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Hand-Rearing South American Coati Pups (Nasua nasua) Under Zoo Conditions: A Case Series with Daily Milk Intake and Growth Records

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ABSTRACT

Hand-rearing of orphaned procyonid neonates is occasionally required in zoo and wildlife care, yet published, species-specific protocols for coatis remain limited and are often embedded within broader husbandry guidance. This case report describes assisted hand-rearing of three orphaned South American coati pups (Nasua nasua) managed at Sardar Patel Zoological Park (SPZP), India, with emphasis on milk feeding volumes and growth monitoring. Pups were stabilised with thermal support, housed in a nursery setting, and fed a milk replacer regimen with frequent feeds and daily weight checks, consistent with widely used neonatal and wildlife rehabilitation principles. Across a 45-day monitored period, body mass increased from 82–89 g at intake to 325–501 g, with average daily gains of 5.52–9.36 g/day. Maximum recorded daily milk intake ranged from 137–180 mL/day, while mean daily milk intake during recorded days ranged from 71.0–89.1 mL/day. All pups remained clinically stable during the monitored period. This report provides practical, data-anchored guidance on early coati neonate management and highlights key considerations for milk volume targets, monitoring intensity, and risk control (aspiration, hypothermia, and gastrointestinal intolerance), within the context of established procyonid husbandry guidance.

INTRODUCTION

South American coatis (Nasua nasua) are social, diurnal procyonids distributed broadly across South America and characterised by omnivorous, opportunistic foraging that often emphasises invertebrates and fruit, with vertebrate prey typically forming a smaller component (Ferreira *et al.*, 2013; Rodrigues *et al.*, 2021). In managed settings, coati diets and food presentation methods influence both health risks (e.g., disproportionate animal-based foods and potential iron overload concerns) and behavioural outcomes (e.g., foraging time budgets) (Clauss *et al.*, 2006; Shora *et al.*, 2018).

Orphaned neonates represent a distinct challenge: the margin for error is narrow due to thermoregulatory limitations, dehydration susceptibility, aspiration risk, and rapid metabolic turnover. General neonatal principles emphasise immediate warming, careful hydration assessment, frequent small feeds, and objective monitoring (especially daily weights) (Miller, 2012; MSD Veterinary Manual, n.d.-a, n.d.-b). While broader procyonid guidance exists for preventive care, nutrition, and veterinary risk management, case-level datasets documenting milk volumes and short-term growth trajectories in coati pups are scarce in the published zoo literature (AZA Small Carnivore TAG, 2010). This case report aims to address that gap by presenting a structured account of early hand-rearing management supported by quantitative feeding and growth data.

This dataset aims to clinically document and analyse growth trajectories and milk-feeding parameters in hand-reared South American coati neonates (Nasua nasua) under zoo nursery conditions, and to derive practical, data-supported benchmarks for neonatal management.

LITERATURE REVIEW

Neonatal Hand-Rearing Principles and Feeding Physiology in Nasua Nasua

Baseline biological parameters for N. nasua, described in species accounts, provide contextual benchmarks for neonatal mass and developmental timing (Gompper, 1998); however, structured quantitative datasets documenting milk-intake trajectories during artificial rearing are rarely reported in the peer-reviewed zoo literature.

The AZA Procyonid Care Manual (AZA Small Carnivore TAG, 2010) and wildlife rehabilitation standards (Miller, 2012) emphasise three core management principles: maintenance of thermal stability prior to feeding, provision of small frequent meals with gradual volume adjustments, and daily objective weight monitoring as the primary indicator of feeding adequacy. These recommendations align with broader mammalian neonatal care frameworks that identify hypothermia, dehydration, and aspiration as major risk factors in orphaned neonates when environmental and feeding conditions are suboptimal (Miller, 2012).

The wide range of relative intake values (mL/kg/day) observed in hand-rearing scenarios is physiologically plausible in early life due to small body mass and rapid metabolic turnover. Importantly, intake values must be interpreted alongside tolerance and weight trends rather than as rigid numeric thresholds. During weaning, tapering of relative milk intake corresponds to general mammalian lactation patterns, in which mixed feeding

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progressively reduces reliance on milk as gastrointestinal maturation advances (Langer, 2003). Although species-specific lactation composition data for coatis are lacking, gradual reductions in mL/kg/day concurrent with stable growth are consistent with expected physiological progression rather than undernutrition.

