

Blood sampling from Göttingen Minipigs

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Collecting blood samples from Göttingen Minipigs is a process that has been refined and evaluated continuously over the years, as it is important to reduce the level of stress imposed on the animals, both due to animal welfare, staff experience, and ensuring high quality blood samples to enable research results of as high validity as possible.

Background

Up until 2019, V-benches were mainly used when collecting blood samples from Göttingen Minipigs, which required the presence of four staff members. The process was to lift the minipig and place it on its back. Up to three staff members would restrain the minipig: One for the hind legs, one for the front legs, and one for the head. Once the minipig was calm the sample could be collected.

This involved a certain stress factor for the minipig, as being placed on its back and restrained in this position is unnatural to the minipigs but was necessary to access the blood vessels in the throat. Therefore, most pigs struggle to get back on their feet, and the more the pig struggle, the harder it is for the staff to restrain it. This is also why it could be difficult to collect blood samples from older and larger pigs without sedation.

Refined method

An alternative to blood sampling in V-bench is sampling from a sling. The minipig is lifted and placed in a sling, which looks like a suspended hammock with holes for the legs. When placed in the sling they therefore hang in a belly-down position, as if

simply elevated from the floor, which is much more natural for them. The sling also has a hole at the neck position from where the blood sample is collected. For this process only two staff members are needed: One for lifting, placing, holding the front legs if needed and calming the minipig, and one for collecting the blood sample. This method also enables blood sampling from larger animals, and successful collection of blood samples from animals up to 24 months of age has been performed, only here you need two staff members to do the lifting.

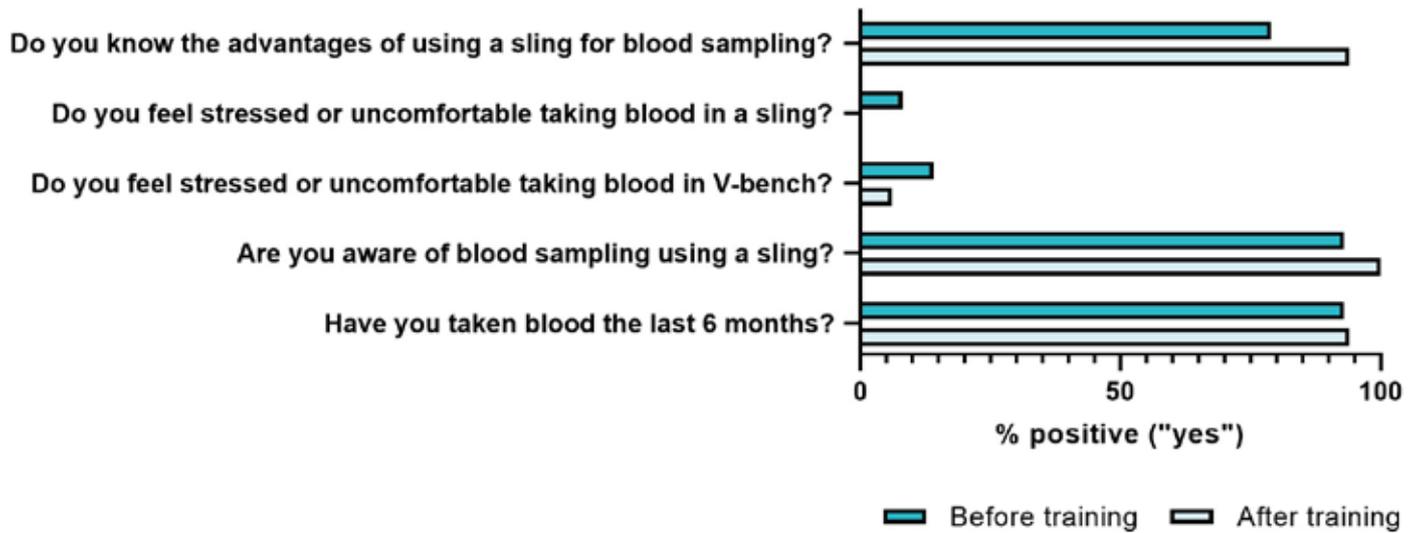
The vast majority of the minipigs are completely calm when placed in the sling which creates a much more stress-free environment and positive experience for both minipigs and staff members.

