Documented Effects on Animal Welfare & Indoor Air Quality

CASE STUDY · GIVSKUD ZOO – ZOOTOPIA

Based on the final examination project by Stephanie Maria Lanchow

Investigation of Biobed bedding in the indoor enclosure of nilgai (Boselaphus tragocamelus), focusing on animal behaviour, indoor air quality and practical daily management.

EXECUTIVE SUMMARY

The project compared conventional wood shavings with a Biobed system under normal operating conditions. The documented results indicate improved resting behaviour and indoor enclosure use, alongside substantial reductions in ammonia, airborne particles and volatile compounds. Daily maintenance increased by approximately five minutes, primarily due to watering.

1. Introduction

Providing high standards of animal welfare while maintaining a healthy working environment is a continuous challenge for modern zoological institutions. Traditional bedding materials such as wood shavings are widely used but may contribute to dust formation, ammonia accumulation and reduced indoor air quality.

To evaluate an alternative approach, Givskud ZOO investigated the use of a Biobed in the indoor enclosure of nilgai (Boselaphus tragocamelus). The project was carried out as part of Stephanie Maria Lanchow's final examination project as a zookeeper specialising in zoo animals.

The study focused on three key areas

- **Animal behaviour and welfare**
- **Indoor air quality**
- **Practical daily management**

2. Study Design

The project compared the existing wood shavings bedding system with a Biobed bedding under normal operating conditions. Data were collected before and after the conversion.

- Behavioural observations
- Distribution of animals inside the stable
- Ammonia measurements (NH_3)
- Formaldehyde (HCHO)
- Total Volatile Organic Compounds (TVOC)
- Airborne particles (PM2.5 and PM10)
- Moisture and pH of the bedding
- Daily working routines for zookeepers

This combination of behavioural observations and environmental measurements provided a comprehensive assessment of both animal welfare and stable conditions.

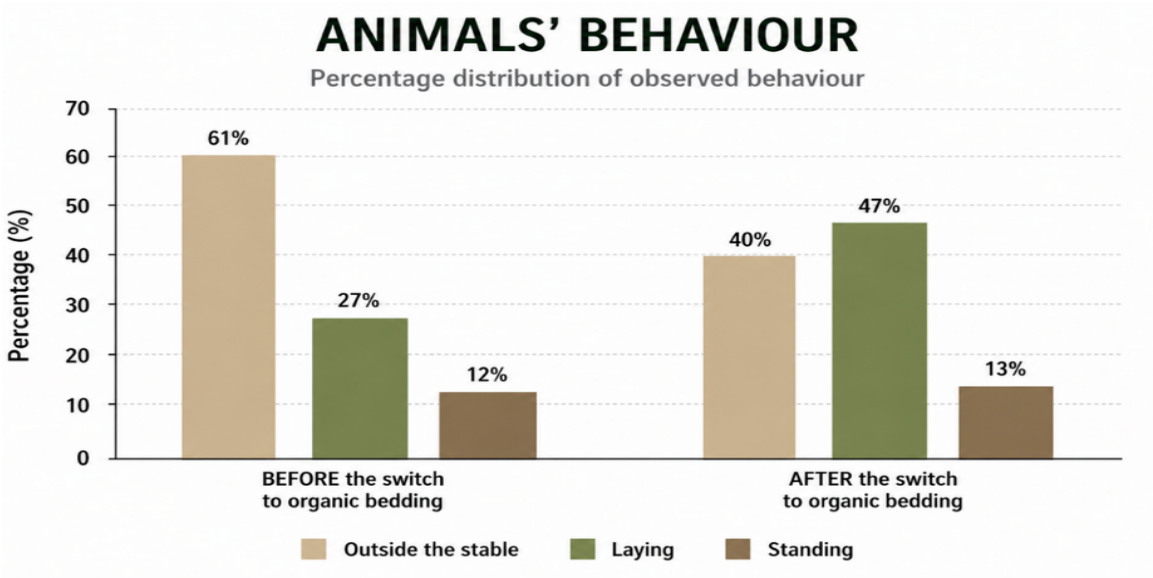
3.Key Findings

The study documented substantial improvements following the introduction of the Biobed.

