Husbandry and management of the Small Indian Civet *Viverricula indica* (É. Geoffroy Saint-Hilaire, 1803) in Kerala, India

M. BALAKRISHNAN* and M.B. SREEDEVI

Abstract

A survey of captive Small Indian Civets *Viverricula indica* in Kerala revealed 43 holdings with 86 civets. Among them, 62% of animals had been procured from the wild as young animals, of which 59% came from paddy fields, 28% from thickets, bushes or grassy areas amid forest, and 13% from rubber plantations. Only 11% of captive civets had been born in captivity. Milk, cooked rice, and bananas formed the regular diet with occasional supply of frogs, garden lizards, rats, chicken, beef, papaya, and pineapple. Stomach content analyses of dead civets collected from the wild revealed the presence of rat, babbler, frog, cricket, centipede, millipede, crushed beetle, shells, seeds, berries, fruits and grass leaves. Most civets were kept in individual wooden cages. A reed pole about 65–75 cm long was fixed vertically in the centre of the cage to facilitate scent marking by perineal gland rubbing. The marked secretion from the pole was scraped out by a piece of coconut leaf. The secretory output was of 2–6 g/animal/month. Local people use the secretion for its anti-asthmatic, anti-inflammatory and aphrodisiac properties. As per the information gathered from civet owners, 22% of the captive civets live only for few months and 70% live for 4–8 years. To substitute for deaths, fresh civets are trapped, which exerts pressure on wild populations. To reduce such pressure on natural populations, a captive breeding programme for civets, under control of government, is suggested.

*Keywords*: Ayurveda pharmaceuticals, captive breeding programme, diet, farming, perineal gland secretion

Introduction

The Small Indian Civet *Viverricula indica* (É. Geoffroy Saint-Hilaire, 1803) is a tawny-grey or greyish-brown viverrid, distributed in both forest and scrub/grass hill regions, where there is sufficient long grass or thickets to provide daytime refuge. Its fur coat is lined or streaked, especially on the rear dorsum. Crossbars are found on the sides of the neck. The belly, back and flank regions have spots arranged in rows (Prater 1980). Secretive habits, timid nature and stressful physiological and behavioural characters of civets are often cited as reasons for the dearth of scientific information on civets (Wemmer & Watling 1986). For example, the

Fig. 1. A pair of captive Small Indian Civets in a typical wooden cage. Note the colour difference of the lower part of the reed pole fixed in the centre of the cage, denoting the sites of scent markings. The civet on the right hand side is in a typical scent marking posture with protruded perineal gland pouch.
Sulawesi Palm Civet *Macrogalidia musschenbroekii* was not reported for several years but field investigations revealed it to be rather more widely distributed than had been known from historical records (Schreiber et al. 1989).

Several species of mammals possess complex glandular organs exclusively developed for secretion of sebum, which is effective in chemical signalling and is used by people as a fixative for odoriferous substances (Eisenberg & Klieman 1972, Adams 1980, Balakrishnan & Alexander 1985). Most viverrids have such conspicuous glandular organs lying between the anus and the opening of the reproductive organs known as the perineal glands. These specialised integumentary scent glands are used primarily by the animal in olfactory signalling (Ralls 1971). In ‘true civets’ *Viverra* and *Viverricula* the scent glands may be seen externally as a fairly large perineal pouch with hairy swollen lips. The secretory substance of this gland, ‘civet oil’, is popularly known as ‘civet’. Civets are extensively used for their perineal gland secretion, which is a prized item in the perfume industry (Ding et al. 1988). The African Civet *Civettictis civetta* is highly exploited for this purpose (Schreiber et al. 1989). In India, ‘civet’ is widely used in Ayurveda (a traditional system of Indian medicine) pharmaceutics, to prepare the traditional incense sticks and for flavouring tobacco (Nandkarni 1982, Xavier 1994). The Sri Venkateswara Temple in Tirumala maintains a colony of Small Indian Civets in Andhra Pradesh State, where the perineal gland secretion is used in religious rituals (Xavier 1994, Gupta 2004).

