

Role of Caretakers in the Welfare and Management of Captive Wild Animals A Review

Dr Vipul Sharma

Sr. Manager - Vantara, India

Corresponding author: Dr Vipul Sharma | vipul.sharma63@gmail.com

Abstract

Caretakers are central to the daily welfare, health, safety and behavioural management of animals maintained in zoos, rescue centres, conservation-breeding facilities and other ex-situ settings. They translate institutional policies into repeated practical actions, including feeding, water provision, enclosure hygiene, environmental enrichment, behavioural observation, cooperative husbandry, health reporting and emergency response. Yet captive-animal literature has more often evaluated resources, interventions or animal-based outcomes than the human practices and organisational conditions that produce those outcomes. This review synthesises evidence on the caretaker role across six connected domains: routine husbandry; welfare monitoring; enrichment and cooperative care; health and hygiene; safe handling and emergency preparedness; and caretaker training, work conditions and institutional support. A structured narrative review approach was used to organise peer-reviewed evidence and authoritative welfare frameworks around a practical caretaker-to-outcome pathway. The evidence indicates that caretaker competence, consistency, communication and animal-specific knowledge can influence the reliability of husbandry procedures, the quality of behavioural information, the success of training and the safety of animal care. Positive keeper–animal relationships and cooperative training may reduce fear and improve response rates, although the evidence base remains uneven across taxa and facilities. Caretaker welfare is also relevant: occupational stress, grief, burnout and insufficient organisational support can affect staff functioning and should be treated as management risks rather than individual shortcomings. The review proposes a practical framework linking caretaker inputs to husbandry quality, animal-based welfare indicators and conservation-readiness outcomes. Future work should validate standardised indicators, include underrepresented taxa and settings, and test whether staff-centred interventions produce measurable improvements in animal welfare.

Keywords: captive wildlife; animal caretaker; zookeeper; animal welfare; husbandry; environmental enrichment; cooperative care; human–animal relationship; zoo management

1 Introduction

Modern zoos, aquariums, rescue centres and conservation-breeding facilities are expected to maintain high standards of animal welfare while also contributing to conservation, education and research. These aims depend on daily husbandry: the repeated provision of food and water, sanitation, appropriate social and physical conditions, enrichment, observation, medical support and safe movement. Welfare assessment frameworks increasingly emphasise the animal's physical health, affective state and opportunities to express species-appropriate behaviour, rather than relying only on enclosure resources or institutional intentions [1–4].

Caretakers are the staff members who most consistently observe animals and implement these requirements. Depending on the facility, they may be called keepers, animal care staff, handlers, mahouts or animal care professionals. Their work is not limited to cleaning and feeding. It includes recognising subtle behavioural changes, identifying injury or illness, maintaining records,

implementing enrichment, supporting veterinary procedures, responding to emergencies and communicating information across shifts. In practice, caretakers are therefore a critical link between written protocols and animal-based outcomes.

The human component of captive animal care has nevertheless received less integrated attention than enclosure design, diet, enrichment objects or veterinary interventions. Studies of keeper–animal interactions show that individual dyads can differ and that keeper characteristics, experience, knowledge and interaction style may influence animal responses [5,6]. A recent scoping review of husbandry training also indicates that training is increasingly used to facilitate handling, sample collection and medical procedures, but that published evidence is uneven across taxa [7]. These findings suggest that caretaker competence and working conditions should be considered within welfare-assurance systems rather than treated as background variables.

This review has three objectives: (i) to synthesise the main pathways through which caretakers influence captive-animal welfare and management; (ii) to identify practical indicators that facilities can use in training, supervision and daily records; and (iii) to highlight evidence gaps and research priorities for staff-centred welfare management.

