK-05956, Slovak Republic, e-mail: ballo@alconet.sk*

**Abstract.** Tatra Mountain chamois (*Rupicapra rupicapra tatrica*) were studied in 2005–2009 in the ridge areas of the valley complex between Sivý peak in the west and Baníkov peak in the east and their adjacent lateral ridges and depressions (Western Tatra Mtns.) as well as in Mengusovská Valley (central Tatra Mtns.). Observations were focused on monitoring abundance, sex ratio and spatial and vertical distributions throughout the year. The study area in the Western Tatra Mtns. was visited 227 times and during these visits chamois were observed 148 times, while only their tracks were registered on 30 days. There were overnight visits. Chamois moved down to the forest mostly in winter months. Their descent to the forest during winter months from December to March was due to feeding or visiting saltlicks.

*Key words:* West Tatra Mtns., *Rupicapra rupicapra tatrica*

## Introduction

The importance of the Tatra chamois (*Rupicapra rupicapra tatrica*, Blahout 1971) is not only in its natural value as a glacial relict but also in its rarity. This subspecies lives in the most sensitive environment to negative anthropogenic factors: high mountains. At the end of the 20<sup>th</sup> Century the population was threatened with extinction (Kaliská 2000).

The subspecies requires species protection as well as landscape protection. The Western Tatra Mountains and the valley complex of Jalovecká Valley, where our interest was focused, were established as part of the buffer zone of the Tatras National Park in 1949. Since 1987 the Western Tatras are part of the Tatras National Park.

To solve the practical problems of protecting this species it is necessary to map its recent distribution, seasonal migration and, most of all, to identify the reasons for its vertical migrations into the forest zone. Next, it is necessary to know its ecological requirements to evaluate the impact of all negative factors on individual localities and then to elaborate proposals for progressive care.

The aim of this study was to describe and discuss the vertical movements of Tatra chamois

which until now were considered to be highly dependent on alpine rocks and meadows, with less being known about the importance of the upper forest in their life cycle. There are numerous reports of the occurrence of Tatra chamois in the forest zone. However, these observations are anecdotal and come from the whole area of the Tatra Mountains. We did not find any paper in which such observations were systematically recorded according to season, either in one year or during several years from one locality.

## Materials and Methods

During the years 2005–2009 we focused on the ridge areas of the valley complex between Sivý peak in the west and Baníkov peak in the east (Western Tatra Mountains). Fieldwork was focused on monitoring abundance, sex structure and spatial and vertical distributions in all seasons. The number of visits to the study area is presented in Table 1. The data on abundance, sex and age structure is presented Tables 2 and 3. The forest zone was characterised by discontinuous forest with dwarf pine. Results of a second observer from Štrbské Lake and Mengusovská Valley in the central part of the High Tatras were processed similarly.

Year	No. of visits (days)	No. of chamois observat. (days)	No. observat. prints	No. of over-nights in the field
2005	50	30	9	10
2006	48	38	3	11
2007	44	25	11	17
2008	39	30	2	13
2009	46	25	5	14
Total	227	148	30	65

**Table 1.** Number of visits to the study area in 2005–2009.

Year	No. of chamois
1986	212
1989	132
1993	59
2000	38

**Table 2.** Observed abundance of chamois in the Western Tatra Mountains.

Year	Male	Female	Youngs	Yearlings	Total
2003	1	3	2	0	6
2004	2	5	1	1	9
2005	2	6	2	1	11
2006	3	6	2	1	12
2007	4	5	3	2	14
2008	7	8	3	3	21
2009	8	8	3	3	22

**Table 3.** Size of the Salatin herd according to monitoring in the years 2003-2009. (Chamois monitored in the Sivý-Banikov area were only part of the total number of chamois mentioned in Table 2).

## Results

All observations from the Western Tatras Mtns. are summarised in Appendix 1 and Table 4. Chamois mostly came to the forest zone during winter months: in January (8 visits), December (7), February (7) and March (5). Chamois were observed in the forest zone once in each of the months May, July and October, always during bad weather (wind, rain and cold). The only observation of female chamois taking their young into the forest zone as protection against bad weather was in July 2007. During winter months, from December to March, entering the forest zone was connected with food and visiting a salt lick.

