

# Feeding as a Method of Environmental Enrichment for Malay Tapirs (*Tapirus indicus*) at Nuremberg Zoo, Germany

By Susanne Zenzinger

## Abstract

**The aim of this study was to examine the effects of environmental enrichment on the feeding and resting behaviour of Malay tapirs at the Nuremberg Zoo. In addition, the enrichment objects used were examined in order to ascertain their suitability as occupational food. For this purpose, three successive experiments were carried out with the Malay tapir group (1.2) at Nuremberg Zoo within an observation period lasting from July 1<sup>st</sup> to October 2<sup>nd</sup> 2002. These experiments used suspended food branches and stuffed jute sacks as well as providing spiked hay-bales. The observed individuals were an adult male, an adult female and her female calf. The results pointed to a preference for the suspended food branches followed by the hay-bales and finally the jute sacks.**

## Introduction

The environmental surroundings of zoo animals differ fundamentally from those of their free ranging relatives. Zoo animals are usually fed at fixed times and so efforts to find and consume food do not take up as much time as in the wild. Therefore, a gap is left in the life of an animal kept in captivity that must be filled (Johann 1992). If this is not achieved, the animals may react with prolonged periods of rest (Dittrich 1986), stereotypic behaviour or increased aggression (Johann 1992).

The term “environmental enrichment” attempts to fill the gap left by the lack of foraging opportunities (Meister 1998). For that purpose, natural as well as artificial objects are used. Natural objects are usually objects or methods of providing food and are favoured by most animals. In most cases, variation can be created in different ways and times of presenting food. To avoid the development of a habit, it is crucial for every kind of enrichment to create continuing variety. The more easily that the offered objects can be manipulated, the longer it will take for them to lose their enriching effect (Berufsverband der Zootierpfleger 1997).

Until recently, tapirs have not received much attention regarding the development of specific enrichment programmes. Presently, there are far less studies of this topic on the Malay tapir (Taylor 2000) than on its American relative, the lowland tapir (Sharpe 1997; Penning 1998; Müller 2001). Therefore, the aim of this study was to examine the consequences of environmental enrichment on the feeding and resting behaviour of Malay tapirs. In addition, the enrichment objects used were examined and their suitability as “feeding enrichment” evaluated.

## Materials

During the observation period between July 1<sup>st</sup> and October 2<sup>nd</sup> 2002, three successive experiments were carried out with the Malay tapir group at Nuremberg Zoo:

1. Hanging up leafy food branches on a coconut rope (suspended branches).
2. Hanging up slit jute sacks stuffed with fruit, cut grass, hay and small branches on a coconut rope (jute sacks).
3. Bringing in hay-bales spiked with fruit, peanuts and small branches tied together with a coconut rope (hay-bales).

The observations took place exclusively in the outdoor enclosure. The observed individuals were an adult male and female and their female calf (Table 1). For protection of the offspring, the male was kept apart from the two females.

**Table 1.** Composition of the Tapir Group Investigated at Nuremberg Zoo.

ANIMAL	SEX	DATE OF BIRTH
HENK	1.0	24.04.1997
INDAH	0.1	15.05.1998
CALF [Nür14]	0.1	09.05.2002

## Methods

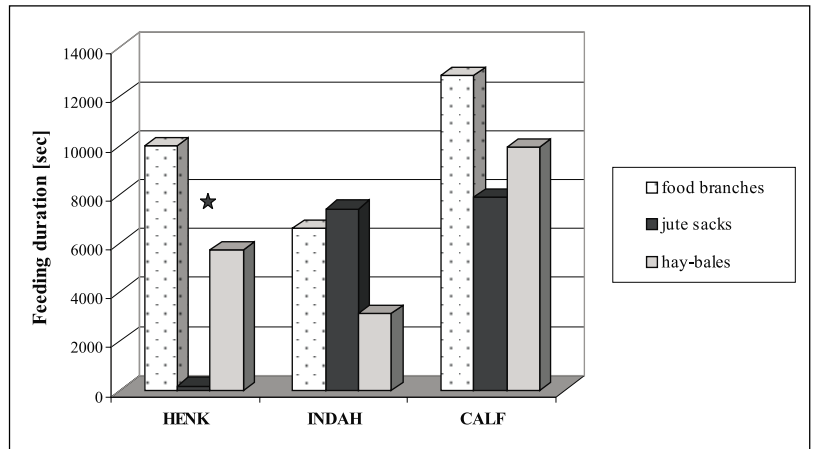
For each experiment, the observation period lasted seven days. Every day, the respective enrichment objects were renewed before observations began. The analysis was based

