

# Seeing your slaughterhouse through the eyes of a pig

*Tips on how to reduce stress, suffering, and ease handling*

- Edition 2024 -



**Eyes on  
Animals**

Watching  
out for their  
welfare

## Foreword by Dr. Temple Grandin



*Improving Animal Welfare in Pig Slaughterhouses* is an excellent booklet which provides practical information to improve welfare, transport, handling efficiency, and stunning.

The information in this book will be especially useful to slaughterhouse managers and staff who work directly with the pigs.

Numerous photos show transport vehicles, lairages, flooring, raceways, restrainers and stunners in European facilities. There are extensive guidelines and photos about simple methods to reduce the frequency of pigs balking, backing up or turning around when they are being moved. Modifications of lighting to reduce reflections and illumination of a dark race entrance will often improve pig movement.

Some other topics that are covered in this excellent publication are cooling pigs on transport vehicles, stunning methods, handler training, and the use of video cameras to monitor handling. Video cameras can be used to detect poor handling, but they also can be used to reward employees who handle pigs quietly with careful low stress handling. Lots of easy-to-use practical tips that managers, welfare officers, and employees can immediately start using.

Dr. Temple Grandin

Dr. Temple Grandin is a world-known ethologist and spokesperson for the humane treatment of livestock. Author of more than 60 scientific papers on animal behavior and consultant to the livestock industry on animal-behavior, welfare and design. In 2020, Dr. Temple Grandin published the book "The Slaughter of Farmed Animals: Practical Ways of Enhancing Animal Welfare" which is excellent for people working in or with slaughterhouses, trying to reduce animal fear and pain.

## Personal note by Eyes on Animals



This Industry Tips document is a collection of better or brand new and unique practices we have seen during our inspections of slaughterhouses. They represent years of work and experience visiting slaughterhouse all over the globe.

You can easily navigate to the desired chapter using the clickable table of contents. Throughout the document, you will find various photos and videos. We would like to

thank all slaughterhouses that granted us permission to create and use this visual material for educational purposes.

Our main goal is to get these better practices copied and put in place in slaughterhouses everywhere so animal suffering can be reduced. That is why it is free and public on our website. Nevertheless Eyes on Animals is a small NGO with a tight budget. Please consider making [a donation](#) for the use of this document: IBAN: NL73TRIO0212364219 | BIC: TRIONL2U. Thank you!

The Eyes on Animals slaughterhouse inspection team (from left to right) – Madelaine, Margreet, Asalet, Roy, Lesley, Monique and Safian

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# 1. On-farm handling and loading

- ☑ **Good handling of pigs starts with socializing them at the farm.** Dr. Temple Grandin highly recommends that slaughterhouses ask their supplying farmers to walk through the weaner pens at least once a day. The farmer should gently motivate the pigs to get up and move around, by using quiet herding-tools, such as plastic boards and bags. Pigs will then become used to close contact with people and be less panicky and flighty when handled during transport and slaughter.<sup>1 2</sup> It already helps to do this at least a few weeks ahead of transport to the slaughterhouse.<sup>3</sup>



*By walking through the weaner pens at least once a day pigs get familiar with being moved by people and become less fearful. This will ease handling during transport and slaughter.*

- ☑ Make sure pens on the farm have **sufficient enrichment material for rooting.** Rooting is extremely important for pigs, as pigs explore their environment with their noses. Rooting-material provides positive feelings. **The best rooting material is rich, good quality soil. When they have access to the outdoors with good quality rich soil pigs like spend hours digging with their snouts in search of small insects and roots and simply enjoying the new smells. For pigs that cannot be raised outdoors but must be kept indoors, provide a thick layer of rooting material such as straw or alfalfa as this enable them to root somewhat.**

Pigs reared in enriched environments where they can perform natural behaviors are less sensitive to stress compared to pigs reared in barren environments (on barren floors or slats). These “enriched” pigs are therefore easier to move and

fight less.<sup>4</sup>



*Pigs from enriched pens are less sensitive to stress and therefore easier to move during transport and in the slaughterhouse compared to pigs raised in barren environments.*

- ☑ **Advise pig farmers and truck drivers to handle pigs calmly when moving and loading them** and to not use tools that cause pain or fear, such as electric prods or clappers. Yelling or hitting against metal doors is also not acceptable as abrupt loud noises cause pigs to panic.

Remember: a stressed pig is more likely to freeze, balk or walk backwards, which will cause jamming, jumping and the whole group to panic. These pigs are not 'stubborn' but simply scared. Once a pig becomes very fearful, chances are high that his/her condition will deteriorate during transport. Pigs arriving at slaughterhouse in a state of "shock", or are experiencing acute respiratory distress, are often pigs that were handled roughly during loading on the farm.<sup>5</sup>

In general stressed pigs are more difficult to handle and more likely to cause delay in your plant. Therefore make sure stress-levels are low, starting at the point of moving and loading them at the farm.

- ☑ **Allow farmers and truck drivers to use only plastic moving boards and calm smart body behavior to move and load pigs onto the truck.** In most cases these tools are sufficient to move pigs in the right direction and do not cause fear.



Calm and easy-going people are often the most successful at effectively moving pigs as they do not cause fear. Calm, smart handling keeps the pigs calm and a calm pig is much easier to move than a nervous one. When you want to move pigs quickly, act slowly !



*Plastic boards are often sufficient to move and load pigs in a calm manner towards the truck*

Plastic bags or flags are also acceptable. These moving-tools motivate pigs forward, without stressing them out too much. They do not produce a lot of noise and cannot be used to harm the pigs, like the commonly used rattling paddles can. However, the less movement and noise, the better. Therefore only use these tools when necessary.



*A flag or bag can also be used to move pigs without causing much stress*

- ☑ Make sure that the corridors inside the barn and towards the truck are **wide enough so at least two pigs can walk next to each other**. Pigs do not like to walk behind each other in a single-file.

- ☑ Pigs have poor depth-perception. If there are any distractions on the floor, such as puddles, drains or strange objects, they will want to explore them first to make sure they are not holes or obstructions. Therefore make sure all corridors, from pen to truck, are clean and empty. **Remove all objects from the floor as they will only distract the pigs and cause them to balk.**



*Pigs have poor depth-perception and are very curious. They have the need to explore objects first before moving forward. Remove all objects to reduce any distractions that can cause pigs to balk.*

Best is to get down on your knees and observe the corridor from the pigs' point of view. See the video below made from a pig's perspective. Do you recognize all the objects that will distract pigs ?



*Distractions in the corridor from the pigs' point of view*

- ☑ To make it easier to move pigs from their farm pen towards the loading ramp of the truck, it's helpful to **attach tall, solid panels along the sides of the corridor** to create a clear pathway forward and block lateral distractions. This way they

are not distracted by the pigs in the other pens that they have to walk past and are more concentrated on moving forward. Tall solid panels are important to use on farms where the pig pens have bars (they can see through it) or in pens with low sidewalls (they can see over it).



*Place tall solid panels (see right photo where the black boxes illustrate the panels) to reduce pigs being distracted by pigs in pens that they have to walk past (see left video).*

- ☑ **Always move and load pigs in small groups (max 9, best is 6)** - this way they will walk much easier and it prevents jamming, trampling and built-up fear. Never crowd in on them. When they sense there is little space they panic and try to run back towards where they came from or they freeze. Remember, at all times: moving smaller groups of pigs works better than large groups.



*Move and load pigs in small groups to keep them calm*

- ☑ **Avoid moving (large) groups towards small corridors.** This causes a bottleneck effect where pigs will jam, jump on each other and panic. Pigs need sufficient space ahead of them, space to turn around (in case they are facing the

wrong way) and space to pass each other. Therefore make sure exits are always wide.

- ☑ **Do you want to remove one pig from the group?** In addition to a board, you can also use a bucket and place it over the pigs' head. This blocks the pigs' view. You can then easily back him/her up to another area. Watch a video of this principle below.



*Placing a bucket over the pigs' head to separate from the group with little stress*

- ☑ **Make sure the corridor-floors are not wet and slippery.** If your floors are slippery, sprinkle sawdust to prevent pigs from slipping and falling. Pigs that are afraid to slip will be less prone to walk! A long-term solution is to grate the floors or mix gravel with the cement so that they are anti-slip.

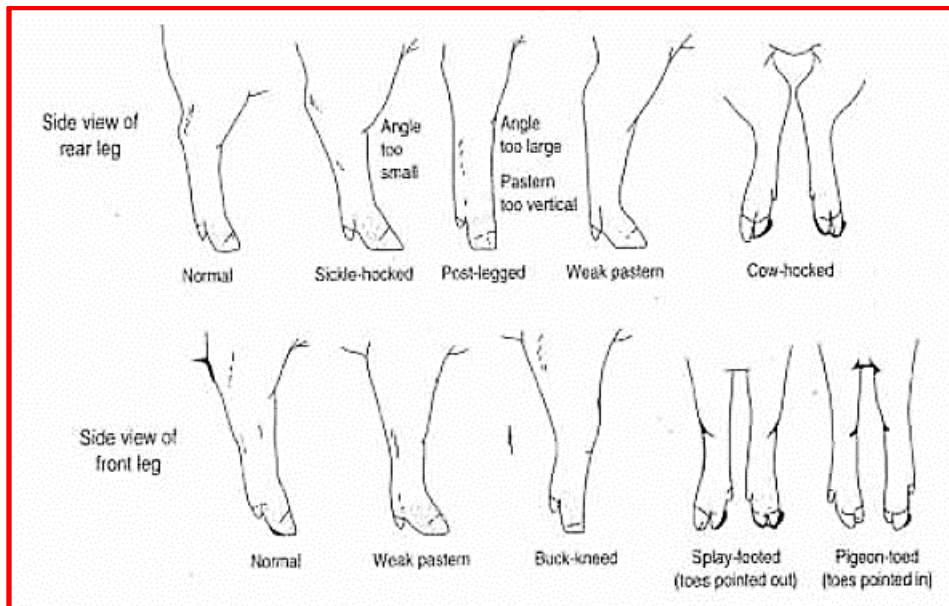
Sawdust also helps to mask deviations on the floor, such as metal strips, drains, sudden changes of color and puddles. Having an even floor with no distractions will make it much easier to move pigs through.



*Sawdust helps make the floor less slippery and reduces distractions on the floor, such as drains, metal strips and puddles.*

- ☑ **Let pigs walk at their own speed.** Rushing or chasing them will have the opposite effect. Be aware that most pigs come from intensive indoors farms where they are given very little room and thus have not had the opportunity to exercise. They are not used to walking (long) distances.

Some pigs will also have physical difficulties walking due to genetic leg abnormalities. See the leg conformation chart of Temple Grandin below to recognize pigs with walking difficulties. Be patient and gentle with them, never force them.



*Leg deformation chart from Temple Grandin<sup>6</sup>*

- ☑ Pigs do not like to walk in the opposite direction of the airflow. If wind is blowing in their faces, they will walk backwards, turn around or balk. Close doors to prevent a drafts and wind currents in the direction of the pigs. The airflow can be checked by using a smoke producing device or a simple cigarette.
- ☑ When pigs are moved from pen to truck, **good lighting is crucial**. Make sure the corridors, the loading ramp and the truck are all well-lit. Pigs refuse to walk towards the dark. They move best when they can see well, and go from a lit up area to a more lit-up area. Thus towards the light.

To motivate pigs to walk outside, it helps to illuminate the outside area a little more than the indoor area. However make sure all spaces are provided with enough lighting for the pigs to see where they are going.



*To motivate pigs to walk outside, it helps to illuminate the outside area a little more than the inside area. Pigs like to walk towards the light.*

## 2. Arrival

### Combat heat-stress

Unfortunately Eyes on Animals continues to see long waiting lines in front of slaughterhouses with pigs left on board for hours. The pigs suffer severe heat-stress. From studies it is known that pigs experience the most stress during transport when left waiting on board a stationary truck.<sup>7</sup> Pigs are calmer when the vehicle is moving smoothly.



*Long waiting times on board stationary vehicles are a serious risk to pig-welfare*

In a stationary truck the temperatures and humidity can easily build up and cause heat-stress and even death.



*Long waiting times increase the risk of heat stress and mortality*

It is also undesirable to leave pigs on board of a waiting truck as the pigs will become restless.<sup>8</sup> They tend to wake up and, if social groups have been mixed, often start fighting. This will also make the pigs more susceptible to heat-stress. Contrary to what is often thought, pigs will actually fight much less severely when they have more room.<sup>9</sup> At lower densities pigs are able to show submissive behavior, such as withdrawing themselves from the fight. When this behavior is not possible (due to a high loading density), submissive pigs will continue to be attacked.



*Waiting times are also unacceptable because of risk of fighting. Source left photo: Varkens in Nood.*

To prevent pigs from fighting and suffering from heat stress due to long waiting queues, the slaughterhouse should take the following measures:

- ☑ The lairage should be large enough to accommodate the number of animals to be slaughtered. This means there is sufficient space in the lairage to immediately unload pigs at the moment of arrival. Immediate unloading is also a legal requirement (Council Regulation 1099/2009).<sup>10</sup> A truck should never be seen as, nor used as, a waiting area.



- ☑ **The lairage space should have** a buffer of 10% in order to accommodate animals arriving earlier or later than planned or in case of a breakdown in the slaughter-line. Many slaughterhouses slaughter more and more animals each year but retain tiny lairages, this is not acceptable. The lairage size needs to increase too and if that is not possible, then the number of animals arriving each hour should be limited and not increased.
- ☑ To make immediate unloading possible, the slaughterhouse should also have **numerous unloading ramps**, so that multiple trucks can unload at the same time instead of waiting in single-file.
- ☑ The unloading area should have be of a cool and comfortable temperature for pigs and be well ventilated by using (mobile) fans and/or air-conditioning.
- ☑ Adjust **the delivery times of live animals to the night time or early morning** when the temperatures are lower (enforce a tropical schedule). This avoids loading and transporting animals during the hottest period of the day (12:00-20:00).<sup>11</sup> The working hours of the employees should also be adjusted in the summer according to announced heat waves. At Van Rooi slaughterhouse (NL) they are experimenting with this.

Ideally slaughterhouses should adopt this tropical schedule (pigs arriving only in the night-time and early morning) each year in the months June, July and August. This provides clarity to all parties involved, such as slaughterhouse staff, pig farmers, the transporter and the official authorities, and prevents continuous changes in the planning as soon heat-waves are announced.

- ☑ Have a second look at the inbound schedule and make sure that there are **not too many trucks arriving at the same time**, especially not during hot and humid periods of the day.
- ☑ **Do not transport pigs during rush hours on hot days.** Advise drivers to call the police if they unexpectedly encounter a traffic jam and the pigs develop heat stress. The police can then safely escort the driver past the traffic jam.
- ☑ On days when the heat and humidity is known to cause welfare problems, accept and slaughter fewer pigs or no pigs at all.

If trucks nevertheless have to wait outside the following steps **MUST** be taken:

- ☑ Build a **canopy** where all livestock trucks can park underneath so that animals on board are kept in the shade until they can be unloaded. Protecting animals against adverse weather conditions is also a legal requirement.<sup>12</sup> The canopy should provide shade during the whole day (thus be built with lateral protection also from the sun). Make sure the sides of the canopy are open so the wind can still blow through the trucks. Having extra trees along the canopy is always a good idea as trees create extra airflow and shade.



*Canopies for animal trucks waiting in line at Vion slaughterhouse in Boxtel, Westfort slaughterhouse in IJsselstein and Van Rooi slaughterhouse in Helmond (all in the Netherlands). At these slaughterhouses the lairages are unfortunately not large enough to make immediate unloading of all pigs arriving possible. Instead the pigs are often left waiting on board the trucks for 45 minutes to a couple of hours.*

- ☑ The sun should **not shine on the sides of the trucks** either. Therefore make sure the canopy is wide enough or has shadow-nets on the sides, that can be pulled down or up depending on the position of the sun. It is important that the netting is breathable (for sufficient ventilation) and tall (so animals on all the different loading-decks are given shade).



*Left: sufficient lateral shade-netting at Westfort slaughterhouse in IJsselstein. Right: the shade-net at this slaughterhouse cannot be closed fully down to the ground (see blue arrows), the lower crates (see orange markings) are therefore still exposed to the sun.*

- ☑ Make sure there is **enough air-space in between and above the trucks** so air can circulate at all sides and pass through the trucks to help dissipate the heat inside. The roof of the canopy should therefore be tall enough and the trucks should not be parked side by side. There must always be plenty of room between and above the trucks.
- ☑ Be **extra cautious with forced-ventilated closed trucks**; their fans suck in air from the outside and bring it into the pig-compartments. If this outside air is warm (because the truck is parked next to a conventional (open) animal truck that radiates heat or because the sun is shining on the fans), the temperature inside the forced-ventilated truck can become extremely high and hot air will be blown onto the pigs. Therefore never park forced-ventilated trucks next to conventional animal trucks and prevent sunbeams from shining onto the fans.
- ☑ **Set up powerful, large, mobile industrial fans.** These should be adjustable in height, angle and portable so they can be positioned beside each truck and the airflow can reach each pig. Make sure to have enough fans for all loading decks. If trucks must be parked side by side, make sure each row is well ventilated and has its own fans.



*Large mobile fans to ventilate stationary trucks help reduce heat-stress*



*Left, old situation: fans are too low, the airflow does not reach the top decks. Right, new situation; two fans are stacked and can be set at different angles so also upper decks can be reached.*

- ☑ Instead of a canopy trucks can also be parked on a lane in between and underneath tall shady trees to provide shade and air circulation. Make sure however that this area provides enough shade during the *whole* day (also when the sun is positioned lower in the sky). However, on days with little wind, a lane with tall shady trees is insufficient and extra big and adjustable (in height and angle) mobile fans are still necessary.



*Left: waiting line in between trees. Fans are on the other side of the trucks. Right: trees provide shade at this parking zone. Fans are however missing and thus this is inadequate.*



*These trees do not provide enough shade. The trees must be tall and very shady (wide branches, big leaves...).*

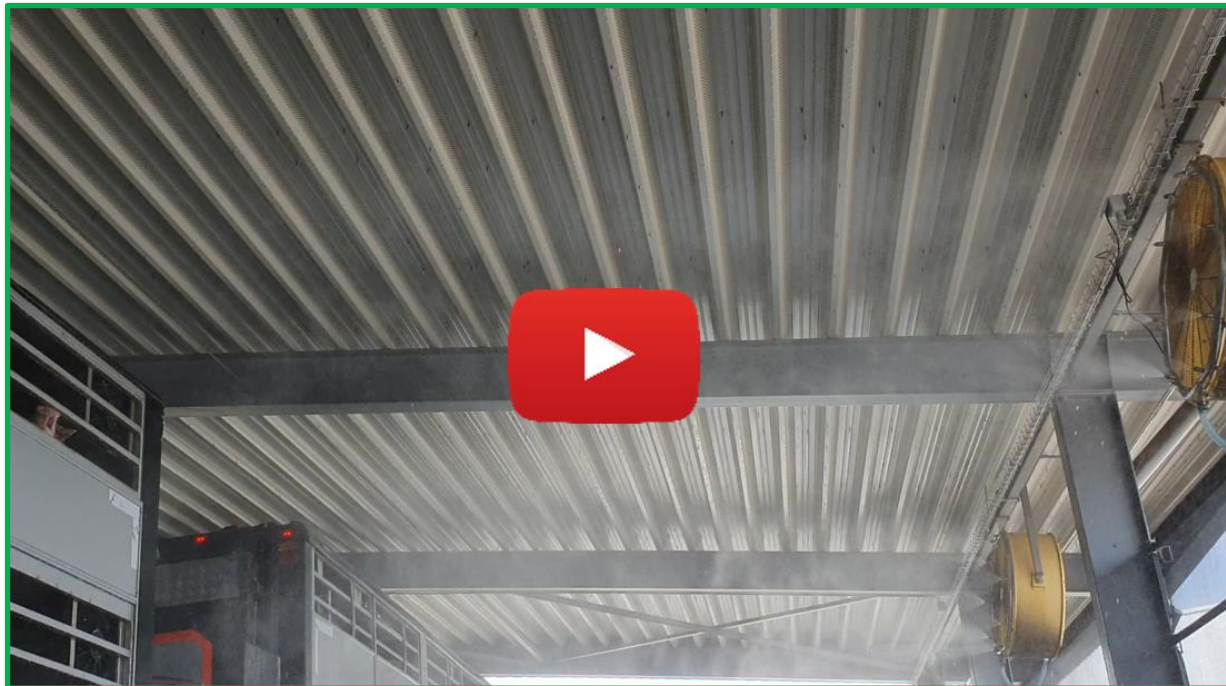
- ☑ Make sure that there is a water misting system under your canopy, using cooled water, to further decrease temperature inside trucks. Studies have shown that heat stress is reduced when misting systems, in combination with good fans, are used on animal trucks waiting in line. At arrival pigs were less thirsty (reduction of drinking behavior in the lairage) and less physically exhausted (when moved through the slaughter-process). There was also a reduction of drip-loss in the meat. <sup>13</sup>

Make sure misting systems are always used in combination with sufficient ventilation (powerful fans) so the humidity does not rise. The higher the humidity level – the more difficult pigs can cope with heat.

Van Rooi slaughterhouse in Helmond (NL) has a misting-system built into their canopy. Watch a video below. At Westfort pig slaughterhouse in IJsselstein (NL) they have also installed water misters (using cooled water) and fans along the roof to reduce the temperature inside the trucks waiting. The fans switch on automatically when the temperature reaches 22 degrees and the water misters when the temperature reaches 25 degrees. With their strong fans and cooled-water misting system, they are able to reduce the temperature under their canopy by 3 to 5 degrees Celsius.

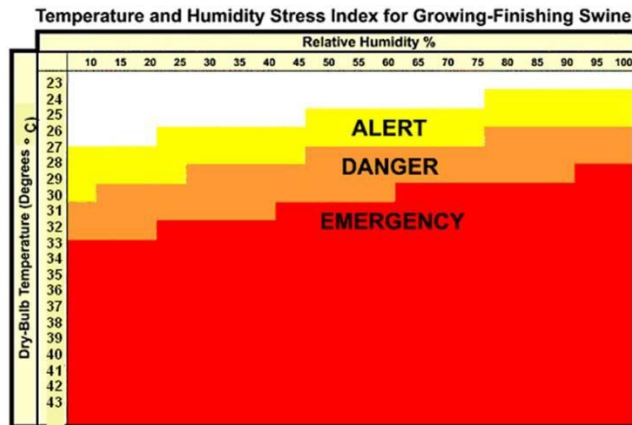


*Left: water misting-system at Van Rooi slaughterhouse in Helmond (NL). Right: Fans and water misters at Westfort slaughterhouse in IJsselstein (NL)*



*Pig on board of truck enjoying cool mist on hot summer day at VION slaughterhouse in Boxtel*

- ☑ When wetting the asphalt or trucks regularly, realize that doing this is only beneficial for the pigs if it is being done with the use of powerful industrial fans. Wetting the asphalt or truck alone, will slow down the rising temperature but will also increase the humidity (creating a sauna-like environment). An increase in humidity on a hot day means that the pigs will have trouble cooling down and will suffer more.



*Wetting asphalt is only beneficial for pigs if it is done with the use of an industrial ventilator so the humidity does not increase*

- ☑ Whitewash the asphalt to reflect sunlight (and lower absorption of heat) and reduce heat inside the truck. The roof of the canopy should also be light-colored for the same reasons. Dark colors absorb heat and become hot, whereas light colors reflect the heat and become less hot.



*Whitewashed floor and white roof to reflect sunlight at VION Boxel and Remkes in Epe.*

- ☑ As long there are no sufficiently shaded and cooled parking areas, animal truck drivers should continue driving to get wind into the truck and not stop. Parking during hot and humid weather is unacceptable. The temperature and humidity

inside a poorly ventilated stationary truck will increase at a very high speed, especially as pigs usually wake up when the truck stops and begin to move and stress.<sup>14</sup>

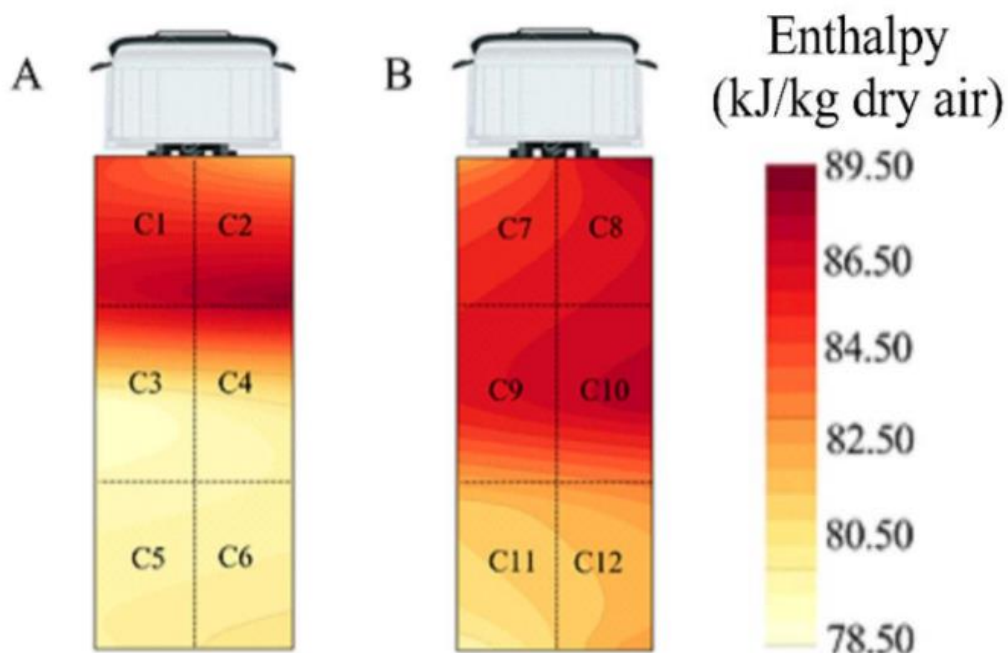
- ☑ Make sure pigs have sufficient space to lie down in lateral recumbency (on their sides) without having to touch each other. This means 1m<sup>2</sup> per pig (110kg) minimum.<sup>15</sup> Pigs need adequate space to cool themselves down, ensuring they are not forced to lie against or on top of other pigs, and they also benefit from being able to rest against a cooler floor (through conduction) with a large part of their bodies. At lower densities hierarchy fights will also be less intense.<sup>16</sup>
- ☑ Place signs with “forbidden to park for livestock trucks” at parking spots in the area of the slaughterhouses where trucks are regularly seen parked and waiting with pigs on board.
- ☑ **Appoint one employee of the slaughterhouse to be responsible for checking on the welfare of pigs on board waiting trucks during extreme heat.** This employee should be trained to [recognize signs of heat stress](#). As soon as pigs develop heat stress, or the welfare is impaired for other reasons, the truck should be given immediate priority to unload so the animals do not suffer additionally and can receive proper care.
- ☑ **Appoint another employee to patrol the area around the slaughterhouse premise (radius of up to 5 km) to be sure no pig trucks are parked and waiting there for their turn to unload.** This appointed employee should order the driver to continue driving to give the animals inside fresh wind or, if conditions inside the truck are very bad, accompany the truck to the unloading ramp of the plant and give the pigs priority to get offloaded. Make use of official warnings and financial incentives to prevent repetition.
- ☑ Make sure the employees responsible for the welfare of pigs on the parking area and in the surrounding area are well equipped to check all decks and types of trucks. What they need:
  - A [portable ladder](#) (to check on the pigs on the upper decks), a thermometer- and humidity meter and a hex-key to open ventilation hatches in the case of closed animal-trucks with forced ventilation.





*A portable ladder, a thermometer and a humidity meter should be part of the standard equipment of the slaughterhouse*

- Make sure the employee checks especially those areas on the truck where the risk of heat stress is highest. Namely, the compartment at the front part of the truck (behind the cabin/motor), on both the lower (A) and upper level (B).<sup>17</sup> See illustration below.



*Trailer heat zones and their relation to heat stress in pig transport. A: upper deck, B: lower deck. Source: Machado, N (2021)<sup>18</sup>*

- We advise slaughterhouses to **not accept transporters using forced-ventilated closed trucks or trucks with perforated side walls** in the summer period. Animals on board these sorts of trucks exhibit more signs of heat-stress because the temperature and humidity levels on board these trucks can often get too high. Ventilation seems to be lacking (bad quality, quantity or maintenance of the fans) or pigs, standing in front of the fans, are blocking the airflow for the other pigs on board. We especially advise prohibiting those trucks that do not have large access doors all along the sides. Access doors along the side are crucial to properly inspect all animals on board and also to assist animals in the case of an emergency. Pigs on board have very little chance of getting enough air and a high chance of serious heat stress and death if there are no access doors that can be opened in the case that the fans stop working.



*Forced-ventilated closed trucks (left) and trucks with perforated side walls (right) should be prohibited in the summer period as they impose a higher risk of heat-stress*

As long as forced-ventilated trucks and trucks with perforated side-walls continue to be accepted the following steps **MUST** be taken:

- Request drivers to decrease the **loading density** by at least 20% on hot days. The higher the loading density, the more difficult to ventilate effectively.
- Forced-ventilated closed trucks and trucks with perforated side-walls (which decrease natural ventilation) should **be given extra priority when the slaughterhouse employee checks on the well-being of animals waiting on board trucks to be unloaded**. Make sure the appointed

employee measures the temperature and humidity inside these trucks to and if the fans are strong enough and well maintained. The ventilation hatches can often be opened with a hex-key.



*In forced-ventilated closed trucks and trucks with perforated sidewalls (blocking natural ventilation) there is a higher risk of pigs developing heat stress. Employees responsible for animal welfare should give priority to these trucks and always check them thoroughly.*

- Make sure forced-ventilated closed trucks and trucks with perforated sidewalls have big access doors and shutters (over their full length and at all loading levels) for natural ventilation in the case of a breakdown in the electric ventilation. Manufacturers/body shops of trucks informed us that there is an increasing demand for forced-ventilated trucks with built-in shutters all along the sides that can be opened and closed. This enables chauffeurs to switch to natural ventilation whenever needed (when fans break or there is another emergency). This is a positive and much needed development.<sup>19</sup>

In several EU countries closed animal-trucks (forced-ventilated or conditioned) are forbidden.<sup>20</sup> Having proper access to inspect and assist animals on board is required by law.<sup>21</sup>

In Germany fines are handed out if access-doors are lacking or too small.<sup>22</sup>

- Make sure your slaughterhouse has a protocol to combat heat-stress (of all the points above) and repeatedly send it to all suppliers and transport-companies during the summer, and especially when hot or humid weather is expected so that everyone is on the same page and knows the rules and

consequences. The Dutch heat protocol developed by the industry [can be read here \(only available in Dutch\) >>](#)

## Recognizing signs of heat stress

**Heatstress can be recognized by the following signs<sup>23</sup>:**

- ✗ Rapid, shallow breathing with the mouth wide open (see the video below). The abdomen goes up and down very quickly.



- ✗ A pig suffering from heat stress will (when there is space available) lie on his or her side with the legs stretched in an attempt to cool his or her body temperature down. **A normal respiratory rate for a pig is 30-40 breaths per minute**, which can be calculated easiest by the up and down movement of the chest. The pigs on these videos below have a respiratory rate that is dangerously high (over 120 breaths per minute).



*Pigs lying on their sides with legs stretched. The respiratory rate is dangerously high.*

- ✗ Sometimes there is foam/saliva around their mouth which is a warning sign of heavy and prolonged panting due to heat stress. See the video and photo below.



*Pig with heat stress, foam collects around his/her mouth*

- ✗ Their skin sometimes turns red (locally and blotchy).

## Combat cold stress

In the winter season, cold stress can become a major welfare concern. Most pigs are raised intensively and indoors. They are used to being in barns with a relatively stable temperature of around 20°C. These pigs are not used to cold temperatures. When pigs are suddenly exposed to cold wind, rain or even snow during transport, they can become hypothermic. From research it is known that mortality during transport increases when temperatures drop (4-10°C versus 12-26°C).<sup>24</sup>

Unfortunately, Eyes on Animals continues to witness livestock trucks with the sides fully open while transporting pigs on cold winter days. It is important that slaughterhouses, as well as transporters, are prepared for cold days.

What to pay attention to during the winter season:

- ☑ Advise truck drivers to partly close the side openings of their trucks when temperatures drop to 12°C or lower inside the trailer to protect the pigs on board from cold-stress. Take into account the direction and strength of the wind.



*This chauffeur has partly closed the shutters of his truck to protect the pigs inside against the cold.*

- ☑ Despite the cold, do not load more pigs than usual. This will hinder their mobility, which they need. When a compartment is too full some pigs will be pushed against the side walls and not be able to move away when they become cold, increasing the chance of frost bite and suffering. Always give animals adequate space. It is up to the truck design and chauffeur to make sure the air inside is warm enough, without ever having to crowd the animals to maintain warmth.
- ☑ Add a **thick layer** of bedding on each floor so it does not extract heat from the pig's body. Piglets are particular vulnerable to cold-stress. Make sure to give them extra bedding.
- ☑ Make sure pigs are unloaded and brought to the lairage as soon as possible. In the lairage they are protected against extreme weather conditions. Make sure the lairage is warm and comfortable. See [Chapter 3. Lairage – comfortable temperature](#) for more info.

- ☑ Make sure to communicate clearly to your drivers which weather conditions are considered too dangerous for transporting pigs. All drivers should be aware in which weather conditions they are not allowed to bring pigs. For example when there is a snow storm or the roads are too slippery with many accidents occurring on the road.
- ☑ Transport pigs at times when it is a little less cold (for example during the day instead of at night or during cloudy instead of clear weather).
- ☑ Make sure there is a protocol to combat cold stress (adding all the points above) and it is sent to all suppliers and transport-companies as soon as cold days are announced. That way everyone is on the same page and knows the rules to abide by.

### Recognizing signs of cold stress

Cold stress can be recognized by the following signs:

- ✗ Pigs are huddling (lying on top of each other with half of their bodies, even though there is no lack of space) and are often lying ventrally with their legs curled underneath (in order to reduce contact with the floor). See a video of pigs huddling below.



*When pigs are huddling this is often a sign of cold stress or drafts.*

- ✗ Pigs are unwilling to lie down (because the floor is cold and maybe even wet!) and are restless.
- ✗ Pigs are shivering continuously or repeatedly.

## Unloading area

### Good handling

- ☑ **It is best to unload pigs in small groups** - one compartment at a time (max 12 pigs at a time) instead of one whole deck at a time. Give the first pig sufficient time to explore the new environment and he/she will then lead the remaining pigs. Pigs are calmer in smaller groups and thus move more easily.<sup>25</sup> When pigs move easily, human handlers will also be more calm with them. It is a win-win solution.



*Do not unload more compartments at the same time as this often results in confusion, bottle-necks and stress.*

Unloading too many pigs at a time (more than one compartment) often results in panic, confusion, pigs jumping on top of each other (as they have nowhere to go) and pigs freezing from fear. Especially when they are being rushed. This costs time! It will also lead to more fights in the lairage as pigs from different compartments are mixed.

- ☑ When offloading the pigs, **don't use any tools that can cause fear or pain** such as clappers, electric prods or sound producing paddles. Tools that are very noisy are always stressful! Only move pigs forward that have space in front of them. When pigs are jumping on top of each other, you are too close and causing too much stress.