Under the Indian Wildlife (Protection) Act, 1972, the Small Indian Civet is listed in Schedule II (Part II), and hence it is illegal to keep them captive. Even if permission is granted by the concerned government agency, criteria for the maintenance and use of this species are to be followed. There are instances of abuse of wildlife resources as already reported in the case of Ethiopian civet farming (WSPA 2000). Such mistakes are to be corrected if this resource is to be constantly used for the welfare of the people involved in the practice. Although people have been keeping civets for generations, scientifically oriented husbandry and management practices are yet to be established for sustainable use of civets as a wildlife resource (Xavier 1994, Sreedevi 2001). The present investigation evaluates the farming practices of civets in Kerala, most of which were illegal, and assesses the possibility of civet farming as a legal programme for sustainable wildlife resource use, following the objectives of the Convention on Biological Diversity (UNEP 1992).

**Methods**

*Survey of captive civets in households and in institutions*

A survey was conducted during 1994–1999 in all known civet holding areas in Kerala (Xavier 1994) covering the Administrative Districts of Thrissur, Kozhikode, Malappuram and Palakkad. The Zoological Garden in Thrissur and Oushadi (an Ayurveda pharmaceutical manufacturing company under Government of Kerala) were also included in the survey. Civet keepers were interviewed and relevant information on all aspects of civet holdings including husbandry and management were gathered and recorded. Information on the number of animals available in each of the holdings, type of enclosure/cage used, maintenance of the enclosure, food items provided, quantity of the perineal gland secretion available from each animal, longevity under captivity and substitution against old, deceased and escaped animals were recorded. Information of civets in natural habitats was gathered from indigenous people around civet habitats.

*Stomach content analyses*

The stomach contents of the dead civets collected from natural habitats were separated and analysed for information on their natural food habits. Seeds, fruits and other vegetative matters collected from the stomach contents were preserved. Animal material in the stomach were preserved in 10% formaldehyde and later examined under a stereo microscope.

**Observations**

*Husbandry and management of civets*

Altogether, 43 civet holdings containing 86 civets were available for the survey. Among these, 16 units had only one civet each, 23 units had two civets each and two units had three civets each. There were two units with nine civets each. Only these latter two units were having permission to maintain civets, as issued by the Wildlife Wing of the Kerala Forest Department.

As revealed by the owners of the holdings, 62% of the civets were procured from the wild as young ones (below one month of age, at time of procurement). Fifty-nine percent were collected from paddy fields, 28% from thickets, bushes or grassy areas in forests, and 13% from rubber plantations. Among the civets under captivity, 9.5% were rescued after they accidentally fell into wells and 17.5% were procured from traps set for other animals. Only 11% of the captive civets were born in captivity. Among the captive civets, males formed 55% and females 45%. Among civets procured from the wild as kittens, 54% were females, but among those procured from traps, 82% were males. Sixty-seven percent of civets rescued from wells were also males. Among the civets born under captivity, 57% were males.

To trap civets, a double-compartment mongoose trap was commonly used in Kerala. Civet kittens were also trapped in rat traps. In the closed compartment, various baits such as meat, plantain, frog *Rana* or garden lizard *Calotes* were used. The cured civets were kept in individual cages. Group housing was rare. Milk, cooked rice, and banana formed the regular diet of the captive civets in Kerala. Further, frog, garden lizard, rat, chicken meat, papaya and pineapple were supplied when available. Most cages were of double compartments of average size $120 \times 60 \times 45$ cm, made of teak, jack or areca wood. When the cage was to be cleaned, the animal was shifted to the other compartment. Eighty percent of civets in captivity defecated in one of the corners of the cage, in effect making a ‘civetry’. So as to keep the cage clean, 75% of the civet owners removed faeces from the cage every day and 30% of them used water to clean the cage and also spray over the animal once per week. Around 20% of the civet owners cleaned the cage only 4–5 times a year. Among the civets under observation, 22% lived only for a few months, 70% lived for 4–8 years and 6% escaped from cages.

Areed pole (occasionally a pole of teakwood) about 65–75 cm long was fixed vertically in the centre of the cage (Fig. 1) to facilitate scent marking by perineal glandular rubbing of the civet. As they repeatedly use the same area for their scent marking, it was easy to scrape out the glandular secretion from the reed pole using a scalpel or a piece of coconut leaf. Civet owners revealed that the secretory output of the perineal glands would cease after 7–8 years. When old animals were no longer productive, they were either set free or killed and eaten.
Table 1. Identifiable stomach contents of the Small Indian Civets observed as dead in natural habitats.

