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Practical Insights on Hand Rearing of an Abandoned Lion Cub (*Panthera leo persica*, Meyer, 1826) at North Bengal Wild Animals Park, Siliguri, West Bengal, India

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ABSTRACT

Apart from serving as recreational centres, zoological parks in India today have become a cornerstone of ex-situ wildlife conservation through their research, education, rescue, animal rehabilitation services and hand-rearing facilities for abandoned or orphaned wild animal infants. Hand-rearing is a delicate, time- and labour-consuming process that may be required during maternal rejection, inadequate lactation, diseases or neonatal susceptibility. This article presents a successful case of hand-rearing of an abandoned Asiatic lion (*Panthera leo persica*) male cub at North Bengal Wild Animals Park, Siliguri, India. The protocol followed involved gradual diet modifications based on the nutritional requirements of the cub, close health surveillance, proper hygiene maintenance, behavioural observation, and systemic enrichments. The scientific husbandry management, development and growth rate of the cub, health challenges encountered, and the strategic handling of those challenges have been documented.

INTRODUCTION

Zoological parks in India, over time, have evolved from leisure spaces for royalties to institutions for supporting ex-situ conservation initiatives, research, education, rescue centres and animal rehabilitation hubs (Rajamani, 2000). Considering this shift, in 2009, the Recognition of Zoo Rules acknowledged the gravity of establishing nursery units in a zoo setup, encouraging the zoo management to raise the isolated, rescued or rejected animal infants within the zoo facility, under proper veterinary care. Hand-rearing is a labour-intensive and tedious process in which the new-born animals are looked after by humans, without the involvement of their biological mother, and should only be considered under unavoidable circumstances, such as maternal mortality or rejection, poor mothering ability, feral, diseases, and injuries (Mohapatra *et al.*, 2019). In ex-situ conservation programs, pre-established knowledge of hand-rearing becomes imperative when managing Endangered species like the Asiatic lion (*Panthera leo persica*), whose wild population already faces a risk of extinction due to threats like poaching and unpredictable natural events (Breitenmoser *et al.*, 2008). In India, this majestic species naturally exists as a single sub-population in the Great Gir Landscape of Gujarat and is protected as a Schedule I species under the Indian Wildlife Protection Act, 1972 (Jhala *et al.*, 2019). Based on 2024-25 data of Zoo-MIS record, Central Zoo Authority, India, 37 Indian zoos together house 206 individual Asiatic lions (75males: 100 females: 31 unknown) to date. Despite this sizeable captive stock, reports on the hand-rearing of lion cubs are still scanty, which could be attributed to the limiting number of incidences necessitating such interventions. Thus, in the present paper, attempts have been made

to elucidate the protocols followed considering the feed, physiological and behavioural development of an abandoned lion cub, and challenges faced during the hand-rearing process for future references to the wildlife veterinarians and caretakers, if a similar situation prevails.

MATERIALS AND METHODS

In April 2024, a lioness housed at North Bengal Wild Animals Park (NBWAP), Siliguri, India delivered three cubs between the 17th (cub 1 at 10:59 am and cub 2 at 4:02 pm) and 18th (cub 3 at 01:12 am) at the Lion Night Shelter of the zoo. Despite the peri-parturient-focused management plans implemented, it was noticed through CCTV footage that the mother, after briefly grooming the newborns, refused to nurse them. She positioned herself in a sternal recumbency posture, enabling the cubs to suckle. Since there was a possibility that the long parturition had made the lioness tired, the cubs initially weren't separated from the mother. However, even after about ten hours since birth, when the mother continued to refuse to nurse them and was periodically aggressive and irritated, with numerous failed attempts of suckling by the newborn cubs, the urgency of hand-rearing emerged. Further, considering the poor mothering record of her first litter in the previous zoo she was transferred from, the management decided to hand-rear the lion cubs in the zoo's veterinary hospital (Figure 1a). Unfortunately, the cubs 2 and 3 could not survive, owing to the primary cause of ill nursing, and other health issues. Recognizing the urgency to prioritize neonatal care for Cub 1, the only surviving, eldest and strongest offspring in this litter, which is also our study animal, the management initiated focused hand-rearing and supportive care to the cub, with

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24-hour monitoring to ensure its survival and healthy development.