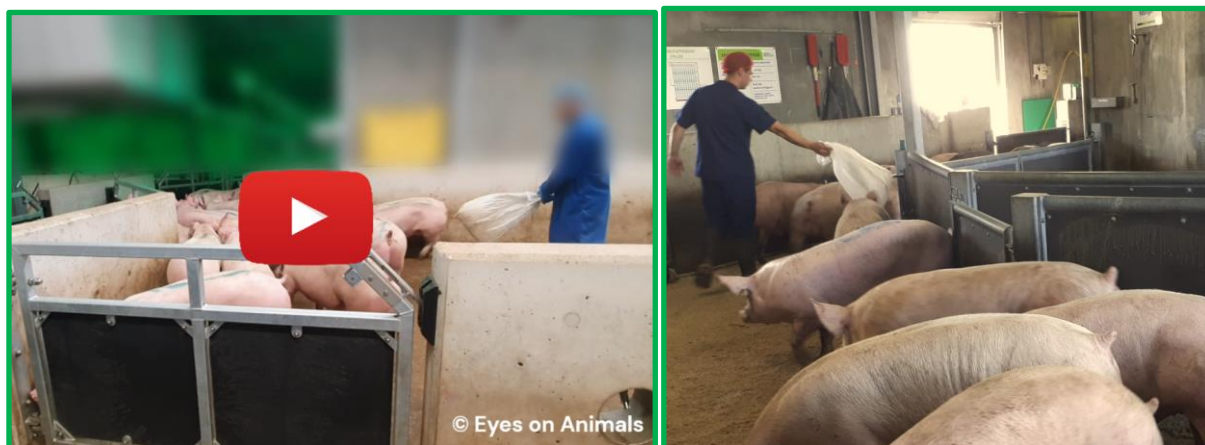
Like Temple Grandin always says “when pigs are moving forward, DO NOT touch them”. Just let them be!



*Only move pigs forward when they have space in front of them. When pigs are jumping on top of others to try and get away, you are too close to them and making them fearful.*

Only make use of your body position, or a tool that makes little or no noise such as a plastic board, a bag or a foam-swimming noodle to motivate the pigs to walk out of the truck. This is usually enough and keeps the pigs calm. A calm pig can be moved most easily.

Be alert that tools also **be only used** when pigs are not moving forward themselves. If they are moving forward themselves, let them be !



*Your body position and a bag are often enough to unload the pigs. Left: unloading at Compaxo in Zevenaar (NL). Ideally the group sizes are smaller. Right: unloading at Vion in Apeldoorn (NL).*

- ☑ Hang up **big banners** at the unloading docks to remind drivers that rough handling (electric prodding, kicking, hitting, banging handling tools against the walls to make noise) and shouting is not accepted and pigs should be best unloaded in small groups to reduce stress.

Slaughterhouses should have a clear animal-welfare policy and communicate it clearly and regularly throughout the chain (from farm to slaughter).



Information sign at Pali pig slaughterhouse in Geldrop (NL) to make it clear that rough behavior is not tolerated and unloading is to be done in small groups.



Information signs at the unloading dock of Gosschalk (NL) clearly indicating that electric prods are not allowed

- ☑ Be aware that pigs may have had **earlier negative experiences with electric prods**, and thus can react with extreme fear due an electric prod in the slaughterhouse. Even if an electric prod has the voltage set very low, pigs can still become extremely stressed by them (as the pig of course does not know that the voltage is set lower than the previous time). This is why we advise against the use of electric prods.

Temple Grandin recommends to listen and look at the pig's reaction – a loud scream is a sign that he/she experienced too much stress. <sup>26</sup>

- ☑ Always make sure there is enough space on board for the driver to enter the truck to move the pigs out, without forcing pigs to jump on top of each other. Compartments should not be too full, as pigs will than have nowhere to go when the driver enters and will start to panic. They need to be able to keep sufficient distance from the driver. The driver should enter the compartment quietly and always along the side walls, not through the middle of the pigs.
- ☑ Make sure that drivers place enough sawdust on each floor of their trucks. Advise them in this.

An insufficient amount of woodchips (you can clearly see the floor underneath) means a greater chance of pigs slipping during transport and unloading, which causes injuries. Be sure to check if each floor has enough bedding and give warnings when drivers don't meet your standards. The highest deck should be given extra attention as in some truck-designs the bedding falls down (via gutters at the sides of the floor).



*Floor with not enough woodchips on top, causing a greater chance of pigs slipping and getting injured.*

- ☑ Use (intelligent) camera surveillance and have big screens in the unloading area visible so **drivers are aware they are being filmed**. This will motivate them to move and unload pigs in a humane way. See for more information on intelligent camera systems in [Chapter 7. Smart surveillance >>](#)

## Design and layout

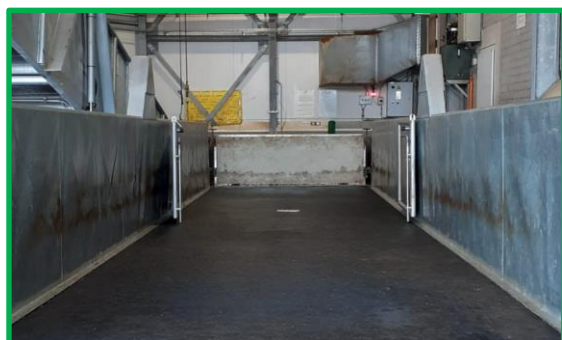
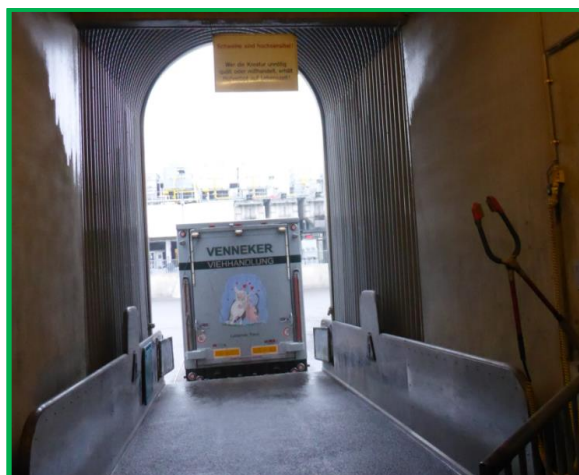
- ☑ Make sure trucks can be unloaded underneath **a roof**. This reduces the risk of heat-stress, slipping (from rain) and prevents the pigs from **being blinded by the sun**.



*Left: pig is being blinded by the sun as there is no roof. Right: a short roof was built to reduce*

*this risk. It is however too short; the truck is still partly parked in the sun.*

- ☑ **Ensure that the sides of the unloading ramp are solid and high**, this prevents pigs from falling off the ramp and blocks the view of negative distractions in the surrounding environment that could make them fearful or hesitant.



*Make the sides of the unloading ramp high and solid*

- ☑ **Place rubber or synthetic panels on the inside of the unloading ramp to prevent metal to metal contact during unloading.** This prevents a lot of noise and enables the pigs to walk more easily off the tailgate. The sound-absorbing panels can be attached with screws to make sure they stay in place. See photo below of Compaxo slaughterhouse (NL) as an example:



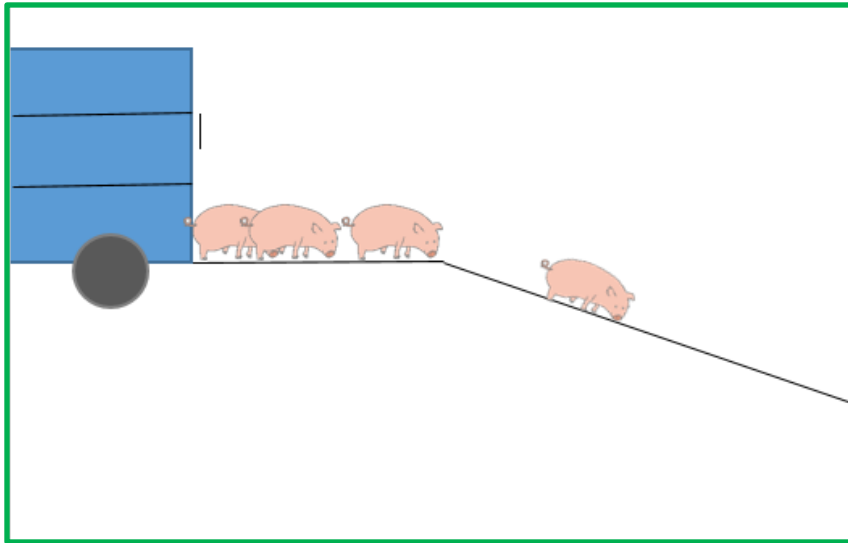
*Rubber panels to reduce noise (from metal to metal contact) at Compaxo pig slaughterhouse in Zevenaar (NL)*

- ☑ **Illuminate the place where the pigs are unloaded.** Pigs tend to walk more easily towards an illuminated area. Ensure that light does not shine directly into the face of the pigs because this inhibits their movement. Diffuse (soft and indirect) light is best to reduce shadows as much as possible. This can be accomplished by placing more lights higher up at the sides of the unloading area.
- ☑ A **long** unloading platform that can be set, via a hydraulic lift-system for example, at the different heights of the truck decks (see photos below) so pigs can walk (almost) straight off easily is the most ideal.



*A loading platform that can be set at different heights so the gradient is minimal*

- ☑ To prevent pigs from falling and slipping, Temple Grandin recommends a level dock area so pigs stepping out of the truck will walk on level floor first before they have to walk down on a gentle slope.<sup>27</sup>



*When the first part of the unloading dock is flat, pigs will walk off the truck more smoothly*

- ☑ The floor of the unloading ramp and platform should be **non-slip** to prevent pigs from panicking, slipping, falling or even injuring themselves. Ideally the **floor is the same as in the rest of the facility in terms of color and structure** to prevent sudden changes.

Pigs are sensitive to contrasts as they are not very good at seeing depth and distance. Differences in flooring causes stress, hesitation behaviour and thus pile ups. Make sure to check regularly if the anti-slip effect is still sufficient.



*Non-slip floor unloading dock*

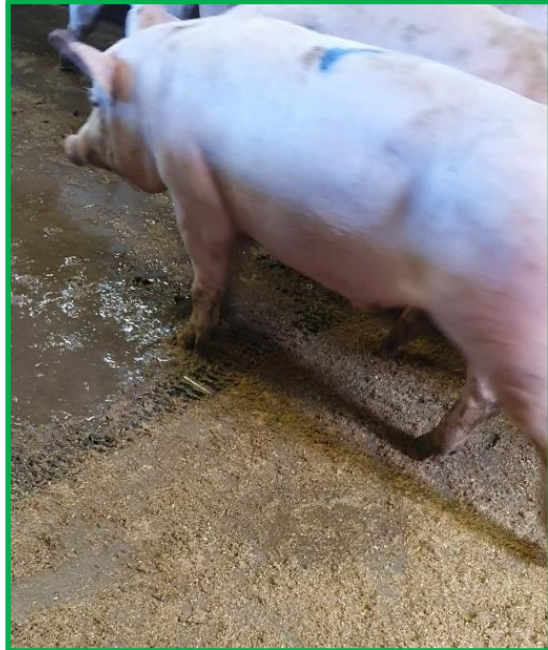
*Non-slip ramp Berdex truck*

*Non-slip ramp Finkl truck*

- ☑ **Remove strips, objects, drains or other distractions on the floor.** Pigs have poor vision – all sudden changes in flooring (color, texture, reflection) can cause them to pile up or get distracted. Also make sure there are no strange objects lying around on the floor (coveralls, gloves, hoses etc...). If it is not possible to remove them - mask them with a thick layer of bedding on the floor.



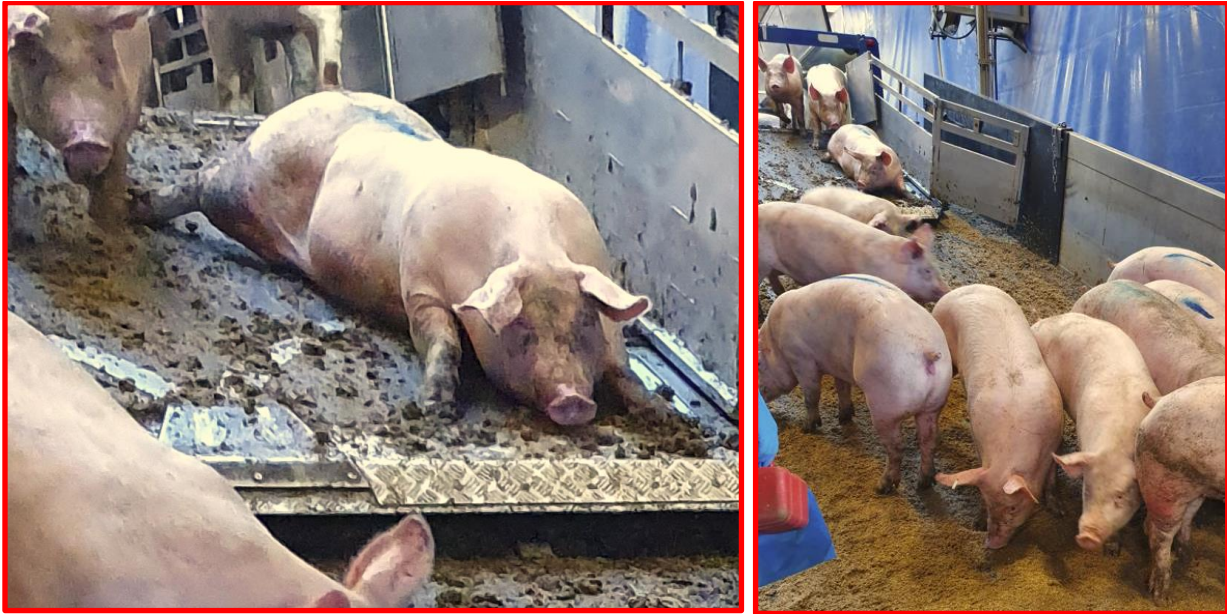
*Remove metal strips, drains or other distractions on the floor. They will cause pigs to balk as they want to explore it first.*



*Sawdust helps to reduce sharp contrasts caused by drains*

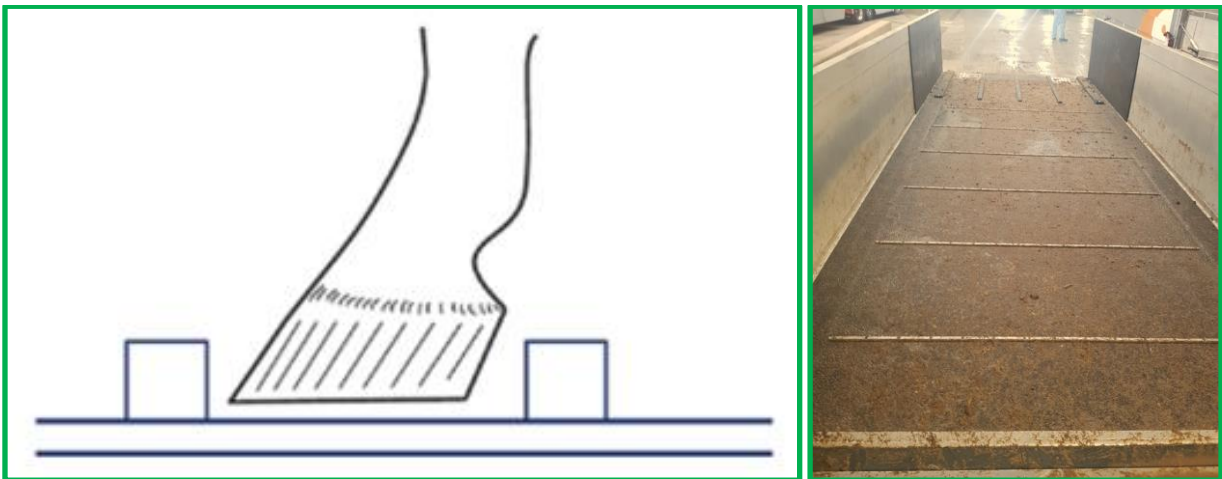
- ☑ **The steeper the slope, the more fearful the pigs are and the greater the risk that they slip and/or fall.** In Europe the legal maximum is 20° but in reality this is much too steep. Best is when there is no gradient at all. <sup>28 29 30</sup>





*With steep slopes chances of pigs falling and injuring themselves are high*

- ☑ Make sure to use cleats when there is a slope, even when the ramp is not very steep. This prevents pigs from being fearful of slipping and falling. The cleats should not be too high or wide (2,5cm x 2,5cm max) with not too much space in between each but enough for the pig's cloven-hoof to fit in between. Ideal is 15cm minimum. <sup>31</sup>



*Left drawing: Correct cleat spacing for livestock. The cleats should be spaced so that the hooves fit easily between them. For pigs this is 15cm minimum. Source: Temple Grandin. Right photo: Cleats on the unloading dock of Compaxo slaughterhouse (NL). Cleats should not be too high or wide (2,5cm x 2,5cm max) .*

- ☑ Sprinkle sawdust to camouflage sharp contrasts and puddles. Sawdust also has an anti-slip effect. Keep it dry and refresh it when necessary.

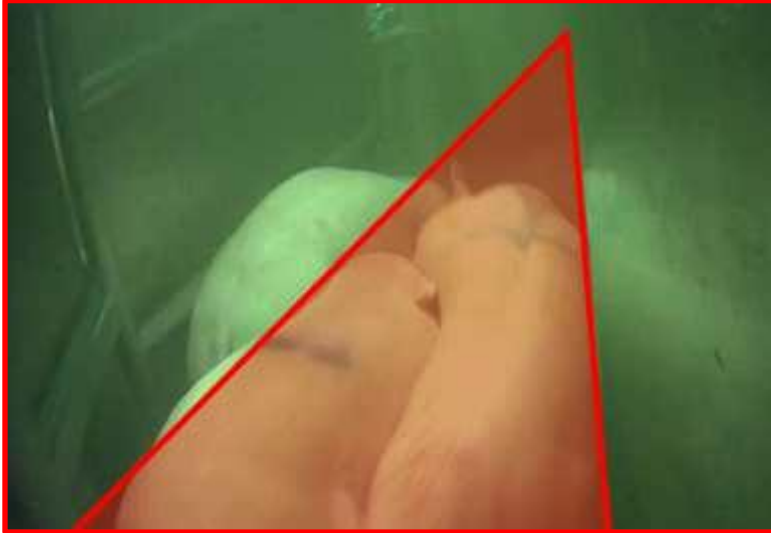


*At Westfort slaughterhouse in Gorinchem (NL) (when it was still open), they would sprinkle sawdust on the loading docks to reduce sharp contrast and improve grip.*



*Sawdust in the corridors at Van Rooi slaughterhouse in Helmond (NL) to reduce sharp contrasts and puddles distracting the pigs*

- ☑ Prevent dead-end spaces or corners that pigs can walk into. It should be very clear to pigs where they must walk and there should not be any confusion. Confused pigs can easily get stuck in a corner or dead-end and panic as they no longer know where to go.



*Prevent dead-end spaces, where pigs can pile up and become stressed.*

- ☑ Make sure there is a power supply in the unloading area for cross-ventilated closed trucks to connect their ventilation system to. This is very important during the summer, because pigs on board such trucks are totally dependent on the mechanical fans built inside the walls of the truck working for fresh air.



*Make sure cross-ventilated trucks can connect to a power supply, so their fans always work, as seen at Westfort slaughterhouse in IJsselstein (NL).*

## Handling of pigs in pain or discomfort

- ☑ Always have an Animal Welfare Officer present in the unloading area. It is important the transport-conditions, the handling and the health of the pigs are

being checked by a skilled and trained person.

- ☑ **Make sure there is a portable electric stunner** near the unloading ramp, so that pigs that have become sick, injured or extremely stressed or exhausted during transport can be stunned immediately upon arrival, there where they lay, and further suffering is prevented. This is also a legal requirement. For safety reasons it is best to have several stunners with short cables at different locations, than one stunner with a very long cable to cater all the unloading ramps.



*Electric tongs to stun injured or sick pigs immediately after arrival.*

- ☑ Make sure there is a back-up stunner in case the electric stunner does not work.
- ☑ Clean the electrodes after every 20-25 pigs. Do this by using a metal brush or automatic wire wheel.<sup>32</sup> Check if the stunners work properly and replace them when necessary.
- ☑ Manual stunners need to be used in a correct way.
  - We recommend both head and then heart stunning as the standard procedure for emergency killing (and not just head stunning), to reduce risks of pigs regaining consciousness as much as possible.

- Make sure the electrodes are placed correctly – in between the eyes and the ears. Second best is directly underneath the ears. Hanging banners or posters at the unloading dock can help remind workers how to position the electrodes correctly.



*Poster reminding workers how to position the electrodes*

- Check for signs of consciousness after head-stunning and then AGAIN after heart-stunning (before you bleed out the pig). This means you have to check for signs two times.
- Employees who are allowed to emergency stun a pig need to have followed a specific **training for performing this task**. Make sure to repeat the trainings in order to prevent bad habits and laxity. Frequently check if employees perform this task well. Stunning correctly is crucial for animal welfare.

For more information, please refer to [Chapter 5. Stunning - Electrical stunning >>](#)

- ☑ **Pigs that are emergency stunned, need to be bled out as soon as possible.** Electrocuting the heart does not guarantee cardiac arrest. Besides, shackling the pig and moving it towards the slaughter-line can re-activate the heart again.<sup>33 34</sup> Therefore a pig, even after being electrically stunned to the head and heart, should still be bled out as soon as possible.

EURCAW (European Union Reference Centre for Animal Welfare) recommends to stick (bleed out) the pig within 10 seconds after electric stunning in order to

prevent pigs regaining consciousness during bleed out.<sup>35 36</sup> If a captive bolt gun is used; also stick and bleed out the pig as soon as possible after because shooting does not always cause immediate death.<sup>37</sup>

Find more details on stun-to-stick intervals in [Chapter 5. Stunning >>](#)

- ☑ Pigs that arrive injured, in pain, exhausted, severely stressed or experience difficulties breathing should **be stunned and bled out immediately on the spot** to prevent any further suffering.

**Signs of exhaustion, extreme stress or shock are:** immobilized by fear “freezing” (while sometimes still screaming), collapsing, lying or sitting down on the floor unable to stand up, muscle tremors (shaking) and fast, shallow open-mouth breathing or repetitive barking sounds. These pigs are very likely experiencing organ failures due to blood circulation issues, which can ultimately cause the heart to stop.



*Pigs in shock often collapse and are unable to get back up. After a while they will often lie on their sides. They regularly have rapid, shallow open-mouth breathing. Pigs in shock should be killed immediately, on the spot where they lie, to prevent any further suffering.*

**Signs of breathing difficulties:** sitting like a dog with legs spread, open-mouth breathing, coughing and blue skin discoloration. Breathing difficulties can be caused by blood circulation problems resulting from severe stress. It can ultimately cause the heart to stop.



*Pig having breathing difficulties (mouth wide open). He/she sits like a dog with the legs spread. Skin is dark red/bluish in color. This pig should be humanely killed immediately to prevent further suffering.*

See below two videos of pigs showing signs of fatigue, breathing difficulties and possibly also heart failures.



*Left: pig showing signs of extreme exhaustion. Source: EURCAW. Right: pig with breathing difficulties, likely due to organ failures caused by stress. Source: Varkens in Nood*

- ☑ Shock or extreme exhaustion in pigs is often caused by rough handling and stressful transport conditions.<sup>38</sup> Important causes are:
  - ✗ not enough space in the truck to rest
  - ✗ rough and bad treatment during loading and unloading; multiple use of electric prods, (un)loading too many pigs at a time, hitting and yelling, rushing the animals
  - ✗ heat stress; often due to insufficient ventilation in the truck and long waiting lines and hot and humid weather
  - ✗ water and/or food deprivation for too long

Slaughterhouses should therefore have a **registration system** in which they keep track of the number pigs arriving in shock or extreme exhaustion, the concerned transport companies, transport conditions (if any deviations are detected) and the farm of origin. This way the probable cause (a rough handler, a poorly ventilated trailer...) can be identified and responsible parties can be notified and warned.

### 3. Lairage

The purpose of a lairage is to give the pigs a chance to rest and recuperate from transport. Make sure the lairage is indeed comfortable enough to permit rest and to quench their thirst and either cool down or warm up.

Remember: a pig that feels safe and comfortable will lie down shortly after arrival. If the pigs are still restless after 30 minutes to 1 hour; find the reasons why and improve the lairage!

#### Lairage capacity

First of all the size of the lairage (and number of unloading docks) should **always be adequate for the supply coming in.** It should have at least an additional “10% buffer space” in the case that more trucks than expected arrive at the same time or there is a break-down in the slaughter line so that all pigs can still be immediately unloaded after arrival.



There should not be any pigs that have to wait on board of stationary trucks. The lairage has to be big enough to prevent this. Refer to [Chapter 2. Arrival – combat heat stress >>](#)



*Have enough unloading platforms and a big lairage so all pigs (even some unexpected ones coming early or late) can still be immediately unloaded*

Having pigs wait on stationary trucks is highly undesirable. From scientific study it is known that pigs in transit experience the most stress when trucks are stationary.<sup>39</sup> They will become restless, start to fight and, should there be poor ventilation and/or exposure to sun, they will likely start to suffer from heat stress. One study found that there is a 2.2-fold increase in mortality when pigs are on board stationary trucks for over 30 minutes.<sup>40</sup> It will also lead to a higher incidence of carcass defects (PSE and DFD meat).





Waiting lines in front of the slaughterhouse are undesirable because of the risk of heat stress and fighting. Therefore, the lairage should be large enough to accommodate the incoming supply and have a buffer for unplanned but frequently occurring events, such as pig trucks arriving earlier or later than planned, or breakdowns in the slaughter line leading to backlog.

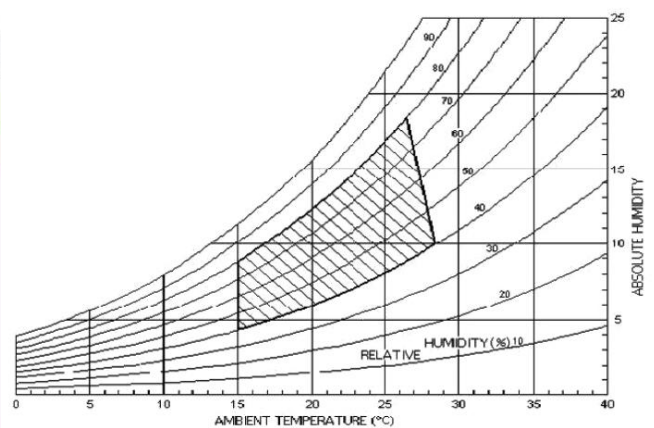
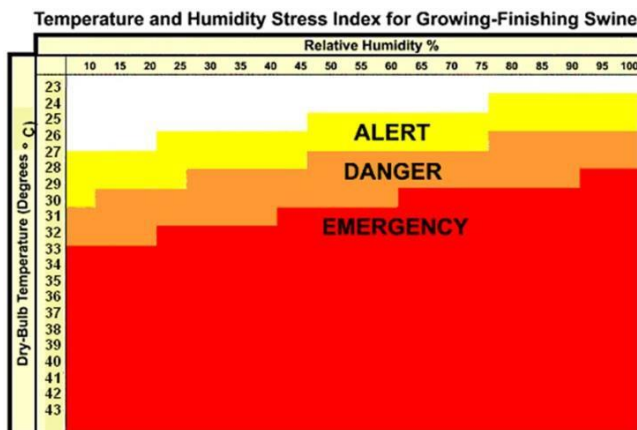
## Comfortable temperature

### Reducing heatstress

**Make sure the lairage is not too warm.** The temperature in which pigs feel comfortable strongly depends on the humidity. On humid days, pigs have more difficulties to cope with heat. In the Netherlands the average humidity is relatively high (around 75%). Pigs are very susceptible to heat stress as they have a limited amount of sweat glands. Heat stress is one of the most common causes of death among pigs.

To prevent pigs from suffering from heat stress:

- ☑ **Keep temperatures inside the lairage below 24°C.** Take measurements of temperature and humidity regularly. Please refer to the graphs below.



Left: Temperature- and humidity index, Right: Comfort zone finishing pigs. Source: Correia-da-

- ☑ Observe the pigs several times a day to make sure the thermal climate is comfortable and the pigs are not experiencing any heat stress. Read more in [Chapter 2. Arrival – Recognizing signs of heat stress >>](#)
- ☑ In lairages we sometimes see skylights in the ceiling. These let a lot of sunlight through and can cause the temperatures in summer to rise which leads to heat stress. Be extra vigilant of the behavior of pigs in the pens that fall under the sunrays coming in from these skylights.

**Apply coating, glass foil or light colored panels on skylights** to reflect the sunlight and block hot sun rays from coming in.



*Skylights can cause temperatures to rise very quickly*

- ☑ The lairage should be equipped with a **good misting and ventilation system** in order to keep the temperature low in the summer. If the humidity is higher inside than outside, then the ventilation-system is not good enough.

In the case that pigs show signs of heat-stress, it is helpful to turn on the misting system continuously or more regularly and use cold water. At normal temperatures however, this is being discouraged as it keeps the pigs awake. Only turn on the misting system 5-10 minutes after arrival and shortly before they are moved towards the stunner.<sup>41</sup> At temperatures below 5°C misting systems can cause cold-stress. Watch a video of Eurcaw below that shows pigs enjoying

the cool mist.

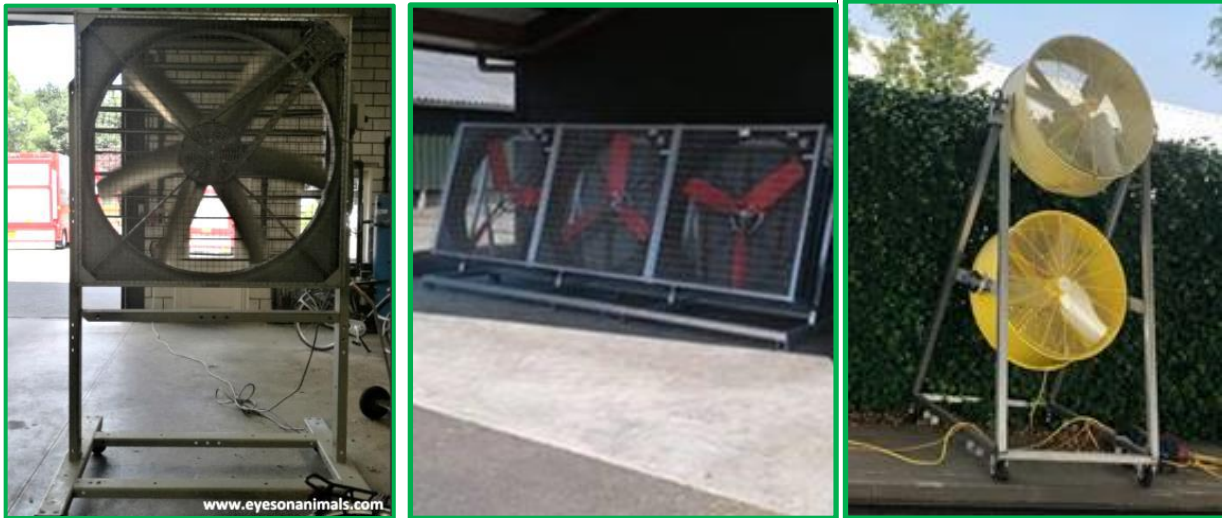


*Misting system in combination with fans helps reduce heat stress on hot days but should not be used continuously on normal-temperature or cold days. Source left video: EURCAW*

- ☑ Make sure the mist is not too dense as it causes fog and will block pigs' and workers' view. This will cause problems with handling and moving of pigs.
- ☑ In small slaughterhouses pigs are sometimes hosed down with a water hose or high pressure sprayer. This can cause a lot of stress as the jet stream is too hard and temperature too cold, it shocks the animals. Pigs will often try to avoid the spray, jump into corners or on top of each other. Only use a misting system, not a strong jet.

If a misting system is not possible, lower the pressure of the water in the hose and never point the jet stream in the faces of the pigs but only spray them from the rear.

- ☑ If you cannot keep the lairage cool enough with your current ventilation- and misting system, use **air-conditioning**.
- ☑ **Make sure there are powerful mobile fans available** that can be used inside the lairage when necessary, for example during a heat wave or breakdown in the slaughter line. There should be enough powerful fans to be able to reach all pigs inside the lairage.



*Make sure there are powerful portable fans at varying heights available that can be used inside the lairage when and where necessary*

- ☑ In order to cool down, pigs need to be able to lie down on their sides (lateral recumbency), ensuring they are not forced to lie against or on top of other pigs, and they also benefit from being able to rest against a cooler floor (through conduction) with a large part of their bodies. For this a pig of 110kg needs 1m<sup>2</sup> at the very minimum. A sow (180-200kg) needs 1.2m at the very minimum. Pigs are not able to sweat as humans can, therefore, it is crucial that they are provided with enough space to cool themselves against the floor and via the air.

42

## Reducing cold-stress

**Make sure the lairage is not too cold either.** Almost all pigs are raised in barns where temperatures are relatively stable and comfortable (about 19-20°C). They are not used to cold. Pigs can easily experience cold-stress when temperatures drop below 12°C. Piglets will experience cold-stress much sooner.

To prevent pigs suffering from cold stress:

- ☑ Watch the pigs closely. Are they huddling to the point that they crawl on top of each other, even though there is plenty of space? They are likely experiencing stress due to feeling cold (caused by the air or floor temperature) or there being air drafts in the pen. More details can be found in [Chapter 2. Recognizing signs of cold stress >>](#)



*When pigs are huddling to the point of crawling on top of each other, as seen on this photo, they are experiencing cold-stress or discomfort by drafts.*

- ☑ Keep temperatures inside the lairage around 20 degrees Celsius. Pigs will then be able to rest comfortably and recover from (cold)stress caused by transport.
- ☑ **Do not forget to measure the floor temperature!** A concrete floor can be much colder than the air. Be aware that a cold floor is extracting heat from a pigs body, especially when it is wet. The pigs will refuse to lie down or they will huddle (lying on top of each other to avoid having to feel the floor). The floor temperature can be measured with an infrared thermometer. But you can also get a good impression by touch. Does it feel cold? Than it will also be cold for the pigs.
- ☑ Having **floor heating** installed is the best long-term solution. Temporary solutions are also a thick layer of bedding or rubber mats to reduce cold-stress.
- ☑ **In winter, misting systems can cause cold stress.** At temperatures below 5-10°C (for slaughter-pigs) or 10°C (for piglets) misting systems should not be used (constantly).<sup>43 44 45</sup> When pigs are stunned with electricity, only turn on the misting system shortly before they are brought to the stunner and use warm water.

Attention: pigs that have not eaten for a long time, are very young or in poor condition are extra susceptible for cold-stress. Get these animals out of drafts and onto warm floors and let them be housed with other animals that they can lie down beside to stay warmer. Look closely for [signs of cold-stress](#) and adjust the

ventilation, misting systems and (if any) heating systems or bedding accordingly.

- ☑ **Prevent drafts in the lairage.** The presence of a draft will prevent pigs from resting, cause them to huddle and increases fighting. Make pen walls and gates solid down to the floor or use anti-draft curtains. Any openings in the pen walls let air flow in and seriously disturb the pigs, they must be sealed. Close doors that are causing drafts.



*Good anti-draft rubber curtains at Westfort pig slaughterhouse in the Netherlands to stop drafts (left photo), open gaps causing unwanted drafts (middle photo) and a curtain (right photo) to block distractions and unwanted drafts into the lairage.*

## Measuring-systems

- ☑ Make sure the **temperature and humidity in your lairage are being measured** and an alarm system is set up to give you a warning when the temperature and humidity are in the [dangerous zone](#). The sensors of the measuring-devices should be positioned in the middle of your lairage at the pigs' height to make sure to get values that the pigs experience.

Genba Solutions has developed a special measuring-device for slaughterhouse-lairages. In addition to temperature and humidity, this device also measures CO<sub>2</sub>, ammonia and sound-level. The values can be read on the computer via special software. [Read more information here >>](#)

## **Reduce fighting and mounting behavior**

Mixing pigs from different social groups prior to transport and during lairaging is unfortunately standard practice but should be avoided because mixing results in very

detrimental hierarchy fights, more mounting behavior (especially in boars), injuries, fear and exhaustion due to the inability to escape the aggressive situation. Welfare problems in mixed groups increase with lairaging time (and time of food deprivation). If mixing cannot be prevented, it is recommended to slaughter them as soon as possible and especially when they start fighting.<sup>46</sup>

### Indicate the cause of the scratches

When pigs are found with new scratches and wounds on the neck and shoulders, this is a sign of **hierarchy fights between the pigs due to mixing**.



