

# Activity rhythms in the Giant panda

*Ailuropoda melanoleuca:*

## an example of the use of checksheets for recording behaviour data in zoos

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The behaviour data recorded in zoos by non-research staff members often has limited value because it is either too detailed or not detailed enough. In both cases, the records may be of little use to future employees who want to predict an event or to outsiders looking for certain kinds of information about a species. The reasons for this relate primarily to the short-term function of the data-gathering itself.

When a new or rare species arrives at a zoo, staff members usually spend considerable time watching the specimen(s) and record their observations in narrative form, i.e. *all* behaviour displayed by the animal is written down. This type of data collection continues until the staff members have a working knowledge of the normal routine of the species in captivity and are confident that the specimen(s) has adapted to the new environment. The main function of this form of behaviour recording is to acquaint keepers with the new animal and to ensure that it adjusts to captivity. When this goal is achieved, the staff usually ceases recording behaviour narratively and may only occasionally record unusual or especially interesting events. Observations in narrative form often are neither summarised nor used again.

Often a similar approach is taken towards pregnant and lactating ♀♀, especially when there is little information available on maternal care and ontogeny in the species, but also when the staff is unsure of the mother's ability to rear her young. Again, observations are recorded narratively and later discontinued when the mother and litter settle into a routine. Although this narrative is *essential* to gain a working knowledge of an animal's behaviour, the relevant information often remains buried in pages of notes or in the head of a staff member.

The reverse of this method of recording behaviour is jotting down a particular event, such

as oestrus, in particular species. This type suffers from being too brief, too general in content, and too irregular in occurrence, although it is, in fact, the most common type of record in zoos.

For example, the signs of oestrus in a felid are well known. Females may rub the cheeks or flank on objects, roll over on the ground, produce a pre-mating call, and display an increase in activity. Unfortunately, individual ♀♀ differ in the manner of displaying oestrus, and all ♀♀ may occasionally exhibit these patterns at other times.

The note 'oestrus' in the records may therefore refer to the fact that a ♀ was observed to perform one or all of these behaviours just once or many times. Moreover, the oestrous periods may also not be recorded correctly because individual keepers differ in what they recognise as oestrous behaviour and they may only record their observations on an irregular basis. Obviously, when the time comes to mate the ♀ (if she is not housed permanently with a ♂), there is no way, from the records, to predict the approach of oestrus.

Check sheets solve the problem of too much or too little detail, and standardises the observations so that they are easily analysed and conducted on a regular basis. At the National Zoological Park we have recently used check-sheets for observations on the Indian rhinoceros *Rhinoceros unicornis*, the Lesser panda *Ailurus fulgens*, the Giant panda *Ailuropoda melanoleuca*, the tiger *Panthera tigris*, the cheetah *Acinonyx jubatus*, and two species of marmoset. The tiger, cheetah, rhinoceros, and marmoset observations have centred around the determination of oestrous cycles as a basis for achieving successful breeding while the Giant and Lesser panda observations were conducted in order to determine the normal activity rhythms for these species. In most cases, observations were made either by the regular keeper staff or by volunteers

who are members of the Friends of the National Zoo (FONZ); few of the observers are trained in animal behaviour.

Two types of check-sheets have been used. The time-sample check-sheet requires that the observer spend four to five minutes every hour observing the behaviour of a particular specimen(s). As can be seen in Fig. 1, which is an example of the

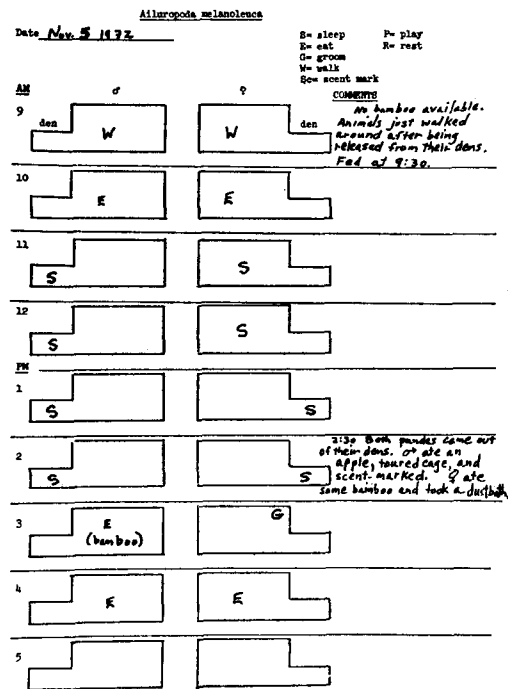


Fig. 1. Time-sample check sheet for Giant pandas *Ailuropoda melanoleuca*. Behavioural observations are recorded for 4-5 minutes in every hour.

check-sheet used on our recently acquired Giant panda, the abbreviation for the behaviour can be placed on the cage diagram in the approximate location where the behaviour was performed. The numbers of behaviour categories are limited, but there is also space for extra comments if any unusual behaviour is seen.