Once the cub was brought to the veterinary hospital of the park, the cub was examined for any external injuries, and a sensory and visual response test was done by making soft noises behind the cub. After weighing and sexing the cub, lukewarm milk formula @ 20% of body weight was offered through sterilized feeding bottles (Shalini *et al.*, 2023), and details of its feed consumption and body weight were documented. In the present study, the overall feed management has been divided into four (04) phases for a better understanding of the approach (Table 1); Phase 1: Provision of formula milk for the first seven (07) weeks. The frequency of feeding was twelve (12) times per day, Phase 2: Transition from formula milk to minced chicken between the 8th to 14th weeks. The frequency of feeding was gradually reduced to three (03) times per day, Phase 3: Provision of chicken and introduction of beef in its diet. With the increased quantity of meat provided to the cub, the frequency of feed provision was progressively reduced to once a day from the 15th-21st week onwards, and Phase 4: Sole dependence on meat and introduction of pork in its diet. The frequency of feed provision was once a day in the evening hour between 4-5 pm from the 22nd to the 28th week. Throughout its stay in the veterinary hospital of the park, two specific keepers were assigned the task of constant monitoring and care, including the maintenance of hygiene at all times. Thereafter, the animal was shifted to an enclosure at Lion Safari, where other lions of the park are housed.

Prophylactic measures and other management practices such as monthly stool screening for the presence of gastrointestinal parasites were carried out using standard sedimentation and flotation methods (Pariyar *et al.*, 2021) at the laboratory of the Veterinary Hospital of the Park. Routine deworming and vaccinations were also practised. In addition to this, health-related challenges such as helminth infestation, joint pain in the hind limbs, hemoparasite infections, and the interventions adopted thereafter were recorded. Throughout the hand-rearing process, the guidelines set by the Central Zoo Authority, India (Mohapatra *et al.*, 2019) and recommendations from the medical team of the West Bengal Zoo Authority, India were strictly taken into consideration. NBWAP upholds the highest standards of animal welfare for both, captive and rescued wild animals. Ethical clearance was not required for the current study and hand rearing of the abandoned lion cub was performed in the veterinary unit of the park as a routine veterinary practice.

RESULTS AND DISCUSSION

Results

Phase 1

On the day of arrival at the Veterinary care unit of the park, the rectal temperature of the cub was recorded as 101°F, with heart and respiration rates of 98 bpm and 20 breaths/minute. The cub weighed 1430 g and showed

no signs of external injury. Upon careful examination, the cub was identified as male and appeared alert and responsive to sensory stimuli. The eyes remained open shortly after birth which is normal for the species (Mohapatra *et al.*, 2019). The lion cub was carefully fed with formula milk that was prepared at a ratio of 1:2 (one part of milk powder: two parts of room temperature water) and mixed properly. After feeding, the abdominal region of the cub was gently rubbed to provide comfort. Force-feeding was avoided at all times and the cub mostly spent its time sleeping or resting, along with playful and exploratory behaviour at times. The housing area of the cub was properly cleaned, and light bulbs of 1000 watts were incorporated. A dehumidifier was also installed and a cooler was always kept on standby. Limited visitation was implemented to prevent disturbances and the risk of disease transmission as the lion cub being an altricial species is dependent and delicate at the early stages of its life. At the end of three weeks or so, milk teeth started to emerge (Figure 1 b-c). Besides this, overall weight gain during phase 1 was normal (Table 1).

Phase 2

The formula milk was slowly replaced by minced chicken and the cub accepted the feed with minimal rejection. The maximum increase in body weight was observed in the 14th week, during which the overall quantity of meat consumed by the cub amounted to 6535g. During this phase, at the end of the 11th week and early 12th week of age, a sudden abnormal fluctuation in rectal temperature (102.2°F – 103.5°F) that was different from the cub's natural diurnal body temperature was noted, as this rise and fall in rectal temperature was accompanied by symptoms such as sluggishness and visible lethargy. The blood sample was then collected and sent for analysis in a Government institution. The results showed that the cub was positive for *Babesia* spp., *Ehrlichia* spp., and *Mycoplasma* spp. Virology examination revealed that the cub was negative for Feline Panleukopenia Virus (FVP), Canine Distemper Virus (CVD), and Feline Infectious Peritonitis (FIP) RNA. The immediate intervention was taken with tetracycline, lincosamide and quinolone class of antibiotics for 28 days along with other supplements (Table 1). Besides this, primaquine 0.5mg/kg body weight was also administered for 3 days. The cub was closely monitored under strict biosecurity measures and over time, the cub showed steady recovery, with progressive improvement in its activity and energy levels. The rectal temperature recorded post-recovery ranged between 100°F-101.5°F which falls under the normal range (Friend *et al.*, 2020). Complete eradication of hemoparasites was obtained during phase 3.

