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Contribution to some aspects of Takin (*Budorcas taxicolor*) behaviour in Bhutan

Introduction

In 1985 the Royal Government of Bhutan named the "Takin" as national animal of Bhutan (THINLEY, 1988). In the declaration it is described as follows:

"The takin is an unique animal, quite heavy and bulky. To the Dzongkha-speaking people, it is very popularly known as Dengem-Tshey. The animal is found in Jigme Dorji Wildlife sanctuary in "northern Bhutan. It lives in the steepest and most thickly-wooded vegetation. In summer months they go up in high mountain reaches and collect in herds of considerable size but in winter months they travel down to thickly-wooded vegetation. Bhutan can claim to be the last refuge to harbour takin in its natural and unspoilt habitat".

In order to protect the takin's habitat the Royal Government of Bhutan issued a command creating three wildlife sanctuaries in northern Bhutan (MINISTRY OF TRADE, INDUSTRIES AND FORESTS, 1974). The entire area of the three wildlife sanctuaries, now called Jigme Dorji Wildlife Sanctuary, covers the most western natural biogeographical distribution of the takin in Bhutan. In the interest of preserving the flora and fauna in the sanctuaries, clearly defined restrictions were published. JACKSON (1981) recommended the organization of a status survey for the key-species takin as member of the high altitude fauna. The task was again proposed by WWF (1987) because of the total lack of accurate information. Also BLOWER (1986) stated that the takin could be at risk unless effective measures were taken to protect this valuable part of Bhutan's national heritage. In the same context RODGERS and PANWAR (1988) mention the lack of data on the distribution, abundance and ecological needs of the takin. They describe these parameters as essential prerequisites of any good management and national conservation planning.

The distribution of the takin in Bhutan has not been investigated and its status is very uncertain. As far as it is known, takin populations live in the upper catchment area of the Mo Chu, on both east and west sides. The summer grazing grounds are in the Tscharitatang valley north east of Lingshi and there are some indications of a second summer grazing ground in the Lunana region. It seems that in the winter time the takin population stays much more to the south, but reliable information both about the resting haunts and the migration routes are not available (WOLLENHAUPT, 1989; 1990; 1991).

Habitat and Biology

The takin is a typical member of the high altitude fauna of the Himalayas. The "Mishmi takin" is biogeographically viewed as a representative of eastern fauna elements in Bhutan. It belongs to typical chinese taxa in the biogeographical region of the Indo-Chinese realm (RODGERS/PANWAR, 1988).

The takin of the Mishmi hills is described as inhabiting areas in the eastern Himalaya with more moist and warmer conditions, a higher treeline and abundant shrubs such as dwarf rhododendrons. This habitat description is confirmed by FINN (198O), BLOWER (1986), RODGERS/PANWAR (1988) and THINLEY (1988).

The takin has a history going back over 25 million years and is the only member of Budorcatini among the goatlike animals (NIEDERSÄCHSISCHES LANDESMUSEUM, 1984).

NEGI (1985) describes the takin as a rather clumsy looking animal, with short tail and limbs.

A more detailed description of the takin's appearance is provided by FINN (1980). He describes it as a heavy animal of about 10 hands at the withers, a very short tail, short limbs and stout and with unusually large back hoofs. He compares the horns with those of the gnus in Africa and states horn length may extend two feet in bucks and half as much in does.

The following description of the appearance of the Bhutan takin originates from observations of a 12 member herd (Table 1):

The takin has black fore and hind legs. The body is covered with a thick dark brown coat. A deep black dorsal stripe is characteristic. The tail is black and somewhat bushy. Older animals have in comparison to younger members of the herd, a more grey coat. This is especially distinct on the front of the head.

The height at the withers of an adult takin is approximately 130 cm to 150 cm. The length measured from the tip of the nose along the backside to the end of the tail, amounts to 180 cm to 210 cm. The tail itself has a length of 30 to 40 cm.

The differentiation between male and female takins by observation methods only is quite difficult. Both sexes possess short horns. The characteristic genitals such as the four teats and the penis are covered by the thick and long hairy coat. The identification of the sex is sometimes only possible in a lying or resting position of the takin. In direct comparison, male takins are taller and heavier than the female.

The horns of the takin are similar to those of the African gnu. The horn length, the height, the circumference, the spread, and the rings of the horn vary from animal to animal. The length of the horns of middle age takins amounts to 35 cm up to 45 cm. The last 10 cm to 15 cm of the tips of the horns are polished and sharp.

Obviously there is a close correlation between the number of the rings and the age of the takin. The age rings of the horns vary in this case between three and twelve.

A differentiation between age correlated rings and decoration rings was not observed. The horns of older males show often a degree of wear presumably as a consequence of intraspecific social conflicts or sparring for herd dominance.

Investigation methods

Ethological observations were carried out with a takin herd in the Motithang Zoo in Thimphu, Bhutan.

The observed takin herd consisted of twelve animals (Table 1).