In the central Tatra Mountains (Mengusovská Valley, Appendix 2 and Table 5), chamois were observed moving into the forest zone in the following months: January (10 visits), February (27), March (14), April (3), June (1), July (1), August (1), September (1), November (2), December (3). The diet (grazing) was the most important reason for these seasonal movements. Winter 2009 (from

February to March) in particular was a very exceptional period, with a huge amount of snow in the valley. During this period chamois were more often in the forest zone than in other years and higher mortality was observed.

## Discussion

Many scientists in Slovakia believe that there are two ecotypes of chamois: forest and alpine (e.g. Roubal 1950, Klíma 1959, Sládek and Mošanský 1985, Chovancová and Gömöry 2000). Recent telemetry studies show that distribution is connected more with home range or with habitat carrying capacity than with long-lasting genesis of ecotypes. Studies from the German and Italian Alps demonstrate that there is significant mobility of individuals between forest and alpine meadows. This mobility is seasonal, sexual and individual or group specific. Alpine meadows are very important for most individuals, while for some individuals their winter range can be 10 km away from the summer range (Bögel *et al.* 1998).

Chamois usually occur in the forest zone in winter; during spring, summer and autumn they move to the alpine zone (Monaco *et al.* 1998). This is because they need rocky habitat and in the forest they require steep slopes (Dupré *et al.* 1998).

There are also two populations of alpine chamois in Slovakia. One is in the Veľká Fatra Mountains, where 30 chamois from the Alps were released from 1955. They have recently been estimated to number 45–50 individuals (Remeník pers. comm.). In 1963, six alpine chamois were released in Slovenský raj. There are now estimated to be 100 individuals there (Hájek pers. comm.). Hrnčiar (1972) wrote about the movements of these chamois. He highlighted some cases of migrations of chamois from Slovenský raj

Year	No. of total observations	No. of observations in the forest												Total forest	%
		Months													
		1	2	3	4	5	6	7	8	9	10	11	12		
2005	30	1	1	1	-	-	-	-	-	-	-	-	1	4	13.3
2006	38	4	-	1	-	1	-	-	-	-	-	-	2	8	21.1
2007	25	-	1	-	-	-	-	1	-	-	1	-	2	5	20.0
2008	30	2	2	2	-	-	-	-	-	-	-	-	1	7	23.3
2009	25	1	3	1	-	-	-	-	-	-	-	-	1	6	24.0
Total	148	7	4	4	-	1	-	1	-	-	1	-	6	30	20.3

**Table 4.** Observations of chamois in forest in the Western Tatras (Sivý-Banikov).

Year	No. of visits in biotope	Total observation in the forest	No. of observations in the forest												
			months												
			1	2	3	4	5	6	7	8	9	10	11	12	
2006	79	5	1	2	1	-	-	-	-	-	-	-	-	1	-
2007	100	9	3	5	-	-	-	-	-	-	-	-	-	-	1
2008	90	6	1	-	3	-	-	-	-	1	-	-	-	-	1
2009	99	43	5	20	10	3	-	1	1	-	1	-	1	1	
Total	368	63	10	27	14	3	-	1	1	1	1	-	2	3	

**Table 5.** Observations of chamois in the forest in the central Tatra mountains from 2006 to 2009.

and proposed solving this problem by removing the alpine populations or hybridising them with Tatra chamois (Šprocha 1971, Čikovský 1972). Migrations of 15–17 individuals of alpine chamois in Veľká Fatra are known from the years 1955–1962 over distances of 6–43 km from the centre of their occurrence (Sokol 1965). There were four cases of individual migration and two cases of group migrations. From Slovenský raj, 5 individuals moved 11–49 km. These were individual migrations. There are some possible explanations for these cases:

*Directly following release.* The migrating individuals were individuals that were used to their favourite places and territory in their original location and the unknown habitat could result in wandering migrations.

*After some years wandering* of breeding males searching for females; searching for new habitats by immature chamois; changing location to avoid a rival (intra-specific competition) or predator (Blahout 1976).

The reason for wandering could also be *increased concentration of tourists* in connection with repeated disturbance of chamois (Blahout 1976).

In Slovakia, several fossils of chamois have been found which are 10,000 years old. In recent years fossils from the Neolithic have been found:

1. Demänovská Ice Cave: 5,810 ± BP (Radúch 2007)
2. Muránska planina: 8,640 ± 5BP (Vlček 2006)
3. Choč peak: 4,700 ± BP (Radúch 2007)

All of these fossils were analysed at the University of Poznań. From them we can deduce that relatively recently chamois occurred at lower elevations. The chamois population in the Tatra mountains is probably influenced by various factors (predators, grazing, hunting, rocky habitat, tourists and various sports activities), which force them to live above the timber line. Chudík (1963) wrote about groups of Tatra chamois which live in the forest zone and they did not notice any health problems for 10 years. He thought that so-called forest chamois might arise from these groups.