*Pigs with fresh scratches on their necks, head and shoulders. The location of the scratches indicate hierarchy fights caused by mixing pigs from different social groups.*

Are the scratches and wounds located more on the flanks and shoulders of the pigs ? These scratches are likely caused by **mounting behavior**. Mounting behavior often causes a vertical scratch (caused by claws scratching the other pigs' body during mounting).





*Mounting behavior causes typical vertical scratches, often at the sides and shoulders of a pig's body.*

**To prevent hierarchy fights and mounting behaviour slaughterhouses should:**

- ☑ **Keep pigs in socially stable groups at all times: from farm to the lairage in the slaughterhouse.** Never mix or merge pigs from different social groups: not at the farm, not during transport and not in the lairage.

Motivate farmers and transporters to keep and transport pigs in socially- stable groups. Drivers should simply load pigs from one fattening-pen in one truck-compartment. They can use trucks with dividers that can be adjusted according to the group size on the farm.



*Trucks with partitions that can be placed in different positions, so that different size compartments can be created.*

At the slaughterhouse pigs from one truck-compartment should be housed in one waiting-pen with no mixing of new animals. Use **partitions that can be set at**

**different spacings** to keep different small social groups separate from one another in the lairage.

- ☑ At Tönnies slaughterhouse in Rheda-Wiedenbruck (DE) and Westfort slaughterhouse in IJsselstein (NL) partitions are used to keep groups a bit smaller in order to reduce hierarchy fights a little. Also at assembly centers we regularly see the use of plastic gates that can be set up, placed and taken down as desired, for example at Meijer in Harfsen (NL) and Van den Boogaart in Veghel (NL). Mixing is nevertheless still standard practice as group-sizes in these facilities are often larger than on the farm.



*Plastic gates at Meijer and Van den Boogaart assembly centers that can be set up as desired*



*Lairages at Tönnies (DE) and Westfort (NL) with partitions to reduce the mixing of pigs from different social groups*

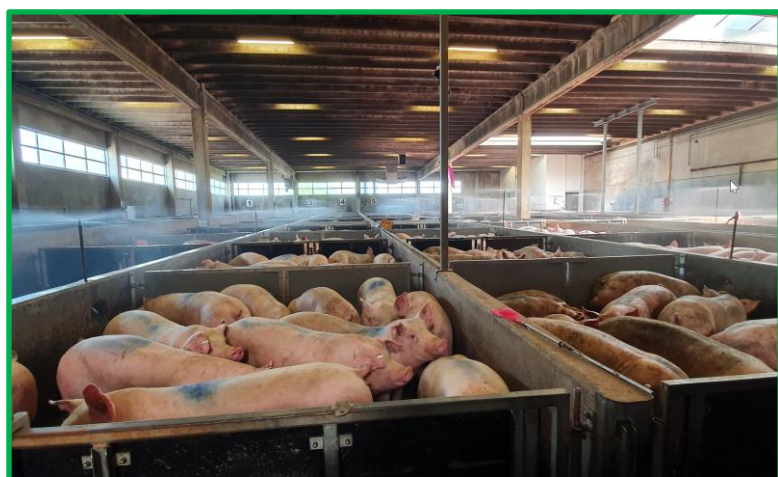
- ☑ In Belgium there is a co-op called “Porc Qualité Ardenne (PQA)” that **keeps its pigs as much as possible in socially-stable groups from farm to slaughterhouse** in cooperation with its farmers. The manager of the slaughterhouse says this makes a world of difference in the noise level and to animal-welfare in their slaughterhouse. Also in Northern Europe it is common to

raise pigs without mixing them from farrowing to slaughter. [Please watch a video of PQA here >>](#)



*Video from PQA where pigs are kept in socially- stable groups from farm to slaughter*

- ☑ At the Van Rooi slaughterhouse in Helmond (NL), since mid-2023, pigs from different truck-compartment are no longer mixed or merged in their lairage. They unload one truck compartment at a time (11-13 pigs) and place these pigs in one single holding pen. This has led to much greater tranquility in the lairage, both because there are fewer hierarchy fights and because unloading, herding, and housing small groups of pigs causes much less stress. Other Dutch slaughterhouses are planning to follow this commendable example.



*At Van Rooi pig slaughterhouse pigs from one truck compartment are kept together in one single pen to reduce hierarchy fights*

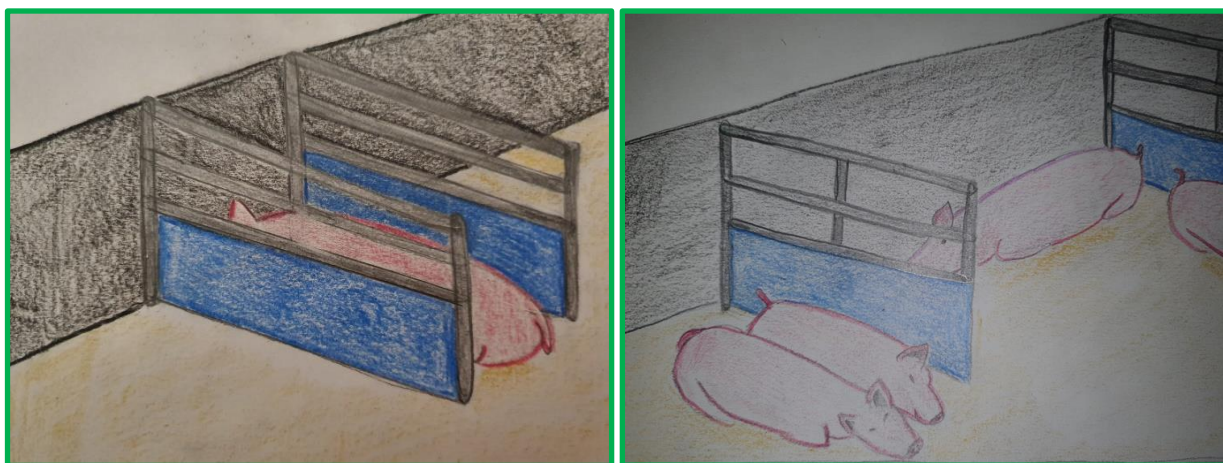
- ☑ At most slaughterhouses, pigs have often been previously mixed. If mixing cannot be avoided, it is recommended to slaughter them as soon as possible, especially when the pigs begin fighting. Resting them serves no beneficial purpose; instead, it tends to increase stress, hierarchy conflicts, mounting behavior, and can have a detrimental impact on meat quality.<sup>47</sup>

However, ideally slaughterhouses should transport, lairage, and unload pigs in socially stable groups (and thus stop mixing them), allowing them to rest for a period of 1 to 3 hours before they are moved to the stunning area. This resting period is especially important after long-distance transports.

- ☑ In case transport companies cannot prevent mixing prior to transport (on the farm), **we recommend to at least keeping pigs from one truck-compartment the same as in one waiting pen of the lairage.** Do not merge pigs from different truck-compartments in one waiting pen as this will further increase stress and hierarchy fights.<sup>48</sup>
- ☑ Bringing uncastrated boars in the night before slaughter is unacceptable when they had just been mixed during transport. They will fight during the whole night in the slaughterhouse lairage to set up a new hierarchy order. Slaughter them soon after arrival. Until then, give them plenty of straw to prevent severe hierarchy fights and mounting behavior.
- ☑ Different social groups should never be mixed, but when there is no other choice, make sure that the pigs **can escape from each other by making shelter-areas.**

This can be accomplished by building an individual passageway (see left drawing below) or a group passageway where submissive pigs can run into to escape the attacks of an aggressive pig.

To build such a passageway only two fences are needed. Make sure the fences are solid to the floor in order to prevent draughts or body-parts getting stuck.



*Create shelter areas by adding fences to each pen where pigs can seek shelter behind and escape attacks*

Creating ways for submissive pigs to escape, reduces injuries, noise, aggression and stress in the entire lairage area.<sup>49</sup> An additional benefit is that pigs prefer to

rest along solid walls and in corners rather than out in the open. By adding extra fences you create more comfortable and calm resting places.



*Escape- boxes provide shelter for pigs that are the victim of aggression or sexual frustration, such as those seen in the above photos.*

- ☑ Make sure the lairage walls have doors in them so that pigs that are aggressive can easily be moved to another pen and/or have gates in your pen to separate dominant pigs if necessary.



*Doors in the lairage pens so aggressive or attacked pigs can be removed easily*

- ☑ Make sure pigs can keep sufficient distance from one another. It is important that they be able to show natural calming behaviors, such as submission and withdrawal. Fights will then cause less injuries, stress and exhaustion. Temple Grandin recommends that pens be maximum  $\frac{3}{4}$  full, and that  $\frac{1}{2}$  full is even better. EURCAW recommends having 0.78 m<sup>2</sup> per pig under normal weather conditions.<sup>50</sup>
- ☑ Scatter some **corn** kernels on the floor of the lairage pens before placing pigs in them can help reduce stress. The newly-arrived pigs will make a positive association with the new place and this will make them calmer. The pigs will start to investigate the corn and focus their attention on the floor rather than on bugging each other or the new novel environment. This will prevent both stress in the pigs and keep them positively busy, with less time to fight. Wood shavings, straw or CCM (Corn Cob Mix) will have similar effects. Watch the effect of sprinkling corn on the pen floor in the right video below.



*Scattering corn kernels can create a positive distraction for pigs and will decrease fighting behavior upon arrival to the lairage pens.*

- ☑ Use **AllBite blocks** inside the lairage to reduce aggression. AllBite is a molasses-based block designed to reduce vice behaviors. Its design and its delivery system attract pigs and encourage them to chew on the block instead of on each other. For more information and to order one (about 45 euros) click here: <https://go.alltech.com/allbite>



*Use all-bite blocks to reduce fights and improve welfare. © Alltech*

- ☑ Spray a masking odor on all boars so they all smell the same. From slaughterhouses we have heard that this reduces fighting inside the pen significantly. This spray from the company Schippers is known to be good: <https://www.schippers.nl/ms-non-bite-spray-600-ml-1909970.html> Repeat whenever necessary. The effect is not eternal!<sup>51</sup>



*Usage of masking spray at Westfort pig slaughterhouse (NL) to reduce fighting*

- ☑ Fighting in pigs decreases when the pen has the odor of a boar in it or when there is a strong-smelling boar present in the lairage.<sup>52</sup> Spray some boar taint in the lairages for that reason. Artificial boar taint can be bought (as it is used on farms to test which sows are in heat (estrous)). See an example here: <https://www.msschippers.com/ms-boar-odor-150-ml-4505625.html>

- ☑ Some smaller slaughterhouse in the Netherlands sprinkle the back of the necks of pigs with vinegar to reduce aggression. The managers of these plants say this helps reduce fighting as all pigs smell the same. The effect however is not long-lasting so be aware that you will need to repeat it and it is important to keep waiting times low.<sup>53</sup>
- ☑ Use enrichment material inside the lairage pens which the pigs can root in and is chewable. The pigs will then start to investigate the material and fight less as they are positively distracted (see left video below). The best is straw or woodchips on the floor so pigs can express their rooting behavior for long periods of time and have a comfortable floor to lie down on. Rooting is an important inherent behavior that keeps pigs content and focused. But material such as jute cloth is also beneficial for welfare. Make sure that pigs, on hot days, can also lie down on bare floor to cool down.



*Chopped straw at Feenstra slaughterhouse to positively distract pigs from fighting and to provide lying comfort for pigs that are brought in the night before slaughter*

- ☑ If you offer chains with toys attached, such as balls, make sure they are small in size. The pig needs to be able to grab the toy in his/her mouth to make it more interesting (see left video below). If the balls are too big pigs can only push it and not grab it, making it less interesting. As you can see in the right video below, the pig will then prefer the chain where the ball fell off.





*Enrichment “balls” at a Belgian and at a Dutch slaughterhouse. The balls in the left video are better, as the pigs can grab them in their mouth. In the right video you can see the pig prefers the chain without a big ball at the end, as he/she can chew the chain but cannot place the big ball in his/her mouth. Even better is straw or woodchips so pigs can perform rooting on top of chewing.*

- ☑ To stimulate positive interaction in between pigs from different pens, attach toys that can be pulled at on both sides of the pen-wall (seesaw-effect) or make peeping holes through which pigs on both sides of the pen can see each other and touch noses.



*See-saw toys and peep-holes to stimulate positive interaction and enrichment at Feenstra slaughterhouse (NL)*

- ☑ Toys on the floor are not ideal. They get dirty quickly and pigs will then lose interest in them. If they are used anyhow, make sure to clean them regularly. Also make sure the pigs have enough space to play with the material. In an overcrowded pen enrichment material is useless.



*Toys on the floor get dirty quickly and will then be neglected by the pigs. Clean them regularly or even better - switch over to straw or woodchips or hanging toys.*

## Waiting times and fasting periods

- ☑ Fasting pigs before slaughter, within limits, is beneficial for welfare. It reduces the risk of pigs vomiting during transport and developing heat stress. However, fasting periods longer than 12-16 hours are known to increase fighting, skin damage and restlessness due to hunger.<sup>54</sup> Be aware many pigs have already been fastened for 12 hours minimum at the moment of arrival.<sup>55 56</sup> **Therefore: slaughter pigs within 1-3 hours after arrival.**<sup>57 58</sup>

**Hungry pigs are also very difficult to handle;** they go backwards, turn-around and vocalize more. They also walk less smoothly (they get stiff) and are therefore less easy to move forward. This is confirmed by slaughterhouse-managers we are in contact with.<sup>59</sup>

- ☑ **Avoid keeping pigs overnight.** If this cannot be prevented, make sure to feed them soon after arrival. They have been fastened already for a long period of time (approximately 12 hours).

Legally, pigs only have to be fed when they have not been slaughtered within 12 hours after arrival.<sup>60</sup> This is however far too late as in reality it represents 24 hours of not being fed. This feeling of hunger leads to many welfare problems, such as fighting and stiffness when walking. Slaughterhouses should always

take into account the whole fasting-period; from farm to lairage.



*Food-trough at Van Rooi slaughterhouse in Helmond (NL) to feed pigs if kept for longer than 12 hours.*

- ☑ Be especially alert on total feed-withdrawal times with sows and piglets; because they are often coming from assembly centers they very often have been fastened even longer than one thinks. Slaughter them as soon as possible or satisfy their hunger by offering them food.

## Pen density

- ☑ **Make sure there is space for all pigs to comfortably lie down and rest.** In order to properly rest, pigs need to be able to lie down comfortably (without having to touch other pigs), stand up and turn around. For this a finisher pig needs 0,78m<sup>2</sup> minimum.<sup>61</sup> Also check if pigs have enough space to easily walk towards the water nipples. Sows, of course, need more space than slaughter-pigs. Adopt at least 1,1m<sup>2</sup> per sow.<sup>62</sup>

Pigs fight considerably less in pens that are kept 1/3 empty.<sup>63</sup> Even better is when the pen is half empty.

Pen density can also be checked and monitored with intelligent camera systems.

[Read more about this here >>](#)



*Overcrowded lairage; pigs are unable to rest as they cannot lie down comfortably without lying on top of each other and should one want to walk or drink, he/she disturbs others.*



*Left pen: perfect loading density. Right pen: loading density is 'ok' at normal temperatures. Pigs fight considerably less when they have more space.*

- ☑ In summer make sure every pig can lie down on its side with legs stretched out, without having to touch other pigs. In this position a pig can reduce its body temperature by the form on conduction. For this, a finisher pig needs at least 1.1m<sup>2</sup> of space.<sup>64 65</sup> A sow (180-200kg) needs 1.5m<sup>2</sup> minimum.
- ☑ **Sufficient space is also crucial to keep stress-levels low when pigs are moved out of the lairage.** If the pen is overcrowded, pigs have nowhere to go when the employee enters the pen and comes close (into their flight-zone). This results in (mass)panic, pigs jumping onto each other and being trampled.

Make sure pigs have enough space to turn around, walk past each other (when the pig in front stops or slows down) and to exit the pen without having to walk past the employee too closely. Never walk in the opposite direction of the pigs or through the pigs, always walk behind them.

Find more details in [Chapter 4. Moving of pigs – Moving pigs in and out of the lairage >>](#)



*The fuller the pens, the greater the risk of mass panic*

- ☑ To keep pigs calm, it is best to keep them in small groups (up to 15 pigs).<sup>66</sup> The best is 10-12 pigs; pigs from one truck-compartment can then be kept and placed together in one lairage pen. This prevents the mixing of pigs from different social groups, and thus prevents hierarchy fights.

## Reduce noise

- ☑ Pigs are very sensitive to new or sudden noises. Pigs cannot localize the direction of sound as well as people. Pigs are able to hear sounds that humans cannot (ultrasound). **Pigs experience less stress in a quiet area – this will also ease handling and improve meat quality.**

**Therefore get rid of all loud and abrupt noises in the plant**, such as people shouting, gates that bang when closed, chains hitting metal, loud machines or loud herding tools, such as clappers and rattles., hissing sounds from pneumatic machinery etc.. Make sure the noise level in the lairage does not exceed 75dB as pigs need to be able to rest and recover from transport stress.<sup>67</sup> Noise levels above 80-85dB, especially when they are abrupt, are known to cause stress in

pigs (increased heartrate and agitation) and negatively affect meat quality (PSE meat).<sup>68</sup>

- ☑ Hang up a **large decibel monitor** linked with a green smiley face/light or red unhappy face/light, to make employees aware of the noise level and motivate them to aim for lower decibels. For more information about decibel monitors and where to order them refer to [Chapter 7. Smart surveillance - Sound >>](#)



*Monitors showing the decibel level in a Dutch slaughterhouse. Left: dB monitor at the unloading dock, right: dB in the lairage.*

- ☑ Using plastic instead of metal gates and fencing is a way to reduce noise because **plastic gates** hardly make any sound when opening or closing.



*Plastic gates are much better than metal one to keep noise level low: at export center Meijer (left photo) and slaughterhouse Westfort (right).*

- ☑ Prevent metal on metal contact when gates are closed by mounting rubber or other sound-reducing strips or padding where they come into contact.



*Mounting rubber helps in reducing loud bangs when gates are closed*

- ☑ Make sure that areas where a lot of noise is produced (for example where the trucks are cleaned with high-pressure water hoses or where animals are being unloaded) are located far away from the animals, or are separated from the lairage by insulated walls. Inside the lairage you want it to be as quiet as possible so animals can rest and not be distracted or anxious.



*By installing a noise reduction wall between the lairage and the rest of the slaughterhouse, the noise level in the lairage at Ameco cattle slaughterhouse has been significantly reduced (left photo). At Compaxo, a noise reduction wall was installed to prevent echoes and noise from spreading (right photo) through the lairage.*

- ☑ **Install materials in the ceiling that can help absorb noise.** Make sure that, when using pneumatic systems, hissing sounds are transported to a different room via a pipe. The shape of the roof has a big influence on the noise level inside a lairage. A gable-roof (inverted V-shape) will cause more noise than a

saw-tooth-shaped roof.<sup>69</sup>



*Sound absorbing design and material of ceilings*

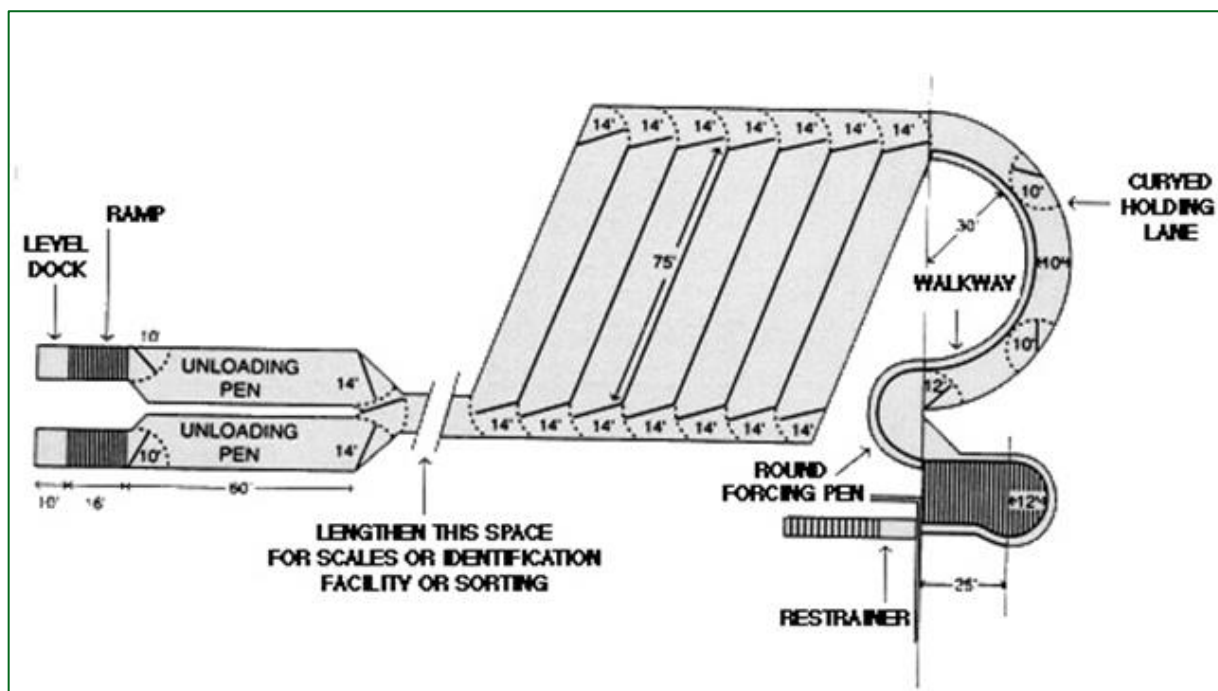
- ☑ Research shows that melodious music lowers the heart rate, which indicates a lower stress level, in animals (just like in humans). When music is played, pigs startle less easily from sudden noises. Make sure the music is soft and melodious. Classical or soft rock can work. Hard (rock) or fast music with lots of up and downs in tone can have the opposite effect.

A slaughterhouse in Belgium has installed speakers in the lairage and is very pleased with the result. In a German slaughterhouse, where they also play music, they have composed a [Pig Pop CD with classical music and soft rock](#). The pigs in the lairages are calmer and the employees enjoy the music as well. Studies have shown that a content and relaxed employee is calmer when handling animals than a frustrated or bored employee.

## Design

- ☑ Long and narrow pens where pigs can enter on one end and can exit on the other end (see drawing below) are ideal. Pigs like this design of pen because there are two long solid walls to lie against. Pigs prefer to lie against a solid-wall rather than in an open area. Long and narrow pens also result in fewer fights.<sup>70</sup>





Temple Grandin's design showing oblong pens. This design was made for a cattle slaughterhouse but the left part (unloading and lairage pens) can also be applied to pig slaughterhouses. © T. Grandin

- ☑ The walls of the pens should be high enough and solid down to the ground in order to block the pigs' view of workers, minimize distractions, stop draughts and keep pigs calm. The walls should be 1m2 high so pigs cannot look over it.<sup>71</sup>
- ☑ **Make sure that there are no sharp edges or pointy objects in the lairage** or any of the areas where live animals will be passing through. These will cause injuries.



Sharp protruding objects will cause injuries. Photo: T. Grandin

- ☑ Make sure there are electric tongs available throughout the lairage, so animals that are suffering can be stunned and killed immediately on the spot where they lie. Bleed out the animals immediately after stunning them and only move them to the slaughter line afterwards.



*Left: cord and socket attached to a rail along the entire lairage so the mobile electric stunner can be used everywhere in the lairage. Right: mobile trolley to bring pigs that have been emergency stunned and bled-out pigs to the slaughterline.*

- ☑ Make sure there are enough water nipples so all pigs (also the submissive ones) are able to easily access water at all times. Also check if the nipples are easy to access (at a height of 0,7m2 for slaughter pigs) and work efficiently.<sup>72</sup> Check them regularly.

Be aware pigs are often deprived of water during transport – they can arrive already very thirsty, especially on hot days, and need to have access to water as soon as possible. There should be at least one drinking nipple per 10 pigs, but to avoid the risk of submissive pigs not easily accessing the nipple, it is much better is to have several spread out throughout the pen.



*Left photo: Nipple too close to pipe rendering it inaccessible. Right photo: Correct nipple.*

- ☑ The best are water-nipples integrated into the wall, so they do not protrude or cause injuries, for example when pigs fight and rub up against them.



*Most ideal are water-nipples integrated directly into the wall, so they do not protrude*

- ☑ It is important that the condition and mobility of pigs can be checked without the veterinarian or inspector having to enter the pen. Entering the pen will wake up and stress the pigs. Make sure there are paths in between the pens where inspectors can walk.

## Sick pen

- ☑ Pigs that arrive in poor condition, are injured, sick, in shock or showing any signs of discomfort or suffering **should be stunned and killed immediately** (using

emergency slaughter) on the spot. This is required by law. Please refer to [Chapter 2. Arrival - Handling of pigs in pain or discomfort >>](#)

But also mildly sick or injured pigs or pigs with a (small) abnormality (“suspect animals”) such as a large umbilical hernia, a joint infection, a bitten tail or abscess should **be stunned and killed immediately** to relieve their discomfort right away. This applies to both category 2 AND 3 pigs. Never let them wait until the end of the day – this prolongs their stress. Waiting in a slaughterhouse is not restful for any animal and certainly not for one that already feels compromised.



*(Mildly) sick or injured pigs or pigs (“suspect animals”)*



*Stun and kill suspect animals immediately on the spot to relieve their discomfort*

- To prevent “suspect animals” contaminating the slaughter line they can be marked or tagged after killing them. This way the veterinarian sees easily that

their carcass needs special attention in the post mortem check. Some slaughterhouses have an extra slaughterline for carcasses that need extra inspection. In any case, do not leave them to wait until the end of the day.



*Marking (a cut in the dead pig' feet) of suspect animal in Austrian slaughterhouse*

Nevertheless, a pig can look healthy on the outside, but have a major infection on the inside. Some slaughterhouses therefore argue that separating those with small abnormalities in advance does not make sense because each individual has to be properly checked anyway.

**If slaughterhouses however make use of a pen to accommodate suspect animals for a (short) period of time, they have to make sure the conditions inside these pens are optimal:**

- ☑ The pen should be **near the unloading area** so pigs can be rested immediately after unloading. This area is usually noisy however, so **insulated walls** or other options must be used to keep the environment inside the suspect pen quiet and non-threatening. Suspect pigs are often not in an optimal condition. Even more than other pigs they need to recover from stress in a quiet area.
  
- ☑ Provide a **soft and warm lying area** for the suspect animals. Offer the animals sawdust, straw, or rubber matting to lie on. When pigs are in the lairage over 12 hours, bedding is required by EU law (EC 1099/2009).<sup>73</sup>
  
- ☑ Westfort and Compaxo (NL) have installed floor heating in the sick pen (and the rest of the lairage). This is also a good idea to keep the pigs warm and

comfortable. Tönnies (DE) and Pali (NL) offer rubber mats. Cooperl (FR) and Feenstra (NL) offer straw, this is the best solution. At Van Rooi and VION there is woodchip bedding.



*Straw at Cooperl (photo taken 2008) and Feenstra (photo taken 2021)*

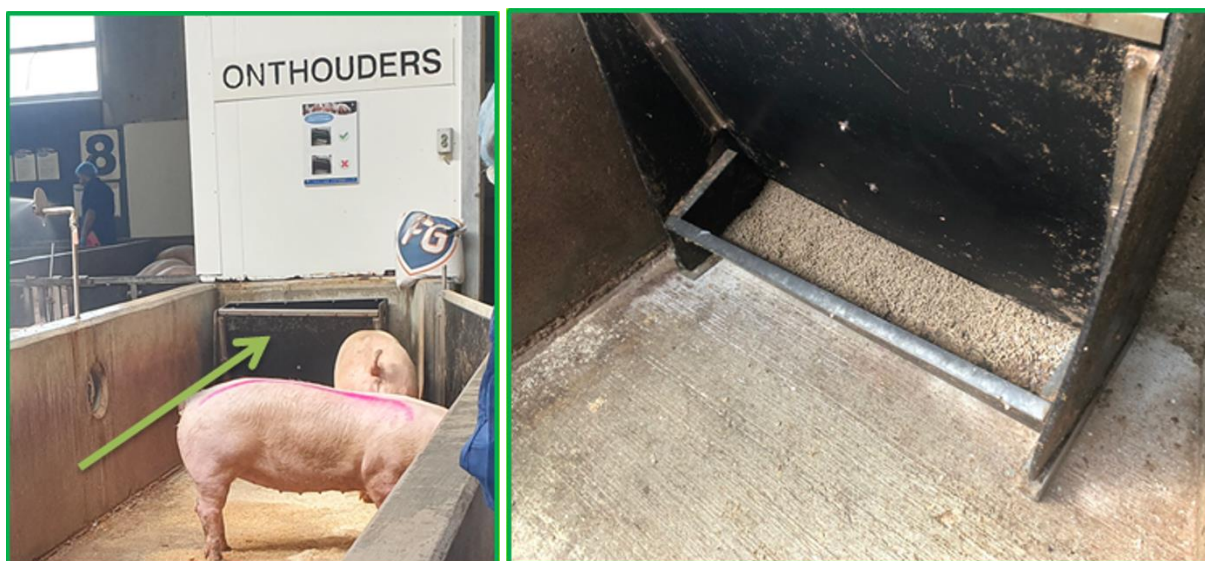


*Rubber mats at Tönnies (DE) and Pali (NL)*



*Sawdust at VION and Van Rooi (NL)*

- ☑ Make sure that there are **enough drinking nipples**, easily accessible for all pigs (including the submissive and less mobile ones).
- ☑ Make sure to give suspect pigs **food upon arrival**, in case they are not slaughtered immediately (within 1-2 hours) and especially if they will have to wait until the end of the slaughter day. Be aware most pigs, at arrival, have not eaten for 12 hours at least.<sup>74 75</sup> They are thus already very hungry and the hungrier a pig feels, the more difficult it is handling them.<sup>76</sup> Not feeding them and keeping them until the end of the day is totally unacceptable. Refer to [Chapter 3. Lairage – Waiting times and fasting periods >>](#)



*Food for the pigs kept in the suspect pen at Van Rooi slaughterhouse (NL)*

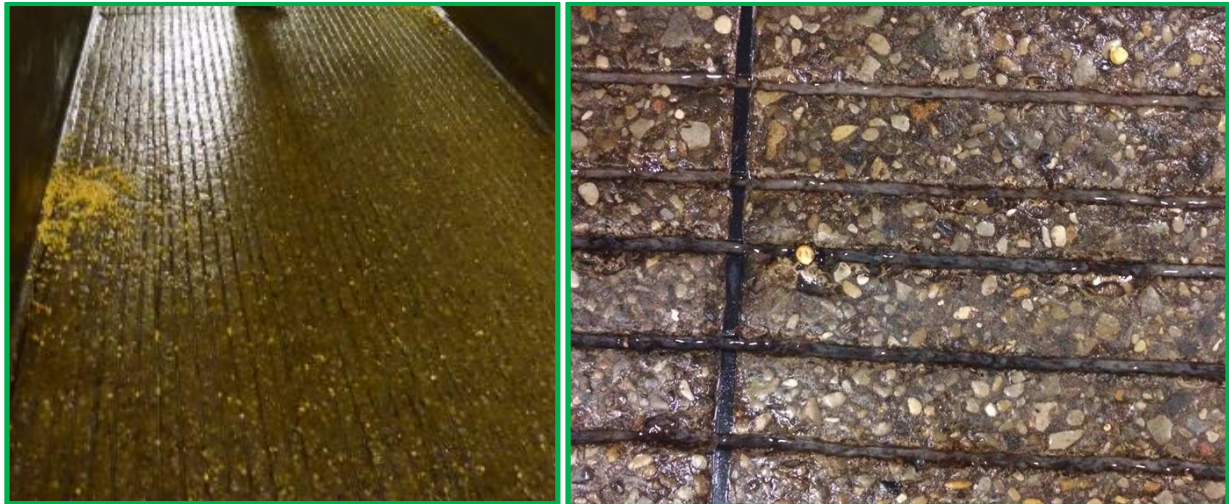
- ☑ Make sure there is **enough space and no draughts**. To prevent draughts, make sure the walls are solid down to the floor. There should be no open gaps.
- ☑ Make sure the **floor is dry, especially in the winter**. Wet floors easily extract heat from a pig's body. In the winter it can cause hypothermia.
- ☑ Give the pigs some **corn kernels, Corn Cob Mix (CCM) or bedding** to keep them occupied.
- ☑ Place **dividers into the sick pen** so submissive pigs can be easily separated or protected from dominant pigs. Creating ways for submissive pigs to escape, reduces aggression and stress in the entire pen. Refer to [Chapter 3. Lairage -](#)

[Reduce fighting and mounting behavior](#) for more details and illustrative drawings.

- ☑ Make sure that the **temperature is comfortable**; in between 15-26°C for slaughter pigs and 15-20°C for sows depending on the humidity level. The higher the humidity, the more difficulty pigs have in coping with heat-stress.

## Flooring

- ☑ Use the **same flooring in the lairage as in the rest of the facility**. This prevents sudden changes in floor structure or colors. Differences in flooring causes confusion, fear, hesitation behavior and as a result, bottlenecks and pile-ups.
- ☑ **Have a comfortable and good anti-slip floor**. When floors are slippery pigs will walk more slowly and they will feel insecure. It can also lead to serious accidents and injuries, especially when there are hierarchy-fights and the fighting pigs slip and slide.



*Good, non-slip flooring at Toennies slaughterhouse*





*Good non-slip flooring (concrete with slots milled out) at Feenstra slaughterhouse (left) and unknown slaughterhouse (right)*

- ☑ Use floor heating in winter and floor cooling in the summer to keep pigs comfortable and prevent cold- and heatstress. It also reduces stiffness after long lairage times.

## 4. Moving of pigs

### Moving pigs in and out of the lairage

- ☑ Most important: move pigs in **small groups**. This is a basic principle.<sup>77</sup> The number of animals depends on the design of the facility, but very small groups (6 pigs) work best.<sup>78</sup>



*Always move pigs in small groups.*

- ☑ Make sure pigs have enough space; raceways and corridors where pigs are being driven through should be **maximum half full**.<sup>79</sup> Pigs need space to turn around when facing the wrong direction and to pass each other.<sup>80</sup> If they don't have space, they will jump on top of each other and some could fall and get

trampled – causing panic in the whole group. They also need to be able to keep sufficient distance from you to prevent them to panic. Crowding them or causing bottle-necks creates welfare problems but also will slow you down.

Working with small groups and allowing them enough space, prevents (mass) panic, trampling, smothering and injuries while moving pigs out of the pen.



*Here too many pigs are moved out of the lairage at once. If panic breaks out pigs have nowhere to go and will trample and smother each other.*

**☑ Always let pigs walk ahead of you and don't walk against the flow.**

When you move the pigs out of the pen, make sure that they have sufficient space in front of them (to walk away from you). Make sure to approach pigs from the back-end of the pen, where the pigs do not have to go. Most pigs from intensive farms have the natural tendency to walk away from humans as they are scared of people.



*Walk behind the pigs and make sure the space ahead of them is clear and empty*

- ☑ **Before you start moving the pigs, make sure the gate is open.** Only then, when there is an exit route for the pigs, do you start moving the pigs forward. Make sure you are always positioned behind the pigs, so they don't have to pass you or get close to you.

Never walk into a full pen if the pigs cannot exit the pen on the other side. The pigs will then run away from you towards the gate or walls, where they will panic, jump on top of each other and get trampled.



*Never walk into a pen with so many pigs, especially if they also cannot exit on the other side, this will result in extreme panic (pigs jumping on top of each other and get trampled).*

- ☑ In bigger slaughterhouses, lairage-pens often house dozens of pigs. As pigs should be moved in small groups only, make sure each pen has enough access doors or slots. This way the employee can enter and move pigs out of the pen at different locations. You do not want him/her to wake up the entire group if only the first few pigs have to be moved forward. Each pen for this reason should have more than one access door. The bigger the pen, the more doors are needed. Make sure the doors are easy to use to prevent employee fatigue and ensure consistent use.