The enclosure of the takin herd is divided into several grazing blocks and rotation takes place according to the availability of forage. Most of the area is dominated by blue pine forest, bushes, ferns and grassy patches. There is a small stream and partly stony ground or smaller rocks.

Table 1: Takin herd composition with reference to number, sex and age (n = 12)

No.	Sex	Age
3	female	adult
3	male/female	juvenile
3	male	adult
1	male	semiadult
2	female	semiadult

The takins were observed from the outside of the enclosure by using binoculars and/or a spotting scope.

The observation work was carried out in the months June, October and December 1988. The evaluation of this analysis is based on 2986 observation minutes (49 hours and 46 minutes) with 134 different behavior activities.

For covering as much as possible of the activity cycle of the takins, the earliest observations started at 5.30 am and were concluded by 6.00 pm.

After carrying out some preliminary observation work, it was decided to distinguish the following seven main activities in the behavior of the takin (Table 2).

Table 2: Definition of observed behaviour activities

Code	Description
1.	Resting and ruminating
2.	Browsing
3.	Moving slowly and occasional browsing
4.	Standing at gaze, intraspecific interaction and games
5.	Disturbance by man
6.	Disturbance by domestic animals
7.	Defecation/dropping

Explanation of the activities:

1. Resting and ruminating takins prefer open sites with a view when bedding down. Short sleeping periods are included in this activity.
2. The browsing activity covers only intensive browsing periods.
3. Moving slowly and occasional browsing is mostly connected with a change of the browsing area. This para covers the activities along the route to the next browsing site such as drinking of water.
4. The activities, standing at gaze, interaction and games comprise intraspecific behavior patterns. They exclude any browsing activity.
5. Disturbance by man were caused by some visitors and by the guard.
6. Disturbance by domestic animals were caused by dogs, sheep and cows.
7. The defecation/dropping activity is always measured in units of five minutes.

Results and discussion

The behavior activity data were compiled and assessed. The daily periodicity is presented as breakdown in time per activity (Table 3) and as diagram in activity per cycle and time (Fig. 1).

Table 3: Abstract of average daily activities of a twelve member takin herd at Motithang zoo

Act	Description	Time
1.	Resting and ruminating	35.6%
2.	Browsing	17.8%
3.	Moving slowly and occasional browsing	25.2%
4.	Standing at gaze, intraspecific interaction and games	9.3%
5.	Disturbance by man	7.2%
6.	Disturbance by domestic animals	0.2%
7.	Defecation/dropping	4.7%

Resting and ruminating:

The main activity of the takin is resting and ruminating. This activity is represented by more than 35% of the whole activity scale

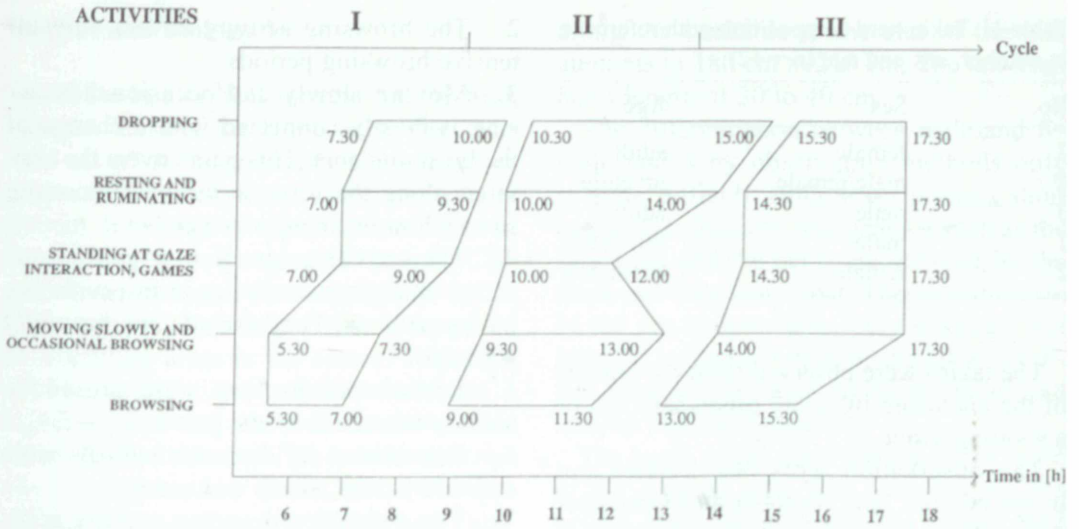

Fig. 1: Compilation of activity data of a takin herd (n = 12) at Motithang zoo in Thimphu/Bhutan

(Table 3). One can distinguish three activity periods.

Activity I in the morning extends from 7.00 to 9.30 h.

Activity II covers the period from 10.00 to 14.00 h.

Activity III begins in the afternoon at 14.30 and ends at 17.30 h.

The resting and ruminating activity amounts to approximately 9 1/2 hours. It is divided into tree periods of two to four hours each. The longest resting and ruminating period of the takin is around noon. Additional periods of this activity could be expected during the night time.