In the Belianske Tatra Mountains, where the timber line is not bordered by dwarf pine, chamois can descend into the forest zone through snow sheds, mainly through the avalanche snow drifts, overgrown by grass without any problems. In the forest zone, there are sufficient possibilities for escape from predators among the limestone cliffs. For these reasons there are more migrations throughout the year. We obtained data from the Belianske Tatra Mountains from a former Tatras National Park ranger, Ján Pitoňák (pers. comm. 2009):

In 1956–1963 there were 20 chamois in Vtáčie turne (1,195 m a.s.l.) throughout the year.

In 1959–1963 there were 22 chamois in Tokarne (1,200 m a.s.l.) throughout the year.

In 1959–1965 there were 12 chamois in Javorinka (1,464 m a.s.l.) throughout the year.

In 1962–1963 chamois descended to Zlebina (1,407 m a.s.l.) to a meadow near a hut throughout the year.

In 1970–1985 there were 25 chamois in Cosek (1,228 m a.s.l.) throughout the year.

In suitable habitats of the limestone Belianske Tatras, chamois may be seen in the forest zone every year (Ksiažek and Sedláková 2006). The main localities are: Opálenica (1,200 m a.s.l.), Mačejevo turne (1,400 m,

Dlhý vrch (1,200 m), Faixova poľana, Kôň (1,300 m). In the crystalline parts of the Tatras (High and Western Tatra Mountains), migrations into the forest zone are more often in winter, when the pine dwarf is under snow. There are also several anecdotal reports of occurrence in the forest zone from the vegetation period. In August 1958, three chamois crossed the brook at 900 m a.s.l. in Jalovecká Valley (Róbert and Blažej Haluška pers. comm. 2009). In the 1960s, Frian (2009 pers. comm.) saw two individuals on Trnác hill (950 m a.s.l.). Seven individuals were seen at Osobitá from November 1971 to May 1972 (Halák pers. comm. 2009). The first author of the present study also has an unusual observation of a male chamois in the Low Tatra Mountains. The male moved from the highest peak of the range, Ďumbier, to Ohnište (seven kilometres away) where it spent the winter. It had to cross a four kilometre long forest zone at an altitude of c.1,100–1,200m a.s.l.

In the Western Tatras there are lot of salt licks for deer at the level of the timber line and chamois descend to this zone in winter to use these salt licks. Blahout (1976) mentioned that mountain spruce forests are not appropriate for chamois because of bad visibility and a greater danger of predators. The Tatras National Park Administration assumed that chamois in the forest zone were ill and they were designated for shooting. The reasons were:

1. Chamois were not wanted in the forest.
2. Chamois in the forest zone were suspected of disease (Janiga and Zámečníková 2002).

According to our observations, these premises of the Tatras National Park service were incorrect. Of 148 observations made over five years, 20.27 % were in the forest zone. There are only 114 chamois in the Western Tatras mountains (Lenko 2008). In winter 2008/2009 we observed the whole Sivý–Baníkov peak herd (22 individuals) in the forest zone. Frequent visits to the forest zone is associated with low incidence of tourism in these localities during winter. The reason for visiting the forest zone in winter is also food. Below timberline there are a lot of rowan berries, bilberries and lichens on the trees which are accessible food for chamois.

There are more tourists in the High Tatra Mountains and this is probably why descent into the forest zone is less frequent. We found that chamois descended into the forest zone more often after heavy snowfall. In autumn, descent into the forest zone was associated with bad weather and with the breeding season.

## Acknowledgements

Thanks to Dr. Marián Janiga for his professional support and guiding, to Martina Jurčovičová for English translation and to Robin Rigg for final English proofreading.

## References

- Blahout, M. 1976: Kamzičia zver. Príroda, Bratislava.
- Bögel, R., Fröhwald, B., Lotz, A. and Walzer, C. 1998: Habitat use and population management of chamois *Ru picapra rupicapra* in Berchtesgaden National Park. In *Proc 2<sup>nd</sup> World Conference Mt. Ungulates*, pp. 13–22.
- Čikovský, L. 1972: Chránená krajinná oblasť Slovenský raj.