Post-Neonatal Nutritional Considerations and Management Context

Successful neonatal stabilisation must be integrated with long-term dietary planning in captive coatis. Reports of excessive hepatic iron deposition in captive Nasua spp. highlight the risk of dietary imbalance in managed omnivores and underscore the importance of carefully formulated post-weaning diets that avoid disproportionate vertebrate-product inclusion (Clauss *et al.*, 2006). Nutritional management in this species therefore requires attention not only to macronutrient adequacy but also to micronutrient exposure and bioavailability.

Behavioural dimensions of feeding are also relevant. Studies evaluating food presentation in coatis suggest that excessive processing (e.g., over-chopping) may alter foraging time budgets and potentially influence social dynamics (Shora *et al.*, 2018). Thus, diet structure during the juvenile transition should support naturalistic feeding behaviour alongside nutritional balance.

Maternal infanticide, the precipitating event in this case, has been documented across mammalian taxa and is influenced by ecological and life-history variables (Lukas & Huchard, 2018). While direct causation cannot be inferred, early nursery intervention following maternal rejection is consistent with accepted zoo veterinary management practices when neonatal viability is otherwise preserved.

Collectively, the limited species-specific literature and reliance on extrapolated neonatal principles reinforce the value of quantitative case documentation. By pairing daily milk totals with growth outcomes during the highest-risk developmental window, data-anchored case series contribute practical benchmarks to an otherwise predominantly descriptive evidence base.

Case History

Three South American coati pups (Nasua nasua) were admitted to the SPZP nursery immediately after birth as the female giving birth showed infanticide behaviour with the first pup. Infanticide in female South American coatis in captivity could be attributed to perceived offspring non-viability, inadequate maternal experience, or disturbance immediately after parturition, triggering maladaptive maternal behaviour such as cannibalism. Such events are documented in Procyonids and are often associated with environmental stressors, poor neonatal vigour, or disruption of normal mother–infant bonding which aligns with the findings of Lukas and Huchard (2018). Three pups were isolated and admitted to nursery to ensure viability. Two pups presented with minor external injuries consistent with early-life trauma, while one pup had no visible identifying marks at the time of intake.

All animals were managed under institutional veterinary oversight, with the intent of stabilisation and supportive rearing until age-appropriate transition to independent feeding and standard juvenile husbandry.

MATERIALS AND METHODS

Nursery Housing and Environmental Control

Pups were maintained in a quiet nursery area with strict control of draughts, handling intensity, and hygiene. Enclosures were designed to allow secure nesting, concealment, and postural comfort, using soft bedding and frequent spot-cleaning to reduce pathogen load—consistent with wildlife rehabilitation standards for neonates (Miller, 2012). Thermal support was prioritised, given the well-recognised risk of hypothermia in orphaned mammals (MSD Veterinary Manual, n.d.-a).

Feeding Strategy and Milk Administration

Milk feeding followed conservative neonatal practice: small, frequent feeds with close observation for intolerance (bloating, diarrhoea, regurgitation) and aspiration risk (coughing, nasal discharge, respiratory effort) (Miller, 2012; MSD Veterinary Manual, n.d.-a). A commercially available milk replacer (institutionally standardised) was used, prepared according to manufacturer instructions and delivered via controlled bottle/syringe feeds with appropriate positioning to reduce aspiration risk (MSD Veterinary Manual, n.d.-a).

Feeding volumes were adjusted using the following practical rules:

Figure 1: Daily weighing of coati pups

Figure 2: Coati pups resting in the nursery

1. Daily weight checks as the primary objective guide for adequacy of intake (Figure 1) (Miller, 2012).

2. Progressive adjustment of total daily milk volume in response to growth and clinical tolerance, recognising that neonates often require comparatively high relative intakes (mL/kg/day) and that over-feeding can be as hazardous as under-feeding (MSD Veterinary Manual, n.d.-a).