<table>
<thead>
<tr>
<th>Place of collection</th>
<th>Sex</th>
<th>Weight, kg</th>
<th>Stomach contents observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nilambur</td>
<td>Male</td>
<td>3.0</td>
<td>One small <em>Rattus</em>, one cricket (Gryllidae)</td>
</tr>
<tr>
<td>Vadakkancherry</td>
<td>Male</td>
<td>2.5</td>
<td>Two crickets, one beetle, grass pieces</td>
</tr>
<tr>
<td>Kodassery</td>
<td>Female</td>
<td>3.5</td>
<td>Three centipedes <em>Scolopendra</em>, two crickets, fruits of <em>Ziziphus oenoplia</em></td>
</tr>
<tr>
<td>Poyya</td>
<td>Male</td>
<td>3.5</td>
<td>One scorpion <em>Palamnaeus</em>, two beetles, one cricket</td>
</tr>
<tr>
<td>Konnakuzhy</td>
<td>Female*</td>
<td>3.8</td>
<td>Four newly born <em>Rattus</em>, two crickets, grass pieces</td>
</tr>
<tr>
<td>Kodassery</td>
<td>Female**</td>
<td>4.0</td>
<td>One small babbler <em>Turdoides</em>, fruits of <em>Z. oenoplia</em> and <em>Aporusa lindleyana</em></td>
</tr>
<tr>
<td>Vellikulangara</td>
<td>Female**</td>
<td>3.5</td>
<td>Legs and shell of small crab (Brachyura), one frog, two millipedes <em>Spirostreptus</em>, grass pieces</td>
</tr>
</tbody>
</table>

**Pregnant – two foetuses**

Discussion

The captive civet population surveyed in Kerala was male-biased. This may be because males are greater wanderers than females, and as a result are more prone to be trapped or to meet with ac-

The perineal gland secretion of civets

Secretory activity of the perineal glands of civets began when they were 3–6 months of age. However, at this age the output was low and it was not sufficient to be scraped from the sites where they scent-marked regularly when they were around eight months of age. Each individual secreted 2–6 g/month. Among civet holders, 70% believed that food items like garden lizard, goat meat, beef and a special variety of plantain popularly known as ‘poovan pazham’ would enhance the output of the perineal gland secretion. Some farmers remarked that they could augment the glandular secretory output by providing these food items as well as by spraying water inside the cage and over the animal. The glandular secretion found adhered on the reed poles after scent marking was scraped off daily or at least twice per week. During the hot months of the year, if the secretions were not collected in the morning, they would melt and flow down on to the floor of the cage, whence the farmers had to discard it. The butter-like perineal glandular secretion of the civet turns brownish when exposed to air and light. Civet owners mix the glandular secretion with white vaseline, butter, finely ground ‘poovan pazham’ and even the faeces of civets to increase the quantity while selling. Selling collected secretion was easy, as there was high demand in Ayurveda pharmaceutics. All Ayurveda physicians whom we contacted stated that they were not getting sufficient quantity of ‘civet’ for their use in the preparations of Ayurveda medicines as per the proportions prescribed in literature.

Experienced civet owners have the opinion that certain physical characters such as pointed snout, coppery tinges on hairs, more than nine rings on the tail, odd tail-ring number and black tail tip are characteristics of civets with better quality and quantity of the glandular secretion.

The Small Indian Civet in the culture of indigenous people and their traditional medicine

The indigenous people interviewed revealed that the Small Indian Civet is a familiar wild animal around their settlements in forest areas and amid bush-dominated areas. They considered civet meat to be tasty, nutritious and medicinal. They were also of the view that eating civet meat would help to regain a person’s lost vigour and vitality. They hunt civets with their traditional bow-and-arrow. They also use trained dogs to locate civets taking shelter in holes and under bushes during daytime. When they detect civets in holes, they smoke the entrance to force the civet out, when it is caught or killed.