Phase 3

The minced chicken was slowly replaced by chicken pieces with an equal proportion of meat and bones. Milk provision was completely ceased. Beef bone (a single piece of about 200-300g) was provided in the 18th week,

which the cub engaged playfully but did not consume. Weight gain and overall growth of the cub was consistent. However, on the 17th week of age, mild lameness was noted. On investigation, the cub had developed joint pain in the hindlimb. An anti-inflammatory herbal spray was applied and glucosamine-based nutraceutical supplements (1 tab/day for 15 days), calcium (1 tab/day for one month) and multivitamin syrup (1tab/15 days) were given. The cub was exposed to morning and evening sunlight under strict supervision for an hour every day. Concerning the infestation of helminths, *Toxocara cati* eggs were isolated during the routine stool examination. Praziquantel & Pyrantel embonate active ingredient dewormer (5mg/kg body weight) was given. Vaccination against feline panleukopenia, calicivirus, herpes virus, and rabies was done in the 20th week. The booster vaccine was given after 21 days, followed by revaccination at 12-month intervals. Through these medical interventions, the cub gradually recovered and gained back his energy.

Phase 4

By this phase, the cub had grown significantly in size and was accepting its feed regularly. The pork was introduced into its diet in the 28th week, and the overall weight gain was also normal. Minimum interaction with keepers was ensured during feed time to prevent or minimize human imprinting and encourage independence. The calcium and multivitamin supplements were continued along with broad-spectrum dewormer (Table 1) as in the subsequent stool test, *Toxocara cati* eggs were again identified, but at a lower intensity. The cub was in sound health and displayed exceptional acrobatic abilities, sensory response, and high vigilance at this phase of hand-rearing. In the 28th week, the cub was accommodated in a considerably spacious cage, which was transferred into the lion night shelter. Although the cub was housed at a safe, barriered distance from his parents, his presence was made known to the other lions. The cub was then relocated to its respective enclosure after proper disinfection within the lion night shelter of the park. Various structural and environmental enrichments such as wooden platforms, scratching poles, swings, ponds, and ornamental plants, were incorporated within its enclosure. Feed enrichments were also frequently carried out to keep the animal occupied, and prevent any kind of stereotypic behaviour (Figure 1e-g). The hygiene was well maintained at all times, with proper disinfection of all the animal-related utilities.

Discussion

Successful hand-rearing of abandoned or orphaned wild animals in captivity has been reported by authors like Husain (1966), Dhoot *et al.* (2000), Khadri *et al.* (2002), Najera *et al.* (2011), Patel *et al.* (2022) and Doley *et al.* (2025). The reports advocated by Azhar *et al.*, 2023 point out medical issues like constipation, diarrhoea, hyperthermia, eye blindness and hindquarter weakness in human-raised lion cubs in captive set-ups. Further, Gehlot *et al.* (2020) reported another successful case of hand-rearing lion