*Make sure there are several entrances on each side of the pen so the worker can easily move out the pigs*

- ☑ Move the pigs out quietly. Do not shout or whistle or bang your herding tool against the side walls. Do not use tools that cause pain or noise such as electric prods, noise producing paddles or clappers. Use tools that are quiet, such as a plastic flag on a stick, a bag or a moving board. Like Temple Grandin says “if pigs walk forward, do not touch them and stop using the tools”.<sup>81</sup> Make sure to never walk through the group.



*Foldable plastic sheet to move pigs (left) and flag with handle and centre handhold (right), which is lighter to use than a board. Source: Temple Grandin<sup>82 83</sup>*



*Moving pigs without any tools at Westfort slaughterhouse in IJsselstein (NL) – the best way to move pigs.*



*Moving small groups of pigs out of the lairage with silent tools; a blown-up plastic bag and a plastic moving board. Videos taken at Compaxo slaughterhouse in Zevenaar (NL).*

- ☑ Especially when a lairage pen does not have enough entry doors, flags on a stick are ideal. Without coming to close (and stress the pigs out) pigs can be moved forward in small groups from the outside of the pen.



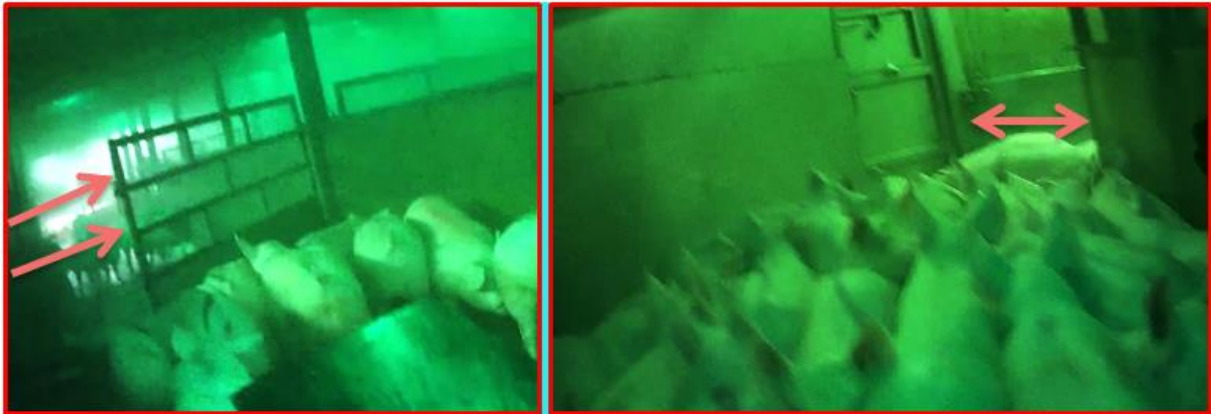
*By using a flag on a stick, pigs can be herded forward without having to access the pen. Photos taken at Compaxo slaughterhouse in Zevenaar (NL).*

Pigs will naturally walk away from you, so hurting or frightening them is not necessary and is unacceptable. Be aware that a stressed pig is more difficult to move. The calmer you are, the easier it will be to move the pigs out.



*By using a flag on a stick the arm can be extended so that, pigs can be herded forward calmly without the worker having to enter the pen. Video taken at Compaxo slaughterhouse in Zevenaar (NL).*

- ☑ Half-open gates, square corners, funnel shaped and narrow exits are unacceptable. These cause confusion, pile-ups and excessive stress.



*Half-open gates (left) and funnel-shaped or narrow exits (right) lead to pile ups and stress*

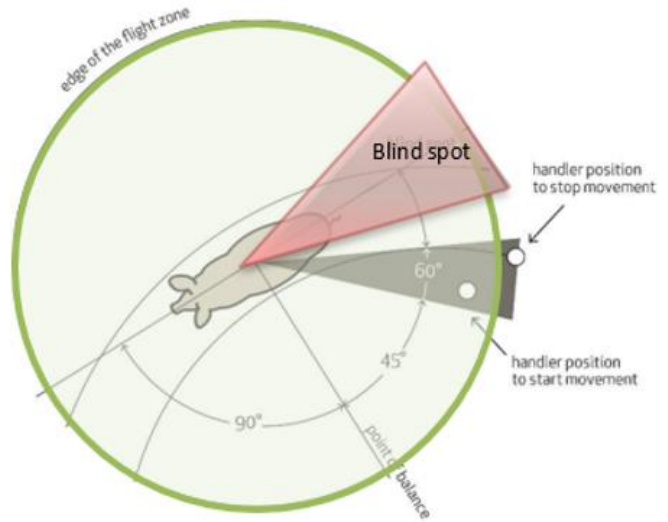
## Raceways general

**If pigs are scared to enter a raceway or reverse half-way – there is a problem with the raceway, not with the pigs.** Find out why the pigs are scared to move forward and remove the causes.

### Pigs' view

It is important to realize that pigs see the world differently than we do. They are much lower to the ground and have a very wide angle of vision (310°). This is because their eyes are positioned at the sides of their heads. This enables them to see very well what is happening around them – better than we do.<sup>84</sup> Their only blind spot is directly behind them (see the drawing below).

However, having the eyes positioned on the sides of the head means that pigs' depth perception is poor. For this reason, pigs have difficulties with sudden changes on the floor (texture, color or objects). They first need time to explore it, to be sure it is not dangerous. When walking their focus is therefore mostly on the floor.



*Pigs can see very well around them – they only have a small blind spot directly behind them. Drawing by ICF / European Commission (2017) <sup>85</sup>*

It helps to observe and assess the route by going down on a pigs' eye-level. This means you have to get down on your knees or film it from a low position and then watch the footage! The route should be completely clear and appear safe without any strong contrasts, dark shadows, puddles with reflection, gaps where light come through, people or objects constantly moving around etc...



*Assess the route at eye level of the pig. Is the route clear? Are there things that could possibly scare the pigs?*

## List of distractions

Below is a list of design and handling problems that often cause pigs to panic and balk. Remember: a stressed pig is very difficult to handle – it is crucial to keep them calm and remove all potential stress factors!



- ☑ Remember that a calm pig will show you what is distracting him/her as he/she will look in that direction.<sup>86</sup> In the photo below you can clearly see the pig is distracted by the people standing next to the raceway up ahead. In this case, the pig will not want to move forward ! Get those people out of her/his sight, for example by placing high solid hiding-walls.



*A pig will look at the distraction – in this photos the workers next to the raceway*

- ☑ The **entire floor should be of the same color and material and not have any protruding contrasts.** Due to poor depth perception, pigs are sensitive to contrasts in colors or texture. Differences in flooring causes stress and pile ups.



*Changes in floor colour or material will make pigs balk*

- ☑ Small abnormalities on the floor, such as drain covers, metal strips or puddles, will cause pigs to stop. Pigs want to investigate them, before they continue

walking. **That is why all abnormalities should be removed and floor-drains be installed outside of the raceway and not in it.** The whole floor should be even, without any gaps, bumps or contrasts.



*A sudden change in the floor, such as a metal-strip or drain-cover is enough to cause pile ups.*



*Left: metal strip distracts the pig. Right: drains are painted green to reduce contrasts, which is good. However the pigs were still distracted by the metal grey strips.*

- ☑ Prevent **shadows or reflections of light on the floor**. Pigs cannot see well what a shadow is. They want to investigate it first, to make sure it is not a hole in the ground. Shadows and reflections on the floor will therefore cause pile ups, hesitation, and stress in the pigs.



*Shadows and reflections on the floor like these will make pigs balk. Left: © T. Grandin*

Shadows can be reduced by using indirect and diffuse light. Try placing the lamps on the side instead of on the ceiling or placing more lamps throughout the plant, higher up. Try to remove things that cause shadow on the floors, like beams, bars etc..

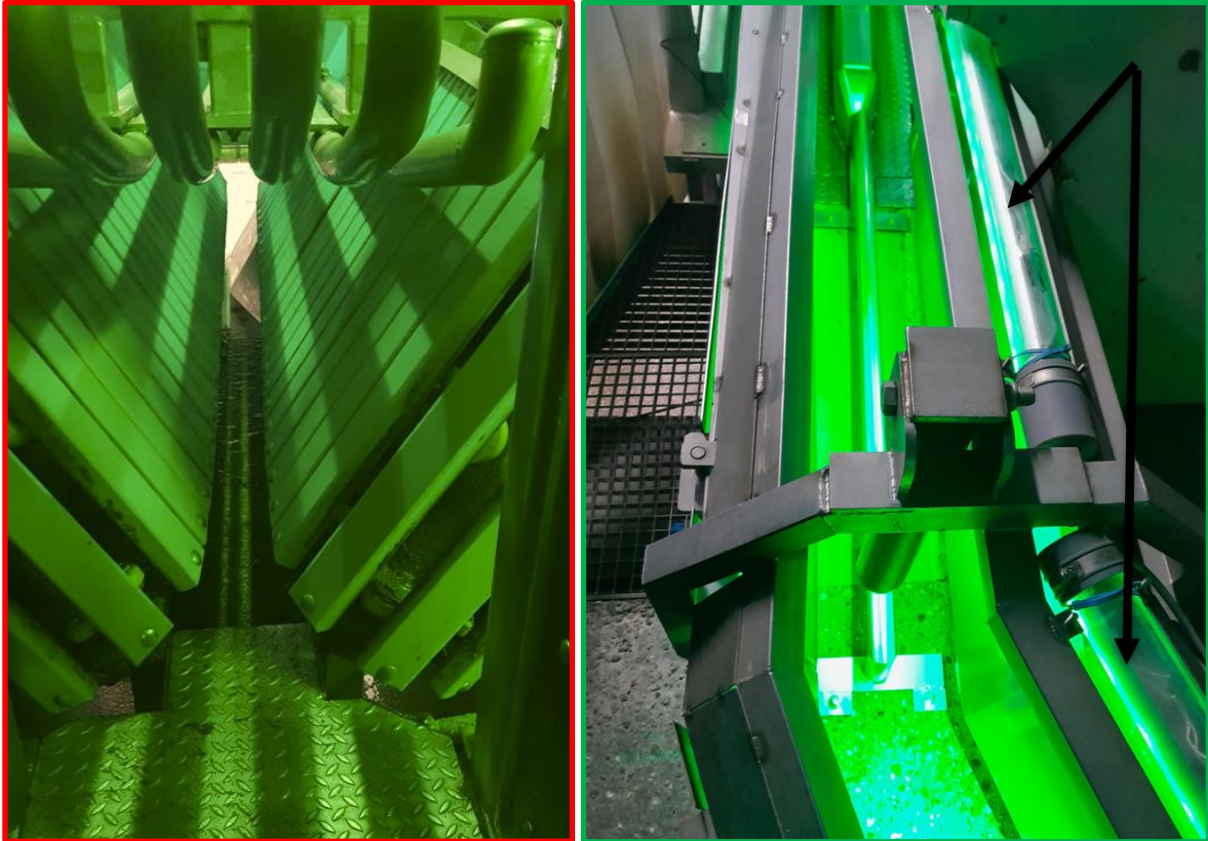
- ☑ Installing green lighting will help reduce shadows on the floor. Green light also has a calming effect on pigs. It is the color of trees and bushes where pigs feel inherently familiar and safe in.



*Green lighting installed at Tönnies (DL) and Van Rooi (NL) to reduce the creations of shadows*

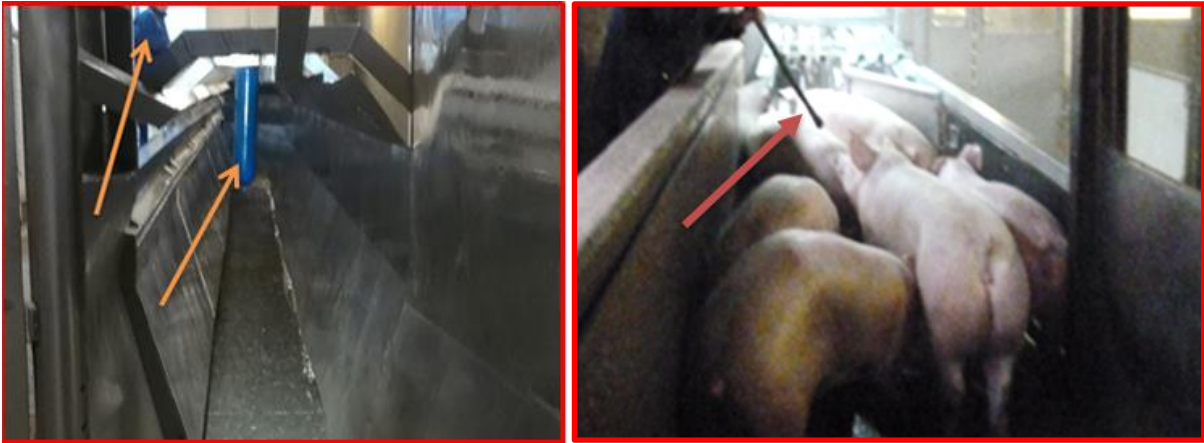
Green light however will not totally remove shadows. If green lights are strong

and placed above the metal bars of the raceway, shadows will still occur. See the left photo below. Place the green lights, whenever possible, in between or below the metal bars (see right photo below) to prevent shadows. Make sure the lights do not shine into the pigs' eyes.



*If green lights are strong and placed above the metal bars (photo on the left), shadows will still be created. To prevent shadows, make sure the lights are placed in between or below the metal bars (photo on the right).*

- ☑ Realize that pigs will not move forward if there is anything hectic happening ahead such as workers moving, shouting or prodding other pigs. This will definitely stop the pig from walking any further. Having workers ahead is a common problem in many slaughterhouses.



*In the left photo the pigs can see an employee and a bright blue anti reverse flap, which will scare him/her off. In the right photo pigs see a prod in front of them hurting other pigs.*

- ☑ **In general it is important to have as few workers as possible along the raceway.** The more workers, the more chaos, the more stress. Workers especially make pigs nervous when they move abruptly and a lot or make loud sounds.
- ☑ **A common mistake is to move pigs forward while there is no space yet further ahead**, for example, because the single-file raceway is full, gate ahead is closed or the stunner it not yet ready. The pigs are forced to stop and as a consequence will turn around. This stop-and-start movements create a lot of stress amongst pigs.

It is important pigs can always continue walking. Temple Grandin therefore always emphasizes to “time your bunches” and “workers be well attuned to each other’s’ activities”.<sup>87</sup> Make sure to have this worked out well in your Standard Operating Procedures. Placing traffic lights at strategic places or video screens can help workers time the bunches well.

- ☑ **Loud noises are one of the most common reasons for pigs to experience stress.** Do not let your workers yell or whistle. Only make use of driving tools that do not produce sound, or only minimal, such as plastic bags, flags and boards. Refer to [Chapter 4 Moving of pigs - calming the movement >>](#)
- ☑ **Make sure to only use metal that is brushed.** Brushed metal will prevent reflections and glimmerings which can distract pigs. It is known that pigs’ hair has a polishing effect. It is therefore important to repeat brushing the metal

whenever necessary. Best is to use hard plastic or concrete whenever possible as these materials reflect light less.



*Reflections in the raceway can cause pigs to stop as they see movement everywhere and get confused.*

- ☑ Another important reason pigs refuse to enter a raceway is when air blows into their face. Pigs really become stressed in windy and drafty environments. If air is blowing in the raceway, the pigs will walk in the opposite direction, away from it. The airflow can be checked by using a smoke producing device. Make sure to close doors and use walls and gates that are solid down to the floor to prevent any drafts.

### Improve design and facilities

- ☑ Make the route towards the stunner simple. The route should be completely clear and appear safe.
- ☑ The group raceway should be a minimum 'two pigs' wide and should have no square corners or wasted space that pigs could walk into and get lost in.

A 90 degree-angle as shown in these photos below will definitely cause pigs to balk, pile up and panic as it looks like a dead-end to them.



*A square angle, through the eyes of a pig (see right photo), will look like a dead end. It will cause pigs to balk, pile up and panic as they cannot see that the path continues to the right.*

- ☑ It is extremely important, especially in raceways with sharp corners, to always move pigs in small groups to prevent jamming and panic.
- ☑ Place a panel in sharp corners to block the sharp corner and make it more diagonal, this will improve the flow and reduce stress. Make sure the panel is the same color as the rest of the raceway to prevent it distracting the pigs.



*A deflecting wall to block off a sharp corner will improve the flow and reduce stress but the ones above are not the right color. Make sure the deflecting wall has the same color as the walls behind it, to prevent contrast.*

- ☑ Make sure that curves in raceways are **well lit** – to prevent the illusion of a dark dead-end. A curved raceway is ideal because it gives pigs the impression that they are walking back to where they came from. A curve in a raceway limits the

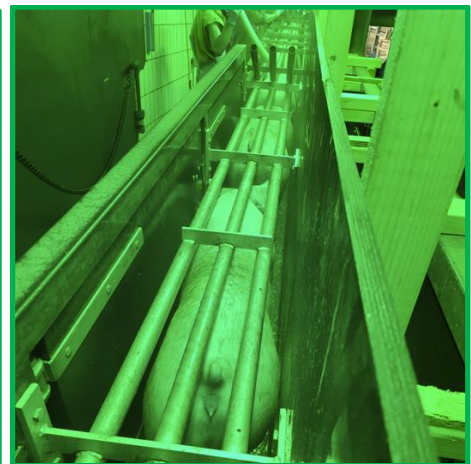
pigs' front and back view which reduces visual distractions.

The exact sharpness of the passageway is very important. A pig needs to be able to **view an area in front of him that has a length of at least 2-3 pigs.**<sup>88</sup> If not, the pig will think that there is a dead-end and turn around or walk backwards.

Read more about curved raceways in [Chapter 4. Moving of pigs – design >>](#)

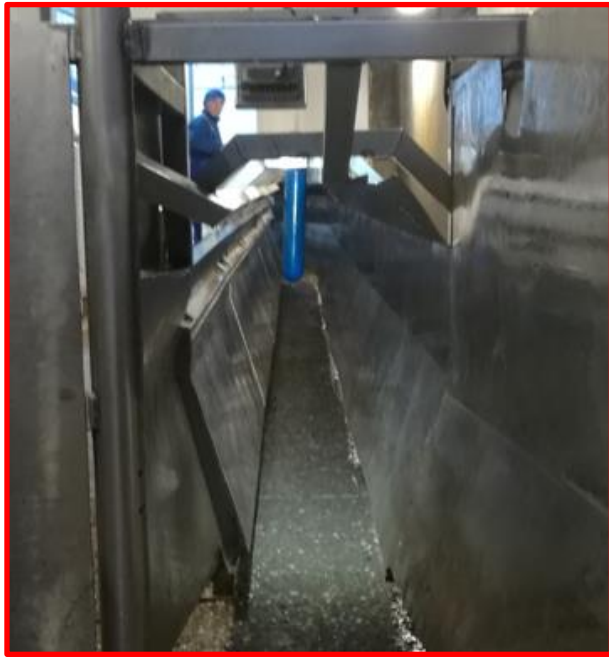
- ☑ **The sides of the raceways should always be high and solid so pigs are not distracted by people or objects around them.** People or strange objects can cause pigs to turn around, pile up and become nervous.

Remember that a worker standing at the side of the raceway is in the center of a pigs' visual field because pigs have their eyes positioned on the sides of their heads.



*High, solid sides prevent pigs from seeing people*





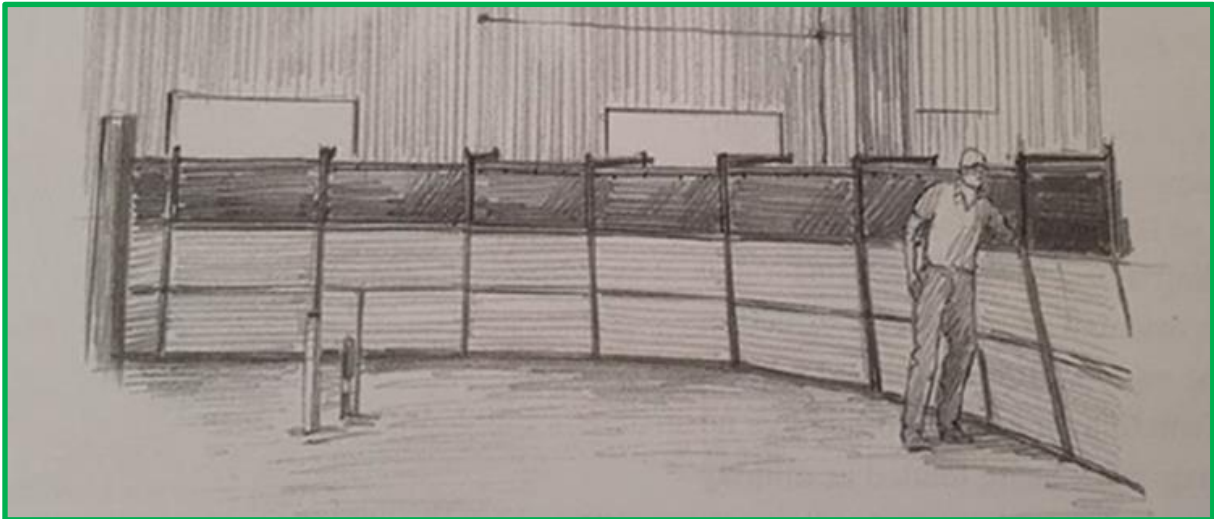
*Left: old situation with open sides, right: new situation with solid sides and green light. Due to the solid sides workers cannot be seen anymore. Lighting however has increased reflections.*

- ☑ If you really need a person to work in the raceway, **place high solid panels where the worker can hide behind** so he/she cannot be seen by the pigs. Pigs will then walk forward more calmly and undisturbed.



*Panel in the raceway at Westfort slaughterhouse where an workers can hide behind when pigs are passing*

- ☑ By hanging rubber curtains at the sides of the raceway, you prevent pigs from getting distracted. At the same time you can still approach the pigs whenever necessary as the curtains are flexible. See a drawing of this idea by Temple Grandin below.



*Illustrative drawing by T. Grandin of a raceway with flexible rubber curtains on the sides, to block the pigs' view of distractions but to still enable workers to approach the pigs when needed.<sup>89</sup>*

- ☑ Also remember to close all open gaps on the side of raceway to prevent pigs from being distracted. Pigs have their eyes on the sides of their heads – what happens next to them is in the center of their vision.<sup>90</sup>



*If a raceway is open on the sides – attach some side panels. This will block pigs' view of workers or other distractions at the side. In left photo you can see side-panels (green arrows) but there is still a gap (red arrow) that needs to be closed (-). In the right photo you can see that the pig can still see a worker ahead (orange arrow) which will make him/her nervous to move forward.*

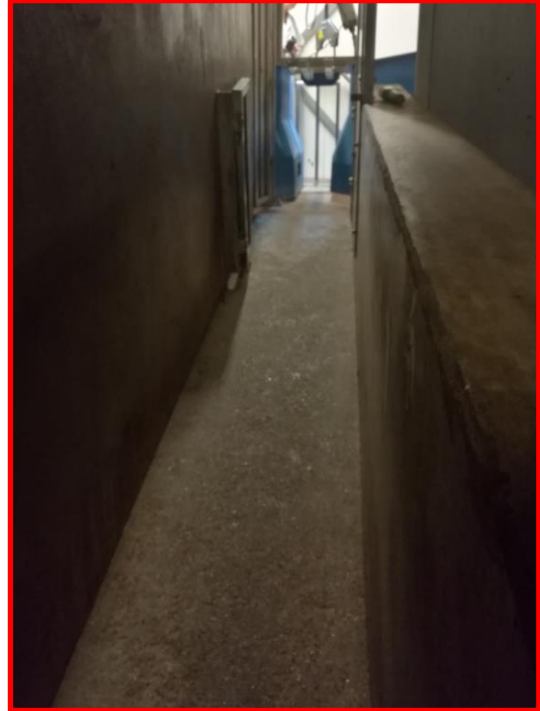
- ☑ **Prevent pigs from getting jammed underneath the “guillotine” doors that slide down automatically.**
  - Have an open space underneath the doors – do not let it close fully to the floor.

- Fit the bottom of the doors with flexible rubber. This prevents injuries (rubber will bend) and warns the pig in advance.
- Make sure that employees operating these doors are continuously alert and are given time to do their jobs well.
- The best are doors with safety-sensors. As soon as it registers slight pressure (a pig underneath) the door opens automatically and immediately.



*Left: guillotine door fully closes to the floor and crushes the pig (old situation), right: rubber is attached and there is an open space underneath to prevent pigs from getting stuck and injured.*

- ☑ Make the flooring of the passageways **non-slip**. If pigs are scared to slip they will slow down or even stop walking, resulting in pile ups and stress.
- ☑ Make sure that all the floors in the slaughterhouse are flat and level. Especially the raceway towards the stunner.<sup>91</sup> Pigs are afraid of slopes, causing pile ups.



*A raceway with a slope going upwards makes it difficult to move the pigs*

- ☑ Make sure there are no gaps, protruding parts or sharp edges in the raceway that can cause injuries.



*Pig with his/her leg caught in a gap next to the anti-reverse door*

- ☑ Use the principle that pigs like to walk towards the **light**. Lighting the end of a passageway (see pictures below) will facilitate pig movement. Avoid light shining directly into the face of the pigs though because this inhibits their movement.

Fiddle with the angle and distance of the light so that the least amount of shadows are created. Indirect diffuse light (from the sides) and lamps placed far away are often best. Green light helps to prevent shadows and keeps pigs calm, but it must be bright enough.



*Left: extra lighting above the single-file raceway can help to encourage pigs to walk forward, right: indirect light from the side causes the least amount of shadows but make sure pigs walk towards more lit-up areas. In this photo it is rather dark.*

**Make sure to use LED light that does not flicker. Flickering lights will distract pigs.** This can be checked by using your phone-camera in slow-motion modus.

- ☑ There should be enough access doors in the raceway to remove pigs that are injured, in shock or frightened to move further. Don't focus too long on a pig that does not want to move further. Let the pig exit the raceway to keep the flow going. Realize that the screams of one individual causes stress in the whole group.

Make sure that compromised pigs are immediately stunned, bled out and moved to the slaughter line after exiting the raceway. Do not abandon them and let them suffer longer.



*Exit-door in the raceway to remove compromised or very stressed pigs*

## Calming the movement

- ☑ **The most crucial factor in keeping pigs calm is by reducing the speed.** A rushed pig is more likely to panic, attempt to escape, turn around, or freeze out of fear – delaying the process. Rushing pigs will invariably lead to poor welfare, affecting both the pigs and the workers, and it will also have a negative impact on your meat quality, specifically the pH level.

You can reduce speed without having to lower your slaughter capacity, simply by installing more stunners, whether you use an electric or CO<sub>2</sub> stunning system. For instance, instead of processing 600 pigs per hour, you can decrease the speed to 300 or even 150 pigs per hour by incorporating additional raceways and stunners. This will have a huge impact on the stress-level in your slaughterhouse!

- ☑ **Ban all stress and sound- producing tools.** The use of electric prods, sound producing paddles, clappers, high-pressure air guns and yelling is not necessary in a well-constructed raceway. Clappers, air-guns or sound producing paddles cause a lot of stress because they are very noisy. They may not cause physical pain to the animals, but psychological fear caused by loud noise is just as bad.

Using your hands, plastic moving boards, plastic bags, a soft brush or a flag are often enough to calmly move the pigs forward. Stop using herding tools if pigs walk forward by themselves.<sup>92</sup>



*Your hands, a board, flag or plastic bags are enough to move pigs forward. Do not produce constant sound. Source two photos on the bottom: Temple Grandin<sup>93 94</sup>*

- ☑ Electric prods or continuous loud noises cause a lot of stress and pain which will negatively impact meat quality (improving pH level). **If pigs refuse to move without the use of electric prods or loud noises – there is a big problem**

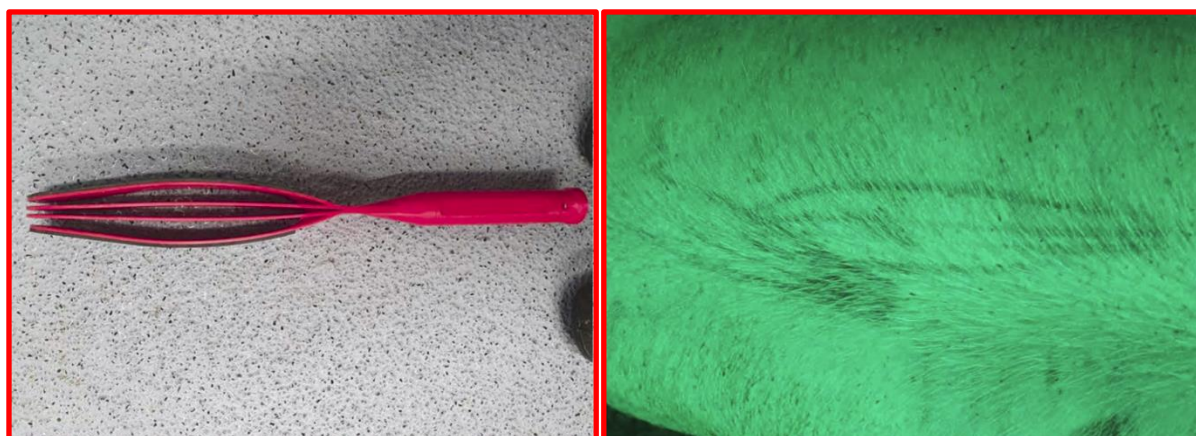
with the design of your raceway. Find the causes! Refer to the previous [Chapter 4. Moving of pigs - List of distractions >>](#)



*Electric prods cause a lot of stress and pain and negatively impact meat quality. Use of prods indicates problems with the design of the raceway or handling procedures.*

**Caution!** Even if your electric voltage is set very low, the psychological stress of being electric prodded is always high, especially because most pigs will have had earlier horrible experiences with electric prods on the farm or during loading. They are of course not aware your electric prod is set at a lower voltage level.

- ☑ **Herding tools such as clappers and paddles encourage poor handling.** All too often, they are used too forcefully and frequently, causing pain and leaving marks on the skin. Ensure that they are phased out in your company



*Skin marks caused by hitting a pig with a clapper. Do not allow their use in your company.*



- ☑ Another crucial points when moving pigs: never place too many pigs in a raceway **and always move pigs in small groups** (6 pigs).<sup>95</sup> Moving pigs in smaller groups is easier and prevents stress. <sup>96</sup> This is also emphasized by Temple Grandin. <sup>97</sup> The risk of mortality during handling is lowest when pigs are kept in small groups. Research shows that moving pigs in large groups does not save time, but people often think that. It is a myth.

Moving too many pigs at once result in mass panic and is causing pigs (due to lack of space) to bottle-neck, jump onto each other and get trampled.



*Here there are way too many pigs in the raceway towards the electric stunner. When pigs get scared, they have nowhere to go and will jump on top of each other and get trampled.*

Pigs facing the wrong direction, will be unable to turn around when the groups are too large and the raceway is too full. They will be pushed over and get trampled, or they may enter the single-file raceway the wrong way around.



*Pigs facing the wrong direction, will be unable to turn around when the raceway is too full. They will be pushed over and get trampled.*

When pigs are given more space and moved in small groups (see photo's below) they can turn around and pass each other more easily. This will reduce stress significantly, for both the pigs and the workers !



*Here pigs are given sufficient space and are moved in small groups, which prevents stress significantly.*

Please see two video's below to see the impact of group size on the stress-level during movement. In the left video (starting at 02:22) large groups are used and in the right video only 4 pigs.



*These videos show the impact group-size has on animal-welfare. Left: big groups, right: small groups.*

- Be sure that pigs have enough space ahead of them to walk away from you.** Do not use any driving tools on (groups of) pigs that are unable to walk forward. In case of pile ups or mass panic, never hit pigs that have nowhere to go.



*Do not drive pigs that are unable to move anywhere, they will jump on the other pigs and cause panic in the rest of the group.*

Check which pigs are causing the pile up and only motivate those pigs to move forward. By working with small groups and by moving pigs patiently these situations will occur less often. Small group-size also allows the worker driving

them forward to steer them better in the right direction as he can access all of them. Herding pigs in small groups also mean that they have the space to walk past each other and the employee moving the pigs can then handle them a lot easier.

- ☑ **The best is to approach pigs from the left side.** Just like in cattle, their left-eye is connected to the right hemispheres.<sup>98</sup> The right hemispheres estimates the risk of danger. A pig will therefore first look at you with the left eye. By approaching the pig from the left side, he/she can better assess danger and will less likely panic and flight.
- ☑ Pile-ups or bottlenecks can also occur when pigs become stuck in the raceway side by side (see video below). This will be noticed by the pigs screaming and having an empty space in front of them. Pay attention to this! Motivate one pig to take a step back so that other pigs can walk forward. The chance of this happening is much higher when the groups are too large or when the worker is impatient and causing stress.



*Pigs are stuck at the entrance to the raceway. Motivate one pig to take a step backwards so that they are dislodged and reduce group size!*

- ☑ It is very **important that the people moving the pigs are calm and move slowly.** Pigs perceive fast and sudden movements as a threat. Pigs will try to escape or will freeze when confronted with a perceived threat.

When the employee stays calm, the pigs will also stay calm, making them easier to handle. Yelling, hitting or rushing the pigs makes them more difficult to handle

and makes everything take longer. Go by the principle of “When you have an hour, it will take you 20 minutes. When you have 20 minutes, it will take you an hour”. Remember to stop touching pigs when they are already walking forward on their own! Less is more! <sup>99</sup>

- ☑ **Make as little noise as possible.** Rattles, clappers or sound-making paddles (stress-stimuli) should be used as little as possible as it will make pigs stressed. Yelling is highly aversive to pigs. Unlike equipment yelling has intent. The animal knows the handler is yelling at him/her. <sup>100</sup> Remember: stressed pigs are more difficult to handle and have a negative influence on meat-quality. If pigs are not willing to enter a raceway, or stop halfway there is something distracting or scaring them. Try to find the causes instead of using sound or other stress-stimuli to force pigs forward.



*Never produce sound by hitting the installations like the bars of this raceway - it will cause the pigs to panic and is morally unacceptable. Panicked pigs are often more difficult to handle and their meat quality is reduced.*

- ☑ **Make sure you place your workers in the RIGHT position.** It does not make sense to have a worker rushing the pigs at a point in the chute where they cannot move any faster and the worker just creates panic and stress, leading to a bottle-neck effect. Place a person only at points where an animal may hesitate to move forward, to keep the flow going and make sure the pigs cannot see the workers.

- ☑ Extreme stress-calls made by a pig is a clear sign of serious distress. Workers however can become insensitive to stress-calls or be under too much time pressure to immediately act upon them. It is therefore very important that stress-calls be registered and connected to an alarm and location. As soon as the alarm goes off, the Animal Welfare Officer can quickly go to the location (or watch the camera-footage) to see what happened and if correct measures were taken. [The sound of a pig in distress \(high-pitch sound\) can be listened here >>](#)

### Handling of pigs in shock

- ☑ **Be alert for pigs showing signs of shock!** Pigs experiencing excessive stress may enter a state of shock. They often pant, sit down like a dog, and eventually lie down. Sometimes this is accompanied by screaming and skin discoloration. A pig displaying these symptoms is likely experiencing organ failures – due to blood circulation issues - and is in significant distress and pain. This can ultimately result in heart failure and death.