on two hours of observation in the morning (9 to 11 a.m.) and two hours in the afternoon (2 to 4 p.m.). These represented the periods of highest activity for the animals in the outdoor enclosure. This period had been determined before the start of the study. The duration of time spent eating the different enrichment objects was recorded as accurately as possible ( $\pm 5$  seconds). The term “eating” has to be taken as occupation with food in general. This does not only include ingestion, but also the acquisition of food that is not easily accessible.

All-occurrence-sampling (Altmann 1974) was used as the recording method. The statistical analysis was carried out according to the Friedman test and using the statistics programme “SsS 1.0 für Windows” by Rubisoft Software GmbH. The results were rated significant if error probability was  $p \leq 0.05$ . However,  $p$ -values between 0.05 and 0.1 can also be of interest and can be accounted for as “not entirely” or “almost” significant (Lamprecht 1999).

## Results

**Adult Male Tapir – HENK:** As shown in figure 1, the adult male spent almost twice as much time eating the suspended branches as the hay-bales. Clearly, he spent least time eating out of the jute sacks ( $p = 0.0027$ , Friedman test). Significant differences (\*) can be seen between the times spent with the jute sacks and the suspended branches ( $Q = 2.940$ , Dunn’s test) and between the jute sacks and the hay-bales ( $Q = 2.0673$ , Dunn’s test). As can be seen from Figure 2, the adult male tried to eat all parts of the suspended branches that he



**Figure 1.** Comparison of the duration of feeding on the different enrichment objects for all observed individuals (overall duration of observation: 28 h for each experiment).

could reach. Whenever all leaves and side branches were plucked off and the bark of the main branch was removed, the adult male repeatedly used the stones in front of the test construction as “stairs” to reach the higher branches. In contrast, the adult male paid little attention to the jute sacks. Most of the time, he kept a distance of at least one metre from the sack and only occasionally sniffed in its direction (Figure 3). However, if he pulled out pieces of the stuffing, he instantly galloped away with them to eat them in another part of his enclosure. This was only observed on two test days out of seven. The hay-bales aroused the adult male’s interest to a greater extent. On the first test day, he took the complete hay-bale to pieces in order to obtain its contents, and consumed a large part of the hay.



**Figure 2.** The adult male uses stones as “stairs” to reach a suspended branch.



**Figure 3.** The adult male sniffs in the direction of a jute sack.



**Figure 4.** The adult female with her nose in the sack. The calf eats fallen hay.



**Figure 5.** The calf uses a hay-bale for rubbing its head.

**Adult Female Tapir – INDAH:** Of the three types of feeding enrichment, the adult female spent the least time with the hay-bales. She spent the most amount of time with the jute sacks (Figure 1). There was a “not entirely significant” difference regarding the duration of time spent eating these objects ( $p = 0.0854$ , Friedman test). Accordingly, the adult female often just plucked off the leaves and the side branches of the suspended branches. The main branch remained almost entirely untouched. In contrast, the jute sacks were shaken and hollowed out with the help of her snout (Figure 4) or were nibbled at the corners. As a result, the contents were partially spread over the ground, where the calf or the adult female herself immediately ate them. The adult female repeatedly tried to push down the sack by using one of her front legs and placing it inside one of the slits. The hay-bales were moved a short distance within the enclosure by using the coconut rope to carry them. The adult female only ate the stuffing, but not the hay itself. In addition, she used the bales for scratching her belly.

