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Srinu Srikanta Maharana
Wildlife SOS, Mathura, Uttar Pradesh, India

Ilayaraja Selvaraj
Wildlife SOS, Mathura, Uttar Pradesh, India

Arun A Sha
Wildlife SOS, Mathura, Uttar Pradesh, India

Baijuraj MV
Wildlife SOS, Mathura, Uttar Pradesh, India

Kartick Satyanarayan
Wildlife SOS, Mathura, Uttar Pradesh, India

Geeta Seshamani
Wildlife SOS, Mathura, Uttar Pradesh, India

Adithyan NK
Wildlife SOS, Mathura, Uttar Pradesh, India

Bohbby Chauhan
Wildlife SOS, Mathura, Uttar Pradesh, India

Pooja Acharya
Wildlife SOS, Mathura, Uttar Pradesh, India

Corresponding Author:
Ilayaraja Selvaraj
Wildlife SOS, Mathura, Uttar Pradesh, India

From avoidance to cooperation: A structured protocol for voluntary participation in clinical and husbandry practices of captive Sloth bear (*Melursus ursinus*) management

Srinu Srikanta Maharana, Ilayaraja Selvaraj, Arun A Sha, Baijuraj MV, Kartick Satyanarayan, Geeta Seshamani, Adithyan NK, Bohbby Chauhan and Pooja Acharya

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Abstract
Captive management of Sloth Bears (*Melursus ursinus*) poses unique challenges due to their strength, behavioral traits, and the species' tendency to mask clinical symptoms. This study presents a structured operant conditioning protocol designed to promote voluntary participation in veterinary procedures, minimizing the need for physical or chemical restraint and thereby improving both animal welfare and staff safety. At the Agra Bear Rescue Facility, 83 of 88 sloth bears (94.3%) were enrolled in a positive reinforcement-based training program incorporating clicker training and individualized behavioral shaping. Foundational behaviors were gradually built into complex clinical procedures. Results showed full compliance for phlebotomy and body weight measurement (100%), followed by high compliance for intramuscular injection (92.8%), blood pressure monitoring (90.4%), ultrasonography (75.9%), and oral examination (71.1%). Lower compliance was noted for electrocardiography (20.5%) and rectal thermometry (43.4%). The findings demonstrate the feasibility and efficacy of operant conditioning in enhancing clinical management and welfare of sloth bears in captivity. The protocol may serve as a model for other species in similar settings.

Keywords: Sloth Bears, operant conditioning, veterinary procedures, animal welfare, behavioral training, positive reinforcement

1. Introduction
The Sloth Bear (*Melursus ursinus* Shaw, 1791), listed as "Vulnerable" by the International Union for Conservation of Nature (IUCN), (Dharaiya *et al.*, 2016) [6], is protected under Schedule I of India's Wildlife (Protection) Amendment Act, 2022. As of March 31, 2024, 340 individuals are housed across 43 zoological institutions in India for conservation, lifetime care, and public education (Central Zoo Authority, 2024) [14].

Veterinary care for captive Sloth Bears presents considerable challenges due to their strength, behavioral unpredictability, and ability to mask clinical symptoms. Traditional reliance on physical or chemical restraint for medical procedures is increasingly viewed as outdated due to its associated stress and health risks, especially in geriatric or compromised individuals (Bush, 1996; Grandin *et al.*, 1995; Phillips *et al.*, 1998) [3, 8, 9].

Modern zoos and rescue centers are shifting toward behavioral management strategies rooted in operant conditioning and positive reinforcement. These approaches reduce stress, build trust, and improve cooperation during veterinary interventions. Empirical studies have demonstrated their effectiveness in various species, including primates (Desmond & Laule, 1994) [5], carnivores (Brando & Coe, 2022) [1], and ungulates (Grandin *et al.*, 1995) [8]. Animals trained through operant conditioning often exhibit reduced abnormal behavior and enhanced welfare (Wiepkema & Koolhaas, 1992; Brando, 2012) [2, 13].