3. Avoidance of abrupt changes in formula strength or feeding volume, consistent with neonatal gastroenteric risk control (Figure 2) (Miller, 2012).

Health Monitoring and Supportive Care

Daily monitoring included body weight, hydration status, faecal character, demeanour, and nursing response. Where minor injuries were present, local wound care and supportive therapy were instituted under veterinary supervision. Preventive veterinary planning (deworming and vaccination strategy) was considered in line with procyonid collection guidance and general small carnivore vaccination principles, acknowledging extra-label use and regional disease ecology (AZA Small Carnivore TAG, 2010; Squires *et al.*, 2024; Day *et al.*, 2016).

Data Handling

Feeding and growth data were recorded daily during the intensive rearing period. For this report, total daily milk intake (mL/day) and body mass (g) were summarised for each pup across the monitored period (45 days). Summary outcomes are reported as start–end body mass, average daily gain (g/day), and descriptive statistics for daily milk intake.

RESULTS AND DISCUSSIONS

Growth Outcomes

Across the monitored period, all three pups showed sustained mass gain (Table 1; Figure 3)

Table 1: Summary outcomes per pup

Pup ID	Start weight (g)	End weight (g)	Total weight gain (g)	Days monitored	Average daily gain (g/day)	Mean feeds/day
A	82	325	243	44	5.52	6.58
B	83	492	409	45	9.09	6.49
C	89	501	412	44	9.36	6.36

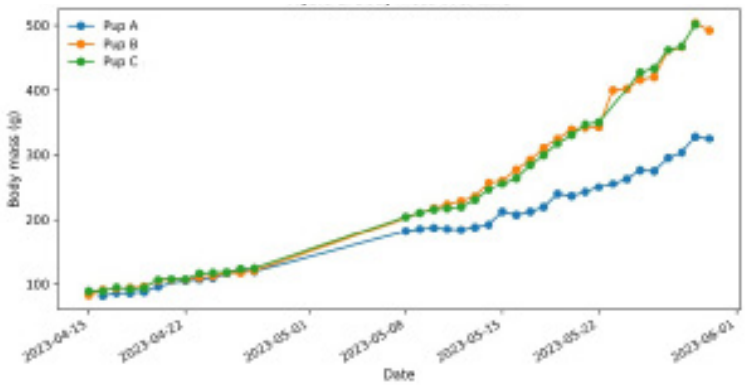

Figure 3: Body mass over time (g)

Milk Intake (Daily Totals)

Maximum recorded daily milk intake ranged from 137–180 mL/day, with mean daily milk intake (for days with recorded totals) ranging from 71.0–89.1 mL/day. When expressed relative to body mass, recorded milk intake ranged approximately from ~90 to ~491 mL/kg/day, reflecting expected high relative intake early in neonatal care and tapering as body mass increased. (Fig.3 and Fig.4) As body mass increased, the relative milk intake (mL/kg/day) showed a natural tapering trend consistent with the

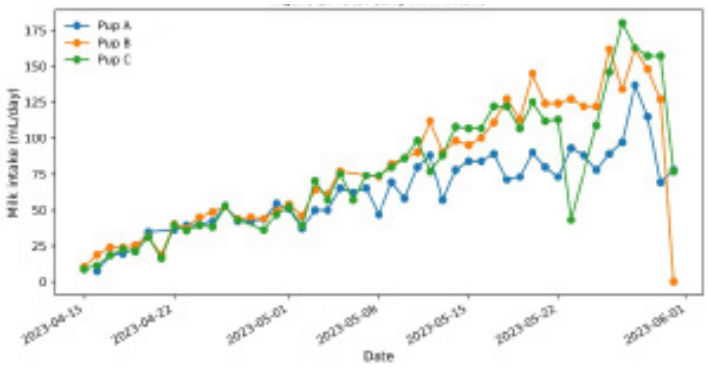

Figure 4: Total daily milk intake over time (mL/day)

Figure 5: Milk intake relative to size (mL/kg/day)

onset of the weaning transition. This decline corresponds to the progressive introduction and increasing acceptance of species-appropriate soft solid feed in South American coati neonates, which reduces reliance on formula as gastrointestinal maturation and digestive capacity for semi-solid foods improve.