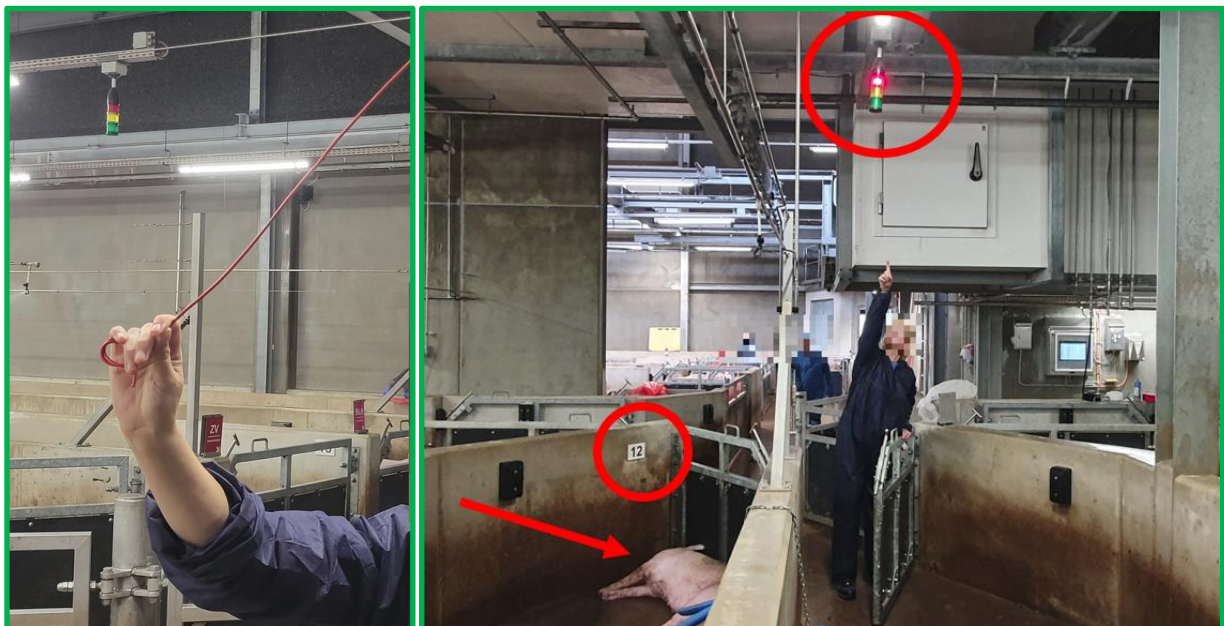
Do not apply any pressure to pigs that go into shock and NEVER force them to move. Proceed with emergency stunning as soon as possible and on the spot. Ensure all your workers promptly recognize signs of shock and know how to respond immediately. Please refer to [Chapter 2. Arrival – Handling of pigs in pain or discomfort](#), for more info.



*Pigs in shock often collapse and are unable to get back up. After a while they will often lie on*

*their sides. They regularly have rapid, shallow open-mouth breathing. Pigs in shock should be killed immediately, on the spot where they lie, to prevent any further suffering.*

- ☑ **Shock is often caused by an excess of stress!** Stress from using painful herding tools on them, moving them in too large groups, rushing and screaming at them to move quickly, stressful transport conditions, and hierarchy fights. Critically assess the handling of the pigs from A to Z! Refer to [Chapter 4. Moving of pigs - calming the movement >>](#)
- ☑ Ensure that raceways have multiple **access doors** along their entire length so that pigs can always be promptly accessed and stunned on the spot if necessary. Read more in [Chapter 4, Moving of pigs – Design >>](#)
- ☑ When pigs enter a state of shock, it is crucial that they are emergency stunned right away. It is unacceptable to let them wait! **Install light-signals on the ceiling at various locations in your slaughterhouse that workers can turn on when there is an urgent situation for a pig in need.** For example, if an alarm light at the back of the holding pen is active, the person responsible for emergency stunning will know that a pig at this location needs to be emergency stunned and head to the location straight away. Ensure that all your employees know where these alarm-light cords or switches are located and use them when necessary.



*An light-signal above a pig in distress goes red after a staff member has pulled the alarm cord.*

*The staff member responsible for emergency stunning now knows that he must come to lairage pen 12 as quickly as possible to relieve the pig of his/her suffering.*

## Single-file raceway towards electric stunner

In electrical stunning systems, pigs are often moved towards the electric stunner via a narrow, single-file raceway of approximately 5-20 meters long. In this raceway pigs have to walk behind each other in a single file. As pigs are herd animal this stresses them out - they prefer to walk in small groups to feel safe. Common design flaws inside the raceway and poor handling also make the pigs scared to enter it. Electric prods or noise-making clappers/paddles are often used to force pigs to enter the single file raceway, causing much stress.

When a slaughterhouse chooses the electrical stunning system, it is important that this “stress-point” be dealt with, not only because causing suffering is unacceptable, but also because the last 5 minutes before a pig is slaughtered has a huge impact on meat quality. The more stressed a pig is just before slaughter, the paler, softer, and more exudative (PSE) the meat becomes. If moving pigs towards the electric stunner could be rendered smooth and calm, then electrical stunning is much more humane than CO2 stunning. Good electric stunning is immediate, whereas CO2 is aversive and takes 20-25 seconds.

Below, we discuss which factors are important to minimize stress when pigs are being moved towards an automatic electrical-stunning system.

### Design

- 1. Construct two single-file raceways side by side.** It is crucial that slaughterhouses construct two single-file raceways side by side instead of just one. By utilizing two single-file raceways, pigs are provided with a choice (between the left or right entrance) and do not feel forced into just one entrance. The ability to choose and not feel forced makes the pigs much calmer and less hesitant to move forward. It also permits the pigs to enter the single files simultaneously, giving them the feeling that they are staying in a group. Having two entrances, side by side, greatly facilitates movement into the single-file raceways. At Compaxo slaughterhouse in Zevenaar (NL), this recommendation from Eyes on Animals has been successfully implemented.





*By installing two single-file raceways next to each other, pigs can choose between the left or right entrance and feel less pressured. Photo on the left: Compaxo in Zevenaar (NL). Photo on the right: © T. Grandin*

- 2. Ensure that the wall/divider between the two single-file raceways is partly see-through.** By making the dividing wall between the two single-file raceways partly see-through (such as keeping gaps at the top and bottom of the divider along its entire length) pigs can clearly see each other and feel like they are still walking forward in a group, side by side. This will make the pigs feel safer and more likely to enter the single-file raceways.<sup>101 102</sup>

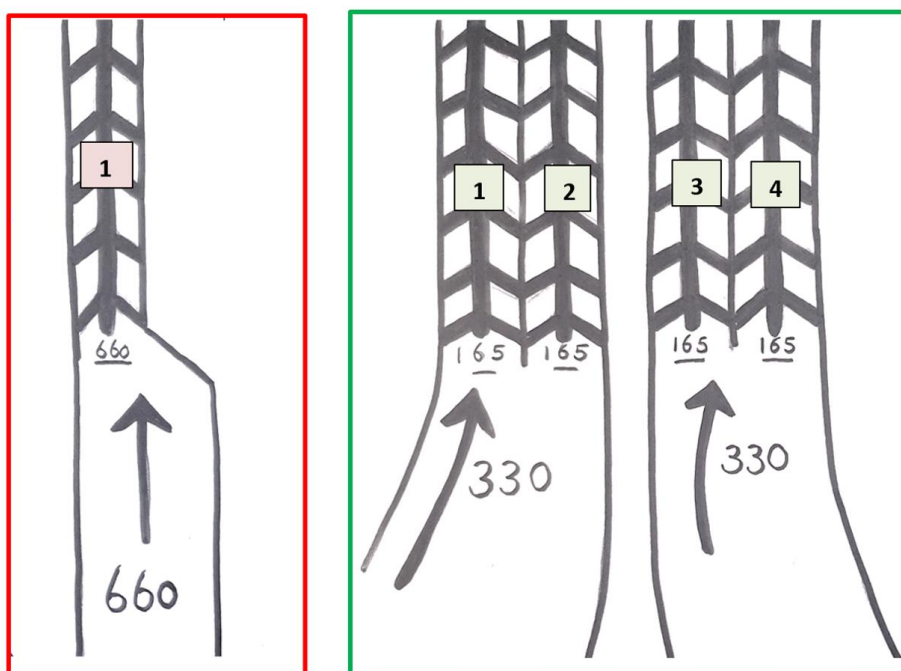


*At Compaxo, the wall between the two single-file raceways was opened at the bottom and top so pigs can see each other and have the feeling that they are walking still side by side, which feels safer for them.*

- 3. Reduce time pressure.** The enormous speed at which pigs are moved into single-file raceways (up to 800pigs per hour) is one of our greatest concerns with the current automatic electrical stunning system. We are demanding the

impossible from the pigs; they must enter a narrow, frightening raceway at an incredibly frantic pace. This inevitably leads to many serious welfare issues, poorer meat quality and frustrated stressed-out workers. We advise no more than 165 pigs per single file per hour.

By installing double single-file raceways (see point 1), each with its own electrical stunner, you can significantly reduce the time pressure in your slaughterhouse. At Compaxo slaughterhouse in Zevenaar, two sets of double single-file raceways were installed (so four in total). Now, there are no longer 660 pigs per hour chased through one crowd-pen and one single-file raceway, but 330 per crowd pen and just 165 per hour through each single-file raceway. This drastically reduced time pressure and stress for both the pigs and the workers and improved meat quality.



*Compaxo, old situation*

*Compaxo, new situation*

- 4. Install “shield” walls in strategic locations to prevent pigs from seeing workers.** One of the most significant reasons why pigs refuse to enter a single-file raceway is because they can see people up ahead. Pigs often fear humans, especially when they make noise, abrupt movements, or hold strange objects. Most pigs have experienced negative things with humans (vaccination, castration, tail docking...). Ensure that all workers are out of the pigs' line of sight. Make sure to install shields (such as high walls, panels, and/or tarps) in strategic locations to prevent the pigs from seeing workers.



Left photo: Worker positioned behind a high, solid wall so that pigs entering the single-file raceway (from the right in the photo) cannot see him. Right photo: solid and high walls are placed all along the crowdpen to ensure that pigs cannot see moving objects or other distractions that may scare them while being moved through. Photos taken at Compaxo slaughterhouse in Zevenaar (NL).



To prevent pigs from seeing workers ahead (left photo), Compaxo slaughterhouse in Zevenaar (NL) placed “wooden view shields” all along the entire length of the single-file raceway (right photo). When workers stand behind these shields, the pigs in the single-file cannot see them as easily.

- 5. Make sure your single-file raceways have access doors.** Access doors are crucial; they, for example, help you remove pigs that become fatigued, get a heart attack or are facing the wrong direction. Without access doors, you would need to empty the entire single-file raceway before you can remove that one individual pig. This is not only inefficient and tiresome for your workers to have to do, but it is also unacceptable to leave a pig in need of help in such a situation for so long! Having access doors all along your single-file raceway will ultimately save you a lot of effort on a daily basis and avoid causing serious animal welfare problems as you can easily remove individual animals at any location inside the raceway.



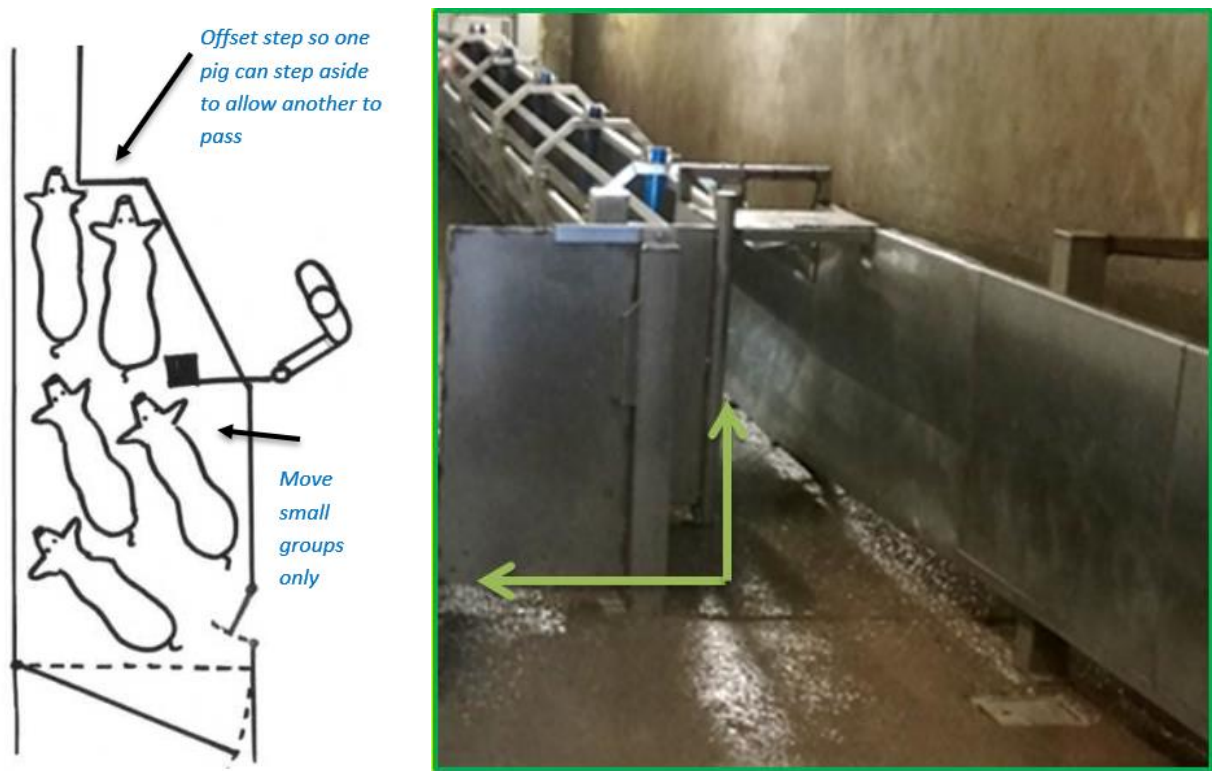
*Easily turning around a pig that entered the single-file raceway the wrong way, thanks to the presence of an access door. Video made at Compaxo slaughterhouse in Zevenaar (NL).*

6. Slaughterhouses that use electricity to stun pigs often use a **funnel-shaped entrance to bring the pigs from 'groups' into a single-file raceway**. A funnel-shaped entrance however will just lead to bottle-necking and pigs jumping onto each other.



*Funnel-shaped entrance to a single-file raceway will lead to bottle-necking and pigs trying to escape. Use of electric prods at this point is very common but totally unacceptable!*

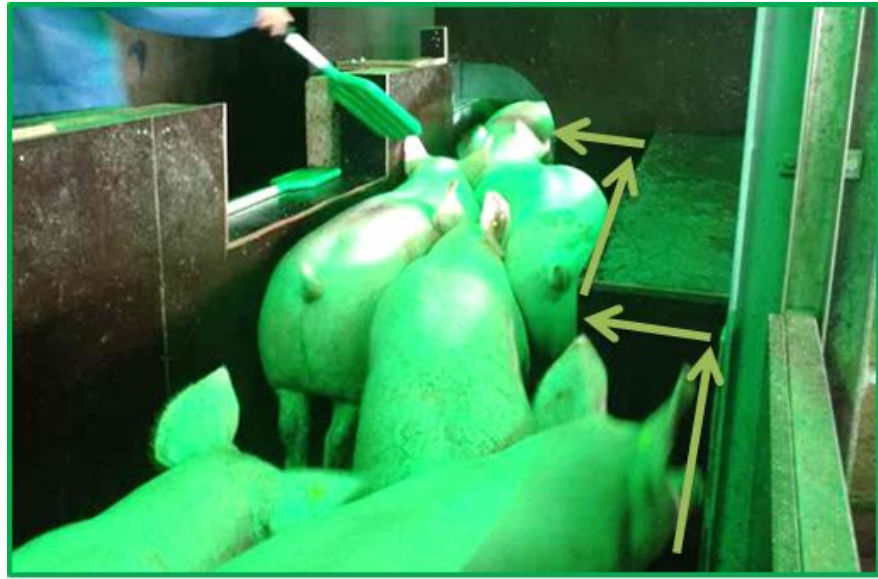
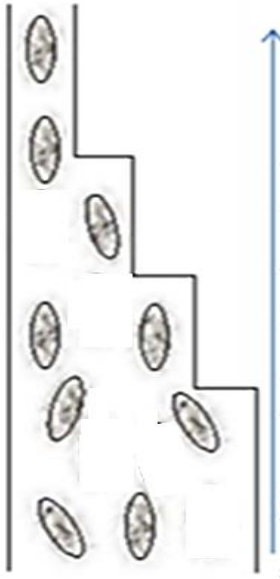
Temple Grandin recommends an **offset-step design** so that one pig can step aside to allow another one to pass. The offset step should be at least the width of one pig. The handler should work opposite to the straight edge. See the illustration of the design below.



Left: offset step design by Temple Grandin, right: offset step in Dutch slaughterhouse

Building more offset steps can help further reduce stress. A raceway with several offset steps is also called a 'stepped raceway'. In a stepped raceway groups of pigs will slowly be made more narrow – step by step. A stepped raceway will make the movement of the pigs towards the single file less abrupt and more natural.

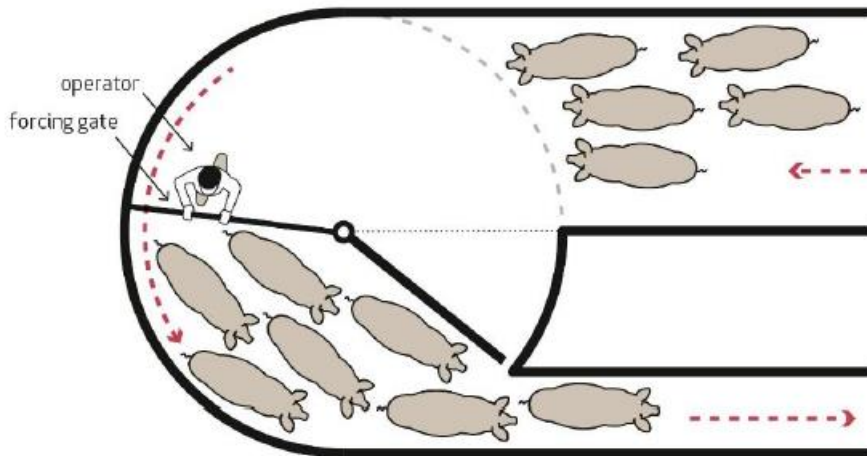
At the slaughterhouse below two offset steps were made to reduce bottle-necking and jamming. Like with all handling of pigs, a stepped raceway only works well when small groups of pigs are moved at a time, such as 5-6 pigs. No raceway, regardless of a top design or not, will work well when you move large groups through. Moving large groups of pigs anywhere is always a no-go! Pigs must be given sufficient space to pass each other, turn back around if facing the wrong direction and the handler must be able to physically reach the first one in line to steer him/her if necessary (like in the case of a single-file raceway towards the automatic electric stunning).



*Left: stepped raceway to make the movement towards the single file less abrupt. Source: Humane Slaughter Association<sup>103</sup>. Right: double-offset step entrance to reduce bottle-necking.*

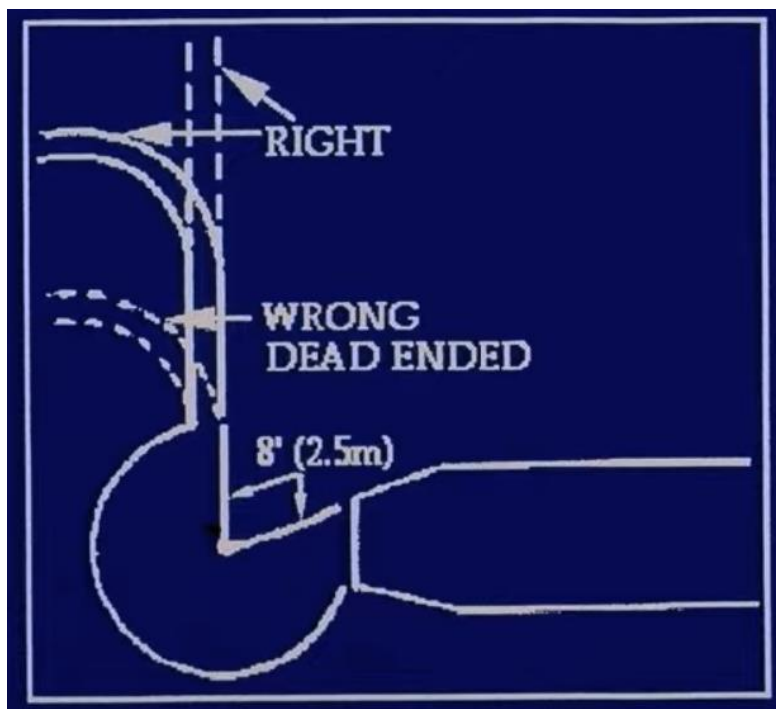
7. To move pigs into the single file raceway Eyes on Animals advises pig slaughterhouses to use a **round crowd-pen**, like the corral designs by Temple Grandin. A corral design or rounded crowd-pen brings the pigs in a curve towards the single-file raceway. This eases movement and reduces fright and stress in the pigs because the round curve gives the impression that the pigs will eventually be returning to where they come from. They are therefore less hesitant to enter the single file chute. Another advantage is that a rounded crowd-pen, prevents pigs from seeing activity up ahead and therefore limits possible distractions.<sup>104</sup>

The round crowd-pen has two solid doors, of which one is static and the other rotatable to move pigs into the single file.



Source: [FSI \(2017\)](#)<sup>105</sup>

8. The recommended radius of the crowd-pen is 2,5m.<sup>106</sup> Make sure the single-file race does not bend immediately and is not too sharp (see the drawing below) as pigs may otherwise refuse to enter it. **A pig needs to be able to view an area in front of her or him that has a length of at least 3 pigs**, if not the pig will think that there is a dead-end.<sup>107</sup> Make sure the curve is well-lit.



*Make curves wide enough and not too sharp © T. Grandin<sup>108</sup>*

9. It is however important that the round crowd-pen never be crowded. It should only be made half-full maximum. Pigs need room to turn around when they are

facing the wrong way and room to pass each other. In North-America several slaughterhouses and farms work with the corral system of Temple Grandin.



*Round crowd-pens that move pigs towards the stunner work very well. Crowd-pens however should only be half-full. The crowd-pen in the left photo is too full according to Temple Grandin. Pigs need room to turn around.*

10. The German slaughterhouse Naturverbund and Austrian slaughterhouse Grossfurtner also use a corral-shaped crowdpen to herd pigs into the single-file raceway to be electrically stunned. It was designed as a corral to reduce stress and panic often caused when pigs are forced to move from a group pen into single-file.



*Corral shaped double entrance raceway for pigs at Naturverbund (left) and Grossfurtner (right)*

By using a **double entrance to the raceway** pigs do not have to be forced into one single entry and thus experience less stress. The pig can chose which entrance to take, or feel like he is escaping the handler. This concept is used by both Naturverbund (DE) and at two slaughterhouses from Grossfurtner (AT).





*Double-entrance to raceway to reduce stress at Naturverbund (DE) and Grossfurtner (AT)*



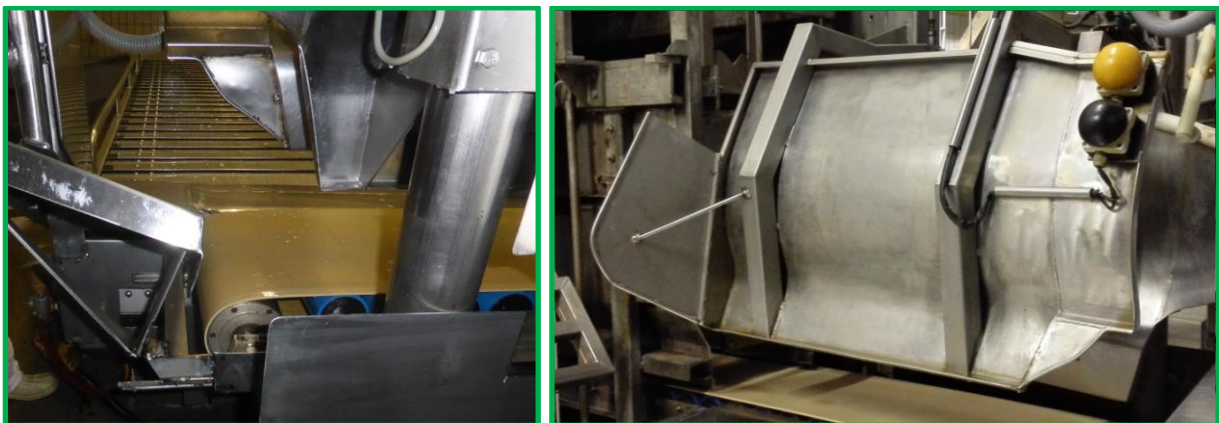
*Double-entrance to the raceway to reduce stress at Grossfurtner (AT)*

We visited both Naturverbund and Grossfurtner and were very impressed with this corral-shaped crowdpen because indeed the pigs moved in a much calmer manner than seen in other slaughterhouses using straight-files. Please see a video we made below.



*Video of corral-shaped crowdpens with double entrance at Thönes Naturverbund*

11. Naturverbund uses a small conveyer-floor in their design. This is something that could work in slaughterhouses that manually stun their pigs. The pigs remain upright on a solid floor but the entire floor moves the pigs automatically towards the stunning. A conveyer floor is also used by Grossfurtner (AT). The slaughterhouses only turn on the conveyer-floor when a pig is balking. So if pigs are walking well, the floor remains still. Make sure the conveyer floor is anti-slip and constructed of a material in the same color and structure as the rest of the raceway floor.



*The conveyer floor at Naturbund (DE) and Grossfurtner (AT). It is only used if pigs balk.*

12. At Willems slaughterhouse in Druten (NL), the **Bud Box principle** is used to get pigs to walk into the restraint box. There is a square pen with an elongated swing-gate inside. With the swing-gate and the help of a plastic board, one pig

is separated from the group and driven to the other side of the pen. The restraint box is open at the top, has a transparent front wall and is well illuminated. The pig therefore sees the box as an escape route and walks into it on his or her own accord. The stress is therefore minimal and lasts only a few seconds.

Watch a video of the Bud Box principle at Willems slaughterhouse below.



*“Bud Box” at Willems: one pig is driven to the other side of the pen with a swing gate and mobile plastic board. The pig sees the box (open at the top, transparent at the front and well-lit) as an “escape route” and enters it almost by itself.*

It is important to stun the pig as soon as he or she has entered the restraint box. This way the pig has little time to realize that he or she is in individual confinement and stress in the box is kept to a minimum. The owner of Willems designed the pen and restraint-box himself, based on the Bud Box principle. [DGS Group](#), a company that manufactures slaughterhouse equipment, is willing to copy this design and sell it.

#### **For a Bud Box, make sure that:**

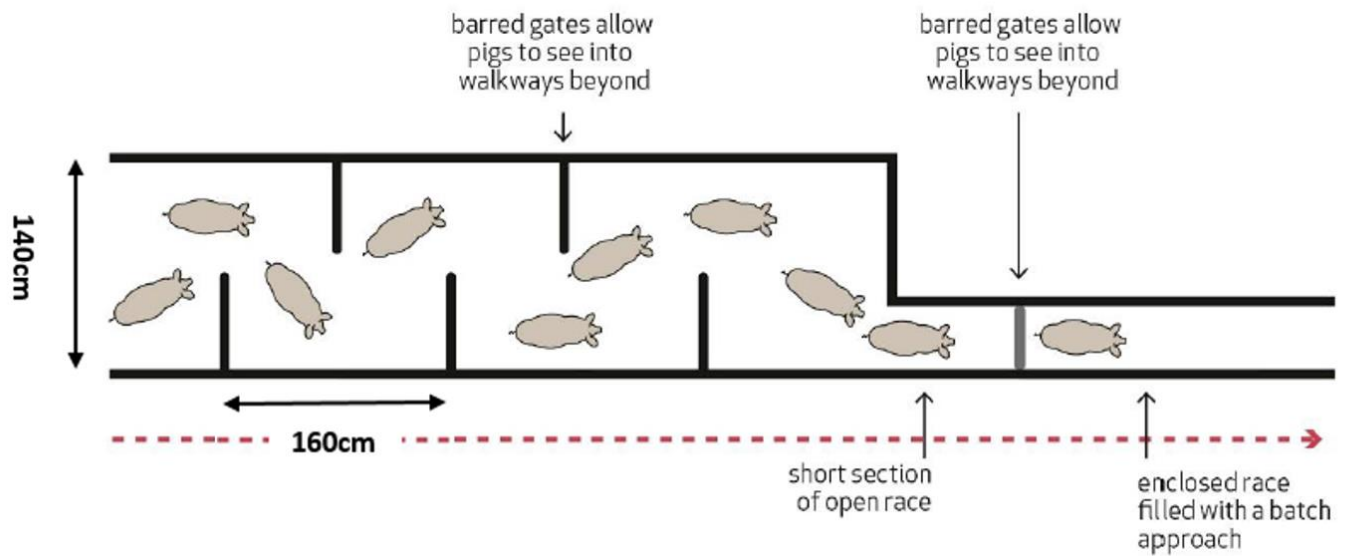
- The swing gate is long and solid down to the ground. The pigs should not be able to see through, under or over it.
- The raceway or restraint box where the pigs are led from the Bud Box must be well lit and there should be no visible dead-ends.

- Moving the pigs forward is easiest (and therefore fastest) when the Bud Box is not too full. No more than half full.
- Stun the pigs immediately after they have entered the restraint box to avoid stress.

13. Another way of easing the movement of groups of pigs into a single raceway is by using a **labyrinth race**. This is considered one of the most effective designs to keep stress levels low.<sup>109</sup>

A labyrinth raceway is split into sections by “partitions” or “gates” on both sides that reach half the race. In each section the group of pigs becomes smaller in a natural way – as some pigs will move forward and some will be stopped by the partition. At the end pigs will walk behind each other into the single-file raceway with minimal stress only.<sup>110 111 112</sup> Please see the design below. The following principles and measurements are recommended:

- Use open-bar gates only, so pigs can see through them.<sup>113</sup> Make sure the spaces in between the bars are small, so pigs cannot get their nose (or other body-part) stuck in between.
- There should be 1.60m in between each partition on opposite sides of the wall.
- The width of the labyrinth is recommended to be 1.40m.<sup>114</sup>
- The first part of the single-file raceway should not have anti-mounting bars at the beginning as this gives the feeling that the space is small. Keep the top open at the beginning to ease pigs entering the start of the single-file raceway.
- Have an open bar- gate in the single-file raceway a few meters after entering.



Source: [Humane Slaughter Association](#) and ICF <sup>115</sup> <sup>116</sup>

14. At Pali slaughterhouse in Geldrop (NL) a short **zigzag turn** (or so called S-turn) was built to reduce the group size more smoothly and make the entrance towards the single-file raceway less abrupt. A video of this design can be watched below.

With this design it is very important to keep group sizes small (6 pigs maximum) and that the worker, moving the pigs, interferes as little as possible. He/she has to stay at a sufficient distance (out of the pigs flight-zone) so the pigs do not get scared.



*Zigzag turn in front of single-file raceway to reduce stress at the entrance of the single file raceway*

## Handling

- 1. Move small groups of pigs only (6 pigs max).** When moving pigs towards the single-file raceway, it is crucial that group sizes are small as the pigs need space to turn around and pass each other. This means a maximum of 6 pigs at a time. Moving large groups inevitably leads to bottlenecks and pigs panicking. Moreover, it is impossible to control a very large group. As a worker, you are unable to steer the first pig in the group as they cannot be reached. Moving large groups does not save time, on the contrary, pigs will experience more stress and become more difficult to handle, causing the flow to stagnate. Please refer to [Chapter 4 Moving of pigs - Calming the movement](#) for more details.



*Move only small groups of pigs at a time (max 6). Pigs in large groups cannot be controlled as most of them are out of your reach (left photo). Moreover, pigs in large groups often cannot turn around or pass each other, causing panic. In small groups (right photo), there is significantly less stress and a better flow.*



*Small groups are much easier to control as you can reach all pigs within the group if necessary. Additionally, pigs have space to turn around and pass each other. This will significantly ease movement.*

- 2. Use only quiet herding tools.** Pigs are sensitive to loud noises, especially when they are abrupt. A stressed pig is less likely to enter a single-file raceway. Therefore, remove all loud tools, such as rattles and clappers, and replace them with quiet tools, such as boards and flags. You can also use your hand to gently stimulate individual pigs to move forward. Use the tools for their intended purpose. Do not use boards or flags to hit the pigs, and avoid hitting them on the floor or against the walls to create loud bangs. Please refer to [Chapter 4 Moving of pigs - Calming the movement](#) for all details.



*Quiet herding tools, such as a board and a flag, are sufficient to move pigs into the single-file raceways. Do not use them to hit the pigs, nor use them against the wall or floor to create noise. Keep calm and quiet. Electric prods are not needed and should never be used here.*

- 3. Ensure that workers maintain a sufficient distance when walking behind the pigs (at least 1 meter).** Pigs often have a slight fear of unfamiliar people and will naturally move away from them. However, if you get too close, you'll notice the pig panicking. You then enter his/her flight zone. A panicked pig often doesn't move in the desired direction but instead freezes or tries to escape by jumping up or running backwards. Prevent this by maintaining a minimum distance of 1 meter when walking behind the pigs. Refer to the photo in point 2 (above) as a good example.
- 4. Ensure a smooth flow by timing the bunches well.** Pigs should only be moved towards the single-file raceways when there is available space inside them. If pigs are forced to stop because the single-files are full, they are likely to turn around and become scared to return. To achieve proper timing of the bunches (groups of pigs), workers must use hand signals to communicate when new pigs can be brought forward. Alternatively, other signals such as lights can be used to indicate when there is space ahead.

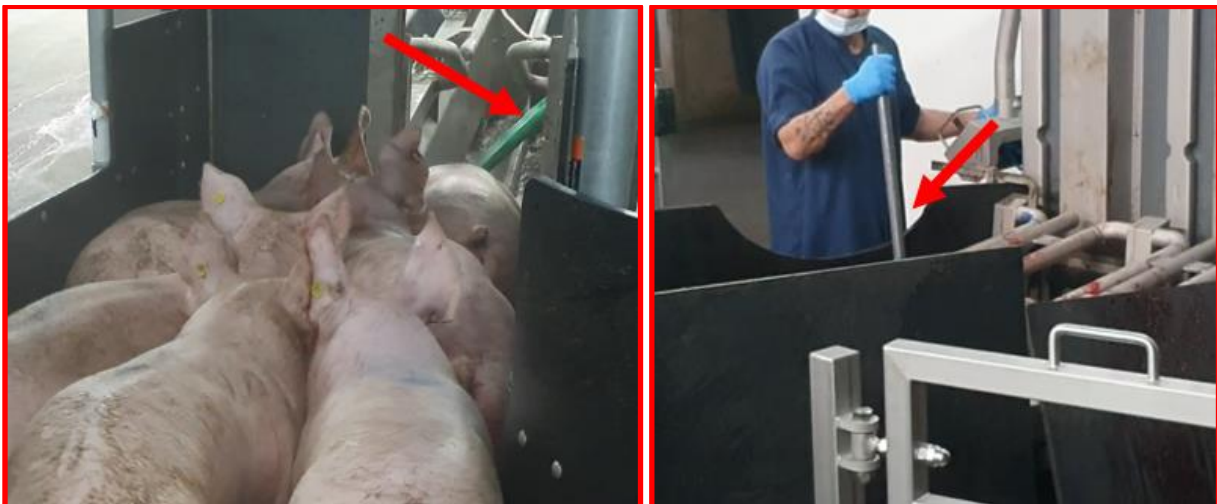




*The single-file raceways have the green light on, which means: new pigs can be brought in.*

## Common distractions, mistakes and design flaws

- ☑ **Ensure that pigs are not distracted by handling tools protruding in and out of the single-file raceway.** Use your handling tool as little as possible. Only use it on healthy pigs that have space in front of them but refuse to move. Never lay your tool on the single-file raceway, as pigs that need to enter the single-file raceway can see it and it will distract, even startle, them.



*Pigs will refuse to enter a single-file raceway when they see a handling tool protruding in and out of it*

- ☑ **Make sure there is enough light at the entrance of the single-file raceway.** Often the entrance of single files are not well lit. Pigs (just like humans) do not like to walk into a dark area. The same applies to the stunning area; make sure it

is well lit and has the illusion of an exit so the pigs want to walk towards it and do not have to be forced.