- Poľovníctvo a rybníctvo*, **24(7)**: 8-9.
- Dupré, E., Pedrotti, L., Scappi, A. and Toso, S. 1998: Distribution, abundance and management of ungulates in the Italian Alps: Preliminary results. In *Proc. 2<sup>nd</sup> World Conference Mt. Ungulates*, pp. 97-106.
- Hrnčiar, M. 1972: Populácie kamzíkov na Slovensku mimo územia TANAP-u. *Poľovnícky zborník*, **2**: 239-245.
- Chovancová, B. and Gómory, D. 2000: Influence of some climatic factors and predators on the population size of Tatra chamois in the Tatra National Park. *Ibex – J. MT. Ecol.*, **5**: 173-183.
- Chudík, I. 1963: Sčítanie kamzíkov. *Poľovníctvo a rybníctvo*, **15(2)**: 9.
- Janiga, M. and Zámečniková, H. 2002: Zoologická charakteristika historických údajov o kamzíkoch (*Ru pica pra ru pica pra tatrica* Blahout, 1971) v Tatrách ako podklad pre vyhodnotenie ich súčasnej početnosti. In *Ochrana kamzíka Chamois protection* (eds. M. Janiga and J. Švajda), pp. 99-182. TANAP Tatranská štrba, NAPANT Banská Bystrica, IHMB Tatranská Javorina.
- Lenko, P. 2008: Sčítanie kamzíkov v Tatrách (TANAP a TPN) 5. až 6.11.2008. [http://www.spravatanap.org/documents/archiv.html#Sčítanie\\_kamzíkov\\_v\\_Tatrách\\_\(TANAP\\_a\\_TPN\)\\_5.\\_až\\_6.11.2008](http://www.spravatanap.org/documents/archiv.html#Sčítanie_kamzíkov_v_Tatrách_(TANAP_a_TPN)_5._až_6.11.2008). (accessed 17.2.2010).
- Kaliská, G. 2000: Kamzík vrchovský v Tatrách na pokraji vyhynutia. Projekt záchrany. Pravda, 1.12.2000, p. 5.
- Klíma, M. 1959: Čtvernozí horolezci. A.B.C, 25.2.1957, p. 11.
- Ksiažek, J. and Sedláková, B. 2006: Súčasný stav populácie kamzíkov v Belianskych Tatrách. In *Výskum a ochrana cicavcov na Slovensku. VII. Zborník referátov z konferencie (Zvolen 14.-15. 10. 2005)*. pp. 33-37. Štátna ochrana prírody Slovenskej republiky, Banská Bystrica.
- Monaco, A., Pedrotti, L. and Tosi, G. 1998: Altitudinal distribution and sexual segregation in a reintroduced alpine chamois *Ru pica pra ru pica pra* population. In *Proc. 2<sup>nd</sup> World Conf. Mt. Ungulates*, pp. 151-158.
- Radúch, J. 2007: Hlavné druhy poľovnej zveri a ich obhospodarovanie – Kamzičia zver. In *Poľovníctvo v Liptove* (eds. S. Churý, D. Jančovič, F. Jaroš, P. Karč, I. Košecký, I. Mráz, J. Oško, J. Radúch, D. Šagát, Š. Šramka, P. Vitek and P. Vrlík). Okresná organizácia Slovenského poľovníckeho zväzu, Liptovský Mikuláš.
- Roubal, R. 1950: Najlepší turisti. *Život*, 13 January 1950: 7.
- Sládek, J. and Mošanský, A. 1985: Cicavce okolo nás. Bratislava: Osveta.
- Sokol, J. 1965: Mortalita kamzíkov (*Ru pica pra ru pica pra* L.) vo Veľkej Fatre. *Biológia*, **20**: 440-446.
- Šprocha, J. 1971: Kamzíky vo Veľkej Fatre, Slovenskom raji a v Nizkých Tatrách. *Poľovníctvo a rybníctvo*, **23**: 8-9.
- Vlček, L. 2006: Zaujímavý nález kostí Kamzíka (*Ru pica pra ru pica pra*) v Jaskyni na Malej Stožke (Muráňska planina). *Aragonit*, **11**: 26-28.

Received 20 July 2010; accepted 3 November 2010.