Staff training

As part of our continuous focus on the 3Rs, we decided to refine our standard blood sampling procedure. The aim was to further reduce the level of stress imposed on the animals, by not only considering the physical placement of the minipigs during sampling, but also assessing the experience inflicted by the staff members.



Picture 1-4
How to place Göttingen Minipigs in a sling.



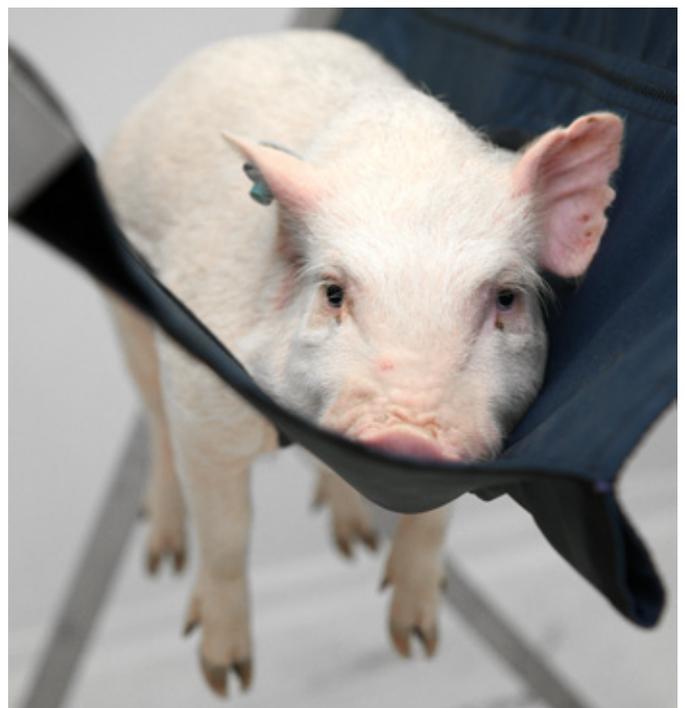
Graph 1
 Extract from questionnaire to 19 staff members conducted before and after training.
 Note: Not all questions were answered by all participants, so the results is a calculation in percentages. The questions have been rephrased for the purpose of visual presentation.

Practicing blood sampling in the sling with the animal caretakers at Ellegaard Göttingen Minipigs started in January 2020. Before training commenced, the animal caretakers answered a survey about their experience with blood sampling (graph 1). The purpose was to follow up with the same survey after training, to be able to measure the output of the training program.

The animal caretakers were trained using the sling in pairs. Animal welfare was discussed and the caretakers were trained in lifting the minipigs to create as stress-free an experience as

possible. Taking animal welfare into account, blood sampling was first trained on sedated minipigs. The caretakers needed to gain the basic blood sampling skills before practicing on un-sedated animals, to avoid stressing the minipig in the training situation.

After completing the training, the survey was filled out again to see if the experience with blood sampling had changed (graph 1). It showed a significant increase in using the sling when collecting blood samples on minipigs weighing over 10 kg (graph 2).



Challenges and retention of new method

When introducing a new method, it is important to present all the advantages before training commences. It must be explained why the new method is better and remove any insecurity that the new method might induce. In this training process the staff has been very welcoming to the changes, as they experience a significant improvement of animal welfare and quickly discovered the many advantages of this new procedure.

The biggest challenge was not the training itself, but rather performing the blood sampling for a real project. Here it has proven important to ensure a successful experience resulting in the confidence to continue. If insecurity occurs, it is easy to go back to the old method which has been performed time and time over, or withdraw from the assignment completely. The

level of training or support needed is very individual, and must be taken into account.

Another challenge has been to maintain the training, so blood samples can be performed by all staff members and not be reduced to a selected few over time.

The method of collecting blood samples from a sling demands a continuous focus and ongoing training. This includes new staff members, who must be introduced to and trained in this way of collecting blood samples. It is important that they build up the same confidence to perform this process, so we can retain a high level of animal welfare and a good and stress-free environment for all parties.