Browsing:

The browsing activity of the takin covers almost 18% of its daily pattern (Table 3). One can divide the browsing activity into three time units.

Activity I coincides with sunrise and is terminated around 7.00 h.

Activity II in the late morning from 9.00 to 11.30 h.

Activity III covers the early afternoon from 13.00 to 15.30 h.

The total browsing time of the takin is around 6 1/2 hours per 24-hour period. This time is distributed on three shorter periods of 1 1/2 to 2 1/2 hours. The acticity browsing has a close relationship to the activity moving slowly and occasional browsing, although it deals only with intensive browsing activities. The peak activities can be observed before and after noon.

Moving slowly and occasional browsing:

This activity is an important one like the daily activity of around 25% indicates (Table 3). The activity moving slowly and occasional browsing shows three units of activity periods.

Activity I coincides with the sunrise at 5.30 h and continues up to 7.30 h.

Activity II in the late morning and around noon extends from 9.30 to 13.00 h.

Activity III covers the afternoon from 14.00 to 17.30 h.

The takin spends approximately 9 hours a

day with the activity moving slowly and occasional browsing. The main activity peaks are around noon and in the afternoon with 3 1/2 hours duration each. A close correlation in timing to the browsing activity was observed.

Standing at gaze, intraspecific interaction and games:
These important behavior elements are represented in the daily activity by almost ten percent (Table 3). The result indicates the importance of this activity for predator avoidance, the social wellbeing of the individual animal and the order of hierarchy within the herd.

Activity I is observed between 7.00 to 9.00 h.

Activity II extends over the late morning from 10.00 to 12.00 h.

Activity III covers the afternoon from 14.30 to 17.30 h.

The activity standing at gaze, intraspecific interaction and games comprises a range of different short activities. Within the daily activity scheme one can distinguish three activity peaks totaling seven hours.

Disturbance by man:
Although these observations were carried out in a public zoo and one could expect disturbances, the reaction of the takin with more than seven percent (Table 3) is comparatively high.

The observation indicates both the reason of the disturbance (watchman and visitors) and the period of the disturbance. In this case the watchman caused disturbances mainly in the morning and in the late afternoon, while visitors disturbed the takins during their main browsing activity. In any case the effects have to be considered.

Disturbance by domestic animals:
Only one single case of this activity was noted. The disturbance was caused by a dog. In the wild one can expect more disturbances by domestic animals because of the fact that takin herds have to share their grazing grounds with livestock such as cattle, yaks, goats, sheep and dogs of the herders. Also there are most probably disturbances caused by competition with wild ungulates (Blue sheep) or as potential prey for large cats (Snow leopard). The disturbance by domestic and wild animals can take place any time of the day.

Defecation/Dropping:
The defecation activity covers around 5% of the daily activity of the takin (Table 3). The result shows the periodic distribution of the activity, in this case divided into three units.

Activity I extends over the period from 7.30 to 10.00 h.

Activity II covers the period around noon and the early afternoon from 10.30 to 15.00 h.

Activity III one can observe defecation between 15.30 and 17.30 h.

The defecation activity of the takin extends in total over a period of nine hours. The actual activity is below 15% of the mentioned period.

Summary

Title of the paper: Contribution to some aspects of takin (Budorcas taxicolor) behaviour in Bhutan

Behaviour data of a takin herd of twelve members were compiled and assessed. The observations took place in an enclosure at the Motithang zoo in the Himalaya kingdom of Bhutan. The observations resulted in a description of five different behavior activities which represent one complete activity cycle. The sequence within the activity cycle seems to be clearly defined. The first and

main activity of browsing overlaps with the activity of moving slowly and occasional browsing. Both activities will be followed, partly with overlap, by standing at gaze, intraspecific interaction, games and the activity resting and ruminating. The defecation activity concludes the activity cycle. It was observed that the takin needs within the daily periodicity, almost three complete activity cycles in order to fulfill its species specific basic requirements.

Zusammenfassung

Titel: Beitrag zu einigen verhaltenskundlichen Aspekten des Takin (Budorcas taxicolor) in Bhutan

Verhaltenskundliche Aspekte des Takin wurden in einem Freigehege in Bhutan untersucht und ausgewertet. Fünf verschiedene Verhaltensaktivitäten konnten voneinander abgegrenzt werden. Zusammengesetzt bilden sie jeweils einen vollständigen Aktivitätszyklus. Der chronologische Verlauf innerhalb eines Aktivitätszyklus konnte bestimmt werden. Das Verhaltensinventar umfaßt in quantitativ absteigender Reihe

- Nahrungsaufnahme
- Nahrungssuche
- Feindvermeidung und innerartliche Auseinandersetzungen
- Ruhe und Wiederkauen
- Defäkation.

Im Tagesverlauf konnten beim Takin drei vollständige Aktivitätszyklen nachgewiesen werden.

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