**Appendix 1.** Observations of chamois in the Western Tatra Mountains (Sivý-Baníkov) from 2005 to 2009. Annotation: **D** - rain, **J** - clear weather; **Polo** - partly cloudy; **Z** - cloudy; **M** - drizzle; **Preh.** - showers; **Premen** - partly rainy or foggy, **Búr** - thunderstorms; **V** - windy; **H** - foggy; **S** - snowfalls; **So** - salt lick; **P** - grazing; **ML** - young protection against bad weather.

Locality	Date	Weather	Males	Females	Youngs	Yearlings	Unident.	Observation in the forest	Reason of presence in forest
<b>Observation in the year 2005</b>									
Lysec	19.1.	J,V	3	-	2	1	1	yes	P
Lysec	6.2.	J,V	-	2	-	-	-	yes	So,P
Lysec	2.3.	J,V	-	1	-	-	-	yes	So,P
Pachoľa	2.3.	J,V	3	-	2	-	-	-	-
Salatín	30.3.	J	-	1	-	-	-	-	-
Vrece	22.4.	Polo.	-	-	-	-	6	-	-
Salatín	1.5.	Polo.	-	1	-	-	-	-	-
Salatín	22.5.	Polo.	-	1	-	-	-	-	-
Brestová	24.5.	Polo.	5	-	-	1	-	-	-
Brestová	27.5.	J	4	-	-	1	-	-	-
Grapy	15.6.	Preh.,V	6	1	2	1	-	-	-
Grapy	30.6.	Preh.	6	2	2	1	-	-	-
Grapy	15.7.	J	4	-	2	-	-	-	-
Grapy	2.9.	J	-	-	-	-	5	-	-
Salatín	5.9.	J	-	1	-	-	-	-	-
Salatín	21.9.	M,V	-	1	-	-	-	-	-
Salatín	23.9.	Z	-	1	-	-	-	-	-
Baníkov	5.10.	J,V	4	-	1	1	-	-	-
Salatín	6.10.	Polo.	-	2	-	-	-	-	-
Pachoľa	6.10.	Polo.	5	-	1	2	-	-	-
Pachoľa	7.10.	J	5	-	1	2	-	-	-
Salatín	13.10.	Polo.,V	-	-	-	-	2	-	-
Baníkov	19.10.	J	6	-	1	1	-	-	-
Salatín	19.10.	J	-	2	-	-	-	-	-
Baníkov	23.10.	J	6	-	1	1	-	-	-
Salatín	27.10.	J	1	2	-	-	-	-	-
Parichvost	28.10.	J,V	3	2	1	-	-	-	-
Salatín	4.11.	Polo.	1	2	-	-	-	-	-
Príslop	10.11.	J,V	2	1	1	-	-	-	-
Lysec	28.12.	Z,S	-	-	-	-	3	yes	P,So
<b>Observation in the year 2006</b>									
Jalovec.s.	6.1.	J	-	2	-	-	-	-	-
Lysec	6.1.	J,V	-	2	-	-	-	yes	P
Lysec	10.1.	Polo.	-	1	-	-	-	yes	P,So

*Distribution of  
chamois in the  
Western Tatra  
Mountains*

Podvátovce	10.1.	Polo.	2	-	-	1	4	-	
Baník	13.1.	J,V	1	-	1	1	-	-	
Podvátovce	15.1.	Polo.	3	-	1	-	-	áno	P
Brestová	15.1.	Polo.	-	1	-	-	-	-	
Podvátovce	28.1.	J, V,	3	-	1	-	-	áno	P,So
Brestová	28.1.	J, V,	-	1	-	-	-	-	
Salatín	31.1.	J, V,	2	-	-	-	-	-	
Pachoľa	16.2.	Polo.	2	-	1	-	-	-	
Skriniarky	25.2.	Hmla	-	3	-	-	-	-	
Lysec	3.3.	Z, V,	-	4	-	-	-	yes	P,So
Skriniarky	24.3.	P	2	-	-	1	-	-	
Vreče	9.4.	Z, V,	2	1	1	1	-	-	
Pachoľa	3.5.	Z,	-	-	-	-	1	-	
Brestová	5.5.	Polo.	1	2	-	-	-	-	
Trnác	10.5.	Dážď	-	1	-	-	-	yes	P
Salatín	21.5.	Z, V,	-	2	-	-	-	-	
Vreče	8.6.	Z,	-	2	-	-	-	-	
Brestová	13.6.	J,	-	-	-	-	1	-	
Skriniarky	16.6.	J,	-	-	-	-	2	-	
Salatín	22.6.	Polo.	3	2	1	1	-	-	
Grapy	24.6.	Polo.	3	2	2	1	-	-	
Pachoľa	28.6.	J,	3	-	2	1	-	-	
Grapy	28.6.	J,	2	1	-	-	-	-	
Pachoľa	6.9.	J,	-	-	-	-	2	-	
Grapy	16.9.	J,	4	-	-	-	-	-	
Salatín	19.9.	J,V,	-	1	-	-	-	-	
Lysec	27.9.	J,	-	1	-	-	4	-	
Baník	13.10.	Polo.	-	-	-	-	3	-	
Salatín	17.10.	J,	-	1	-	-	-	-	
Grapy	26.10.	J,	-	1	-	-	-	-	
Baník	28.10.	Z, H,	-	-	-	-	3	-	
Pachoľa	28.10.	Z, H,	-	-	-	-	1	-	
Lysec	2.12.	J, V,	-	2	-	-	-	yes	P,So
Pachoľa	2.12.	J, V,	-	-	-	-	4	-	
Lysec	22.12.	J, V,	-	1	-	-	-	yes	P,So