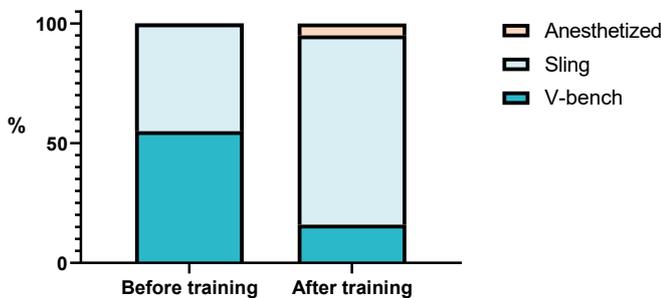
Refinement and reduction

There is no doubt that by implementing blood sampling in a sling the procedure has been improved significantly. Using the sling makes it possible to collect samples from larger animals and thereby collect larger batches. This way the number of animals used can be reduced.

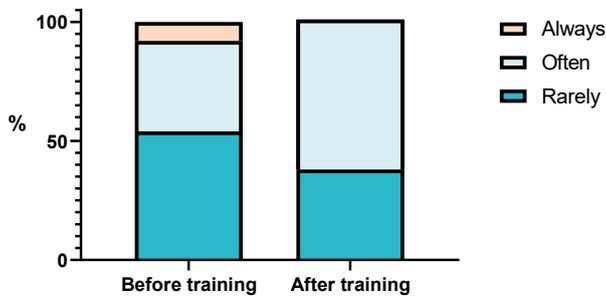
Also, the minipigs are exposed to less stress, which is an important measure for our animal welfare but also ensures high quality blood samples. Heart rate was measured immediately after the minipig was placed in the sling (time 0) and during blood sampling. Blood was sampled once the minipig was calm and within 0-3 minutes after placed in the sling. Minipigs at age 3 months (n=13) had received 6 training sessions prior to sampling (placed in the sling and rewarded afterwards), minipigs aged 6 (n=10) and 12 (n=10) months had received 2 training sessions, and minipigs aged 24 months (n=5) had not been trained.

The younger minipigs received more training as these were part of a specific project. Also, younger minipigs benefit from more sling training as they are a bit more restless in the sling compared to older animals. As the figure shows, all minipigs were relaxed within 3 minutes (by evaluation of their pulse) after being placed in the sling (graph 3).

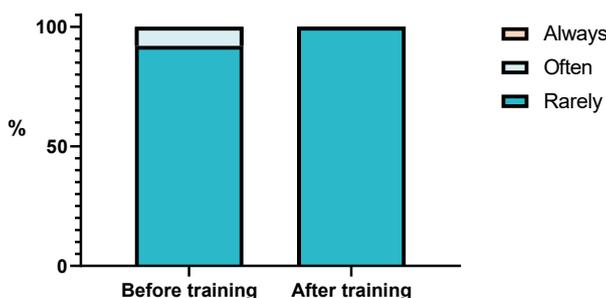
What method do you currently use for blood sampling of pigs > 10 kg?



How often do you experience that the minipig is stressed during blood sampling in V-bench?

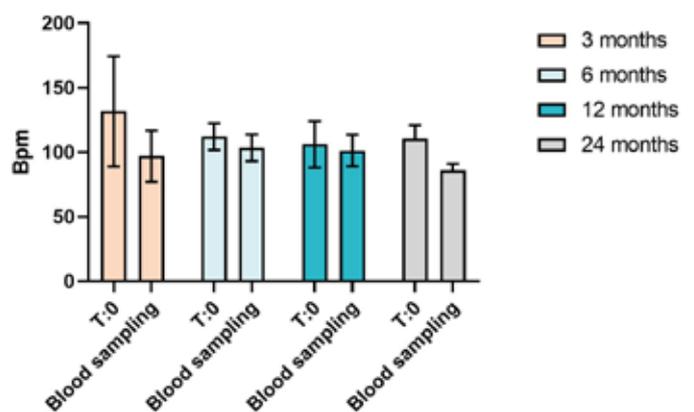


How often do you experience that the minipig is stressed during blood sampling in the sling?



Graph 2
Extract from questionnaire to staff members conducted before and after training. The questions have been rephrased for the purpose of visual presentation.

Blood sampling in a sling



Graph 3
Heart rate: Mean with SD.