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Enhancing Conservation and Health Management of Timor Deer (Cervus Timorensis) Through the Use of Squeeze Cages in Community Deer Enclosures in Cakura Village

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ABSTRACT: The problem of stress in Timor Deer (Cervus timorensis) due to intensive human interaction during care is the background for the innovation of the squeeze cage in Cakura Village, PT Pertamina Patra Niaga Integrated Terminal Makassar. This program aims to reduce stress and injury in the deer and to enhance conservation effectiveness. Results show significant population growth and cost savings, contributing to the Sustainable Development Goals (SDGs).

KEYWORDS: Squeeze Cage, Timor Deer, Conservation, Stress, SDG.

1. INTRODUCTION

Timor Deer (Cervus timorensis) is a protected species facing threats to its survival due to factors such as habitat loss, poaching, and high stress levels caused by human interaction during captive care. This species holds high ecological value and plays an essential role in maintaining ecosystem balance in its natural habitat. According to the International Union for Conservation of Nature (IUCN), the population of Timor Deer has been significantly declining, making effective and innovative conservation efforts crucial (IUCN, 2020).

One major issue in the conservation of Timor Deer is the high level of stress these animals experience when interacting with humans, especially during health checks and care processes. Excessive stress negatively impacts the health, growth, and reproduction of Timor Deer, ultimately hindering efforts to increase the population and ensure the survival of the species. Ancrenaz, Dabek, and O'Neil (2007) emphasize the importance of reducing stress in wild animals to improve conservation program effectiveness.

In this context, the squeeze cage innovation has emerged as a solution to this problem. The squeeze cage is designed to minimize direct interaction between Timor Deer and humans, thereby reducing the stress levels experienced by these animals. With the use of squeeze cages, health checks, sample collection, and care processes can be carried out more safely and efficiently for both the deer and the handlers. Sheriff, Krebs, and Boonstra (2010) show that reducing human interaction can lower stress levels in wildlife, which is crucial for conservation efforts.

PT Pertamina Patra Niaga Integrated Terminal Makassar has implemented this innovation in Cakura Village as part of their conservation program. The program "Use of Squeeze Cages in Timor Deer Conservation Efforts" aims to reduce stress and injury in Timor Deer, improve health and reproduction, and enhance operational efficiency in deer handling. Initial results from this implementation indicate an increase in the Timor Deer population and significant cost savings, providing a model that can be adopted by other conservation programs.

This article will discuss the methods, results, and impact of using squeeze cages in Timor Deer conservation efforts in Cakura Village. We hope that this innovation can serve as a beneficial model for the conservation of other species facing similar challenges and contribute to the Sustainable Development Goals (SDGs), particularly SDG number 15 on Life on Land and SDG number 13 on Climate Action.

2. METHODS

2.1 Technical Description of the Innovation

The initial problem that led to the development of the squeeze cage was the involvement of many people in the care of Timor Deer, which caused stress to the animals. The squeeze cage is designed to minimize the risk of human interaction, reduce stress, and improve the health and reproduction of Timor Deer. Sheriff, Krebs, and Boonstra (2010) show that reducing human interaction can lower stress levels in wildlife, which is important in conservation efforts..

2.2 Origin of the Innovation Idea

The idea for the squeeze cage arose to minimize the risk of interaction between Timor Deer and humans. The use of this cage facilitates sample collection and health checks, improving the health and reproduction of Timor Deer. According to the Best Practice and Innovation Book of the Ministry of Environment and Forestry from 2019-2023, this squeeze cage is a pioneer in its industry.

2.3 Changes from the Old System

Previously, health checks and care for Timor Deer were conducted manually by restraining the deer, involving at least four people. This method often caused stress and serious injuries to the deer, hindering conservation effectiveness. Cattet et al. (2006) emphasize that low-stress handling methods are crucial for animal welfare and operational efficiency. The squeeze cage minimizes the risk of interaction, reduces stress, and enhances the efficiency and safety of deer care.