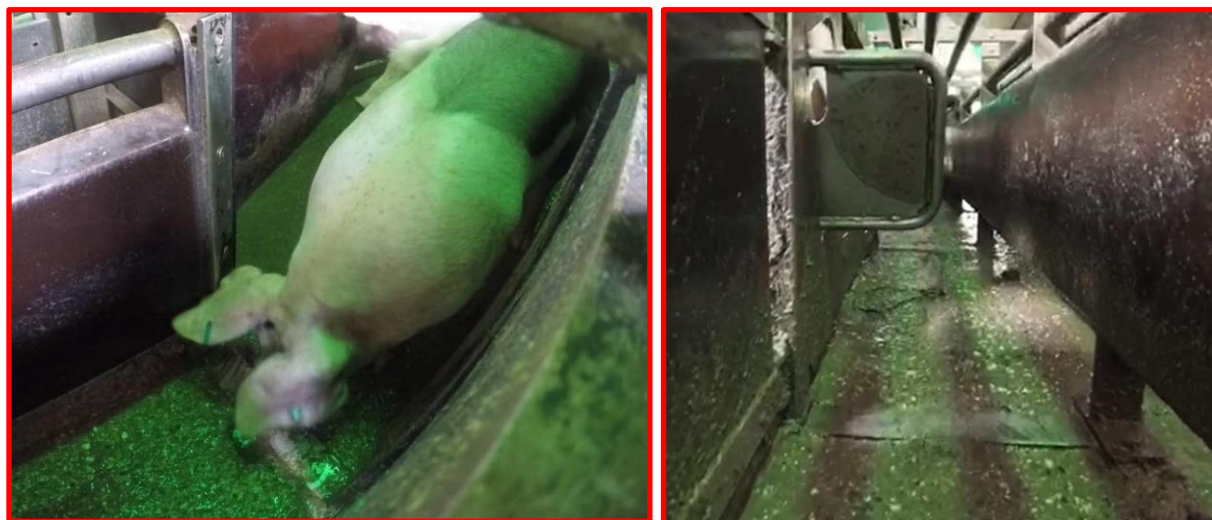
Point the lamps in the same direction as the pigs are walking – so it does not shine in their eyes. Indirect and diffuse light is best so creation of shadows is minimized. Therefore use more lamps and place them higher up and oblique to the raceway. Also be sure the lights are not flickering as this will distract the pigs.<sup>117</sup> This can be tested with the slow-motion modus of your telephone camera.



*The entrances to these single file raceways are not well lit – pigs will be scared to enter. Add lamps.*

- ☑ Pigs are very sensitive to draughts. They will **refuse to enter a raceway where air is blowing into their faces**. Remove all airflows blowing into the direction of the pigs. Airflows can be checked with a smoke generator. Doors that normally are closed create airflows when left open- make sure to close doors. Drafts will also increase fighting in your lairage pens as well!<sup>118</sup>
- ☑ **All too often, pigs are moved in excessively large groups**. This often leads to bottlenecks, pigs getting trampled, and mass panic. Pigs need space to turn around and pass each other. Always move pigs in small groups (maximum of 6 pigs).<sup>119</sup> Moving pigs in smaller groups is easier and prevents stress.<sup>120</sup> Research shows that moving pigs in large groups does not save time, although this is often mistakenly believed. It is a myth. Please refer to [Chapter 4. Moving of pigs - Calming the movement](#) for all details.
- ☑ **Make sure there are no sharp contrasts, shadows, metal strips, metal drains or other distractions visible at the entrance or inside the single-file raceway**. Pigs have limited depth-view. Something as simple as a drain, shadow or metal strip can cause pigs to stop. The pigs refuse to pass it as to them it can

look like a hole in the floor or obstruction. Floors need to be in one color and material. There should be zero distractions and zero contrasts in texture or color.

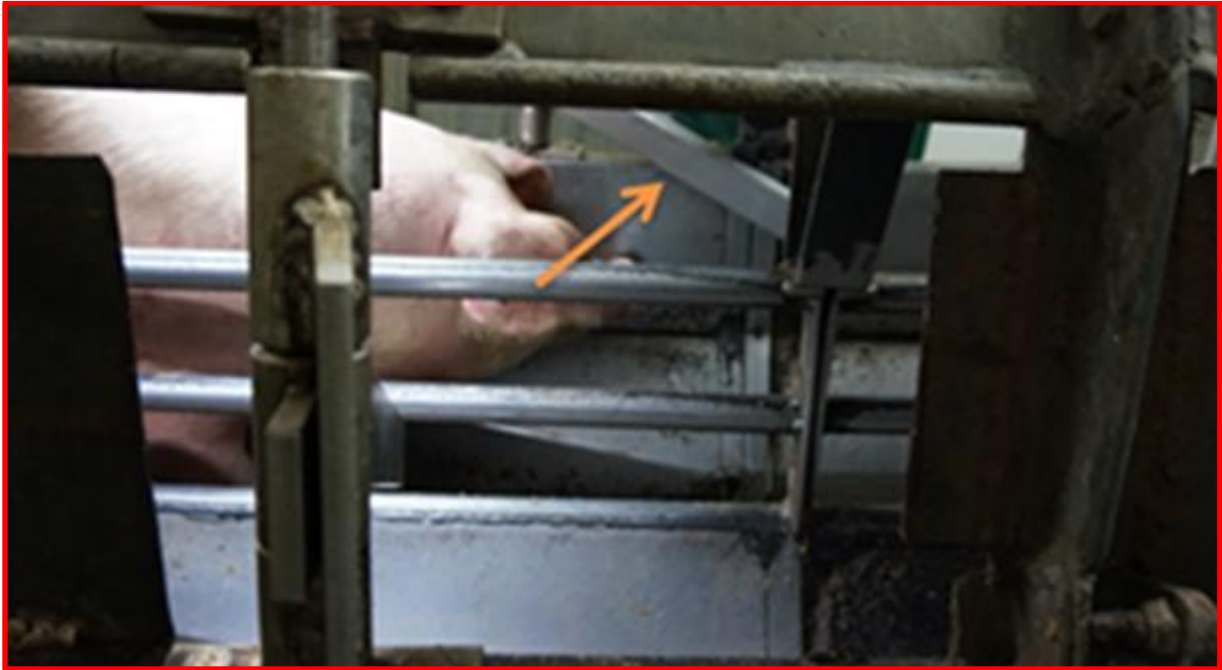


*Left: pig stops to explore a metal strip. Right: raceway full of shadows and white patches on the floor which will distract the pigs.*

- ☑ **Anti-reverse doors form an obstruction.** To prevent pigs from walking backwards or piling up, slaughterhouses often install anti-reverse doors inside the single raceway. These anti-reverse doors however often increase stress, because they form a clear obstruction, especially when they have a bright colour.

For pigs it is not always clear that anti-reverse doors are flexible. Sometimes pigs will even try to crawl underneath them – which can cause entrapment. Instead of installing anti-reverse doors find out what is causing the pigs to balk or pile up in the first place. In a well-designed raceway pigs will not balk nor will they need anti-reverse doors.





*Anti-reverse doors form a visual obstruction to the pigs. Remove them and rather solve the cause of pigs balking or trying to walk backwards.*

Reasons for pigs to balk are: air blowing into their faces, an employee in front of them, noise or jerky movements further up ahead, shadows or reflections on the floor, strange objects in the single-file raceway, dark and dead-ends, a clearly visible conveyer belt, a drop in the floor and not enough light. As long as the causes are not detected or solved and anti-reverse doors are used, we advise to at least make them the same colour as the floor and single-file raceway or see-through so they do not visually stick-out so much.



*At Pali slaughterhouse in Geldrop (NL) the blue anti-reverse “doors” (left photo) were made black (right photo) so they stand out a bit less.*



*At Compaxo in Zevenaar (NL), the old anti-reverse doors (left photo) were replaced with see-through anti-reverse doors (right photo) that have small holes in them, allowing pigs to see other pigs ahead.*

- Raceways with a cage construction work less well.<sup>121</sup> Being surrounded by a metal construction gives pigs the impression that they are trapped.** Additionally, the metal bars often create unwanted shadows. A raceway with an open top and high, solid sides is much better. This will prevent distractions and pigs jumping out, and reduces the feeling of being trapped.



*Raceways with a “cage-like tunnel construction” do not work as well as raceways with an open top. They cause shadows on the floor and gives pigs the feeling of being trapped.*

- If however a raceway with a cage-construction is used and it is not yet possible to replace it or make major changes to it – at least make always sure that the anti-mounting bars are high enough, **so that the pigs do not touch them with their backs when walking. If pigs touch the ceiling with their backs – they**

**will be hesitant to walk further or even stop and sit down.**<sup>122</sup> If pigs of different sizes are slaughtered, the ceiling must be high enough for the tallest ones.



*These raceways are too low: the pigs' backs are rubbing against the top of the raceway. There is a big chance these pigs feel trapped, refuse to move forward and will try to walk backwards to get out.*

- ☑ Make sure the restraint box at the end of the raceway is well-lit and open at the front. If a restraint box or raceway is totally closed and dark at the end, the pigs will know they will be trapped (don't underestimate their intelligence!) and refuse to enter. Give the pigs the illusion that there is an escape route or exit up ahead.



*Restraint box in the old situation: closed front. Pigs will be scared to enter this raceway as it appears dead-ended.*



*Restraint box in the new situation: box opened at the front. The pigs will have less fear to enter this raceway as the end appears open, as if they will be able to exit it up ahead.*

- ☑ It is best to make the restraint box **transparent at the front** by using plexiglass. The pig will then think that the restraint box is not a dead-end, making it not scary to enter. Make sure the box is open at the top as well - so the pig does not get the idea that he or she is walking into a trap. Watch an appropriate restraint-box with transparent front designed by the director of slaughterhouse Willems below (at 1:03).



*The well-designed Willems-box is transparent at the front, open at the top and well-lit.*

- ☑ As soon as the pig has entered the restraint box, he or she needs to be stunned quickly. This way the pig does not have much time to realize he or she is confined and alone, keeping their stress short while in the box. Do not let him/her wait, this causes stress. If you wait, the pig might also try to escape, which can

have serious consequences.

- ✔ **Positive images hung (such as the back end of another animal of the same species, or green grass etc.) at the end of a raceway/restraint box** could help pigs be less scared to enter the restraint box (see photos below). In scientific studies of cattle, this idea has been proven to work. <sup>123 124</sup>

When animals have less fear entering the raceway and restraint box, handling tools that cause stress or pain (like prods, canes, paddles...) will be less frequently used by the workers because animals will move forward more easily on their own will.



*Photos of positive images (such as a field, blue sky and other pigs) on the front wall of the restraint box can encourage animals to enter it more easily. [Copyrights: AMPC](#)*





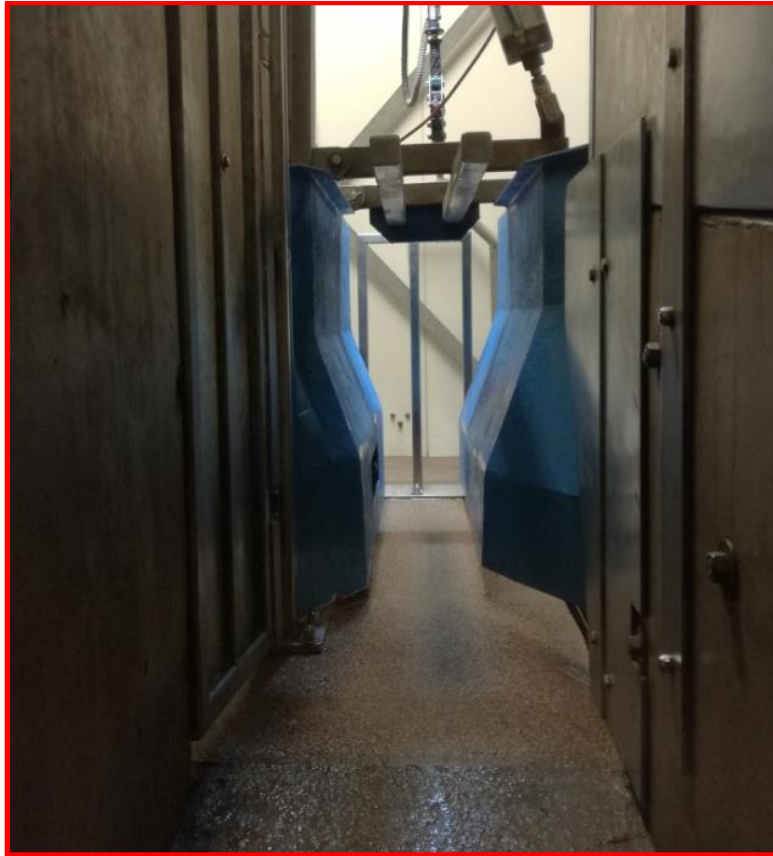
*By placing photos of pigs in strategic locations, you create the illusion that there are pigs further ahead. As a result, pigs feel safer and walk more easily.*

For sheep, positive images are already used in practice to lure them into pens or trucks. See a video of this principle below.



*Sheep lured into lairage and trailer by using sheep-images. Source: Spike & Kirsty Wall*

- ☑ Make sure the restraint box at the end of the raceway does not differ in colour from the rest of the raceway. If a box is really bright – pigs will be distracted or even frightened to enter it. Pigs are very sensitive to sudden changes of colour.



*The restraint box in this photo is much more narrow than the raceway and has a bright blue colour (strong contrast to grey raceway and white back wall). This will frighten the pigs and make them less willing to advance forward.*

## **Belly-belt conveyor restrainer**

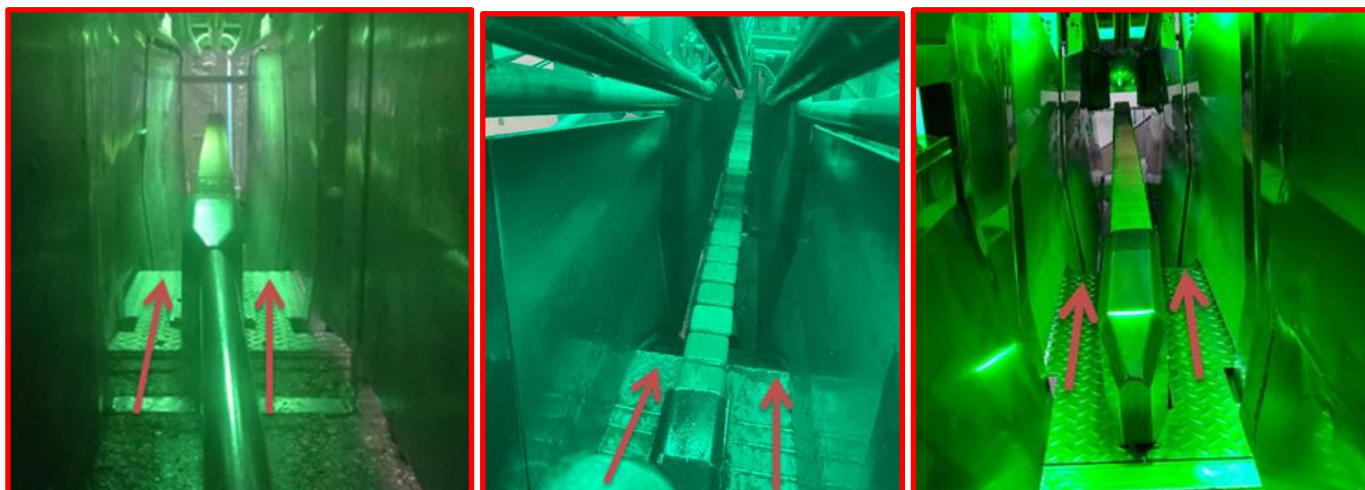
At the end of a single-file raceway, slaughterhouses that stun pigs automatically, often have a **belly-belt** conveyor restrainer installed. This belt “carries” the pigs, underneath their belly, towards the electric stunning tongs. As the pigs’ feet are lifted off from the floor, they cannot move and are restrained in position. Electrodes can therefore be placed automatically. The most well-known automatic restraining- and stunning system is called the MIDAS and is built by the company Marel.

Pigs are often scared to step onto this belly-belt conveyor restrainer. Many pigs balk and panic in front of it. To force pigs onto the belt, they are often electrically prodded by employees wishing to keep the speed up.

**Reasons why pigs panic or balk in front of the belly-belt conveyor and possible solutions are mentioned below.**

## Cliff-effect

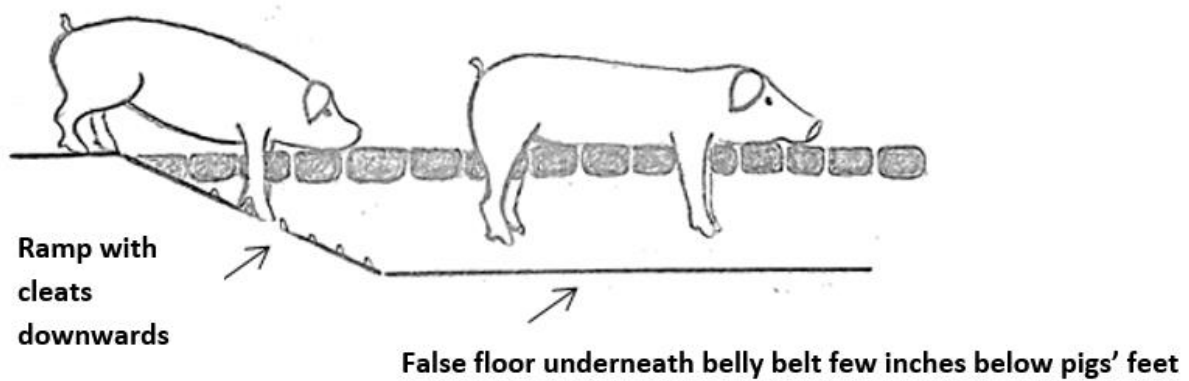
The most common reason why pigs do not want to walk onto the belly-belt conveyor is because it has no floor underneath (the belt carries them underneath their belly). The floor, at the starting point of the belt, drops down or stops altogether. This creates a cliff-effect (pigs get the impression they will fall down). See photos made in different slaughterhouse, but all showing the same cliff-effect, below.



*Visual cliff-effect at the entrance of the belly-belt restrainer causing pigs to panic, balk or walk backwards*

- ✓ To reduce stress at the entrance of the belly-belt conveyer Temple Grandin **recommends installing a solid dark false floor underneath the belly-belt conveyor**, made out of rubber. This false floor will give the pigs the impression that they can continue walking on a floor. It is however important that the pigs cannot actually walk on it; the false floor should be a few inches below the pig's feet as the pigs will otherwise walk backwards as soon they feel the belt underneath their belly.<sup>125</sup>

By making pigs think there is a floor to walk on, they will experience less fear walking onto the belly-belt conveyor. Make sure the pigs walk down via a cleated, not too steep, entrance-ramp. See the drawing below.



*Install a solid false-floor underneath the belly belt, to give pigs the illusion they can stand on it. It is important however that the pigs cannot actually walk on it, make it a few inches below the pigs' feet.*

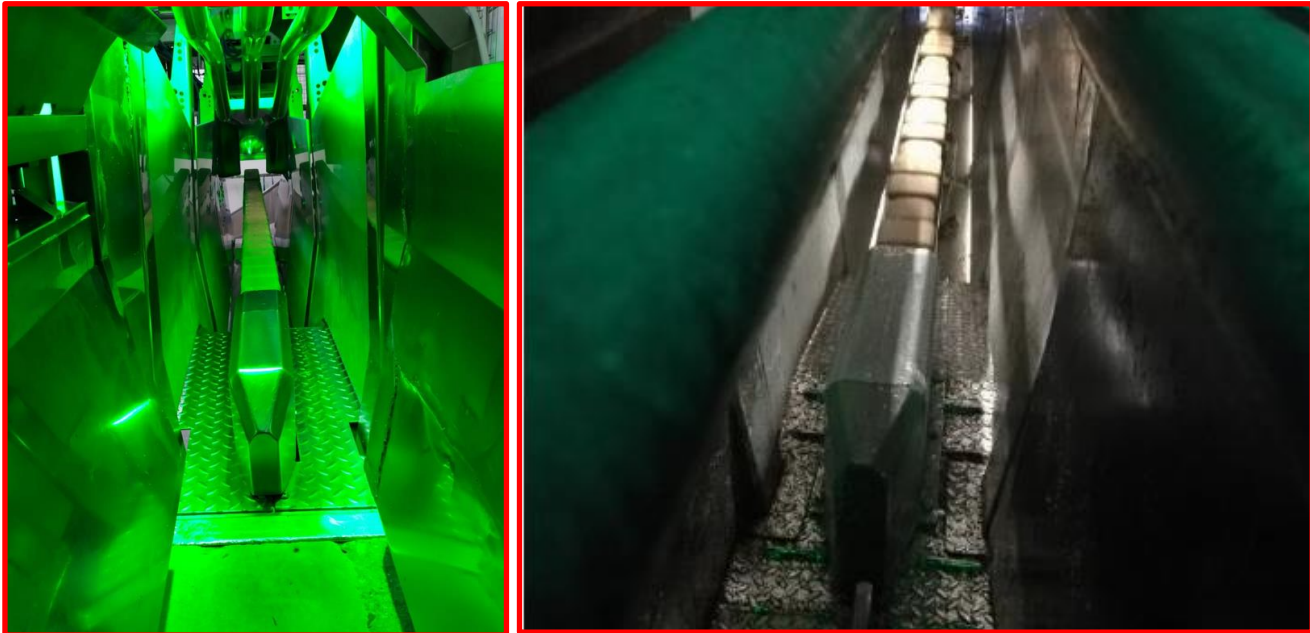


*False floor underneath the entire length of the belly belt at Compaxo slaughterhouse in Zevenaar (NL), giving pigs the illusion they can stand on it (but in reality they can't as it is welded a few inches below their feet).*

## Strange obstacle

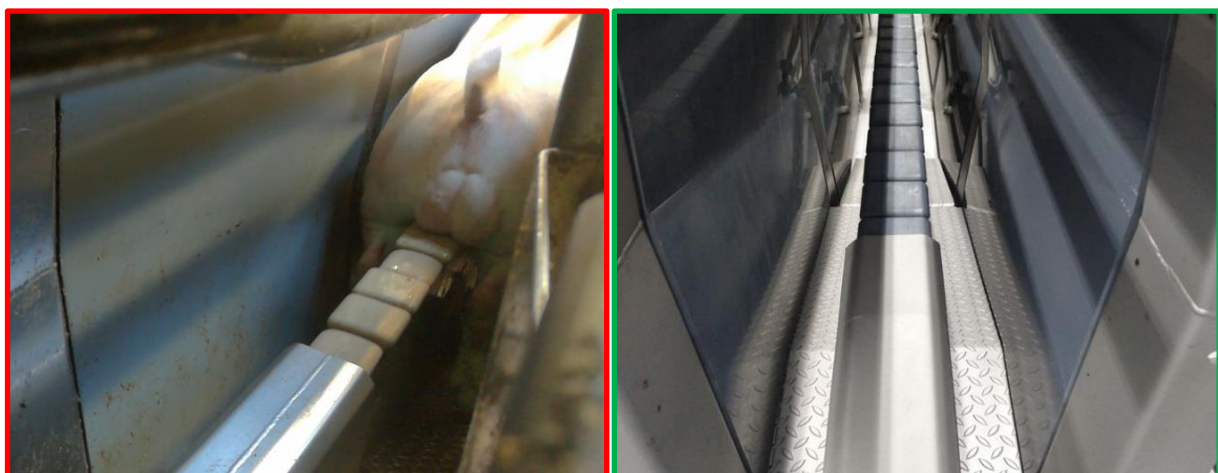
For pigs, the belly-belt conveyor is a strange and unknown obstacle. It moves, is narrow and stands out. Often it is beige in color, so it creates also a strong contrast to the rest of the grey raceway. These abnormalities cause the animals to become fearful. It does not look comfortable or safe to lie on, so they will never do this voluntarily. Often electric prods are used at this point a lot to force the pigs forward quickly onto the belly-belt conveyor, one behind the other to avoid that they have time to see the belly-belt or empty floor in front of them. However this is no way to treat pigs. Gaps in the chain (causing pigs to actually see the belly-belt) can never be totally

prevented either. Below are tips to make the belly-belt conveyor less confrontational and scary for the pigs.



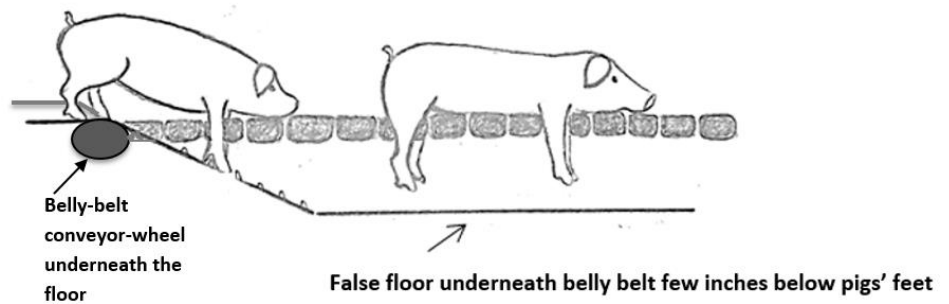
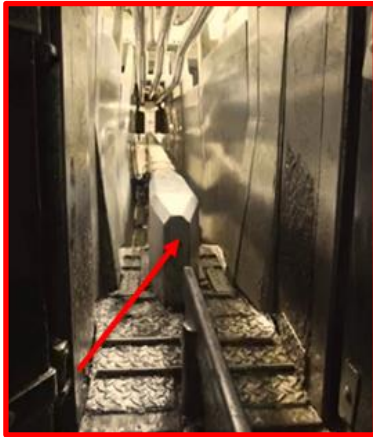
*The belly-belt moves and is made of a different color and texture than the rest of the raceway. This will make pigs balk when they approach it.*

- ✓ The belly-belt conveyor is often beige in color. This differs from the rest of the restrainer, which is often grey. Make sure the belly-belt conveyor stands out as little as possible by ordering it in a grey color. Marel does offer them now in different colors. If the company you work with does not have the color you want, insist that they do ! Avoid contrast in color at all expenses !



*Left: The belly-belt has a beige color. The color differs from the rest of the restrainer. Right: At Compaxo (NL) the belly-belt is made dark-grey. By making it grey it stands out less.*

- ✔ **Make the belly-belt conveyor less abrupt.** The belly-belt conveyor is often a clear visual and physical barrier for the pigs sticking out about 20 cm from the floor! By placing the belly-belt wheel underneath or level with the floor it stands out less. The pigs will then walk more easily onto the moving belly-belt towards the automatic-electric stunner.



*Left: the wheel is clearly visible and sticks out. The pigs feel they will bump into it and it is awkward for them to advance forward, having to slip their legs. Right: by placing the wheel underneath the floor it is not such a physical and visual barrier anymore and the pig will walk in a more natural way onto the belt.*

- ✔ The belly-belt conveyor is made up of small support blocks. These blocks are available for order from Marel in both white and black variants. It is recommended to use the black blocks, as they are softer, more comfortable, and lead to fewer blood spots on the hams. To minimize any discomfort, be sure to replace them regularly. Additionally, the blocks are also available in gray, which makes them less conspicuous.



*Support blocks are available in both soft (black) and hard (white) materials. The soft material minimizes discomfort and reduces blood spots in the hams, but it requires more frequent replacement. Regardless of the material, it's essential to regularly check the blocks to ensure they are not worn out (slippery, irregular and uneven).*

## Reflections

Pigs may also hesitate at the belly-belt conveyor because of light reflections on the metal parts of the restrainer. Reflections may also be visible on the leg-spreading bar. Reflections make pigs balk and walk backwards.<sup>126</sup>

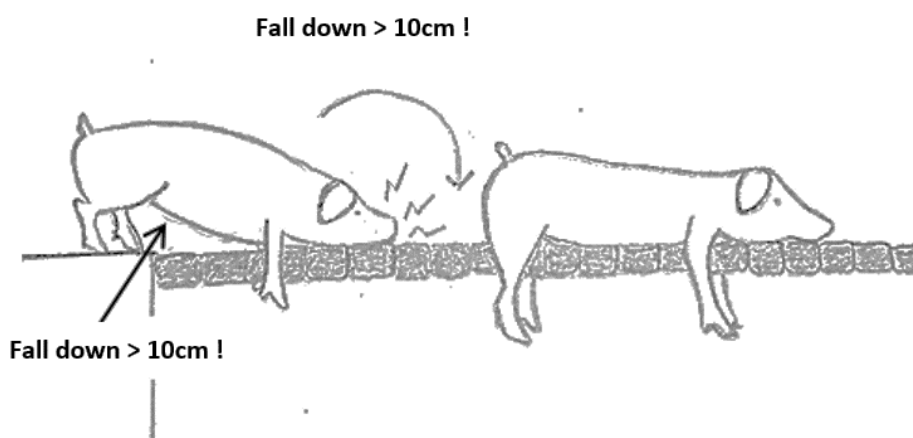


In these raceways there are far too many reflections. Pigs will be scared to walk through them. Use brushed metal instead of shiny metal and adjust lamps to reduce light reflections.

- ☑ Make sure that any metal used for handling live pigs is brushed instead of shiny metal. Brushed metal reduces reflections.
- ☑ Reflections can be prevented by using indirect and diffuse light. Try placing the lamps on the side instead of on the ceiling or place them further high up. Prevent the lights from shining into the faces of the pigs, as this will blind them.
- ☑ Play around with green light. Green light reduces shadows and reflections. It however does not totally prevent them. It is important that the green light is bright enough, if too dark the pigs may not see the passageway well enough.

## Falling

Another issue we sometimes witness is the belly-belt conveyor being placed too low compared to the pigs' belly. When the floor beneath their feet ends, the pigs literally fall 10cm onto the belly-belt.



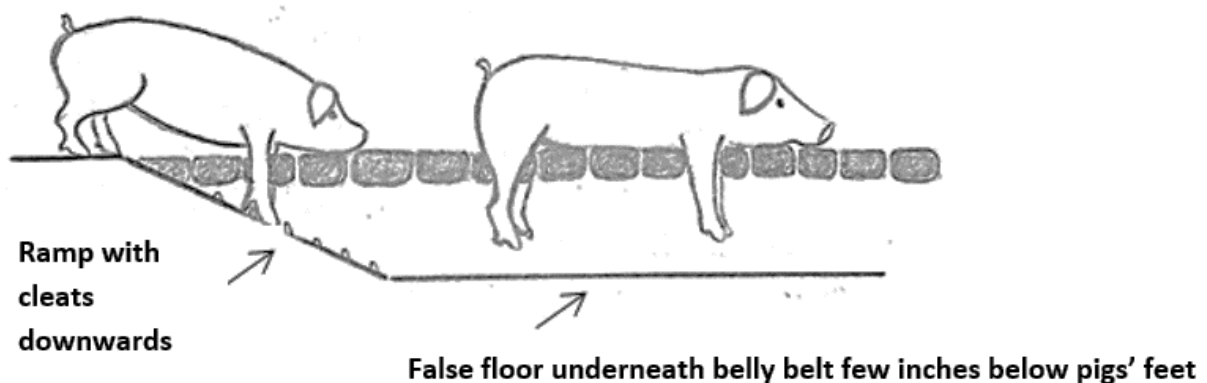
This causes three potential welfare issues. One: it makes pigs hesitate even more to walk onto the belly-belt conveyor, TWO: the fall will cause panic, but also pain especially for uncastrated boars who fall on their testicles and THREE: due to the fall they are not able to balance themselves well. Some end up leaning too much to the right or to the left, making their experience on the conveyor belt even more unpleasant and risking incorrect placement of the electrodes for correct stunning!





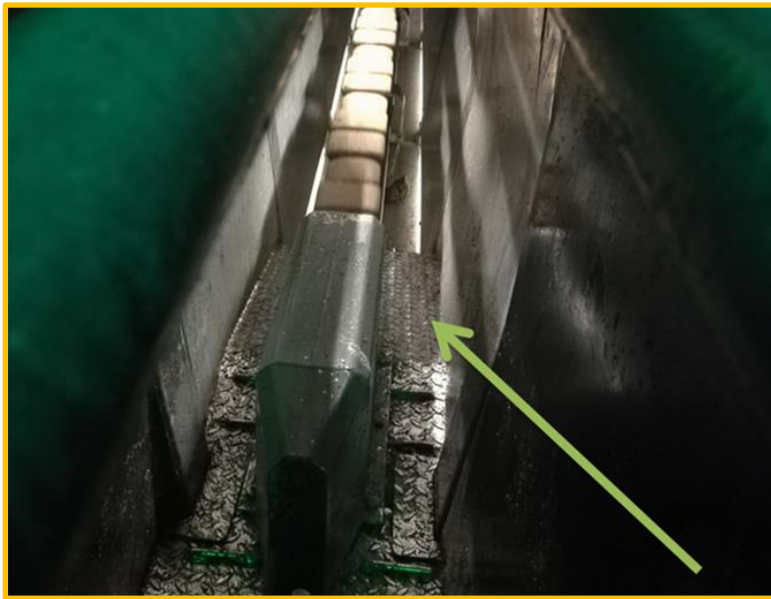
*Falling on the low and narrow belly-belt can hurt the pig and cause difficulties balancing themselves. It can also negatively influence the placement of the electrodes.*

- ☑ By placing a cleated entrance-ramp, pigs can walk down onto the belly-belt instead of falling on it. This will also cause less balance problems. Take the time to align the entrance ramp precisely so the pigs walk smoothly onto the conveyor belt! Even being a few centimeters off can cause problems, so observe, observe and observe and then correct the alignment until it is perfect.



*Placing a cleated entrance-ramp at the right angle so pigs can walk down instead of falling down*

In the restrainer below there is an entrance-ramp to the belly-belt to attempt to break the fall. However, the entrance-ramp below it is a bit too short (pigs will see that floor ends!) and it misses cleats, thus does not have good grip.



*Restrainer with short entrance ramp to the belly-belt to break the fall. It however misses cleats for grip and needs to be longer with a false floor, to stop pigs from seeing that the floor ends.*

## Raceway towards CO<sub>2</sub> stunner

### Automatic push-gates

If pigs are stunned with CO<sub>2</sub> they are often moved in groups toward the stunner. Moving pigs in small groups rather than in a single-file is better for welfare and easier to do. This advantage however is cancelled-out if pigs experience severe stress by the use of (too many) badly-designed powered pusher gates. Eyes on Animals often sees these push-gates causing a lot of fear and injuries, due to bad design, too large group sizes and poor operating procedures. Equipment companies often like to sell more powered push-doors than necessary (as it increases their profit).<sup>127</sup> We therefore recommend the following:

- ☑ **Remove as many automatic-push gates as much as possible and replace them by well-trained, calm and professional employees.**<sup>128</sup> This will keep the pigs much calmer.

Automatic push-gates force pigs forward – even when pigs are facing the wrong direction or are scared to move. This causes pigs to fall, be trampled, panic or injure themselves.



*Automatic push-gates can cause injuries and pigs being pushed over and jumped on.*

At Westfort pig slaughterhouse in The Netherlands all automatic push-gates (based on Eyes on Animals' recommendation) were taken out and replaced by calm, well-trained professional employees, except for the last gate that pushes the pigs into the CO<sub>2</sub> cage (worker safety reasons). Noisy handling tools, such as rattlers and pebble-paddles, were replaced by noiseless tools such as flags, plastic moving-boards and workers' bare hands. This reduced the stress among the pigs significantly and also improved meat quality (pH level improved by 0.2).



*At Westfort all automatic push-gates were removed. Pigs are now moved by hand, a flag and plastic-moving boards; noisy tools, such as rattles and plastic pebble-paddles, are phased out.*

Van Rooi slaughterhouse in Helmond (NL) did the same. All automatic push gates (except for the last one into the CO<sub>2</sub>) were removed on recommendation of EonA. Pigs are now manually moved by workers with plastic-moving boards. Secondly the group sizes were reduced from 8 to 6-7 pigs at a time. This significantly reduced stress. Previously they had one worker constantly checking

the gates to prevent pigs from getting stuck underneath or pushed over as much as possible. Now this risk is totally eliminated as the gates are removed and this work-position is no longer necessary. Due to the removal of the push-gates there are also fewer technical problems.



*At Van Rooi automatic doors (left) were removed and replaced by workers (right) moving animals with plastic-boards.*

- ☑ In case automatic doors are used and cannot yet be replaced by well-trained and calm employees, try to use as few doors as possible.

