

# REFINED POST-ANESTHETIC RECOVERY OF GÖTTINGEN MINIPIGS

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### ABSTRACT

Anesthesia is commonly employed in Göttingen Minipigs undergoing surgery, or other interventions not suited for awake animals. To various degrees, minipig physiologic- and hemodynamic parameters are affected by the anesthetic protocol chosen. Post-anesthetic care is important in ensuring smooth and rapid recovery and avoiding post-procedural complications. We describe four feasible methods of providing non-pharmacological post-anesthetic support: calm and safe housing, monitoring of vital parameters, supplemental heat, and soft padding for physical protection. The increased care regimen during recovery continues until the patient is alert, ambulatory, has swallowing reflex, and with satisfactory cardiovascular and pulmonary function. The methods proposed are not exhaustive and measures such as preemptive and adequate analgesia as well as post-anesthetic welfare assessments are essential for optimal recovery.

### NON-PHARMACOLOGICAL POST-ANESTHETIC SUPPORT METHODS



#### SURROUNDINGS

Following their procedure, the anesthetized animal is moved to a dedicated recovery room. The room is separate from the other animal rooms, with only other animals in recovery present.

The recovery pen is clean, dry, and quiet. To minimize visual stimuli, the light in the room is dimmed while it is in use. The minipigs are single housed during recovery.

It is generally sufficient to move the minipig to its home pen when the animal is alert, has regained righting– and swallowing reflex and vital parameters are within normal. This includes having patent airways under their control.



### CONCLUSION

A rapid and refined recovery can be promoted by use of non-pharmacological support methods. We recommend four specific methods that are feasible in many establishments. First, having a dedicated recovery area, e.g. by employing a clean and dry room with soft lights, separated from other animals. Second, enforcing frequent monitoring of vital parameters aids in facilitating timely intervention in case of emergency. Supplemental heat should be provided, e.g. by use of an external heat source. Lastly, physical protection e.g. by use of padding in the pen area is recommendable in avoiding self-inflicted injuries. The proposed methods here are not exhaustive, and other components, such as preemptive, adequate analgesia are essential in achieving optimal post-anesthetic recovery.



#### MONITORING

Adequate monitoring and timely intervention increases the chances of successful postanesthetic outcome (National Research Council, 2011).

Delaying extubation until swallowing reflex returns allows for patent airways. Following extubation, low flow nasal cannula oxygen is provided for improved oxygenation. Intravenous catheters are maintained for as long as possible to facilitate quick access for medical interventions.

Animals in recovery should always be under close observation. Vital signs are frequently monitored and recorded: EtCO<sub>2</sub>, oxygen saturation, heart rate, and temperature.



#### HEAT

Anesthetic agents affect the thermoregulation of the animal, generally resulting in some degree of heat loss. This is further aggravated by decreased heat production in the immobile, anesthetized animal and potentially also the surgical procedure and interventions e.g. open cavity surgery. Furthermore, Göttingen Minipigs lack the insulating fur coat decreasing peri-anesthetic heat loss in other laboratory mammals.

Hypothermia can increase the risk of several types of post-anesthetic complications, e.g. prolonged recovery, wound-infection etc. (Grimm et al, 2015)

During recovery, supplemental heat is provided through heated flooring and heat lamps. Lamp height should be adjusted to cover largest possible patient surface to ensure effective heat transfer and avoiding thermal burns.

Measures should be taken to ensure normal, or slightly increased room temperature and avoid draft in the recovery room (Swindle, 2013)



#### PHYSICAL PROTECTION

While recovering from anesthesia, judgment, locomotion control, and reflexes are still impaired. Consequently animals are at increased risk of injuring themselves during this time period. Soft bedding such as a thick blanket or mattress serves as insulation and decreases conduction heat loss. It has the added benefit of decreasing discomfort coming from prolonged, localised tissue pressure in recumbent Göttingen Minipigs with prolonged recovery. Pen walls can be padded by use of mattresses or similar. At Ellegaard Göttingen Minipigs customized foam cushions with plastic covers, velcro, and holes for the snout provide a hygienic, space-saving padding that aids the minipigs in using their snout in stabilizing their body and movements when ambulant.



### REFERENCES

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