2 Review approach

This paper uses a structured narrative review approach. Literature was organised around combinations of the terms captive animal, zoo, aquarium, wildlife, animal welfare, caretaker, keeper, husbandry, enrichment, cooperative care, human–animal relationship, health monitoring, safety and staff wellbeing. Peer-reviewed studies, review articles, evidence maps and established welfare frameworks were prioritised. Relevant evidence was grouped thematically rather than combined statistically because the literature includes diverse species, facility types, outcome measures and study designs. The review therefore aims to develop an evidence-informed management framework, not to estimate a pooled effect size.

The synthesis distinguishes three levels of indicators. Resource-based indicators describe what is provided, such as enclosure features, diet or equipment. Animal-based indicators describe the animal's response, such as behaviour, body condition, injury, disease, stress-related signs or willingness to participate in care. Management-process indicators describe how care is delivered, including training completion, observation quality, record accuracy, response time, communication and adherence to standard operating procedures. A robust welfare system should connect all three levels.

3 Caretakers as welfare agents

Caretakers influence welfare through frequent, repeated and often species-specific decisions. The same enclosure or diet can produce different outcomes depending on timing, consistency, observation, social context and the quality of staff–animal interactions. Their position gives them access to longitudinal information that may not be visible during periodic veterinary examinations or formal welfare audits. A caretaker may notice a change in appetite, gait, resting location, vocalisation, social tolerance or response to a familiar cue before the change becomes clinically obvious.

This role should not be interpreted as transferring institutional responsibility to individual staff. Caretaker performance is shaped by staffing levels, shift design, training, equipment, supervision, reporting culture and the clarity of protocols. Where a facility expects reliable welfare outcomes, it must provide the conditions that allow caretakers to observe, act and escalate concerns. The relevant management question is therefore not simply whether a caretaker is trained, but whether the whole care system supports competent action.

4 Routine husbandry and environmental management

Routine husbandry is the foundation of captive welfare. Feeding and watering schedules, diet preparation, cleaning, waste removal, bedding, enclosure checks, social management and access to shade or shelter all require consistent execution. Small deviations may matter when repeated across days or when animals are sensitive to timing, food presentation or environmental change. Caretakers can reduce variation by following clear procedures while also recording justified adaptations for individual animals.

The evidence map by Martin and colleagues demonstrates the breadth of husbandry and management interventions used in captive settings and the need for stronger evidence about what works under which conditions [8]. From a caretaker perspective, this means that interventions should be documented in a way that captures implementation fidelity. Records should identify what was done, when, by whom, for which animal or group, and what response was observed. Without this information, a facility may know that an enrichment or management practice was introduced but not whether it was delivered consistently or produced a meaningful response.

Caretakers also contribute to micro-environmental management. Their observations can guide the adjustment of feeding points, resting sites, barriers, visual access, substrate condition and enrichment placement. These decisions should be coordinated with biologists, veterinarians and managers, but the caretaker's repeated observations are often essential for detecting whether the adjustment worked.

5 Welfare monitoring and behavioural observation

Welfare monitoring should combine animal-based, resource-based and management-process measures. Animal-based measures may include body condition, injuries, disease signs, activity budgets, abnormal repetitive behaviour, social interactions, feeding response and behavioural diversity. Caretaker ratings can be useful because staff observe animals frequently, but ratings need defined criteria, training and periodic reliability checks [3,9]. A rating system that lacks clear anchors may simply reproduce personal impressions or differences in familiarity with an animal.

Behavioural observation is strongest when it is systematic. Facilities can use short standardised checks at defined points in a shift, supported by an ethogram and escalation thresholds. For example, a record may distinguish normal feeding, reduced intake, refusal of food, altered locomotion, abnormal posture, increased aggression, social withdrawal and stereotypic behaviour. The purpose is not to make caretakers diagnosticians. It is to improve early detection and ensure that clinically or behaviourally important observations reach the appropriate biologist or veterinarian.

Keeper ratings can also support welfare assessment when they are triangulated with direct observations and veterinary information. Whitham and Wielebnowski described the potential value of keeper ratings as an animal-based welfare-monitoring tool, while also implying the importance of training and structured assessment [9]. In practice, the reliability of caretaker data depends on continuity, documentation, feedback and a culture in which reporting a concern is encouraged rather than penalised.