**Observation in the year 2007**

Pachoľa	9.1.	J,	2	-	1	1	-	-	
Podvátovce	4.2.	Z,S,	3	1	2	1	-	-	
Podvátovce	11.2.	J, V,	-	-	-	-	5	-	
Pachoľa	15.2.	Z, S, H,	-	1	-	-	-	-	
Lômik	17.2.	J, V,	-	1	-	-	-	yes	P,So
Hlboká	20.2.	Z,S,	-	1	-	-	v lavíne	-	
Kozie chrbty	1.3.	Z, V,	-	-	-	-	9	-	
Jalov sedlo	8.3.	H,	4	-	2	-	-	-	
Salatín	26.5.	Z, V,	3	1	-	1	2	-	
Salatín	6.6.	P,	1	-	-	-	-	-	
Baník	14.6.	Polo, Búr.	-	2	-	2	-	-	
Ban. sedlo	21.6.	Prehán.	1	-	-	-	-	-	
Ráztoka	4.7.	Z,D,	6	-	4	-	-	yes	ML
Grapy	13.7.	Z,	-	-	-	-	5	-	
Lômik	17.7.	Polo,	-	3	-	-	-	-	
Grapy	2.8.	Polo,	-	1	-	-	-	-	
Skriniarky	7.8.	Z, V,	2	-	2	-	-	-	
Salatín	26.9.	Z,	5	1	2	2	-	-	
Lysec	30.9.	Z, V,	-	2	-	-	-	-	
Rusňačka	3.10.	Z, V,	-	3	-	-	-	yes	P
Salatín	4.10.	J,	-	-	-	-	15	-	
Pachoľa	12.10.	J, V,	6	1	4	-	-	-	
Hlboká	19.12.	J, V,	-	2	-	-	-	yes	P
Ban. sedlo	24.12.	J,	-	-	-	-	2	-	
Podvátovce	27.12.	J,	5	-	2	-	-	yes	P,So

**Observation in the year 2008**

Pachoľa	3.1.	J, V,	3	-	-	-	-	-	
Lysec	3.1.	J, V,	-	-	-	-	2	yes	P
Lysec	4.1.	S, V,	5	-	3	2	-	-	
Lysec	9.1.	J, V,	-	-	-	-	5	yes	P
Rusňačka	17.1.	M, V	-	-	-	-	1	-	
Lysec	3.2.	J, V,	-	-	-	-	3	-	
Lysec	19.2.	H, D,	6	-	4	1	-	yes	P,So
Ruňačka	23.2.	D, V,	-	1	-	-	-	yes	P
Salatín	26.2.	H, V,	2	-	2	-	-	-	