The data are easily analysed, and the results can be expressed as the percentage of five-minute observations spent performing a particular activity. This type of data is especially useful where there is interest in keeping regular long-term records on the activity rhythm of a species. Often, the results are predictable, but the time-sample check-sheet can point to a gradually

changing pattern which may otherwise be overlooked. For example, a comparison of our daily sheets on the Giant pandas from 20 July to 18 August 1972, 19 August to 16 September, and 21 October to 16 November, indicated that the ♂, 'Hsing-Hsing', is spending more time feeding, and both he and the ♀ are more active in the afternoon.

In general, we have found that the Giant pandas are active between 0800 and 1000 hours and again from 1600 to 1700. These activity periods coincide with feeding times and the period when the pandas are given access to the outdoor enclosures.

The main disadvantages of the time-sample check-sheet are that it must be continued for a prolonged period in order to be useful and changes in keeper routines (such as feeding times) can easily distort the results. The latter must always be kept in mind when analysing data if the cause of the observed change is to be correctly attributed. Also, the time-sample check-sheet is limited in the amount of detail that can be included.

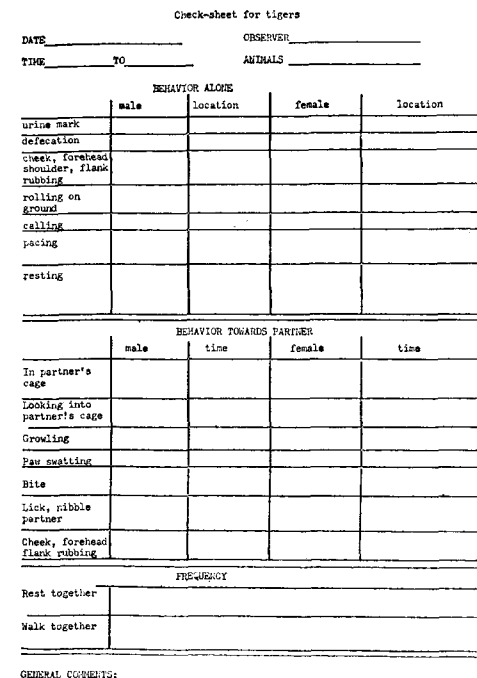


Fig. 2. Check sheet used for determining oestrous cycles in tigers *Panthera tigris*. The animal(s) is observed for 30-60 minutes at a prescribed time every day.

The second form of check-sheet has proved more useful for determining the occurrence of cyclical changes in behaviour since it requires a longer observation period. The animal(s) is observed for a minimum of 30 minutes (more often one hour) at a prescribed time every day. The frequency of occurrence and duration of a limited number of behaviour patterns are recorded. For example, with our tiger observations, we have concentrated mainly on patterns which might vary with the oestrous cycles.

As can be seen from Fig. 2, the tiger checklist can be used when animals are either alone or together. Typically, patterns of short duration are only recorded as having occurred, while with long-term behaviours, such as pacing, the length of the activity can be indicated.

A similar sheet (Fig. 3) has been used for studying the nocturnal activity of our pair of Giant pandas. A week-long nocturnal watch (1800 to 6000) was organised, and observations were conducted by FONZ volunteers. The observers were given a diagram of both cages to allow them to pinpoint the location of a particular

act. They were also provided with an instruction sheet which described the behaviour patterns and gave examples of how to complete the sheet. The following example is from the instructions:

(5) Scent-marking: The ♀'s scent-marking behaviour is relatively simple: She will rub her anogenital region on either the wall, by backing into it with the tail raised, or on the edge of the platform or a tub, by standing over it in a squat.

The ♂'s scent-marking is more complex. He cocks his leg like a dog against a wall or door, and may urinate or anogenital rub or both while his leg is raised. The ♂ also urinates and/or anogenital rubs while in a handstand, i.e. upside down. We not only would like to know which scent-marking patterns he shows, but also where he scent-marks. Some of his favourite positions are at the centre door leading to the ♀'s cage and on the glass at the front of his cage (see cage diagram). We have divided the front glass into 5 sections (Panes 1-5) so we can pinpoint marking areas. At the moment he prefers Panes 1 and 5.

Both animals may rub the anogenital region

GIANT PANDA CHECK-SHEET FOR ONE HOUR

DATE 4 Dec. 1972 TIME: 10:00 TO 11:00 P.M.