**Female Calf:** The calf spent most of the time eating the suspended branches. It spent the least amount of time with the jute sacks (Figure 1). Thus, an “almost significant” difference could be determined according to the Friedman test ( $p = 0.0515$ ). The calf preferred to remove the bark from the suspended branches. With regard to the jute sacks, the calf’s behaviour on the first test day mirrored that of the adult male described above. But by the second day of testing, such behaviour was no longer observed. The calf ate the fruit as well as the hay. A short period of nibbling for longer periods at the corners of the jute sack, which contained the fruit pieces, was observed. The calf exhibited a very wide range of different activities with the hay bales. While trying to hollow the bales with its nose, the calf sometimes climbed on top of the bale. In this position, the calf either spread apart the single hay-ribs or used the hay-bale to sway back and forth. In this experiment, the calf also ate fruit as well as hay. The

calf also used the hay-bales for scratching. Due to the calf’s height, either only the head (Figure 5) or the complete body could be rubbed.

## Discussion

The adult male clearly preferred the suspended branches and the hay-bales to the jute sacks and also showed a preference for the suspended branches rather than the hay-bales (Fig. 1). Of all the animals, the adult female paid the most attention to the jute sacks. She spent far less time with the hay-bales than with the suspended branches. The calf, like the adult male, preferred the suspended branches, followed by the hay-bales and finally the jute sacks. As the results show, no clear preference for any of the enrichment objects could be observed in the case of any individual.

It was also observed that the adult male kept his distance from the jute sacks for most of the time. This behaviour can possibly be attributed to the strong smell of jute. The observations also showed that the adult male was startled whenever he pulled something out of the sack. The reason for that could possibly be the design of the test construction, which caused the jute sacks to swing every time one of the animals touched them. This might be enriching in itself (Berufsverband der Zootierpfleger 1997). However, the adult male seemed to prefer eating the suspended branches, which were mobile. But with the suspended branches and the hay-bales being familiar objects to the tapirs in contrast to the jute sacks, which had not been used with the Nuremberg tapir group before, the adult male’s distrust of the sacks could possibly be explained accordingly. For that reason, Hutchins *et al.* (1984) come out in favour of using as much natural material as possible for environmental enrichment. On the first test day, the calf showed a behaviour quite similar to the adult male’s towards the jute sacks. However, it lost its fear of them after the adult female had spent some time with them. The popularity of the objects used decreased, beginning with the suspended branches, then the hay-bales and finally the jute sacks, with the exception of the adult female. As mentioned above, this could result from the degree of familiarity or from the naturalness of the respective occupational object. The sequence determined could also be related to the natural foraging preferences of the Malay tapir. It is not surprising that the suspended branches came off best, because tapirs are, to a great extent, browsers. Furthermore, fruit makes up a large part of a tapir’s diet and is usually picked up from the forest floor (Williams & Petrides 1980). The hay-bales stuffed with pieces of fruit enabled the animals to practice exactly that kind of foraging behaviour. Unknown objects seemed to attract the adult female the most. The fact that she spent the shortest time with the hay-bales might be attributed to the fact that she was the only one who did not eat the hay but went straight for the contents.

## Conclusion

Taking individual differences into consideration, many enrichment objects may be suitable for tapirs. As animal behaviour depends on various external and internal factors (Berufsverband der Zootierpfleger 1997), reactions to just one enrichment object can be very different. Therefore, a study on a larger scale – especially with more test animals – may give more detailed information on this subject.

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# ASKING THE EXPERTS: OPINIONS ON TAPIR SCIENCE AND RESEARCH QUESTIONS

## How Old is an Old Tapir?

By Leonardo Salas

The survival rate of adult and reproductively active tapirs is probably the most important demographic parameter determining the resilience of a tapir population facing hunting pressure. For an example at hand, see what Leo Maffei has to say in his article in this TSG Newsletter issue. Ageing the animals becomes an inevitable necessity when estimating survival rates, both in unharmed and hunted populations.

We are faced with the same hurdle when addressing questions on heterochrony, and inter- and intraspecific allomet-

ries. Or when determining age of first and last reproduction, longevity, age of dispersers (a critical factor due to increased fragmentation of habitats) and mate choice, just to name a few examples. Yet, it seems like ageing tapirs or any other long-lived tropical mammals is a daunting, if not impossible, feat.

Tapirs have several identifiable growth stages. The most basic stages would be: newborn, juvenile (i.e., animals already with adult pelage but still growing), and adult (i.e.,