Brestová	6.3.	J,V,	-	2	-	-	-	-	
Srdce	6.3.	J,V,	-	-	-	-	2	yes	P,So
Pachoľa	23.3.	J,	6	2	4	2	-	-	
Srdce	29.3.	J,	-	-	-	-	2	yes	P,So
Lysec	2.4.	M, V,	6	-	4	-	-	-	
Podvávajúce	29.4.	Z,	-	-	-	-	3	-	
Skriniarky	29.5.	P,	1	-	1	-	-	-	
Salatín	12.7.	Polo,V,	2	-	2	1	-	-	
Salatín	6.8.	Polo,V,	-	2	-	-	-	-	
Pachoľa	26.8.	J,	-	-	-	-	3	-	
Salatín	3.9.	J,V,	2	8	2	-	-	-	
Grapy	17.9.	J,V,	-	8	-	-	-	-	
Pachoľa	26.9.	Z,S	-	-	-	-	5	-	
Grapy	20.10.	J,	-	8	-	-	-	-	
Grapy	22.10.	J,V,	2	8	2	-	-	-	
Salatín	5.11.	Polo,V,	2	-	2	-	-	-	
Brestová	5.11.	Polo, V,	-	8	-	-	-	-	
Banikov	12.11.	Z,H,	-	-	-	-	8	-	
Prislop	13.11.	Z,H,	-	-	-	-	8	-	
Banik.sedlo	28.11.	Z,	-	-	-	-	6	-	
Rusňačka	27.12.	J,V,	-	-	-	-	4	yes	P

#### Observation in the year 2009

Rusňačka	5.1.	J,	-	2	-	-	-	-	
Lysec	13.1.	Z,	4	-	1	-	-	yes	P
Salatín	23.1.	M,	4	-	1	-	-	-	-
Rusňačka	5.2.	J,	-	8	-	-	-	-	-
Brestová	6.2.	Z,V,	-	3	-	-	-	-	-
Grapy	6.2.	Z,V,	-	3	-	-	-	-	-
Lysec	10.2.	V,Z,	5	3	3	-	-	-	-
Lômik	12.2.	V,S,	2	-	1	1	-	yes	P,So,
Lômik	19.2.	Z,	3	-	1	1	-	yes	P,So,
Lômik	21.2.	V,Z,	-	-	-	-	4	yes	P,So,
Pachoľa	4.3.	Z,V,	6	-	5	-	-	yes	P,
Vrece	13.4.	Z,H,	-	-	-	-	8	-	-
Grapy	18.4.	Z,	4	4	-	-	-	-	-
Grapy	21.5.	Z	-	6	-	-	-	-	-
Salatín	13.7.	Polo,	6	5	3	2	-	-	-
Grapy	9.8.	J,	-	4	-	-	-	-	-
Grapy	19.8.	J,	3	-	2	-	-	-	-
Grapy	28.8.	Polo.	-	1	-	-	-	-	-
Grapy	18.9.	H,	-	1	-	-	-	-	-
Brestová	22.9.	Z,	3	5	1	-	-	-	-
Salatín	20.11.	J,	-	-	-	-	2	-	-
Pachoľa	20.11.	J,	-	-	-	-	11	-	-
Salatín	8.12.	H, V,	4	-	2	1	-	-	-
Brestová	29.12.	J,V,	4	5	2	-	-	-	-
Rusňačka	29.12.	J,V,	-	1	-	-	-	yes	P

**Appendix 2.** Observations of chamois in the central Tatra Mountains (Mengusovská Valley) from 2006 to 2009. **D** - rain, **J** - clear weather, **Polo.** - partly cloudy; **Z** - cloudy; **V** - windy; **S** - snowfalls; **Premen.** - partly rainy or foggy, **P** - grazing.

Locality	Date	Weat-her	Males	Fema-les	Youngs	Year-lings	Unident.	Obser. in the forest	Reason of pre-sence in fo-rest	Ava-lanche dan-ger scale
----------	------	----------	-------	----------	--------	------------	----------	----------------------	--------------------------------	--------------------------

#### Observation in the year 2006

Mlynická valley	10.1.	J.	-	-	-	-	2	yes	P	
Mengusovská valley	10.2.	Prem.	-	-	-	-	3	yes	P	-
Mengusovská valley	28.2.	J.	-	1	-	-	-	yes	P	-
Mengusovská valley	3.3.	Prem.	-	1	-	-	-	yes	P	-
Mengusovská valley	15.11.	Prem.	-	-	-	-	prints	yes	P	3

#### Observation in the year 2007

Mlynická valley	17.1.	J,	-	-	-	-	2	yes	P	3
Mlynická valley	26.1.	J,	-	-	-	-	5	yes	P	3
Patria	31.1.	Polo.	-	1	-	-	-	yes	P	4
Mengusovská valley	2.2.	J,	-	1	-	-	-	yes	P	2