OBSERVER Charles Hawley

Number times male and female sniff each other through center door 10:13; 10:25; 10:47; 10:50

	Male	Location	Female	Location
RESTING OR SLEEPING (time)	10:20-10:25	woodpile	10:19-10:22	woodpile, then doorway
EATING (time)	10-10:05 (bamboo) 10:14-10:16 " 10:26-10:27 "	woodpile. " "	10-10:09 (bamboo) 10:33-10:39 " 10:52-10:55 "	woodpile. woodpile. right front
WALKING (time)	10:05-10:14			
GROOMING (time)				
SAND-BATHING			10:09-10:13	Tub #2
URINATION			10:30	Tub #2
DEFECATION	10:40	woodpile	10:49	woodpile
SCENT-MARKING a) leg cock (l.c.) b) anogenital rub (a.r.) c) urinate (ur) d) handstand (h.s.)	1) l.c. 10:09 2) l.c. 10:10 3) l.c. 10:15 4) l.c. 10:26 5) a.r. 10:17 6) l.c. 10:19 7) l.c. 10:31 8) l.c. 10:50	center door " " " " #5 pane center door "		
PLAY (time)	0 l.c. 10:22 10 l.c. 10:25 10:27-11:00	" " -----	10:14-10:19 10:22-10:39 10:37-10:52 10:55-11:02	

COMMENTS:

Fig. 3. Check sheet used during nocturnal watches on Giant pandas.

on play objects while they are playing, like the basketball. Please record this under scent-marking.

Please include the *time* of this activity. Although the manner in which each volunteer filled in his sheet varied, data analysis was usually easy. Fig. 4 shows the levels of feeding and

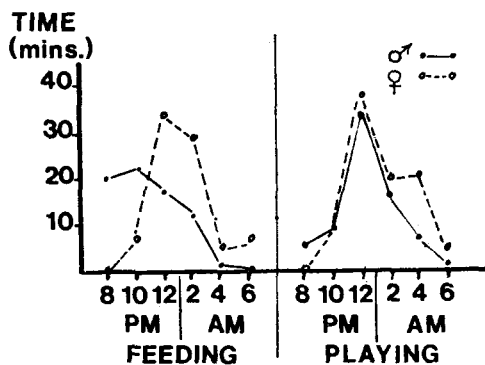


Fig. 4. Nocturnal feeding and playing in Giant pandas.

playing activity averaged for the seven nights, and Fig. 5 presents the scent-marking frequency of the ♂. (Because of the complex nature of ♂

#### Mean number of marks

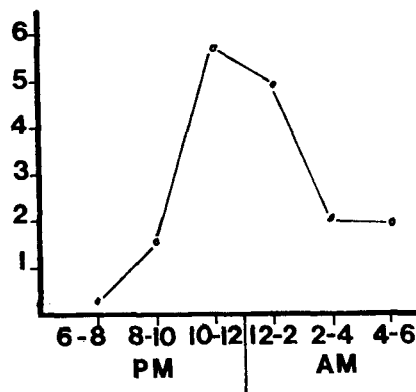


Fig. 5. Scent-marking frequencies of ♂ Giant panda at night.

panda scent-marking, there was more variability in the completion of the scent-marking section than in any other, especially with respect to whether the ♂ urinated, rubbed his anogenital

region, or did both. However, no observer had difficulty distinguishing the different scent-marking postures.)

The data compiled from this series of night watches clearly indicate that the Giant panda is nocturnal, with an activity peak occurring between 2200 and 0200. It has also provided us with some new insights into panda behaviour. Most interesting was the difference between the ♂ and the ♀ in their feeding habits. The ♂ (who is approximately six months younger than the ♀) began eating early in the evening in a desultory fashion and continued to feed intermittently for several hours while the ♀ showed a sharp peak in her feeding. Whether this difference is age- or sex-related or is due entirely to individual differences is not clear, but this may be determined from future studies.

Also of interest was the obvious synchrony in play behaviour, even though the ♂ and ♀ are visually isolated. Several observers commented that both animals would begin playing when the neighbouring panda became active and noisy, and during play periods there were frequent approaches to the door dividing their two cages.

The scent-marking behaviour of the ♂ was also synchronised with his general activity level and especially his play periods. During bouts of play, he often urinated or rubbed the anogenital region on the door separating him from the ♀.

Most exciting, however, were the relative levels of scent-marking in the ♂ versus the ♀. While the ♀ was only observed to scent-mark four times in seven nights, the ♂ marked over 100 times during the same period. Since both animals are still immature, this clear differentiation of scent-marking behaviour was somewhat surprising. Hopefully future nocturnal watches will provide some further information on scent-marking differences.

The main disadvantage of this continuous-record form of check-sheet rests with the observers themselves. Unless clear instructions are provided and followed, the diversity of response may hinder data analysis. It is important for the project organiser to maintain close contact with observers. In any case, the fewer observers are involved, the more consistent the records.

To summarise, recording behaviour data using a check-sheet can be a useful technique in zoos since (a) the data are easily quantified and analysed,

(b) observers need not have any special training in animal behaviour, (c) it can be incorporated into a daily keeper routine, and (d) it provides more standardised, regular observations of the behaviour of captive specimens.

For certain species which are rare and whose survival depends upon captive breeding programmes, the use of a standardised checksheet by several different zoos would allow valuable information to be exchanged in a clear, concise way. It would also lead to an understanding of the typical behaviour changes which occur during a species' reproductive cycle, which could later

be used to diagnose and remedy the cause of infertility in a particular specimen.

#### ACKNOWLEDGEMENTS

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