Make sure that doors do not slide back directly above the pigs when they are moving back to their starting position. The sound and movement of these doors directly above the heads of the pigs causes a lot of stress and fear. It's better to let the doors slide back very high (at least 3 meters above the pigs) so that the pigs barely notice it.



*Automatic doors sliding backwards directly above the pigs cause stress. If they cannot yet be replaced by well-trained employees, try to use as few doors as possible and let them slide back at least 3 meters above the pigs' heads where their movement is less noticeable.*

See below a video of an automatic door sliding backwards, directly above the pigs, causing them to walk backwards out of fear.



*In these videos you can see the pigs walk backwards out of fear, as soon the automatic door slides backwards directly above them*

- ☑ When moving pigs automatically with gates, which is often the case in slaughterhouses using CO<sub>2</sub> stunning systems, there is a high risk of pigs getting trapped underneath the gates, being trampled, jumped on or injured while being pushed forcefully. Watch a video of this welfare risk when using automatic doors below.



*When pigs are pushed by automatic gates, fear is caused and there is a high risk of pigs falling or getting injured.*

- ☑ **Make the bottom part of the push gate that slides downwards out of flexible rubber.** That way if the door slides down while a pig is underneath the flexible rubber will not hurt and bruise the pig as much as a door made out of heavy solid material.<sup>129</sup> Make sure the automatic door is not solid down to the floor – there

should be an opening at the bottom so body parts do not get squeezed or crushed. See a photo illustrating this below.



*Put rubber underneath automatic gates and have an opening at the bottom, to reduce risk of injuries when body parts are stuck underneath*

There are also doors with **sensors that register pressure**. When there is pressure (because a pig is underneath or in front), the gate rises or slides backwards automatically. This is crucial.

- ☑ Make sure the doors are permanently checked and can always be **operated manually and easily by a worker**. A worker can best estimate when doors can be moved down or forward in order to prevent pigs from getting trapped or run over. In case this does happen, he or she can take immediate action.

The same worker can also guide the pigs in the right direction, making sure they are not facing the wrong way and steer them away from the doors.

- ☑ Problems with automatic push-gates are significantly reduced when their speed is **set lower** (<300-350 pigs an hour) and pigs are moved in **very small groups** (max 6 pigs). This gives workers time to be gentle and patient with the pigs. When pigs do not have to be rushed, there will be less stress-related behavior, such as balking and freezing blocking the flow. Small groups are also easier to

handle as the pig in front can still be steered in the right direction, for example by using a foam-noodle or flag. There is also more space for the pigs to turn around and pass each other. See a video illustrating this below.



*By moving pigs small groups at a lower speed, pigs have sufficient time to walk and enough space to turn around, which reduces stress significantly.*

- ☑ The last sliding door in front of the CO2 stunner is often opened halfway to better select the number of pigs going through. However, this common practice is undesirable. Opening the doors only halfway can cause pigs to jam and panic, creating what is known as the 'hourglass effect'. It's essential to ensure that the gates are fully opened, and pigs are moved in small groups as they leave the lairage to prevent splitting them later on.



*Opening gates that slide open only halfway will cause pigs to jam and panic*

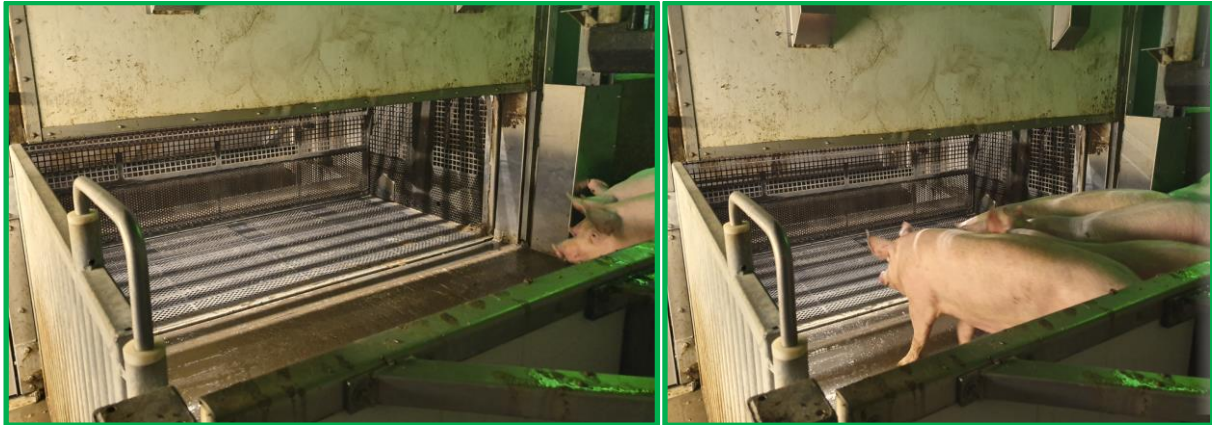
### Design of CO2 stunner

- ☑ **Make sure the CO2-cage is well-lit.** Just like humans, pigs do not like to walk into a dark area and prefer to walk towards lit-up areas. In the two photos directly below the CO2 cages are far too dark. In the two photos further below the lighting is much better, but there are too many shadows. This can be reduced by placing the lights underneath the bars that create shadows. They can also be placed higher up and from the side to slightly reduce the shadows.



*CO2 cages are too dark. Pigs will be fearful to enter and try to turn around. As a result, the automatic gate will force them in in a very unpleasant way.*

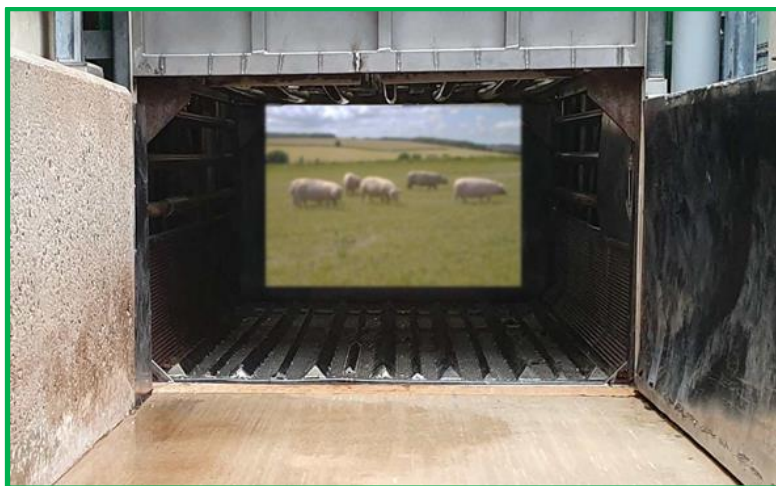




*CO2 cage is well lit and pigs therefore automatically face the right direction. There are however too many shadows on the floor that can distract the pigs from entering.*

- ☑ Make the cage look less like a dead-end and scary by welding an interesting and bright image on the backdoor of the CO2 cage (for example pigs in the grass) so it appears to be an exit. See an illustrative photo below. Less effective, but also helpful is painting the backdoor of the CO2 cage in a light color.

By creating the illusion of an exit, more pigs will face the right direction. This will reduce risks of pigs being tumbled over while being pushed into the CO2 cage while facing the wrong direction.



*Interesting light image at the backdoor of the CO2 cage to simulate an open end and causing less fear*

- ☑ Make sure the CO2 cage is **high enough!** Pigs must not touch the ceiling or frame of the cage with their heads or backs. There has to be a 80cm space minimum above their backs.<sup>130</sup> When the cage is too low, huge problems can occur. Pigs will logically refuse to enter the cage. When forced, they will rub or hit their heads and backs or even get stuck or squeezed in between the entrance

frame of the cage and the push-door.

- ☑ If adult **sows and breeding boars** are slaughtered, be aware that the **CO2 cage of a standard format is not high enough!** Make sure you **use larger CO2 cages**. Organize this with the manufacturer of the CO2 system.

If adult sows and breeding boars are only slaughtered once in a while and you cannot invest in larger CO2 cages, then these animals must be stunned manually with electricity and NOT forced through the normal CO2 stunning system for fattening pigs.



*If pigs are too tall or jump on top of each other they get stuck or squeezed in between the push-door and entrance-frame of the CO2 cage or hit their heads or backs. Be aware of this risk by ordering CO2 cages of sufficient size for the animals you wish to slaughter and prevent pigs from jumping onto each other.*

- ☑ Prevent pigs from jumping on top of each other as it can result in them being **crushed in between the automatic push-door and the entrance frame** of the CO2 cage.

Jumping can be prevented by moving pigs in small groups only (6 pigs max), slow down the speed of the push-gates and giving pigs sufficient space to turn around or pass each other. Refer to [Chapter 4. Moving of pigs - Handling when moved to CO2 stunner >>](#)

- ☑ Make sure there are **no hissing, rattling or beeping sounds** when the CO2 stunner or push-gates are being used. These noises will scare the pigs and cause them to balk, stop and jam.
- ☑ **Make sure the floor of the CO2 cage is made of a very good anti-slip material.** You do NOT want pigs to slip and fall during the stunning phase – as he/she will then be trampled by others. This will not only cause a lot of suffering, but also impairs the inhaling of CO2 – causing an insufficient stun or the pig regaining consciousness.
- ☑ **Best is to keep the floor in the CO2 cage the same as the rest of the raceway.** Sudden changes of flooring, such as holes, bumps, grooves, shadows, colors and reflections will cause pigs to balk. The floor should be comfortable to stand on. Cleats should not be sharp or higher than 1,5cm.<sup>131</sup>



*When there is a sudden change of flooring (from concrete to shiny metal) pigs will balk. Especially at high speeds, this can cause serious problems. Additionally, the cleats are also placed in the wrong direction, which results in suboptimal grip.*

## Handling when moved to CO2 stunner

- ☑ **Always move pigs in small groups.** Best is 4 pigs at the time, max is 6 pigs at a time. Generally pigs are moved in groups of 15, this is far too large!

Make sure pigs have sufficient space in front of them so they can pass each other and turn around easily. This will prevent pigs from jumping on top of each other (due to lack of space).

When small groups are used and pigs get sufficient space, there is much less risk of pigs being pushed over by automatic doors when facing the wrong

direction. **Always keep raceway(areas) half-full, never more crowded!** Please refer to [Chapter 4. Moving of pigs - Calming the movement >>](#)



*Here pigs are given sufficient space and are moved in small groups (4 at a time), which prevents stress significantly.*



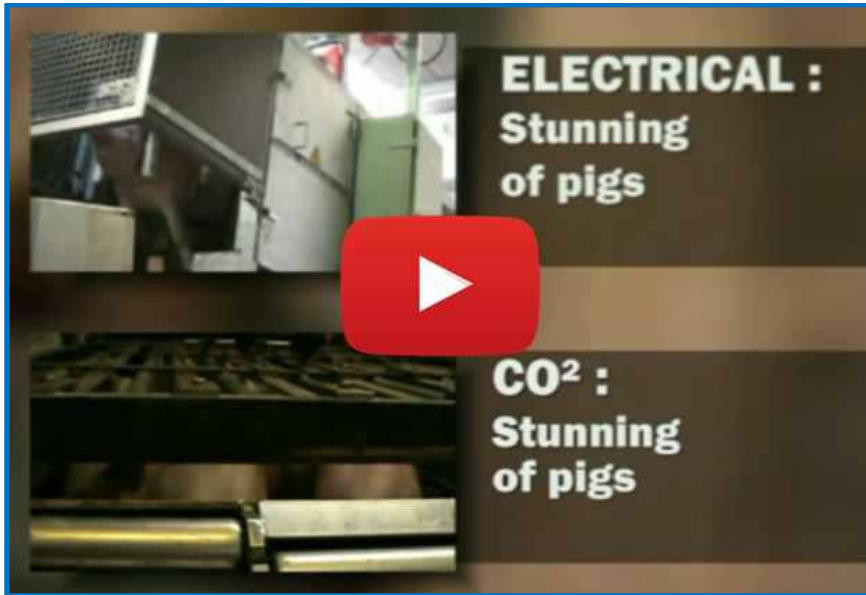
*These videos show the impact group size has on animal-welfare. In the left video (starting at 00:21) large groups are used and in the right video 4 pigs.*

- ☑ **Be patient and gentle with the pigs.** Do not rush them. Let them walk at their own speed. Rushing pigs causes them to balk, freeze or turn around. **It does not save time, but costs time.**
  
- ☑ **Ban all stress-causing handling tools,** such as sound producing paddles, clappers or electric prods and replace them by tools that do not produce much sounds or stress, such as plastic moving boards, plastic bags and flags. For

more information, please visit [Chapter 4. Moving of pigs - Calming the movement](#)  
[>>](#)

## 5. Stunning

Pig slaughterhouses in Europe use either electrical stunning or CO<sub>2</sub> stunning. Eyes on Animals has made a film comparing both stunning methods. Click on the video below to watch it.



The advantage of stunning pigs with electricity is that, if performed correctly, they immediately lose consciousness. The disadvantage is that the pre-stunning period is often highly stressful in larger and medium-sized slaughterhouses as they want to use automatic electric stunning which requires single-file restrainers such as the Midas-system from Marel. In such automatic electric-stunning systems, pigs first need to be separated from the group and walk into a single file raceway (behind each other). This file leads them to a conveyor belt (the restrainer), which carries the pig - underneath his/her belly - towards the automatic electric stunner. Entering the single file and belly-belt conveyor often causes severe stress. At these points, electric prods or other stress-producing tools are used to force pigs forward. Pigs are herd animals and want to stay in the group no matter what. Natural pig flight- and herd behavior should be taken into account when designing the single-file raceway and (belly-belt) restrainer towards the automatic electrical stunning system. This would prevent a lot of fear and suffering. See also the [Chapter 4. Moving of pigs – Design >>](#)

During CO<sub>2</sub> stunning, pigs are moved and stunned in groups. This means they do not have to be forced into a single-file raceway, neither onto a moving belly-belt restrainer.

However the inhalation of CO<sub>2</sub> causes approximately 20-25 seconds of severe fear, a sense of suffocation and a painful burning sensation in the air passageway.<sup>132 133 134</sup>  
<sup>135</sup> Due to an significant increase in blood pressure, which is stress induced, approximately 5-15% of the pigs exhibit lung bleedings.<sup>136</sup> Video recordings have shown that pigs panic so much that they jump up and attempt to escape from the CO<sub>2</sub> “cage/pen” before they become unconscious.

Because CO<sub>2</sub>, in high concentrations, is very aversive and painful to pigs, nothing can be done to alleviate this suffering.<sup>137</sup> CO<sub>2</sub> has inherent welfare problems and thus has no potential to be a humane method for stunning pigs in slaughterhouses. For these reasons, CO<sub>2</sub> stunning has been criticized by many large animal-welfare organizations and scientists and there is lots of talk about it being legally phased out in the near future.



*Electric stunning (see left photo) causes immediate loss of consciousness when performed correctly. With CO<sub>2</sub> stunning the pigs suffer greatly for 20-25 seconds.*

Secondly, moving pigs in groups (seen as the main and sole advantage of CO<sub>2</sub> stunning over electric stunning) is not always without stress – it very much depends on the way the pigs are moved. Eyes on Animals often witnesses pigs being moved in much too large groups, raceways are crammed too full and automatic push-doors are set at too high a speed and are poorly designed, resulting in panic, trampling and sometimes even crushing. These welfare issues nullify any advantage of moving pigs in groups and make CO<sub>2</sub> stunning all-round a very poor choice. See for more information [Chapter 4. Moving of pigs - Raceway towards CO<sub>2</sub> stunner >>](#)

### **Phasing out of CO<sub>2</sub> stunning for pigs**

Already back in 2015 the Dutch House of Representatives [accepted a motion](#) by the Dutch Political Party for Animals to phase out the use of CO<sub>2</sub> for stunning pigs prior to

slaughter.<sup>138 139</sup> The European Food Safety Association (EFSA) and the Eurogroup for Animals have both stated publicly that the stunning method applied to animals at slaughter must be quick and non-aversive. In November 2020 the European Parliament [made 2 million euros available to fund](#) research into a more humane alternative to CO2 so that CO2 can be phased out in pig slaughterhouses in the near future. Regulation 1099/2009 (recital no. 6) also recommends phasing out the use of carbon dioxide for pigs for animal welfare reasons as soon as economical alternatives are available.<sup>140 141</sup> Recently, in April 2022, the Dutch Minister of Agriculture, Nature and Food Quality, Henk Staghouwer, also expressed his commitment to phase out the use of CO2 to stun pigs.<sup>142</sup>

Eyes on Animals is of the opinion that the most humane way to slaughter pigs is by manually electric stunning them, using a design similar to [Naturverbund](#) or [Willems](#) slaughterhouse in Germany and The Netherlands. Sadly however, these “humane” designs can only be implemented in small or medium-size slaughterhouses. Most pig slaughterhouses are getting bigger and bigger and the governments are allowing this, which means manual electric stunning is not possible any longer in them. To slaughter so many animals per hour per stunner, one must switch to automatic electric stunning unfortunately- which means pigs must be automatically restrained and pass via a single-file restrainer. Should society place an importance on the welfare of pigs during slaughter, EonA believes strongly that pig slaughterhouses not be allowed to get so big that manual electric stunning cannot be in use. Eyes on Animals also believes strongly that welfare-labels should take this fact into account when setting their criteria.

Nevertheless, as this does not seem realistic at the moment, Eyes on Animals has initiated a willingness in the large pig slaughterhouse sector to look for better methods to stun pigs humanely. Eyes on Animals hopes that a brand new system will be available in the near future and once it is ready, will encourage plants to make the switch immediately. This could be a non-aversive gas (mixture) that can somehow be administered in a newly designed and engineered group-stunning system. However until now, scientists have not yet found the ideal gas (mixture). With gasses that are less aversive for example, consciousness returns too quickly (which is an animal welfare risk) or there are practical and financial restrictions.

While the search for alternative gasses is ongoing, we feel that the large pig slaughterhouse sector should not be complacent but should commit to a drastic improvement to the design of their current automatic electric stunning system, so that pigs no longer experience stress as seen in the single-file raceway nowadays, which

remains a huge welfare problem. If the stress while moving the pigs from groups into single-file could be removed, we think that electrical stunning is a much more humane alternative to CO2 stunning both for animal welfare but also for the quality of the meat in large pig slaughterhouses. Research shows that with electrical stunning, provided that the stress during the pre-trajectory is reduced, in contradiction of what is generally assumed, the quality of meat is equal or even better as with CO2.<sup>143</sup>

## Electrical stunning

In bigger and medium sized slaughterhouses electrical stunning is often fully automatic (using a belly-belt or V-restrainer). In smaller slaughterhouses they often use manual electric prongs. The pig is then restrained or stays in the group. In all cases, be alert on the following points:

### Stunner settings

- ☑ For an effective stun, the 1099/2009 Regulation requires a minimum current of 1.3A per pig. This current however is based on research from the 80's and 90's when "finisher/slaughter" pigs weighed 100-110kg on average.<sup>144</sup>

The average slaughter weight of finishers have in many cases increased to 120-130kg or even higher. In some European regions pigs are slaughtered at a weight of 160kg for the production of traditional dry-cured hams.<sup>145</sup>

**Make sure to use a higher amperage if pigs weigh more than 110kg (!) in order to prevent stunning failures.**<sup>146 147</sup>

- ☑ If pigs are slaughtered at 150kg or more, a minimum of 2A should be used.<sup>148</sup> For sows or boars (>200kg), the current has to be increased to 3A minimum. For piglets a minimum of 1.3A should be used (similar to slaughter-pigs, as is also required by Council Regulation 1099/2009).<sup>149</sup>

- ☑ **Make sure to use low frequencies;** 100Hz for the head and maximum 50Hz for the heart. The brain and the muscles (including heart) respond better to low frequencies. If higher frequencies are used, the amperage has to be increased significantly.<sup>150</sup>

To induce cardiac arrest always use low frequencies (50Hz maximum) otherwise you will not (!) cause a cardiac arrest.<sup>151 152</sup> For the head, higher



frequencies are allowed, but the amperage than also has to be increased. Over 400Hz is undesirable.<sup>153 154</sup>

Please refer to the table below for optimal settings.<sup>155 156 157 158</sup>

Category	Ampère	Voltage	Frequency head	Frequency heart
Piglets	1,3A	180V minimum	100Hz, max is 400Hz	50Hz max
Slaughter pigs 100kg	1,3A	250V minimum	100Hz, max is 400Hz	50Hz max
Slaughter pigs 110-150kg	1,5-1,8A	250V minimum	100Hz, max is 400Hz	50Hz max
Slaughter pigs > 150kg	2A	250V minimum	100Hz, max is 400Hz	50Hz max
Sows and boars (>200kg)	3A	250V minimum	100Hz, max is 400Hz	50Hz max

#### *Optimal settings for electrical stunning of pigs*

- ☑ The current needs to be applied to both sides of the head for 3 seconds minimum (to induce stunning) and after on the heart for 3 seconds minimum. Placing the electrodes on the heart for a longer period of time results in a higher chance of cardiac arrest or fibrillation, reducing the likelihood of the animal's recovery.

## Maintenance

- ☑ **Make sure the electrodes are cleaned in between breaks and at least every day**, so the current flows well. Use a metal brush or wire for this purpose.<sup>159</sup>
- ☑ Check both the settings and efficiency every day. Checking the settings only, is not enough. You also have to make sure the stunner operates correctly. This can be checked by using a dummy head. The stunner should be first tested on a dummy-head or with a testing device before it is being used on animals.<sup>160</sup> Testing devices can be ordered at Freund. [Click here for more information >>](#)

**Be aware that a failed stun is very difficult to detect.** It can cause muscular immobilization – resulting in the pig not being able to respond to stimuli (as their muscles are cramped) but still be fully conscious and sensitive to pain. This is totally unacceptable and makes it crucial to check the stunner on a daily basis.

## Stun-to-stick times to avoid pigs regaining consciousness

- ☑ **If pigs are stunned head-only, which is standard practice in some small slaughterhouses, there is a high chance they will regain consciousness quite quickly afterwards (< 30 seconds). After the clonic phase (pedaling/kicking) pigs usually recover.** <sup>161</sup>

We therefore strongly recommend to always apply the electrodes to the head first (to stun them) and then also to the chest (to impose a cardiac arrest). By applying the electrodes to the heart (after you applied them to the head first) you reduce the chance of pigs regaining consciousness.

But be aware: the chance of pigs regaining consciousness is still possible because a cardiac arrest, especially in smaller pigs, is not 100% guaranteed.<sup>162</sup> As well, a heart can be re-activated when the pig is hoisted: therefore bleeding the pigs out is vital right after stunning. Bleed the pigs out within a maximum of 10 seconds after head-to-body cardiac arrest stunning, to absolutely minimize the chance pigs regaining consciousness (before or during bleed-out).<sup>163</sup>



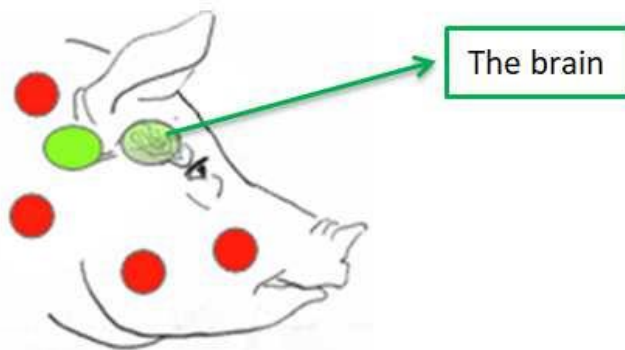
*First stun the head (left photo) and then apply the electrodes to the heart (right photo) to cause a cardiac arrest stun.*

- ☑ Slaughterhouses sometimes also choose for longer current-exposure times to ease the sticking and hoisting process, as it increases the time pigs are “rigid”.<sup>164</sup> If the current is however too low or the electrodes are placed incorrectly – this also masks the signs of consciousness for a longer period of time (as the

pigs' muscles are cramped), which is indeed a huge welfare concern.<sup>165</sup> Therefore always make sure the stunner has [enough power](#) and the [electrodes are placed correctly](#). Additionally, please be aware that electrodes placed on the head for extended periods can accumulate dirt and grease more rapidly, affecting conductivity. It is crucial to [clean them regularly](#) throughout the day to ensure optimal performance.

## Position electrodes

- ☑ To assure an effective stun electrodes should be placed on both sides of the head in **between the ears and the eyes** so the electricity spans the brain. Placing the electrodes on the base of the ears is also acceptable. Please see the illustrations below for correct and incorrect placement of the electrodes.



*Left: good (green dots) and bad (red dots) positions of electrodes. Source: H. Anil. Right: correct position of the electrodes. Source: OIE.*

- ☑ **We regularly see electrodes being placed incorrectly.** We see this problem in slaughterhouses where pigs are automatically stunned (for example with a Midas system), as well in slaughterhouses where pigs are manually stunned. If the electrodes are placed incorrectly, the electricity will very likely not span the brain. The animal will not be adequately stunned; he/she will receive a painful shock before losing consciousness, or will not lose consciousness at all.<sup>166</sup>

### **Automatic stunning**

In slaughterhouses where pigs are stunned automatically, electrodes (often with a Midas system) are sometimes placed too far behind the ears. This is unacceptable, especially when it is more than 5cm off.<sup>167</sup>



*Electrodes from automatic stunning systems are sometimes positioned too far behind or below the ears. Stunning-experts recommend electrodes be positioned right between the eyes and ears or directly below the ears. Incorrect placement is a serious risk of pigs not being stunned adequately and/or receiving a painful electric shock first.*

→ Ensure that the electrodes (both mechanically and in terms of software) are properly configured. Contact the manufacturer when needed.

→ Make sure that the support blocks (from the belly belt where the pigs lie on) remain securely non-slip. If pigs start to slide forward, they might miss the electrodes!

### **Manual stunning**

With manual stunning we also see that electrodes are regularly positioned too far below or behind the ears and sometimes even in the neck-region (especially in piglets). As pigs often become rigid nevertheless (and pain and consciousness cannot be seen), this failed-stun is sometimes not detected or corrected. Positioning the electrodes becomes especially difficult when pigs are nervous (move a lot) or very small. Read tips on the correct placement of the electrodes in [Chapter 5. Stunning – Group stunning >>](#)



*Left: electrodes are positioned too low and too far behind the ears. Right: electrodes are positioned way too low (neck/breast region). These positions are not acceptable and cause a lot of pain and suffering.*

- ☑ The design of stunners (both manual and automatic) need to be improved in order to assure that the electrodes can be placed easily in the right position - between the ears and the eyes in order for the current to span the brain. Now electrodes are often placed too far behind and below the ears, as this region is easier to reach.

Freund, a German slaughter equipment company, developed a semi-automatic electric stunner that improves the position of the electrodes. The stunner is placed behind the ears of the pig, such that the electrodes touch close to the eyes. This also solves the problems when stunning pigs of certain breeds with hanging ears.<sup>168</sup> See a picture of their stunner below.



Stunner from Freund that improves the position of the electrodes in order to span the brain.  
Copyrights: © M. Marahrens, FLI; © Freund GmbH

- ☑ Best are **stunners with multiple spikes** (instead of one) in order for the current to more likely span the brain.<sup>169</sup>
- ☑ **Should a pig squeal when electrodes are placed on her/his head there is reason for concern!** Especially when this happens on a regular basis. It means the pigs are experiencing pain from the electric current before losing consciousness or do not lose consciousness at all. The current might not be sufficient, not span the brain (incorrect position of the electrodes) or the contact with the skin is poor (dirty electrodes, not putting enough pressure etc.). This is unacceptable. Find out the cause(s) and solve them immediately!

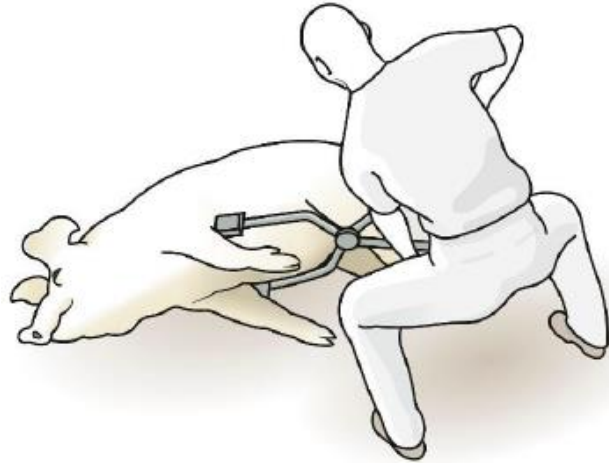
In the video below the pig squeals and feels pain because the prongs are not placed correctly. The electrodes are positioned too far below and behind the ears and are not applied with sufficient force to cause immediate unconsciousness.<sup>170</sup>



*This pig squeals during the placement of the electrodes. She feels pain! The electrodes were placed too low and too far behind the ears and were not applied with sufficient force to cause immediate unconsciousness.*

- ☑ After the head (to make the pig unconscious), the electrodes are often placed on the heart to induce a cardiac arrest. It is important that the **heart is in between the electrodes**. See the two examples below. Both positions are effective since

the heart is between the electrodes. However, the position on the right may be more challenging to execute, as it requires placing the lower electrode slightly underneath the pig, and therefore may be less commonly seen in daily practice.



*Correct position of the electrodes to induce a cardiac arrest. Source right drawing: ICF, 2017.<sup>171</sup>*

- ☑ Never place the electrodes on the heart of a conscious pig – this is extremely painful! Only proceed with heart stunning after the pig has been rendered unconscious through head stunning.
- ☑ It is important that **manual electric stunners are not too heavy** for a worker to hold or carry. If they are lightweight, they can be lifted and placed more easily and accurately on the right position of the pigs' head.<sup>172</sup> The company Freund offers manual stunners made of titanium; which is a lightweight material. [Read more >>](#)

### Pigs missed by the automatic stunner

With automatic stunners, such as the Midas, electrodes are placed on the head automatically. However, there are instances where the sensors fail to detect the pig's head accurately, resulting in incorrect or missed electrode placement. This risk is higher when pigs are panicked due to rough handling or when anti-mounting bars are absent on top of the restrainer.

- ☑ Ensure that your workers do not stress out the pigs, for example, by continuously using electric prods or other stress-inducing tools. When pigs experience fear or are rushed during movement, they tend to crawl on top of each other, slide forward and make abrupt movements in the restrainer, leading to more stunning

failures. Keep the pigs calm and minimize fear when moving them through the single-file raceway and onto the belly belt restrainer. See more info in [Chapter 4. Moving of pigs – Handling >>](#)

- ☑ If pigs are rushed, there is a higher risk of them entering the single-file raceway and the belly-belt conveyor restrainer the wrong way around (thus back legs first and walking backwards, rather than head first walking forward!). As a result, the automatic electrodes will be placed on their backs or flanks instead of their heads, which is extremely painful and will of course not render the pig unconscious. These kinds of mistakes are intolerable!



*A pig in the automatic Midas stunner that entered backwards (left photo). The electrodes are placed on the flanks instead of the head, which is extremely painful and does not render the pig unconscious (right photo before sticking). These kinds of mistakes are often the result of rushing pigs into the single-file raceway and workers being inattentive also due to time-pressure. This is totally unacceptable and should never be seen!*

Ensure your employees herd the pigs calmly and check 100% that all pigs are entering the single-file head first. Should an accident occur and a pig walks back-end first into the single file, this animal must be released from the single-file immediately and either stunned manually or turned around and placed back into the raceway facing the right direction. **It is for this reason that it is absolutely crucial that your single-file raceway has access doors.** Your employees need time to properly manage these situations. Do not put them under time pressure! See more info in in [Chapter 4. Moving of pigs – Handling >>](#)



- ☑ Make sure to have a worker directly below the stunner (where the pigs slide down) so that pigs that were unfortunately missed by the stunner can be manually stunned immediately.
- ☑ It is important to register how often pigs are missed by the automatic stunner. More than once a day is not acceptable. Use intelligent cameras and sensors for this. More information can be found in [Chapter 7. Smart surveillance >>](#)
- ☑ Build a **“trap” at the exit of the automatic stunner** (where the pigs slide down), to make sure that pigs that exit the automatic stunner and are still conscious cannot run out in panic and risk being hurt. A trap/barrier blocks the animal so that he or she can be safely re-stunned manually by an employee in charge. It is not acceptable when pigs are chased through the slaughterhouse. Make sure there are no gaps.



*A “barrier trap” (in blue) to prevent pigs that were not stunned correctly by the automatic stunner from “escaping” and running around in panic. Emergency manual stunning can now*

*more easily be performed when the pig remains somewhat restrained by this blue barrier.*

- ☑ Have two emergency electric manual stunners on hand directly below the automatic stunner (where the pig slides down). The second manual stunner is needed in case two pigs are missed in a row or shortly one after the other.

## Current conduction

- ☑ **Dehydration is a common cause of stunning failures**, as the current conductivity will be lower if pigs are dehydrated.<sup>173</sup> Make sure pigs are well hydrated by offering them water up until the final moments before slaughter. If a pig arrives dehydrated to the slaughterhouse, a few hours in lairage with access to water is not always sufficient for recovery.<sup>174</sup> It is important pigs get enough water to drink on the farm and during transport if the journey is long.
- ☑ **To improve stunning efficiency, install a misting system in the lairage** so that pigs can become lightly wet. Moisture on the skin reduces the contact resistance between the electrodes and the skin. Do not ever use a (high pressure) water hose to wet the pigs though as this causes fear (pigs will try to avoid the water) and pain. Secondly, putting too much water on the pig can also increase the risk of superficial current dissipation.<sup>175</sup> The water of the misting system should not be cold or hot, but rather tepid and come out gently. Take the weather conditions into account.
- ☑ **Make sure the electrodes are applied to the head with enough pressure.** Too little pressure against the skin negatively influences the current flow through the brain and therefore stunning efficiency.<sup>176</sup> An example of inadequate pressure can be found in the video below. In the video the electrodes are also positioned too low and far behind the ears.<sup>177</sup> The pig screams and feels pain due to the incorrect placement of the electrodes.



*Slaughter man using too little pressure when placing the electrodes on the skin of the pig.*

## Meat-quality and stress

- ☑ **It is important the pig does not experience fear or panic when being stunned. An animal is a sentient being and it is immoral to cause pain or panic. Also for meat quality reasons, it is bad to create stress for pigs during stunning because a stressed-out pig will tighten his/her muscles, causing bleedings when an electrical current is applied. The meat-quality of electrically stunned pigs can be better than the meat-quality of pigs stunned with CO<sub>2</sub> in cases where pre-slaughter stress is drastically reduced.<sup>178</sup>**

## Manual stunning

In smaller slaughterhouses pigs are regularly stunned in a group with manual electric tongs. This method does not require restraint or separation from the group; which will prevent much suffering. It does however require a very skilled and calm worker as the placement of the electrodes is a bigger challenge when pigs are moving about in a pen. Secondly it is very important that the area where the pigs are stunned is quiet.

The more restless the pigs, the more likely there will be movement causing errors in stunning. The placement of the electrodes is especially challenging on piglets as they are small, very mobile and move quickly.



*Left photo: electrodes are applied too far behind the ears risking that the current does not span the brain, Right photo: electrodes are placed correctly, at the base of the ears.*



*Here the electrodes are placed far too behind (at the shoulders/neck). It will cause a very painful electric shock and the piglet will not lose consciousness. The piglet will be cramped and unable to respond to stimuli, but feel everything. This is a very serious animal-welfare concern and is completely unacceptable.*

**To reduce stress and improve the positioning of the electrodes, we recommend the following:**

- ❑ **Prevent unnecessary and abrupt noise and movement and block the pigs' view of other employees.** The area in which pigs are stunned should be quiet and free of external stimuli. Pigs need to feel safe in order to keep them calm. Make sure hoisting is performed quietly and preferably outside the stunning area. Do not hose pigs down or play loud music, all these activities will cause stress, distract the employees from their serious tasks and are signs of disrespect to the animal and process. When stressed, pigs will be on guard, all their senses alert and they will be more active resulting in more stunning mistakes.
- ❑ Groups should consist of a maximum 6 pigs and there should be enough space around them to get out of the way and to avoid pile-ups. **Keep the stunning-area maximum half full and never more than that.** This will ease the placement of the electrodes as there is more space and less stress-behavior, such as pigs crawling into the corners and on top of each other. The fewer pigs in the restraining area, the shorter the waiting time (and stress) before stunning.