All indigenous people interviewed were familiar with the perineal gland secretion of the civets, popularly known among them as ‘Merukin puzhu’ (in Malayalam, the vernacular in Kerala) and ‘Merukin puzhuku’ (in Tamil, the vernacular in the neighbouring state of Tamil Nadu). By using a knife, the entire glandular area of the civet was removed, which was then dried under sunlight or with smoke. The secretion was squeezed from the glands and preserved for future use. They also make cigars using perineal gland secretion of civets. The gland was cut into small pieces and along with ganja (a narcotic) rolled in tobacco leaves and inhaled as smoke. ‘Merukin puzhu’ is an ingredient in many traditional medicines of indigenous people, particularly as a cure against respiratory ailments. This glandular secretion is also used as a cure against pimples and discoloration of the face. They also apply this secretion over the body of couples on the day of wedding. They believe that it would act as a sexual stimulant and accelerate chances of pregnancy.

The dried or smoked perineal glands of civets used to be one of the major items among the annual offerings of the indigenous community to the then Maharaja (emperor), to please his highness. This was used to smoke the palace with other incense. Members of the royal family also used the civet gland secretion during traditional smoking.

Food of civets in natural habitats

Seven civets were collected dead from natural habitats (Table 1). Stomach content analyses revealed that they eat a variety of animal and plant parts. The undigested and identifiable contents included rat *Rattus*, babbler *Turdoides*, frog, scorpion, shells of small crab (sub-class: Brachyura), cricket (Gryllidae), centipedes *Scolopendra*, millipedes *Spirostreptus*, crushed beetles, seeds and sweet berries of *Ziziphus oenoplia* and of *Aporusa lindleyana*, crushed pulp of pineapple fruit and grass leaves.

Out of the seven, two stomachs were almost empty. In the case of rats, babbler and frog, only the head region was chewed; other body parts were merely crushed. Feathers were seen intact in the stomach of the civets. In one sample, four young *Rattus* were observed. Stomachs of specimens collected from near human habitation areas contained boiled rice and fish bones.
cidents. Among Small Indian Civets trapped during the present observations, 82% were males (against 57% males among captive-born animals), and among the civets rescued from wells, 67% were males. Most civet owners had only 1–2 civets during the period of the survey. They were not fully dependent on civets for their livelihood. Only two civet holdings had many animals. These two holders were collecting the ‘civet’ exclusively for their own use in the preparations of Ayurveda medicines.

Information gathered from civet owners show that their civets came from a variety of habitats such as paddy fields, thickets, bushes, grasslands, rubber plantations and forests. The civets also wander into human settlements, as revealed by the fact that some of them were rescued from wells in such areas. Most captive civets were wild-caught, only a few being born in captivity. Even these latter did not represent successful captive breeding; rather they were born to mothers who were in their late pregnancy when trapped from the wild. Civet owners either let free those civets which ceased to be productive or kill and eat them after 7–8 years of successful maintenance and extraction of the perineal gland secretion. There being no captive breeding of these civets, owners trap new ones from the wild to compensate for the old and diseased ones. This may be placing pressure on wild populations of Small Indian Civet.

In captivity, civets are maintained on a fairly standard diet of cooked rice, milk, egg, banana and meat. However, these foods differ from those of wild civets, which eat a number of species of animals, including vertebrates such as small birds, reptiles and amphibians, and invertebrates such as molluscs, crabs, insects, scorpions, centipedes and millipedes, in addition to a variety of plant parts in the natural diet of civets as revealed during the present investigation. In addition to animal parts in stomach contents, parts of fruits, berries, seeds and leaves demonstrate that these civets are somewhat omnivorous in natural conditions. As they can live on a variety of food items, their distribution is also widespread, not being limited to natural habitats, but also extending to areas of rocky and tree hideouts, bush and grassy habitats around human dwellings. Civets consume grass pieces and excrete them as a wad entangled with mucus, which may act as a scouring or antiparasitic agent, as is known in canids and felids (Macdonald 1992).

Most civet owners insisted to clean the cage so as to maintain hygiene. They also spray water over the animal, which may help reduce heat stress. It appears that when temperature in the cage is low, the ‘civet’ output is high. The ‘civet’ output was also enhanced by supply of natural foods such as lizard and ‘poovan pazham’. During nights, civets from forest areas also visit nearby human settlements in search of food, especially fruits and berries available in plenty in orchards (Sreedevi, 2001). It is during this extended foraging activity that they accidentally fall in wells. A number of them trapped from paddy fields support the view that they also search for rodents, the population of which is high in paddy fields during the pre-harvest season.