cubs at Machia Biological Park, India owing to the poor lactation of the mother. This literature provides good insights into the real-time situation that may arise during the hand-rearing of wild infants. In our study, throughout the entire process of hand-rearing, the most challenging experience that the management could successfully overcome through the combined efforts of experts was hemoparasitic infection control. Vector-borne, especially tick-borne, infections that are transmitted by arthropods are globally distributed illnesses (Baneth *et al.*, 2012) and represent common health challenges in captive wild felids including lions (Kelly *et al.*, 2014). These blood parasites have been reported by other authors elsewhere (Kinge *et al.*, 2010; Barend *et al.*, 2001; Guimaraes *et al.*, 2007) in the same species. Further, infection with hemoprotozoan like *Babesia* spp. is generally asymptomatic and disease may develop if the immune system of the animal is already compromised by other conditions (Munson *et al.*, 2008). Besides this, non-domestic felids are thought to be a reservoir of hemoplasmas (Willi *et al.*, 2007), and clinical cases of hemoplasmosis are often correlated to pre-existing retrovirus infections (George *et al.*, 2002). Cerrata *et al.* (2002) observed that the asymptomatic, apparently healthy tigers that tested positive for *Ehrlichia* spp., could be carriers of the vector. Thus, routine health screening of the captives is vital to take preventive measures. In our case, we did not find any ticks on the body of the lion cub, however, considering the prevalence of tick-borne diseases and the naturalistic location of our park, the disinfection schedule was continued. While antibiotics like tetracycline (Doxycycline 14 mg/kg body weight) and lincosamide (Clindamycin 11mg/kg body weight), along with quinolone (Metronidazole 10mg/kg body weight) administered for 28 days led to gradual improvement, primaquine (0.5mg/kg body weight for three days) treatment gave a consistent and clearer therapeutic response. The cub gradually gained back his energy and to date is in sound health.

Furthermore, the entire process of hand-rearing is time and labour-intensive, requiring patience and quick response to unforeseen scenarios, as the infants of wild animals lack an efficient immune system (Gehlot *et al.*, 2024), making each day uncertain. Hence, the experience of veterinary professionals and their supporting staff, along with access to the relevant literature becomes vital. Besides, there is no right way to raise any species successfully like their mother (Shalini *et al.*, 2023) and the protocols to be followed may be situation-dependent. In the present paper, despite many challenges that were overcome through proper medical care and management strategies, the cub survived and is presently enjoying enrichments in the lion safari of the park. Considering the limited reports on the hand-rearing of wild felines, the authors hope that the present study may aid as a useful reference for other zoological parks and rescue centres in developing effective protocols while managing comparable cases.

CONCLUSION

Table 1: The details of food consumption, frequency of feeding, average weight gain, and medical intervention of the Lion cub

Phase	Week	Formula milk consumption in ml	Minced Chicken (in g)	Chicken (in g)	Beef (in g)	Pork (in g)	Average frequency of feeding/day	Weight (in g)	Average weight gain (g)	Remarks
Phase-1	1	1380					12	1595	165	
	2	1915					12	1830	235	
	3	1992					12	1930	100	
	4	2040					12	2230	300	
	5	2350					12	2947	717	
	6	2240					12	3455	508	
	7	2280					12	3857	402	
Phase-2	8	2045					4	4400	543	The frequency of feed provision was gradually reduced to four times/day. The transition from milk to a meat-based diet. Absolute Calcium and absolute vitamin supplements were given (1 tab/day for 1 week).
	9	1185	900				4	4973	573	
	10	625	1710				3	5480	507	
	11	910	2110				3	6090	610	Doxycycline @ 14 mg/kg body weight, Clindamycin @ 11mg/kg body weight and Metronidazole @10mg/kg body weight for 28 days with iron tonic (eRBC @ 0.5ml/kg body weight), liver tonic (Liv-52 tabs @ 1 tab/day) calcium and multivitamin supplements (1tab/day for) all for 30days. Primaquine was administered on the 13th week @ 0.5mg/kg body weight for three days. The size of the minced chicken was increased to bite-sized pieces, gradually transitioning to whole chicken.
	12	930	3180				3	6733	643	
	13	900	4800				3	7430	697	
	14	90	6535				2	8664	1234	
Phase-3	15		7905				2	10465	1801	Praziquantel & Pyrantel embonate (worm trap suspension 5mg/kg body weight for 1 day); Iron, liver tonic, calcium and multivitamin supplements were continued. Lameness was observed. The anti-inflammatory herbal spray was applied topically as a glucosamine-based nutraceutical supplement (Canitone joint support @ 1 tab/day * 30 days). The first dose of vaccination against feline panleukopenia, calicivirus, herpes virus, and anti-rabies was inoculated and repeated after 3 weeks. Re-vaccination is carried out in 12-month intervals.
	16		9000				2	11360	895	
	17			8870				2	12434	1074
	18			8120	200-300g (bone)			2	13453	1019
	19			8080				1	13800	347
	20			8940				1		
	21				7000			1		