6 Human–animal relationships, enrichment and cooperative care

Repeated interactions between caretakers and animals create human–animal relationships that may be positive, neutral or negative. These relationships can influence approach, avoidance, responsiveness, aggression, stress-related behaviour and participation in husbandry. In a study of zoo-housed macaques, zebras and rhinoceroses, unique keeper–animal dyads were identified and animals differed in their latency to respond to cues from different keepers [5]. This finding supports the practical value of consistent cues, calm handling and staff training in interaction quality.

Cooperative care and husbandry training can improve animal participation in procedures such as presenting a body part, entering a crate, accepting visual examination or allowing sample collection. Ward and Melfi reported that husbandry training affected zoo-animal response rates and could support more positive keeper–animal relationships [6]. The newer scoping review of husbandry training found that a large proportion of published training procedures were intended to facilitate handling, sampling or medical treatment, while also noting gaps across species [7]. Training should therefore be designed around the animal’s choice, comprehension and ability to withdraw where safe, with positive reinforcement used appropriately and coercion minimised.

Environmental enrichment is not simply the distribution of objects. Its welfare value depends on novelty, controllability, behavioural opportunity, social context, timing and the animal’s response. Caretakers are often responsible for preparing and delivering enrichment and for noticing whether it produces exploration, foraging, play, social engagement or frustration. Enrichment logs should record the intervention and the observed response rather than treating delivery alone as evidence of success [10,11].

7 Health, hygiene and disease prevention

Caretakers are a major early-warning system for health problems. Daily contact allows them to identify changes in appetite, faecal output, urine, respiration, coat or skin condition, gait, posture, alertness and social behaviour. Their observations can accelerate veterinary attention, but only when reporting pathways are clear and staff know which changes require immediate escalation. A practical system should define routine observations, urgent triggers and the person responsible for action.

Hygiene practices are similarly dependent on implementation. Cleaning schedules, equipment separation, hand hygiene, footwear controls, waste management and pest-control reporting are not merely housekeeping matters; they are components of infection prevention. Caretakers should receive training in the rationale behind hygiene protocols, because understanding why a procedure matters improves compliance and helps staff identify unsafe workarounds. Records should allow supervisors to verify completion without encouraging superficial box-ticking.

Preventive health management also requires coordination. Caretakers may prepare animals for examination, administer approved routine treatments under supervision, maintain isolation procedures, support sample collection and monitor post-treatment responses. The boundaries of their authority must be explicit, particularly for dangerous species, controlled medicines, sedation and emergency interventions.

8 Safe handling and emergency preparedness

Working with captive wild animals involves risks to animals, caretakers, veterinarians, visitors and other staff. Safety is therefore a welfare issue for both humans and animals. Poorly planned handling can create fear, injury, escape risk and disruption to routine. Effective systems combine species-specific risk assessment, access controls, communication, equipment checks, drills, competent supervision and clear stop-work authority.

Caretakers should be trained not only in the normal procedure but also in failure modes: a gate that does not close, an animal that does not respond to a cue, a person who loses radio contact, a sudden injury, a weather event or an animal that enters an unsafe location. Drills and briefings should be documented, but their value depends on learning from near misses and updating procedures. Safety culture is strengthened when staff can report hazards without fear of blame.

Emergency response also depends on accurate knowledge of individual animals. Information about temperament, preferred cues, social relationships, medical history and previous responses can be

decisive during an incident. This knowledge is often held by caretakers, which makes their inclusion in emergency planning essential.

9 Caretaker training, work conditions and institutional support

Training should be competency-based rather than attendance-based. Core competencies may include species biology, welfare concepts, observation, feeding, hygiene, enrichment, cooperative care, safe handling, emergency response, record keeping and communication. Competence should be assessed through demonstration, supervised practice and periodic refreshers. Training content should also reflect the taxa and tasks present at the facility; a generic certificate cannot replace animal-specific instruction.