AIR QUALITY PARAMETER	REDUCTION	DOCUMENTED IMPACT
Formaldehyde (HCHO)	**90%**	Lower concentration
TVOC	**88%**	Lower concentration
PM2.5	**85%**	Fewer fine airborne particles
PM10	**82%**	Fewer airborne particles
Ammonia	**68%**	Lower concentration

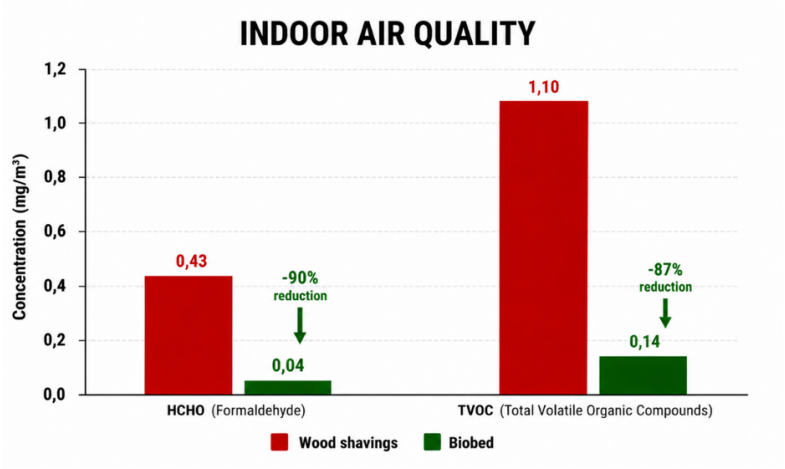
Animal Welfare

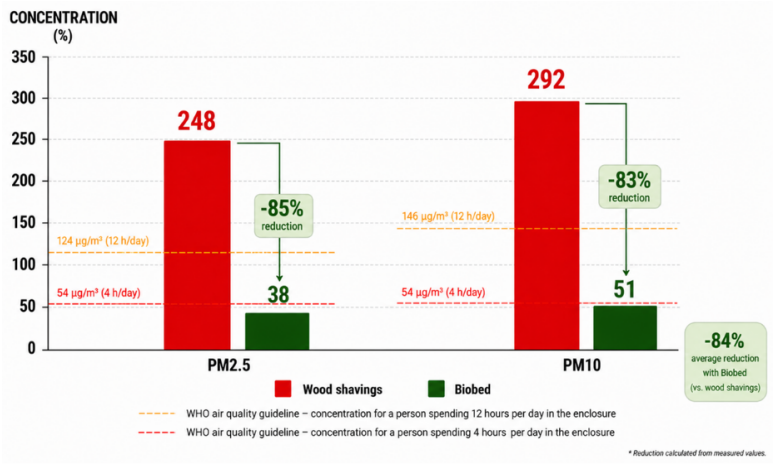
Following the conversion, both adult nilgai and calves spent considerably more time resting inside the stable. The animals also distributed themselves more evenly throughout the enclosure instead of gathering in a few preferred locations. This behavioural change may indicate increased comfort and confidence in the indoor environment.

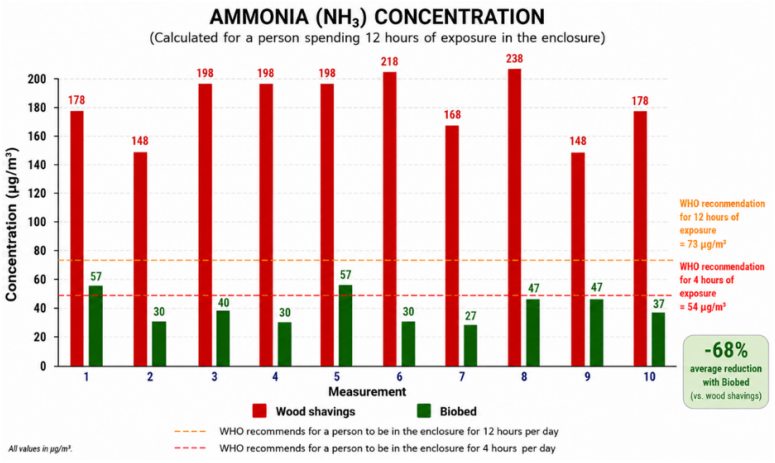


Indoor Air Quality

The project documented significant reductions in airborne contaminants. The reduction in ammonia and airborne particles contributes to a healthier indoor environment for both animals and animal keepers.







4. Practical Experience

Implementation of the Biobed required only minor changes to the existing management routines.

WATERING	DAILY TIME
Every third day was identified as the optimal maintenance interval to maintain suitable moisture levels and microbial activity.	Daily maintenance time increased by approximately five minutes, primarily due to watering.

Despite this small increase in labour, the documented improvements in animal welfare and indoor air quality indicate that the operational benefits outweigh the additional workload.

5. Conclusion

This case study demonstrates that replacing conventional wood shavings with Biobed can significantly improve the indoor environment of zoological animal housing.

- **Improved resting behaviour**
- **More even use of the indoor enclosure**
- **Lower concentrations of ammonia**
- **Reduced levels of airborne particles**
- **Lower concentrations of volatile compounds**
- **Improved conditions for both animals and zookeepers**

Although slightly more daily maintenance was required, the biological bedding system proved practical to manage while delivering measurable improvements in environmental quality.

6. Why This Matters for Zoos

Animal welfare and environmental sustainability are increasingly important priorities for zoos worldwide. Housing systems are expected not only to provide safe and comfortable conditions for animals but also to support healthy working environments for staff and contribute to more sustainable management practices.