Shaping, a core principle in operant conditioning, involves reinforcing successive approximations of a desired behavior (Skinner, 1953) [12]. Though trainer methodologies may vary (Galbicka, 1994) [7], the use of small, achievable steps has proven widely effective. Tailoring training to individual animals based on their history and behavioral tendencies enhances success (Cecil Binney *et al.*, 2003; Poulsen, 2009) [4, 10].

Although veterinary protocols for sloth bears are available (Sha & Ilayaraja, 2022) [11], there is a lack of published guidance on using operant conditioning to facilitate clinical care in this species. This study addresses that gap by documenting a structured, welfare-oriented training program designed to increase voluntary cooperation during routine veterinary procedures in Sloth Bears at the Agra Bear Rescue Facility.

2. Materials and Methods

2.1 Study site and subjects

The study was conducted at the Agra Bear Rescue Facility in Uttar Pradesh, India, operated by Wildlife SOS in collaboration with the Uttar Pradesh Forest Department. The facility houses rescued Sloth Bears formerly used in the dancing bear trade. A total of 88 bears, aged 5-35 years (average weight 88.2±22.0 kg), were assessed; 83 (94.3%) were enrolled in the training program.

2.2 Enclosure design

Dens measured 3.5 × 1.5 × 2.2 meters and featured concrete flooring, metal bars, a rear entry gate, and multiple access ports designed for safe clinical interaction. These ports allowed controlled access to the ventral and lateral body regions of the bear for various procedures.

2.3 Training strategy

Training plans were individualized based on each bear's physical abilities, behavioral tendencies, and medical history. Clicker training was used, with the clicker serving as a conditioned reinforce paired with high-preference food rewards (e.g., dates, coconut, jaggery, and honey). Food preferences were identified through pairwise comparisons.

Training sessions were conducted twice daily for 10-15 minutes, focusing first on basic behaviors such as targeting, sitting, and positioning. Progression to complex clinical behaviors followed a systematic shaping protocol. A behavior was considered learned when reliably repeated three times. Behavioral criteria and reinforcement goals are detailed in Table 1 (Figure 1).

Fig 1: Demonstration of operant conditioning techniques applied to facilitate husbandry and veterinary procedures in captive Sloth bears (*Melursus ursinus*)

Table 1: Behavioral criteria and reinforcement goals

Behaviour	Criteria for reinforcement
Target	Bear touches the target stick with its nose.
Sit	Bear assumes a seated posture on its haunches with front paws held up against the mesh, chest upright, facing forward.
Perineal presentation	Bear sits with its hindlimbs abducted, pressing against the mesh, and exposing the perineal region.
Sleeve	Bear grasps the sleeve bar with its right forelimb claws and holds the position.
Shoulder	While seated, bear extend its shoulder through the port and maintains the position.
Open	Bear opens its mouth fully and holds the position.
Side	Bear stands with its entire side, both fore and hind paws on ground, flush against the mesh.
Lay	Bear turns head, shoulder, and hips inward, transitioning laterally (lateral recumbency).
Up	Bear stands on hind limbs with front paws held up against the mesh.

2.4 Veterinary procedures

Once foundational behaviors were acquired, bears were desensitized to equipment and tactile contact, using gradual exposure and consistent reinforcement. Key clinical procedures included.

2.4.1 Phlebotomy

Bears were desensitized to syringes and antiseptics before aseptic cephalic vein sampling using a butterfly cannula (Figure 2).

Fig 2: Operant conditioning-assisted blood sampling, allowing safe venipuncture with minimal stress

2.4.2 Sphygmomanometry

Bears accepted limb cuffs for blood pressure monitoring using digital devices (Figure 3).

Fig 3: Non-invasive sphygmomanometry in a *Melursus ursinus* by using digital blood pressure monitor, ensuring accurate monitoring of cardiovascular parameters

2.4.3 Ultrasonography

Bears tolerated abdominal and thoracic probing after desensitization, allowing successful imaging (Figure 4 & 5).