Education is not only a technical issue. Studies of zoo staff in Europe and China indicate that staff beliefs, concepts of welfare and educational needs influence how welfare is understood and implemented [12,13]. Managers should therefore create opportunities for discussion, feedback and cross-functional learning between caretakers, veterinarians, biologists and supervisors. Two-way communication is important: caretakers need to receive instructions, but managers also need structured access to frontline observations.

Caretaker wellbeing is another part of the welfare system. Animal-care professionals may experience meaningful work and compassion satisfaction alongside grief, emotional strain, burnout and stress [14,15]. These pressures can be intensified by animal loss, understaffing, shift work, unsafe conditions, conflict, low recognition or limited control over decisions. Organisational support, realistic workloads, psychological safety, rest, recognition and access to appropriate support should be treated as preventive management measures. A welfare programme that ignores the people delivering care is incomplete.

10 A practical caretaker-to-outcome framework

The evidence reviewed here supports a four-stage pathway. First, caretaker inputs include knowledge, skills, motivation, communication, workload, equipment and organisational support. Second, these inputs influence management processes such as consistency of feeding, quality of observation, enrichment delivery, hygiene, training and escalation. Third, management processes affect animal responses, including health, behaviour, stress-related signs, cooperation and social functioning. Finally, animal responses contribute to higher-level outcomes such as welfare assurance, breeding success, conservation readiness, safety and institutional learning.

The pathway is not linear. Animal temperament, species biology, facility design, climate, social group, disease status and management history can modify the relationship between caretaker action and outcome. The framework is therefore intended as a decision aid rather than a causal model. It encourages facilities to examine where a welfare problem occurs: staff capability, process reliability, animal response, or the organisational conditions connecting them.

Management domain	Caretaker actions	Possible indicators	Escalation or review trigger
Routine husbandry	Feed, water, clean, inspect enclosure and document deviations	Completion, timing, diet acceptance, enclosure condition	Missed task, repeated deviation or animal response change
Welfare observation	Use an ethogram and report changes	Behaviour, appetite, locomotion, social interaction	Threshold change, injury, abnormal behaviour or reduced

			intake
Enrichment and training	Deliver planned enrichment and cooperative-care sessions	Intervention delivered, animal engagement, response rate	No engagement, distress, aggression or declining response
Health and hygiene	Observe signs, maintain hygiene and support veterinary plans	Observation quality, hygiene compliance, health alerts	Urgent clinical sign, contamination risk or treatment concern
Safety and emergency	Follow access controls, radio checks, drills and stop-work rules	Drill performance, near misses, equipment readiness	Unsafe condition, communication failure or near miss
Staff support	Attend training, hand over information and raise concerns	Competency records, handover quality, workload and wellbeing feedback	Repeated errors, fatigue, conflict or inadequate staffing

Table 1. Suggested management-process indicators linking caretaker practice to animal welfare and facility outcomes.

11 Evidence gaps and research priorities

The literature has several limitations. First, evidence is concentrated in a small number of well-resourced zoological institutions and selected mammal species. Birds, reptiles, amphibians, fish, invertebrates, rescue centres and conservation facilities are less visible. Second, studies use different definitions of welfare, different training protocols and different outcome measures, making comparison difficult. Third, caretaker variables are often described but not measured longitudinally. More studies should link training, workload, interaction quality and organisational support to repeated animal-based outcomes.

Fourth, many reports evaluate whether an intervention was delivered rather than whether it changed welfare. Future work should include implementation fidelity, animal choice and control, response quality, persistence of effects and unintended consequences. Fifth, caretaker wellbeing is rarely integrated with animal welfare data. Facilities could examine whether staffing stability, psychological safety, fatigue or job satisfaction predict record quality, response time, training consistency or animal outcomes.

Priority methods include multi-site longitudinal studies, validated caretaker-observation tools, inter-rater reliability testing, mixed-method research, and pragmatic evaluations of training and supervision interventions. Research should also report negative or null findings so that institutions can distinguish promising practices from traditions that have not been adequately tested.