Clinical Course

No major clinical complications were recorded during the monitored period. Minor external injuries resolved with supportive management. The pups remained active and responsive in the nursery setting, with progressive improvement in feeding vigour and growth trajectory.

Discussion

This case report provides practical, quantitative benchmarks for early coati pup hand-rearing within a zoo nursery context. The observed growth trajectories (end weights 325–501 g from starting weights 82–89 g across ~6 weeks) indicate that a structured regimen of thermal support, frequent feeds, and daily objective monitoring can support stable short-term outcomes in orphaned N. nasua pups—aligning with widely accepted neonatal management priorities (Miller, 2012; MSD Veterinary Manual, n.d.-a).

Interpreting Milk Volumes and Growth Together

A key contribution here is the pairing of daily milk totals with daily weights, enabling practical interpretation beyond narrative descriptions. The range of observed relative intakes (~90–491 mL/kg/day) illustrates two important realities in neonate management: (i) relative intake can appear high early, and (ii) tolerance and growth trend matter more than any single "universal" number. Over-reliance on rigid volume targets risks either under-feeding (poor gain, dehydration) or over-feeding (diarrhoea, regurgitation, aspiration). Therefore, daily weight trend remains the most defensible decision anchor, as recommended in wildlife rehabilitation standards (Miller, 2012).

Risk Control: Aspiration, Chilling, and Gastrointestinal Intolerance

Across species, aspiration pneumonia and hypothermia are recurrent failure points in hand-rearing; both risks are amplified when animals are cold, weak, or fed rapidly (MSD Veterinary Manual, n.d.-a). The stable clinical course here supports the value of consistent thermal support, quiet housing, slow controlled feeds, and conservative progression of volume—core principles that remain applicable even when species-specific milk composition data are limited.

Diet Context beyond Neonate Stage: Relevance of Procyonid Guidance

Although this report focuses on the neonatal milk phase, coatis transition rapidly into omnivorous juvenile diets. Managed coati nutrition should avoid disproportionate dependence on vertebrate-product-heavy feeds, given concerns around dietary mismatches and potential associations with iron storage pathology in captive coatis (Clauss *et al.*, 2006). Food presentation also matters behaviourally: there is evidence that presentation style (e.g., excessive chopping) can change foraging patterns and may reduce naturalistic feeding time budgets in coatis (Shora *et al.*, 2018). These points are important when planning the weaning phase following successful neonatal stabilisation, and established procyonid care guidance provides a useful framework for preventive medicine and husbandry planning (AZA Small Carnivore TAG, 2010).

Limitation

This is a descriptive case report from a single institution, and it does not attempt to define "optimal" milk intakes for the species. Milk replacer choice and exact composition were not analysed, and longer-term outcomes post-weaning were

Figure 5: Weaned off Coati pup transferred out of nursery at two and half month of age.

outside the scope of the present dataset. Nevertheless, the value of the report lies in its objective growth and intake record during the most risk-sensitive period.

Practical Recommendations (for zoo nurseries and rescue interfaces)

1. Prioritise warmth before feeding and maintain stable nursery temperatures; cold neonates feed poorly and aspirate more readily (MSD Veterinary Manual, n.d.-a).

2. Use daily weights as the primary guide and adjust volumes gradually; avoid abrupt diet changes (Miller, 2012).

3. Record total daily milk intake (mL/day) rather than only per-feed volumes; daily totals align better with growth evaluation and troubleshooting.

4. Plan weaning with attention to coati-specific diet risks, emphasising naturalistic omnivory and avoiding vertebrate-product-dominant diets (Clauss *et al.*, 2006; Ferreira *et al.*, 2013).

5. Integrate preventive medicine planning early, using procyonid care guidance and regionally appropriate vaccination principles under veterinary decision-making (AZA Small Carnivore TAG, 2010; Squires *et al.*, 2024).

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