Phase-4	22		7000			1			Calcium and multivitamin supplements continued. Praziquantel & Pyrantel embonate (5mg/kg body weight) dewormer was given on the 24th week. Pork was introduced into the cub's diet.
	23		7000	3500		1			
	24		7000	3500		1	25760	11960	
	26		7000	5000		1			
	27		7000	7000		1	29500	3740	
	28		7000	7000	500	1			

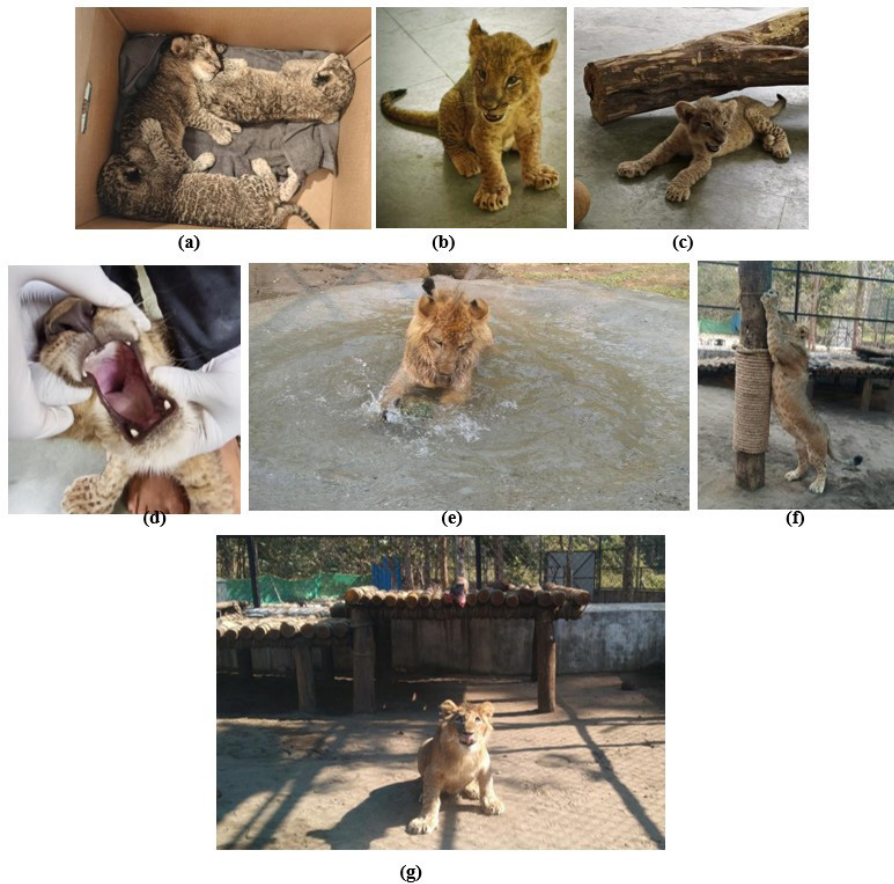


Figure 1: (a) Images of Cub1, 2 and 3 shortly after they arrived at the Veterinary hospital of the park for hand-rearing following maternal rejection (b-c) Image of Cub 1 at three weeks of age, enriched with a wooden log and ball for play. (d) Normal dental development. (e-g) Responsiveness of Cub 1 to structural and feed enrichment in the enclosure at the lion safari area of the park, following hand-rearing at the veterinary hospital.

The current case study demonstrates the resilience of wild feline cubs in withstanding health challenges despite being an altricial species, making early detection difficult. However, once the symptoms persist, dominoes of health deterioration may arise, giving veterinarians limited time for diagnosis and identifying the root cause of the disease. Thus, round-the-clock monitoring, along with prophylactic measures, scientific feeding protocols, and collaborative teamwork, are vital in understanding the normal and abnormal behaviour of the individual cub, allowing timely investigation, diagnosis and interventions. The present case adds to the sparse literature on hand-rearing lion cubs in Indian zoos, particularly in handling conditions like hemoparasitic infections and early behavioural orientations. While maternal care cannot be completely replicated, the present report illustrates how zoos, when adhering to the best welfare standards, can

overcome critical neonatal challenges and give the wild animal infants a second chance at life.

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