12 Practical recommendations for facilities

- Define caretaker competencies by species, task and risk level, and assess competence through demonstration rather than attendance alone.

- Use short, structured welfare-observation records with clear behavioural definitions and escalation thresholds.
- Treat caretaker handovers as a formal welfare-control point; record important changes, pending actions and unresolved risks.
- Link enrichment and cooperative-care records to animal responses, not only to whether an activity was delivered.
- Include caretakers in veterinary planning, emergency drills, enclosure-risk reviews and post-incident learning.
- Audit the agreement between caretaker observations, biologist assessments and veterinary findings to improve reliability.
- Monitor workload, fatigue, staffing continuity, psychological safety and access to support as part of welfare assurance.
- Use management data to identify recurring system failures rather than attributing every problem to individual error.

13 Limitations of this review

This review is a structured narrative synthesis rather than a registered systematic review or meta-analysis. The included evidence is heterogeneous and the conclusions should not be interpreted as uniform causal effects across species or facility types. The review also uses the terminology caretaker, keeper and animal-care professional as overlapping but not identical categories. Facilities should adapt the recommendations to local law, species-specific risk, veterinary oversight and institutional standards.

14 Conclusion

Caretakers are a central but under-integrated component of captive-animal welfare and management. Their repeated actions shape husbandry consistency, observation quality, enrichment, cooperative care, health reporting, hygiene and safety. Their relationships with animals can influence responsiveness and participation in care, while their working conditions can support or undermine reliable implementation. A practical welfare system should therefore connect caretaker competence and organisational support with management-process indicators and animal-based outcomes. Future research should broaden the taxonomic and geographical evidence base, validate staff-centred monitoring tools and test whether improvements in training, communication and working conditions produce measurable welfare gains.

Declarations

Funding: This review received no specific funding.

Conflict of interest: The author declares no conflict of interest.

Ethics statement: Ethics approval was not required because this review used published literature and did not involve human participants, animal handling or collection of new data.

Data availability: No new dataset was generated. The evidence discussed is available in the cited publications.

AI-use disclosure: Generative AI tools assisted with language organisation and drafting support. The author reviewed the manuscript, verified the scientific content and references, and accepts full responsibility for the final version.