3. RESULTS

3.1 Protection of Timor Deer

With the implementation of the squeeze cage, the protected population of Timor Deer increased from 22 to 27 individuals, representing a growth of 5 deer. This innovation has made a positive contribution to the preservation of Timor Deer in Cakura Village. According to Pollock, Muller, and Lee (2015), population growth is an indicator of the success of conservation programs.

In 2023, the Timor Deer population increased by only 1 individual, highlighting the challenges faced by traditional conservation methods. However, following the introduction of the squeeze cage in 2024, the population grew by 6 individuals. This significant increase demonstrates the effectiveness of the squeeze cage in enhancing the health, reproduction, and overall welfare of the Timor Deer. The following calculation illustrates the success rate:

Population Increase in 2024 = Population in 2024 - Population in 2023 = 27 - 22 = 5

Success Rate = Population Increase in 2024 / Population Increase in 2023 x 100% = 5/1 x 100% = 500%

This 500% increase in the population growth rate from the previous year underscores the significant impact of the squeeze cage on conservation efforts.

3.2 Cost Savings

The use of the squeeze cage has resulted in significant cost savings in veterinary care. Previously, the cost of care was IDR 1,500,000 per procedure, with an annual total of IDR 18,000,000. With the squeeze cage, the annual care cost savings reach IDR 18,000,000. Bradshaw, Boutin, and Hebert (1997) note that cost savings are one of the main benefits of innovations that improve operational efficiency.

3.3 Visual Documentation

To provide a comprehensive understanding of the impact of the squeeze cage, visual documentation has been included in the appendix. This documentation features comparative images of Timor Deer care before and after the implementation of the squeeze cage, clearly illustrating the differences in handling methods and resulting stress levels.

Figure 1: Timor Deer Care Before the Implementation of the Squeeze Cage	**Figure 2: Timor Deer Care Using the Squeeze Cage**
	
(This image shows the manual handling of Timor Deer, highlighting the stress and risks involved.)	(This image shows Timor Deer being treated with the squeeze cage, depicting the animal's calmness and the safer, more efficient process.)

4. DISCUSSION

The introduction of the squeeze cage in the conservation efforts of Timor Deer in Cakura Village represents a significant leap forward in wildlife management and conservation practices. This innovation has far-reaching implications, not just for the immediate conservation goals but also for broader aspects such as animal welfare, cost efficiency, cross-sector collaboration, ecological balance, and education.

4.1 Animal Welfare and Stress Reduction

One of the most critical aspects of wildlife conservation is the management of stress, which can have profound effects on the health, reproductive success, and overall wellbeing of animals. The squeeze cage addresses this issue by minimizing direct humandeer interaction during essential care procedures. Traditional methods of handling involved manual restraint by multiple handlers, which often resulted in high levels of stress and physical injuries to the deer. Such stress can lead to a variety of negative outcomes, including suppressed immune function, reduced reproductive success, and even increased mortality rates.

By reducing stress, the squeeze cage not only improves the immediate health outcomes for the deer but also enhances their long-term survival and reproductive potential. This innovation aligns with modern wildlife management principles, which emphasize the importance of animal welfare as a cornerstone of successful conservation programs. The success seen in the increase of the deer population following the implementation of the squeeze cage underscores the direct link between stress reduction and improved conservation outcomes. This innovation demonstrates how animal welfare considerations can be effectively integrated into conservation strategies, providing a model for other species and conservation programs.

4.2 Cost Efficiency and Resource Management

The financial implications of wildlife conservation are a constant concern, with resources often being limited and the costs of veterinary care and management being high. The introduction of the squeeze cage has resulted in substantial cost savings, reducing the need for multiple handlers and minimizing the incidence of stress-related complications that require additional veterinary attention.

Prior to the use of the squeeze cage, each care procedure for the deer involved significant human resources and costs, amounting to approximately IDR 18,000,000 annually. The squeeze cage has effectively eliminated these costs, making the conservation program more financially sustainable. This efficiency in resource management allows for the reallocation of funds to other critical

areas of the conservation program, such as habitat restoration, research, and community engagement. By demonstrating significant cost savings alongside improved animal welfare, the squeeze cage innovation highlights the importance of integrating economic efficiency with conservation goals. This approach ensures that conservation efforts are not only effective but also sustainable in the long term.