Fig 4: Abdominal ultrasonography performed on a seated *Melursus ursinus*, enabling safe and effective visualization of abdominal organs and facilitating diagnostic assessment

Fig 5: Echocardiographic examination of *Melursus ursinus* in left lateral recumbency, facilitating optimal transducer placement and image acquisition of cardiac structures both left parasternal long and short axis views

2.4.4 Electrocardiography (ECG)

Electrodes were introduced gradually; ECGs were conducted in lateral recumbency with reinforcement for compliance (Figure 6).

Fig 6: Electrocardiographic (ECG) monitoring of *Melursus ursinus* in left lateral recumbency, enabling accurate cardiac rhythm assessment during clinical evaluation

2.4.5 Intramuscular injections

Bears were trained to present shoulders and hips, enabling safe IM administration (Figure 7).

Fig 7: Intramuscular injection administered at the hip region using a side body presentation

Fig 8: Reliable core temperature monitoring using a digital thermometer with flexible tip

2.4.6 Thermometry
Digital rectal thermometers were introduced stepwise in seated (perineal presentation) and lateral positions (Figure 8).

2.4.7 Body weight assessment
Bears were conditioned to step onto a digital scale placed inside the den (Figure 9).

Fig 9: Body weight assessment of a Sloth bear using a calibrated digital scale, ensuring precise and consistent monitoring of health and growth parameters

2.4.8 Oral examination
Bears were trained to open their mouths and tolerate inspection with gloved hands or toothbrushes (Figure 10).

Fig 10: Routine dental prophylaxis in *Melursus ursinus* through cooperative training

3. Results
88 bears assessed, 83 (94.3%) participated in the program. All trained bears acquired basic behaviors. Advanced behaviors like side-body presentation (30.1%) and lateral recumbency (20.5%) were less common. Younger bears (5-15 years) demonstrated faster and more consistent training progression.
Clinical procedure compliance among trained bears included: phlebotomy and body weight assessment (100%), IM injection (92.8%), sphygmomanometer (90.4%), ultra-sonography (75.9%), oral examination (71.1%), thermometry (43.4%), and ECG (20.5%), (Figure 11).

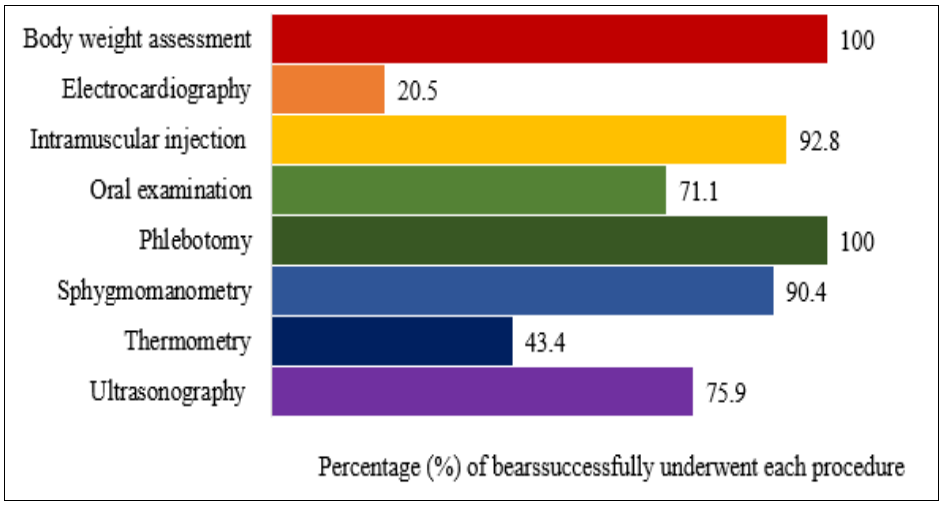

Fig 11: Bar chart illustrating the percentage of bears successfully complied towards each veterinary procedure

4. Conclusion
A structured operant conditioning protocol using positive reinforcement successfully enabled voluntary participation in essential veterinary procedures in captive Sloth bears. The approach minimized stress, improved safety, and enhanced welfare. This model offers a replicable, evidence-based strategy for captive care in zoological and rescue contexts.

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Conflict of Interest
Not available

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