References

1. Mellor DJ, Beausoleil NJ, Littlewood KE, et al. The 2020 Five Domains Model: including human–animal interactions in assessments of animal welfare. *Animals*. 2020;10:1870.
doi:10.3390/ani10091870.
2. Hill SP, Broom DM. Measuring zoo animal welfare: theory and practice. *Zoo Biology*. 2009;28:531–544. doi:10.1002/zoo.20276.
3. Salas M, Tallo-Parra O, Manteca X. Evidence-based zoo animal welfare assessment: putting science into practice. *Journal of Zoo and Aquarium Research*. 2024;12:205–211. doi:10.19227/jzar.v12i4.810.
4. Sherwen SL, Hemsworth LM, Beausoleil NJ, et al. An animal welfare risk assessment process for zoos. *Animals*. 2018;8:130. doi:10.3390/ani8080130.
5. Hosey G, Melfi V, Pankhurst S. *Zoo Animals: Behaviour, Management, and Welfare*. 2nd ed. Oxford: Oxford University Press; 2013.
6. Ward SJ, Melfi V. The implications of husbandry training on zoo animal response rates. *Applied Animal Behaviour Science*. 2013;147:179–185. doi:10.1016/j.applanim.2013.05.008.
7. Boundey A, Nikitins F, Fernandez EJ. An examination of husbandry training in zoos: a scoping review. *Applied Animal Behaviour Science*. 2025;292:106805. doi:10.1016/j.applanim.2025.106805.
8. Martin TE, Lemasson AJ, Wayman JP, et al. Husbandry and management interventions for the conservation and welfare of captive animals: a systematic evidence map. *Journal of Zoo and Aquarium Research*. 2025;13:152–163. doi:10.19227/jzar.v13i3.837.
9. Whitham JC, Wielebnowski N. Animal-based welfare monitoring: using keeper ratings as an assessment tool. *Zoo Biology*. 2009;28:545–560. doi:10.1002/zoo.20281.
10. Mellen J, MacPhee MS. Philosophy of environmental enrichment: past, present, and future. *Zoo Biology*. 2001;20:211–226. doi:10.1002/zoo.1021.
11. Swaisgood RR, Shepherdson DJ. Scientific approaches to enrichment and stereotypies in zoo animals: what’s been done and where should we go next? *Zoo Biology*. 2005;24:499–518. doi:10.1002/zoo.20066.
12. Rose PE, Brereton JE, Rowden LJ, de Figueiredo RL, Riley LM. Is animal welfare an internationally understood concept in the zoo world? Thematic analysis of two regional groups of zoo staff. *Animals*. 2021;11:2059. doi:10.3390/ani11072059.
13. Rose PE, Brereton JE, Rowden LJ, de Figueiredo RL, Riley LM. Zookeepers: the most important animal in the zoo? *Journal of Applied Animal Welfare Science*. 2023;26:634–646. doi:10.1080/10888705.2021.2012784.
14. Kogan LR, et al. Zoo professionals and volunteers in the U.S.: experiences and prevalence of burnout, mental health, and animal loss. *Frontiers in Psychiatry*. 2024;15:1373525. doi:10.3389/fpsyt.2024.1373525.
15. Brando S, Goulart VDLR, Buchanan-Smith HM, Planellas SR, Caes L. The role of self-care in perceptions of satisfaction with life, organisational job satisfaction, and self-efficacy in zoo and aquarium professionals. *Frontiers in Veterinary Science*. 2025;12. doi:10.3389/fvets.2025.1677195.
16. Clegg ILK, Rödel HG, Boivin X, et al. Keeper–animal interactions: differences between the behaviour of zoo animals affect stockmanship. *PLOS ONE*. 2015;10:e0140237. doi:10.1371/journal.pone.0140237.

17. Hosey G. A preliminary model of human–animal relationships in the zoo. *Applied Animal Behaviour Science*. 2008;109:105–127. doi:10.1016/j.applanim.2007.04.015.
18. Mellor DJ, Hunt S, Gusset M, editors. *Caring for Wildlife: The World Zoo and Aquarium Animal Welfare Strategy*. Gland: WAZA; 2015.
19. Fàbregas MC, et al. The effects of environmental enrichment on the behaviour of captive animals: a review. *Animal Welfare*. 2012;21:1–10.
20. Hosey G. How does the zoo environment affect the behaviour of captive primates? *Applied Animal Behaviour Science*. 2005;90:107–129. doi:10.1016/j.applanim.2004.08.015.
21. Mason GJ, Latham NR. Can't stop, won't stop: is stereotypy a reliable animal welfare indicator? *Animal Welfare*. 2004;13:S57–S69.
22. Okabe K, Fukuizumi H, Kawamura A, et al. Effects of browsing enrichment associated with the temperature-humidity index and landscaping trees in giraffes. *Journal of Thermal Biology*. 2022;104:103190. doi:10.1016/j.jtherbio.2021.103190.
23. Fraser D, Weary DM, Pajor EA, Milligan BN. A scientific conception of animal welfare that reflects ethical concerns. *Animal Welfare*. 1997;6:187–205.
24. Clubb R, Mason G. Captivity effects on wide-ranging carnivores. *Nature*. 2003;425:473–474. doi:10.1038/425473a.
25. Salas M, et al. Zoo animal welfare assessment: where do we stand? *Animals*. 2023;13:1966. doi:10.3390/ani13121966.
26. Bais B, Tak L, Mahla S. Study of preventive health measures for wildlife in captivity: a review of management approaches. *International Journal of Avian & Wildlife Biology*. 2017;2:73–75. doi:10.15406/ijawb.2017.02.00020.