Mengusovská valley	6.2.	Z,	-	1	-	-	-	yes	P	-
Mengusovská valley	6.2.	S,	-	-	-	-	2	yes	P	-
Mengusovská valley	7.2.	S,	-	1	-	-	-	yes	P	3
Mengusovská valley	8.2.	S	-	1	-	-	-	yes	P	3
Mlynická valley	5.12.	J,	10	-	6	-	-	yes	P	2
<b>Observation in the year 2008</b>										
Mlynická valley	24.1.	Polo.	-	1	-	-	-	yes	P	3
Mengusovská valley	4.3.	Polo.	-	1	-	-	-	yes	P	4
Ostrva	4.3.	Polo.	-	-	-	-	1	yes	P	4
Hincovo lake	4.3.	Polo.	-	1	-	-	-	yes	P	4
Zlomiská	21.8.	J,V,	-	-	-	4	-	yes	P	-
Zlomiská	9.12.	J,V,	4	-	1	-	-	yes	P	-
<b>Observation in the year 2010</b>										
Mengusovská valley	13.1.	J,	-	1	-	-	-	yes	P	2
Mengusovská valley	15.1.	S,D,	-	1	-	-	-	yes	P	-
Mengusovská valley	21.1.	S,D,	-	2	-	-	-	yes	P	-
Mengusovská valley	23.1.	S,D	-	1	-	-	-	yes	P	-
Patria	27.1.	J,	-	-	-	-	3	yes	P	-
Ostrva	3.2.	Z,	-	-	-	-	3	yes	P	2
Magistrála	6.2.	J,	-	-	-	-	1	yes	P	3
Symbolical Cemetery	6.2.	J,	-	-	-	-	1	yes	P	3
Tupá	6.2.	J,	-	-	-	-	3	yes	P	3
Patria	10.2.	Prem.	-	-	-	-	1	yes	P	3
Patria	13.2.	Prem.	-	1	-	-	-	yes	P	3
Magistrála	17.2.	S,	-	-	-	-	1	yes	P	4
Ostrva	17.2.	S,	-	-	-	-	5	yes	P	4
Zlomiská	17.2.	S,	-	-	-	-	2	yes	P	4
Patria	18.2.	S,	-	-	-	-	9	yes	P	4
Malá Bašta	19.2.	Z,	-	1	-	-	-	yes	P	3
Popradské lake	19.2.	Z,	-	-	-	-	4	yes	P	3
Mlynica	20.2.	Prem.	-	-	-	-	1	yes	P	3
Mlynica	20.2.	Prem.	-	1	-	-	-	yes	P	3
Popradská pleso	24.2.	S,	-	-	-	-	9	yes	P	2
Patria	24.2.	S,	-	-	-	-	9	yes	P	2
Patria	25.2.	Prem.	-	-	-	-	5	yes	P	-
Ostrva	25.2.	Prem.	-	-	-	-	5	yes	P	-
Patria	26.2.	Prem.	-	-	-	-	4	yes	P	2
Ostrva	26.2.	Prem.	-	-	-	-	3	yes	P	2
Mlynica	1.3.	Polo.	-	2 dead	-	-	-	yes	P	-
Patria	12.3.	Z,	-	-	-	-	2	yes	P	3
Ostrva	12.3.	Z,	-	-	-	-	2	yes	P	-
Patria (Mlynic. valley)	17.3.	Prem.	-	-	-	-	2	yes	P	-
Patria (Mengus. valley)	19.3.	S,	-	-	-	-	3	yes	P	-
Ostrva	19.3.	S,	-	-	-	-	3	yes	P	-
Ostrva (Mengus. valley)	23.3.	S,	-	-	-	-	9	yes	P	-
Ostrva (Mengus. valley)	25.3.	S,	-	-	-	-	5	yes	p	4
Ostrva	26.3.	S,	-	-	-	-	9	yes	p	-
Patria	26.3.	S,	-	-	-	-	2	yes	p	4
Ostrva (Mengus. valley)	1.4.	Polo,	-	-	-	-	7	yes	p	-
Ostrva (Mengus. valley)	2.4.	J,	-	-	-	-	1	yes	p	-
Ostrva (Mengus. valley)	10.4.	D,	-	-	-	-	1	yes	p	-
Hincov stream	8.6.	D,	1 dead	-	-	-	-	yes	p	-
Satania valley	28.7.	J,	-	1	-	-	-	yes	p	-
Solisko (Mlynická valley)	26.11.	J,	-	1	-	-	-	yes	p	-
Solisko (Mlynická valley)	3.12.	J,	-	1	-	-	-	yes	p	-
Patria (Mlynic. valley)	3.12.	J,	-	-	-	-	1	yes	p	-