4.3 Ecological Balance and Population Management

The Timor Deer plays a crucial role in maintaining the ecological balance of their native habitats. By grazing on vegetation, they help regulate plant growth, which in turn affects the structure and function of the ecosystem. The decline in their population due to stress and human-induced factors could have cascading effects on the ecosystem, leading to overgrowth of certain plants, changes in habitat structure, and a decline in biodiversity.

The squeeze cage contributes to maintaining this ecological balance by supporting the health and reproductive success of the deer, leading to a stable and growing population. The increase in the deer population observed after the introduction of the squeeze cage reflects a positive trend towards restoring and maintaining ecological balance. Furthermore, a healthy and growing population of Timor Deer can help sustain the complex interactions within their ecosystem, supporting the overall health and resilience of their habitat. This underscores the broader ecological benefits of the squeeze cage, beyond its immediate impact on the deer themselves.

4.4 Cross-Sector Collaboration and Community Involvement

Effective conservation efforts often require collaboration across various sectors, including government agencies, private companies, non-governmental organizations, and local communities. The development and implementation of the squeeze cage in Cakura Village is a prime example of how cross-sector collaboration can lead to innovative solutions to conservation challenges. PT Pertamina Patra Niaga Integrated Terminal Makassar, in partnership with local communities and conservation experts, has played a key role in this initiative.

The involvement of local communities is particularly important, as their engagement and support are crucial for the long-term success of conservation efforts. By involving the community in the care and monitoring of the Timor Deer, the program not only benefits from local knowledge and resources but also fosters a sense of ownership and responsibility towards conservation. This collaboration has the potential to serve as a model for other conservation programs, demonstrating how diverse stakeholders can work together to achieve shared goals.

4.5 Contribution to Sustainable Development Goals (SDGs)

The squeeze cage innovation also contributes directly to the achievement of several Sustainable Development Goals (SDGs), particularly SDG 15 (Life on Land) and SDG 13 (Climate Action). SDG 15 focuses on the protection, restoration, and sustainable use of terrestrial ecosystems, and the squeeze cage plays a vital role in this by promoting the conservation of Timor Deer, a key species in their ecosystem. The conservation of Timor Deer contributes to the preservation of biodiversity, which is essential for the health and stability of ecosystems.

Additionally, by reducing the need for intensive human intervention and associated energy costs, the squeeze cage also supports SDG 13, which calls for urgent action to combat climate change and its impacts. The squeeze cage reduces the carbon footprint of conservation activities by making them more efficient and less resource-intensive. Moreover, by maintaining a healthy deer population, the program indirectly supports the carbon sequestration potential of their habitat, as balanced ecosystems are more effective at absorbing and storing carbon.

4.6 Educational and Training Opportunities

The squeeze cage innovation also provides significant opportunities for education and training, both for conservation professionals and the broader community. The success of this initiative can serve as a case study for wildlife management courses, demonstrating the practical application of theoretical knowledge in real-world conservation efforts. Additionally, the implementation of the squeeze cage can be used to train local communities and conservation staff in humane and effective wildlife handling techniques. This not only improves the immediate care of the Timor Deer but also builds local capacity for ongoing and future conservation efforts.

By providing a platform for education and training, the squeeze cage innovation helps to ensure the sustainability of conservation efforts beyond the initial implementation. It empowers individuals and communities with the knowledge and skills needed to continue protecting Timor Deer and other wildlife species, contributing to the longterm success of conservation programs.

5. CONCLUSION

The implementation of the squeeze cage in the conservation of Timor Deer (Cervus timorensis) in Cakura Village has proven to be a successful innovation in wildlife management. By reducing stress and improving the efficiency of care, the squeeze cage has contributed to significant population growth and cost savings, making conservation efforts more sustainable. The squeeze cage serves as a model for integrating animal welfare, economic efficiency, ecological balance, and community involvement in conservation programs. This innovation not only benefits the Timor Deer but also contributes to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 15 (Life on Land) and SDG 13 (Climate Action).

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