The present study shows that civets are intimately connected with the culture of local human communities, and are used for the medicinal properties of meat and the perineal gland secretion. The indigenous people are familiar with the anti-asthmatic, anti-inflammatory and aphrodisiac properties of the perineal gland secretion of the Small Indian Civet.

The interest of civet owners is to collect maximum amount of ‘civet’ from each animal in captivity. As civets may not yield the glandular secretion during pregnancy and lactation, civet owners are not interested in breeding their captive civets. As civets are known for their scent marking patterns of rubbing the perineal glandular area on environmental sign posts (Xavier 1994), civet owners collect the glandular secretion from such sign posts (reed poles fixed in the cage). As they are not disturbing the animal in any way, this is a feasible method to collect the glandular secretion without further harming the captive animals. Were they to press the glandular area and squeeze out the secretion, as is being practised with Ethiopian civets, the glandular output might be increased but such activities are inhumane (WSPA 2000). In this respect, the civet owners in Kerala are, on average, better in their treatment of captive civets when compared with some holders elsewhere.

When natural food items of civets are provided to captive animals, the glandular output is expected to improve, as is the health of the animal, which could facilitate breeding conditions. If this could be achieved, the captive-born civets would replace trapped wild civets, so as to reduce off-take of natural populations. Hence a captive-breeding programme for civets is highly recommended (Balakrishnan 2002). Because most of the ‘civet’ used in the perfume industry comes from Ethiopia, it could be even more beneficial, in conservation terms, to establish a captive-breeding programme for Ethiopian civets.

Studies on mammalian scent marking patterns have revealed that specialised skin glands are present in many mammals (Mykytowycz 1970, Müller-Schwarze 1977, Adams 1980) and are extensively used for chemical signalling (Ralls 1971, Eisenberg & Kleiman 1971, Johnson 1973, Balakrishnan 1987). Such glandular areas are rubbed against environmental sign posts during various social interactions and during routine foraging and other behavioural activities, thereby transferring the glandular secretion with specific communication signals to the marked sites (Mykytowycz 1970, Eisenberg & Kleiman 1971, Ralls 1971). Because civets transfer their perineal gland secretions during scent marking (Sreedevi 2001) onto environmental sign posts in their natural habitats, it should be possible to collect ‘civet’ from such marked sites. If so, this valuable natural resource could be gathered from civet habitats, without disturbing the animals. The natural ‘civet’ may be more concentrated than that of captive civets, because the natural populations would be healthier with their natural food rather than the restricted diet provided in captivity. Following appropriate feasibility studies, the concerned government agencies could take appropriate actions under a participatory wildlife management programme involving local people to change from their keeping civets in captivity and instead train the owners to collect ‘civet’ from scent-marked sites in natural habitats. The intensity of stress on natural populations of civets might presumably be reduced by collecting ‘civet’ from natural scent marking sites at specific intervals. If so, their reproductive potentiality in natural habitats could be maintained and sustainable extraction of ‘civet’ would be possible.

WSPA (2000) urged consumers not to buy products containing natural civet musk taking into account the deplorable conditions of civets in Ethiopian civet farms. However, before recommending such drastic measures, the international agency should have suggested alternative means by which this excellent and renewable (if managed on a scientific basis) resource can support rural livelihoods. Whatever restrictions would be imposed, such a resource, used from time immemorial, would certainly continue to be used by local people. Incorporation of local people and their traditional practices in wildlife management and conservation were found to have positive effects in Africa (Bell 1987) and...
elsewhere (Mishra 1982); the harvest of ‘civet’ from wild animals could turn out similarly in southern India. There are already many restrictions on the use of biological resources in developing tropical nations, and it is important to avoid further constraints if they are not necessary. Each situation needs review on a case-by-case basis, to determine if the resources can be used sustainably for human welfare, if there will be effective steps to conserve the rich natural heritage of these nations and if the objectives of the Convention on Biological Diversity (UNEP 1992) are to be achieved.

References


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