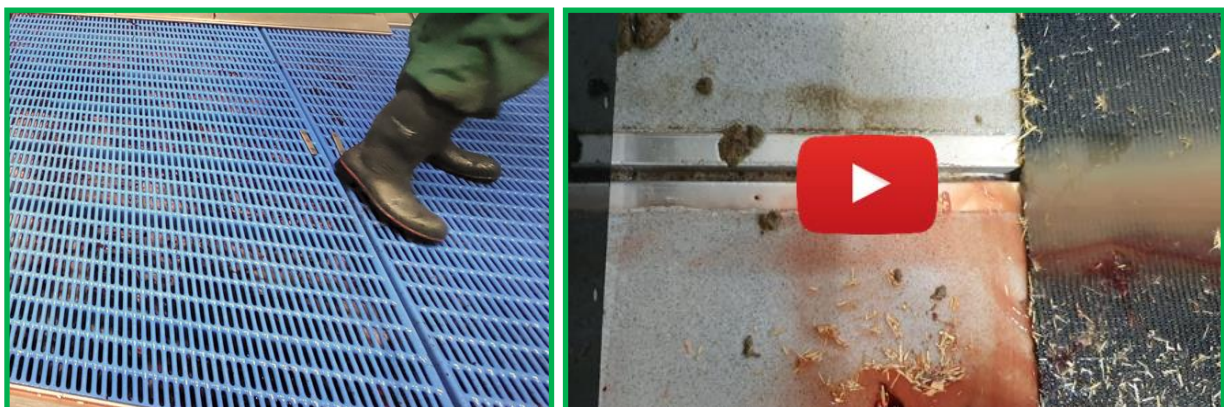


*When stressed, piglets crawl into corners and on top of each other. By placing a maximum of 6 piglets in the stunning-area, stress-behavior is reduced. This eases the placement of the prongs without touching other piglets.*



*Small group sizes to keep pigs calm and ease placement of the prongs*

- ☑ The **last pig to be stunned in the group** can become nervous as pigs are social animals and don't feel safe alone. This can make the positioning of the electrodes more challenging. Adding new pigs can help alleviate this issue. While this practice can be advantageous, ensure that this individual is stunned as one of the first in the next group. Continuously subjecting this pig to be the 'last one' should be avoided, as it may lead to the accumulation of stress.
- ☑ **Make sure the floor is made of very good anti-slip material.** When pigs are also bled-out in the stunning-pen the floors become very slippery due to the blood on the floor. This poses a risk of slipping or injury for the pigs and also imposes a safety hazard for your workers. Ensure there is a good drainage system in place, such as a grid floor (without risking injury to the pigs' feet) or a floor with a gentle slope to allow blood to run off, as demonstrated in the video below.



*Good anti slip floors where slippery blood can drain through. Left: soft plastic grid floor, right: floor with slope.*

☑ The employees given the task of stunning the pigs should have a **calm and patient character**. He/she should have the knowledge and skills to keep pigs calm and know exactly how to position the prongs correctly. A professional and effective employee:

- **Does not make any sound.** So no yelling, no use of noisy herding tools and no whistling.
- **Moves as little as possible.** So no abrupt or unnecessary movements and NO chasing of pigs!
- **Approaches the pig and positions him/herself in the correct way** to reduce the chance of the pig running away or recoiling. See the correct position of the worker in the drawing below.



- **Is patient and waits for the right moment to place the prongs;** when the pig is calm, not moving and there is no chance of touching other pigs.

Watch two video's below of a calm, professional and effective worker.



*The worker is patient, positions himself in the right spot and waits for the right moment to place the prongs.*

At last, it is also important that the worker immediately recognizes signs of pigs regaining consciousness and also knows how to correct measures swiftly if a mistake is made.

- ☑ To positively distract pigs, slaughterhouses can experiment with food, such as hay, inside the stunning pen. When pigs eat from it, the worker can easily and safely place the electric prongs on the head without the pigs noticing it.

Not all pigs will be easy to distract with food. It is important that their stress level is low, and they are used to the type of food that is offered to them. Conventional pigs, for example, that were raised in barren concrete pens, have never seen hay before. It is likely they will not be attracted to hay in such a short period of time.

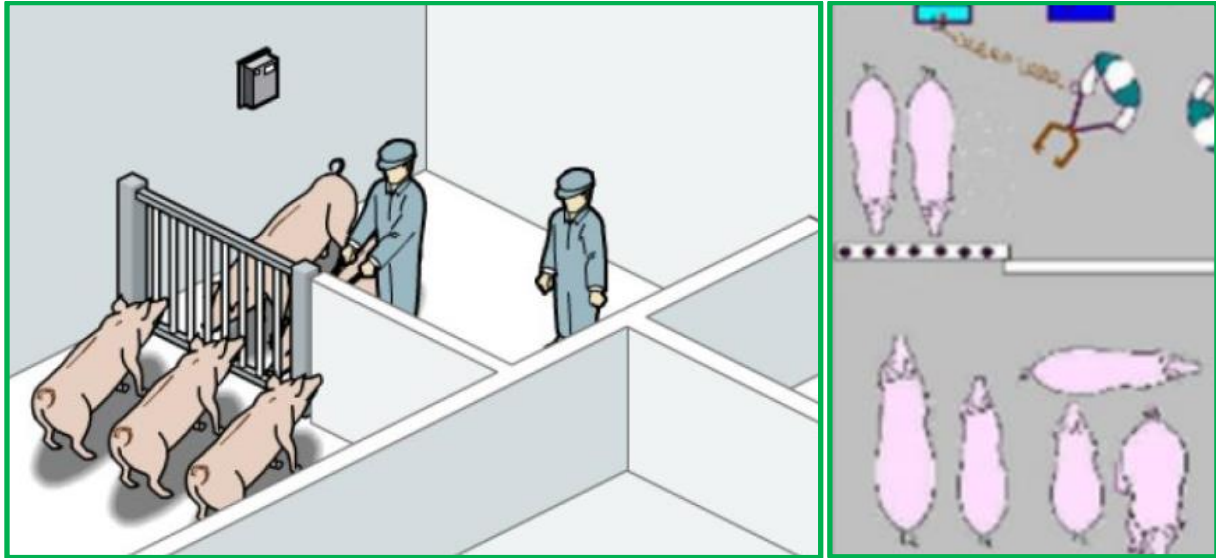




*Straw-racks inside the stunning-pen to positively attract pigs. While pigs are busy nibbling at the straw, the prongs can be placed safely and correctly without startling the pigs.*

- ☑ Another way to ease the placement of the electric prongs, is by placing a **see-through gate in the middle of the stunning-pen**. By placing pigs on both sides, they will be looking at each other and are less likely to see the employee with the tongs approach from behind. See the two drawings from the Norwegian research institute [Animalia](#) below. This principle can also be used by building the stunning pen next to the lairage and have a see-through wall in between. The pigs inside the stunning pen will likely want to move back to where they came from (the lairage) and will all face one direction. This makes it easier to approach the pigs from behind to stun them without them having advance warning.

It is however important that both sides of the gate are equally comfortable and “attractive” for the pigs, to avoid them struggling to go from one side to the other. Realize that the pigs will want to go to the side that feels safer, often the side where they came from or where most of the pigs are.



*Place a see-through gate in the middle of the stunning-pen so that pigs will look at each other and the worker can more easily place the electrodes correctly. Copyrights: Animalia*

Make sure the bars of the gates are close enough together to prevent the pigs (or piglets) from getting their noses, or other body parts, stuck. The gate must be made of a material that does not conduct electricity.



*Make sure the bars of the gate are close together so there is no risk of pigs getting stuck. In these photos the bars are made from metal, which is less safe as it conducts electricity. Copyrights: Animalia*

### Signs indicating (regaining) consciousness

Make sure each pig is stunned correctly. Perform this task carefully and without rush.

Check for signs of regaining consciousness at least at three different moments to be sure the animal does not experience any pain during the slaughter process:

1. Immediately after stunning (before sticking)
2. 40 seconds after stunning
3. shortly before the scalding tank

A pig that is correctly stunned with electricity will undergo two phases. The tonic phase in which the pig immediately collapses and contracts his/her muscles (looks stiff with legs stretched out) and the clonic phase in which the pig will kick involuntary with his/her legs. Slowly the body will then relax. A tonic and clonic phase is a sign of an epileptic seizure – the pig is unconscious.

**Re-stun the pig immediately if the below signs are observed. If these signs occur after the pig was cut, do NOT forget to also check that the size of the incision is large enough (and if necessary, correct it) to ensure profuse bleeding.**

- ✗ The pig **does not show a tonic (rigid) and clonic phase (paddling of the legs)**. Especially the tonic phase should be clearly visible. When the tonic phase is absent (and there is no loss of posture) the pig is still conscious. The clonic phase (paddling of the legs) is less visible in pigs that are stunned head first and then heart or when the electrodes are placed on the head (and then heart) for a long time. This is normal.
- ✗ The pig **blinks spontaneously, in a natural way, or follows movements with the eyes**. This can be tested by waving your hand in front of the eyes.<sup>179</sup> Eyes should have dilated pupils (and not react to increase or decrease in light intensity), a blank stare or be rolled back. Eyes that begin to vibrate for a short amount of time directly after stunning is normal.

Watch a video below of pigs that have been stunned properly. They have a blank stare and dilated pupils. Bodies are relaxed.



*Left: pigs who look properly stunned. Right: eye with blank stare and dilated pupil*

- ✗ **The pig has a blinking-reflex 40 seconds after stunning.**<sup>180</sup> This can be tested by touching the eye (corneal reflex) or eyelid (palpebral reflex) gently. A blinking reflex right after stunning may occur, but it should be definitely absent 40 seconds after stunning. Therefore only perform a corneal reflex 40 seconds after stunning. If the pig blinks he/she should be re-stunned immediately.



*Negative eye-reflex. Blinking or reaction to nose-pinch is absent.*

- ✗ **The pig responds to a pain stimulus.** This can be tested by pinching the nasal septum.<sup>181</sup> See the left video directly above.



*Consciousness can be tested by gently poking the nose with pliers (left) or pinching the nose with the hand (right).*

- ✗ The pig **shows an upright reflex (raising of the head or upper body).**
- ✗ The pig shows **rhythmic breathing or repeated gasping.**

**Rhythmic breathing** can be recognized by in and out movement of the ribs, flanks or nostrils.

An incidental **gasp** (like a fish out of water) may occur. The lower jaw will then go down, but movements of the ribs are absent. This is a reflexive movement and a sign of a dying brain.<sup>182 183</sup> When a pig however **gasps continuously (> three times)**, this can also be a sign that he/she is regaining his/her consciousness.<sup>184</sup> In this case re-stun the animal. Do not take any risks where there is a doubt.

When the stunning is effective the tongue often hangs out. This however does not necessarily have to be observed in an unconscious animal, but it is a good sign if it is.



*Videos of “gaspings”. A single gasp may occur, but repeated gasping (three times and more) can be a sign of regaining consciousness. In the case of repeated gasping the pig should be re-stunned as soon as possible.*

**Important:** If a pig regains consciousness, breathing will resume. This often starts with gagging.<sup>185</sup>

- ✗ The pig **screams or makes other sounds** with clear intentions.
- ✗ The pigs’ head and/or body, after approximately 2 minutes of bleeding out, **is not hanging floppy** on the slaughterline. He/she differs in body posture from the others or still moves and kicks.

Approximately 2 minutes after sticking, pigs should be **dead due to blood loss**. This means the bodies and heads on the slaughterline have to be floppy. Make sure to look at all pigs hanging on the slaughterline and see if any of them stand out – due to a different body posture or movements. After 2 minutes of bleeding-out, kicking and other movements are unacceptable. Likely the pigs have not been cut properly and have not lost enough blood and are thus regaining consciousness. Make sure to re-stun and re-stick them immediately!



*The pigs hanging on the slaughter-line have to be floppy (not rigid or uprighting) like in the left photo. If some pigs, after 2 minutes of bleeding out, still move their heads or legs (see right photo) they must be re-stunned and stuck again immediately.*

**In case of doubt, do not take any risk → re-stun the pig immediately. If these signs occur after the pig was cut, do NOT forget to also check that the size of the incision is large enough (and if necessary, correct it) to ensure profuse bleeding.**

The best is to also have an intelligent monitoring system to **detect signs of consciousness**, alert your workers on the spot, and ensure they act immediately by restunning the animal. Find more information in [Chapter 7. Smart surveillance](#).

## CO2 stunning

In CO2 stunning systems, pigs are either brought gradually (using the paternoster system) or directly (via the dip-lift system) into high concentrations of CO2. Legally, the CO2 concentration must be at least 80%.<sup>186</sup> Slaughterhouses often use even higher concentrations of CO2 (above 90%), causing pigs to lose consciousness more rapidly and therefore increasing throughput rates.<sup>187</sup> However, it is known that higher concentrations are also more aversive to the pigs.<sup>188</sup>

### Stun-to-stick intervals in CO2 systems to avoid pigs regaining consciousness

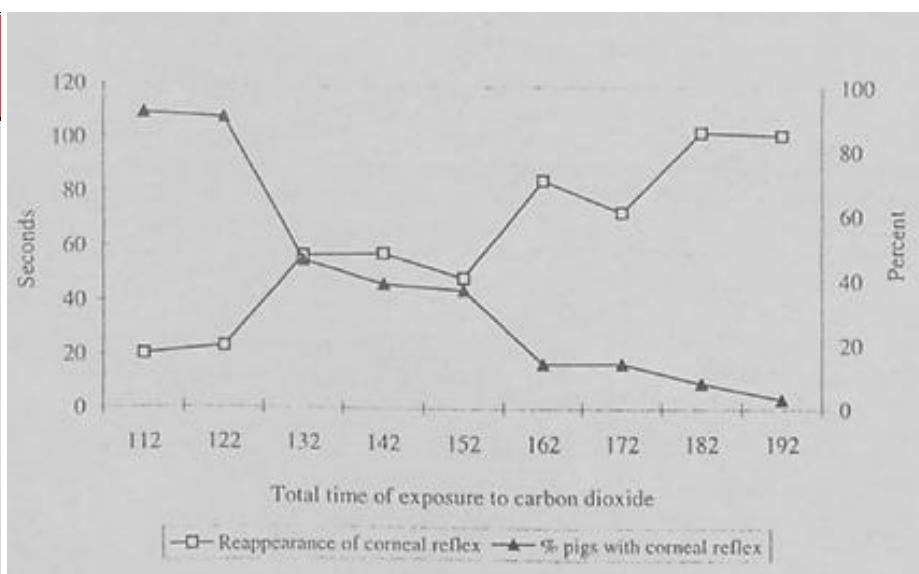
In group-CO2 stunning the stun-to-stick interval is critical as there is a large time interval in between the sticking of the first and last animal of the group coming out of the CO2 cage. This is especially the case in slaughterhouses that have more than one CO2-stunning system in place but just one sticker and just one bleeding-out table.

Prompt sticking is extremely important to prevent pigs regaining consciousness during the slaughter process. Reports from the Dutch Food and Consumer Product Safety Authority (NVWA) have exposed that some pigs in Dutch slaughterhouses are still entering the scalding tank while conscious.<sup>189</sup>

The longer pigs are exposed to CO<sub>2</sub>, the longer the interval between stun and stick can be without risking regaining consciousness. The maximum allowed stun-to-stick interval therefore strongly depends on the CO<sub>2</sub> exposure time. Please refer to the OIE table and the Danish Meat Institute graph below.

To minimize the risk of pigs regaining consciousness after an CO<sub>2</sub> exposure of 2 minutes (which is rather standard in commercial slaughterhouses), they should be stuck within 20 seconds of each one exiting the CO<sub>2</sub> environment. Eyes on Animals has observed that sticking often takes longer, posing a risk of pigs regaining consciousness.

Exposure time (seconds)	Sticking within (seconds)
120	30
130	45
140	60
150	75
160	90



Left table: Stun-to-stick times according to time of exposure to initially 70% CO<sub>2</sub> for 10 seconds and then 90% of CO<sub>2</sub> in air for the remaining seconds. Source: OIE and EFSA.<sup>190 191</sup> Right graph: Minimum time before reappearance of corneal reflex and percentage of pigs showing corneal reflex from end of exposure in relation to total exposure time in CO<sub>2</sub>. CO<sub>2</sub> concentration was 90-93% in air where the CO<sub>2</sub> concentration at the first stop was 79-83%. Copyrights: Danish Meat Institute.<sup>192</sup>

- ☑ **Make sure exposure times and stun-to-stick intervals guarantee pigs do not regain consciousness.** Use the OIE table and DMI graph as a guidance.

The European Commission recommends to expose pigs to CO<sub>2</sub> levels of 90%



and higher for a minimum of 180 seconds.<sup>193</sup>

- ☑ Best is to **irreversibly stun the pigs** so the risk of them regaining consciousness before or during bleeding-out is eliminated. To stun pigs irreversibly they have to be exposed to a minimum of 90% for a duration of at least 3-5 minutes.<sup>194 195</sup> In the UK it is legally required to “kill” pigs when CO2 stunning systems are used.<sup>196</sup> In other countries however this is not (yet) a requirements.



*Irreversibly stunning is advantageous to reversible stunning. To irreversibly stun pigs, they have to be exposed to 90% CO2 minimum for 3-5 minutes.*

- ☑ Many Dutch slaughterhouses only use an exposure time of approximately 120-130 seconds.<sup>197</sup> This means that the stick has to be performed within 20-30 seconds (see graphs above). At this time pigs are often still lying on the conveyor belt.

The EU Council Regulation 1099/2009 does not specify the maximum sticking time, but some EU members do. In Germany, the sticking must be performed within 20 seconds after leaving the CO2 stunning system OR within 30 seconds after the last stop in the CO2 stunning system.<sup>198</sup> Longer stun-to-stick intervals are only allowed when they have been approved by an independent stunning-expert, for the specific parameters and stunning system in the concerned slaughterhouse.<sup>199</sup> In Austria the stick has to be performed in 45 seconds.<sup>200</sup> Unfortunately, the Netherlands lags behind as it does not have additional regulatory requirements.

- ☑ Ensure that all pigs (from the first until the last individual coming out of the CO2 system), are bled within the recommended times. Please refer to the graphs above. We often find this to be a bigger challenge in slaughterhouses utilizing multiple CO2 systems, as many pigs may exit the systems simultaneously, while the number of debleeding tables and personnel performing the sticking is not always increased accordingly.
- ☑ Make sure the exposure time is set at a safe minimum and cannot be adjusted. Make sure to add it to your Standard Operating Procedures, as well as the stun-to-stick intervals.
- ☑ **Be cautious with pigs that have lung problems.** It is likely they have to be exposed to CO2 for a longer period of time to render them unconscious. Dr. Temple Grandin is of the opinion that this issue needs to be researched, as 7-8% of the pigs from factory farms have lung lesions.<sup>201</sup>

**If pigs show clear signs of lung problems** (difficulties breathing, coughing, sitting like a dog), do not let them be stunned with CO2; emergency kill them with the emergency back-up electric prong (or captive bolt if electric stunner is not available) as soon as possible.

- ☑ Make sure critical values with CO2 stunning, such as the exposure time, CO2 concentration, sound and movement of the pigs, the temperature and stun-to-stick intervals are measured and registered. Make sure an alarm goes off when values are in a danger zone. The company Genba Solutions has developed a monitoring system for CO2 systems. [Read more here >>](#)

### Loading density

- ☑ Do NOT overcrowd the pigs in the CO2 chamber/cage. All pigs should have more than enough space to lie down at the same time during stunning (without lying on top of each other!). They also have to be able to spread their legs (chest width) in order to maintain body balance and not fall when the chamber/cage moves into the pit.<sup>202</sup> Overcrowding will result in **serious bruising, inadequate stunning and very serious animal-welfare problems and negative meat quality issues.**

→ Make sure slaughter pigs (100-120kg) get enough space during CO2 stunning. **The recommendation is AT LEAST 0,5m2 each.**<sup>203</sup> Even better is 0,8m2.<sup>204</sup>

If chambers are overcrowded, pigs will be squeezed against each other during stunning and jump or crawl on top of each other. As a consequence pigs at the bottom of the pile will have their chest compressed by the weight of the others. Those pigs will suffer tremendously and may not inhale enough CO2 to be adequately stunned, leading to further serious welfare problems when they exit the CO2 chamber to be stuck and bled out.<sup>205</sup> The inhalation can also be hindered if the pigs are squeezed against each other inside the CO2 chamber.

Overcrowding is unfortunately a common problem in slaughterhouses where they slaughter above their capacity. To cope with the greater volume of pigs, they increase the speed resulting in more pigs being pushed inside the chamber and/or decreasing the exposure time.<sup>206</sup> It can also happen when slaughterhouses need to make up for lost hours or days of operation, due to technical failures, a strike, a virus outbreak among staff, or extreme temperatures outside necessitating transport to stop... Of course this is unacceptable.

Make sure only very responsible and stable employees operate the CO2 stunning system. Train them well and make sure they are skilled and always act professionally.

- ☑ The behavior and sound of pigs in CO2 stunning systems should be monitored with camera- and sound surveillance.<sup>207</sup>

## Distribution of CO2

- ☑ Another common problem is that CO2 gas is not evenly distributed in the chamber. This can be a design fault or caused by 'stack pressure' due to (new) fans or doors being opened or closed elsewhere in the slaughterhouse. When pigs exiting the CO2 chamber appear conscious (when previously the stunning was efficient) this is likely to be caused by a change in ventilation/stack pressure.<sup>208</sup>

- ☑ The temperature of the gaseous CO<sub>2</sub> influences the stunning efficiency as it affects the distribution of the gas. The ideal temperature is about 18-20 degrees. Heating devices might be necessary at cold ambient temperatures.<sup>209 210</sup>

### Design of CO<sub>2</sub>-cage

Make sure pigs are not afraid to enter the CO<sub>2</sub> cage and no force has to be used. The cage must be designed well. It has to be well lit, create the illusion of having an exit, not make any sudden noises and have a good anti-slip floor without any distractions such as contrasts in color or texture, shadows and reflections. Make sure the behavior and physiology of the pig is respected. [Chapter 4. Moving of pigs – design CO<sub>2</sub> stunner](#) for more details.

### Signs indicating (regaining) consciousness

Make sure each pig is stunned correctly. Perform this task carefully and without rush.

Check for signs of (regaining) consciousness at a minimum of three different moments in the slaughter process:

1. Immediately after stunning (before sticking)
2. Halfway during bleed out
3. Shortly before the scalding tank

A pig that is correctly stunned by CO<sub>2</sub> will be floppy; no regular kicking is visible. Eyes should be fixed (blank stare) and have dilated pupils. Their tongues are often protruding.

**Re-stun the pig immediately if the below signs are observed. If these signs occur after the pig was cut, do NOT forget to also check that the size of the incision is large enough (and if necessary, correct it) to ensure profuse bleeding.**

- ✗ **The pig kicks regularly.** After CO<sub>2</sub> stunning the bodies of the pigs should be floppy. There should be **no regular kicking visible**. An occasional kick can happen.<sup>211</sup>



*When the pigs are dropped from the CO2 stunner their bodies should be floppy. Regular movement indicates in ineffective stun.*

- ✗ **The pig blinks spontaneously**, in a natural way, **or follows movements** with the eyes. This can be tested by waving your hand in front of the eyes.<sup>212</sup> When a pig is properly stunned the eyes often have a blank stare, with dilated pupils.<sup>213</sup> The pupil should not change regardless of light intensity changes.



*Properly stunned pigs often have their eyes open, with a blank stare and dilated pupils.*

- ✗ **The pig shows a blinking-reflex.** This can be tested by touching the eye (corneal reflex) or eyelid (palpebral reflex) gently. When the pig blinks he/she is likely regaining consciousness.<sup>214 215</sup>



*A blinking reflex can be tested by touching the eye or eye-lid gently. If the pig blinks it should be re-stunned immediately. In the video on the right the pig does not respond to gently touching his/her eye or pinching the nasal septum. It is likely unconscious.*

- ✗ **The pig responds to a pain stimulus.** This can be tested by pinching the nasal septum.<sup>216</sup>



*Consciousness can be tested by pinching the nose*

- ✗ The pig shows an **upright reflex** (the head or upper body is lifted).<sup>217</sup>
- ✗ The pig shows **rhythmic breathing or repeated gasping.**

Rhythmic breathing can be recognized by in and out movement of the ribs, flanks or nostrils.

An incidental **gasp** (like a fish out of water) may occur. The lower jaw will then go down, but movements of the ribs are absent (see video below). This is a reflexive movement.<sup>218 219</sup> When a pig however **gasps continuously (> three times)**, this can also be a sign he/she is regaining consciousness.<sup>220</sup>



Videos of “gaspings”. A single gasp as shown in the video may occur, but repeated gasping (more than three times) can be a sign of regaining consciousness. In this case re-stun the pig asap.

**Important:** If a pig regains consciousness, breathing will resume. This often starts with gagging.<sup>221</sup>

- ✗ **The pig screams or makes other sounds** with clear intentions.
- ✗ The pigs’ body and/or head, after approximately 2 minutes of bleeding-out, **is not hanging floppy** on the slaughter-line. He/she differs in body posture from the others or still moves or kicks.

Approximately 2 minutes after sticking pigs need to be **dead due to blood loss**. This means the bodies and heads on the slaughter-line have to be floppy. Make sure to look at all pigs hanging on the slaughter-line and see if any of them stand out – due to a different body posture or movements. After 2 minutes of bleeding-out, kicking and other body movements are unacceptable. It is likely that the pigs have not been cut properly and have thus not lost enough blood to die. Since so much time has passed since stunning, they are regaining consciousness. **Make sure to re-stun AND stick them again immediately.**



*Once hanging on the slaughter-line it is important to check if all bodies and heads are floppy.*

**In case of doubt, do not take any risk → re-stun the pig immediately. If these signs occur after the pig was cut, do NOT forget to also check that the size of the incision is large enough (and if necessary, correct it) to ensure profuse bleeding.**

The best is to also have an intelligent monitoring system to **detect signs of consciousness**, alert your workers on the spot, and ensure they act immediately by restunning the animal. Find more information in [Chapter 7. Smart surveillance](#).

### **Captive bolt stunning (penetrating)**

**Electric prongs are better than captive bolt guns.** Stunning with a captive bolt gun requires more precision (the target area is very small) which is a challenge, especially when the pig may move his or her head. Also the brain lies relatively deep in the head. Another challenge is that captive-bolt stunning is characterized by heavy involuntary kicking – which will make it difficult to safely stick the pig and to approach the pig to check for signs of consciousness.

The use of captive bolt guns is not ideal for large sows and boars as their skulls are very thick and difficult to penetrate.<sup>222</sup> It is also not ideal for small piglets as they have skulls that are rather 'soft', which can cause stunning failures. However a non-penetrating captive bolt has been demonstrated as a viable method of producing an immediate stun followed by death in neonate piglets.<sup>223</sup>

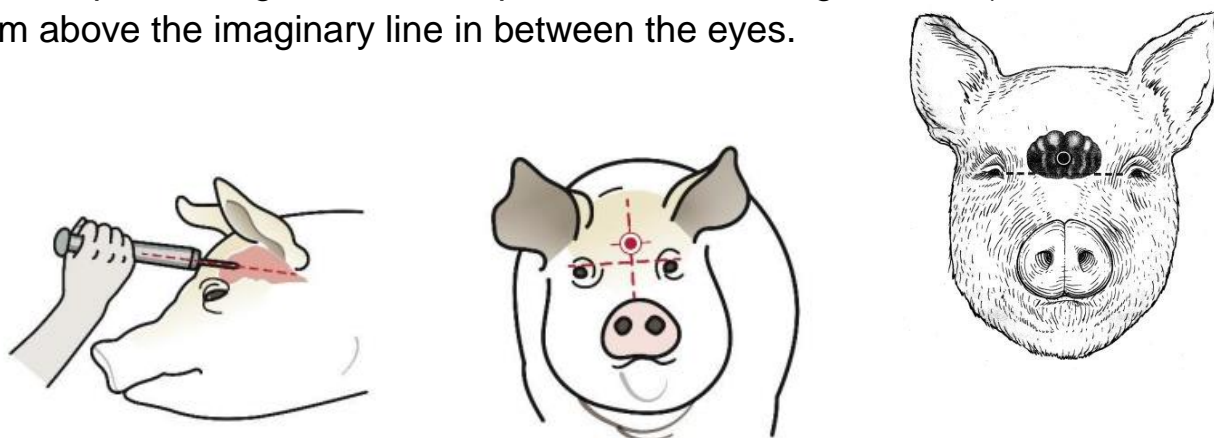
In general, captive bolt guns are mainly used in countries that lack good stunning systems. They are sometimes also used as a back-up or emergency stunner, in slaughterhouses, but also at assembly centers or pig farms.



Captive bolt guns can significantly improve welfare in countries where no other alternatives are available (due to unreliable or unavailable electricity and CO2 systems being too expensive). However, one must be mindful of the challenges involved. It is crucial that captive bolts are used and maintained correctly to prevent welfare issues, highlighting the utmost importance of educating slaughterhouse personnel.

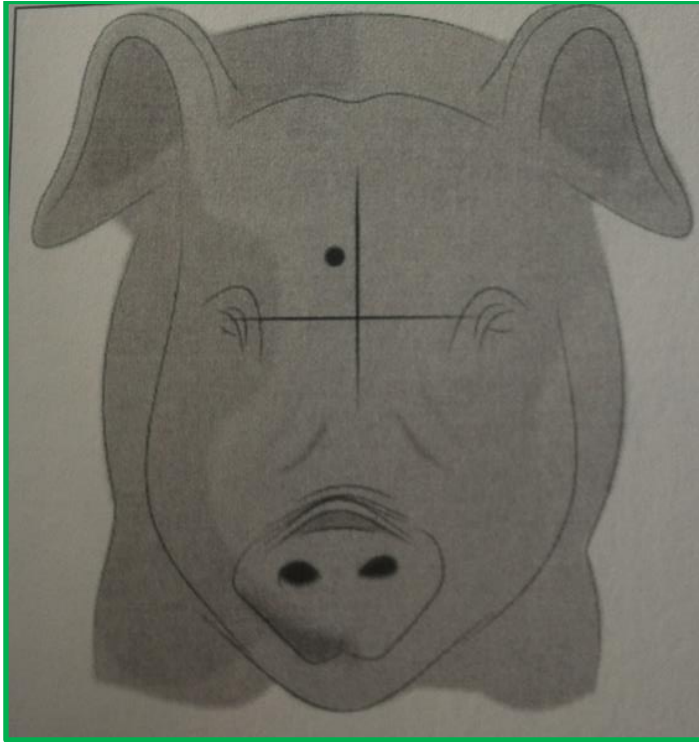
### Positioning of the captive bolt gun

- ☑ The captive bolt gun should be positioned at an angle of 90° (towards the tail), 2 cm above the imaginary line in between the eyes.



*Correct position of captive bolt gun. As the target area is small, it requires precision and skills. Failures are common. Source left drawings: ICF / European Commission.<sup>224</sup> Source right drawing: T. Grandin*

- ☑ If you have a better alternative, avoid using a captive bolt gun on large sows and boars as they have thick bone structure in the middle of their skull which can cause stunning failures.<sup>225</sup> The middle is often too thick to be adequately penetrated. In case a large sow or boars needs to be put out of its misery and there is only a captive bolt gun available, position the stunner 3-4 cm above the imaginary line in between the eyes, a bit to the left or the right where the skull is less thick. See the drawing below.



*In larger pigs the bolt should be positioned 3-4cm above the imaginary line in between the eyes, a little bit to the left or right where the skull is less thick. Source: OIE*

- ☑ Use the strongest cartridges possible for sows and boars. Make sure to use a captive bolt gun with an extra-long rod in order for their brain to be reached and their thick skull to be penetrated. Refer to the manufacturers' instructions so that the correct cartridges are used for each model.<sup>226</sup>

## Maintenance

- ☑ **Clean the captive-bolt gun daily** according to the company's instructions (dust it and replace the rubbers or other parts when necessary). Also do this after every 50 shots!<sup>227</sup> Replace rubbers and other parts on time.
- ☑ Store the gun and its cartridges in a clean and dry place. Humidity is a killer. **If they become wet the shot will lack power, resulting in stunning failures.**<sup>228</sup>
- ☑ Regularly test the effectiveness of the captive bolt stunner. Therefore you can buy a special testing station. Have repair kits and new rubber rings on hand to quickly repair ones that become worn out or damaged. Ask the company where you bought the captive bolt gun for repair kits, a testing station and help for any other issues.<sup>229</sup> When the captive bolt is showing signs of irreversible wear and

tear, replace it with a new one on time.

- ☑ After firing the **pin should retract its entire length**. If it is not, it should be repaired first. <sup>230</sup>

### Signs indicating (regaining) consciousness

Make sure each pig is stunned correctly. Perform this task carefully and without rush.

Check for signs of (regaining) consciousness at a minimum of three different moments in the slaughter process:

1. Immediately after the shot
2. Before the cut
3. Before continuing with the rest of the slaughter process

Alert: make sure you have a (second) back-up stunner available.

When stunning is effective the pig will collapse immediately, stretch his/her legs (tonic phase) and stop breathing. It will then often have intense involuntary kicking/pedaling (clonic phase). Due to this kicking, signs of consciousness are difficult to check and the cut is difficult to perform. Best is to make the cut immediately after the stun, during the tonic phase).

**Re-stun the pig immediately if the below signs are observed. If these signs occur after the pig was cut, do NOT forget to also check that the size of the incision is large enough (and if necessary, correct it) to ensure profuse bleeding.**

- ✗ The pig does not collapse immediately after stunning and **does not show a tonic (rigid) and clonic phase (paddling of the legs)**. In particular the tonic phase should be clearly visible. The clonic phase (paddling of the legs) can sometimes be absent in pigs stunned with a captive bolt gun.

- ✗ **The pig blinks spontaneously**, in a natural way, **or follows movements** with the eyes. This can be tested by waving your hand in front of the eyes.<sup>231</sup> When a pig is properly stunned the eyes often have a blank stare, with dilated pupils.<sup>232</sup> The pupils also do not change even if light intensity does.



*Properly stunned pigs often have their eyes open, with a blank stare and dilated pupils.*

- ✗ **The pig shows a blinking-reflex.** This can be tested by touching the eye (corneal reflex) or eyelid (palpebral reflex) gently. When the pig blinks he/she is likely regaining consciousness.<sup>233</sup> <sup>234</sup> Vibrating eyes or weak corneal reflex, directly after stunning, may be present in unconscious pigs, but should be absent when invasive slaughtering procedures start.<sup>235</sup>



*A blinking reflex can be tested by touching the eye or eye-lid gently. If the pig blinks he or she should be re-stunned immediately. In the video on the right the pig does not respond to gently touching his/her eye or pinching the nasal septum. It is likely unconscious.*

- ✗ **The pig responds to a pain stimulus.** This can be tested by pinching the nasal septum.<sup>236</sup> See the video directly above here.



*Consciousness can be tested by pinching the nose*

- ✗ The pig shows an **upright reflex** (the head or upper body raises).<sup>237</sup>
- ✗ The pig shows **rhythmic breathing or gasping.**

Rhythmic breathing can be recognized by in and out movement of the ribs, flanks or nostrils.

An incidental **gasp** (like a fish out of water) may occur after gas or electric stunning. It however should be absent after captive bolt stunning. If a pig is gasping, the lower jaw will go down, but movements of the ribs are absent.



Videos of “gasping”. Gasping should be absent after captive bolt stunning.

**Important:** If a pig regains consciousness, breathing will resume. This often starts with gagging.<sup>238</sup>

- ✗ **The pig screams or makes other sounds** with clear intentions.
- ✗ The pigs’ head and/or body, after approximately 2 minutes of bleeding out, **is still not hanging floppy** on the slaughter-line. He/she differs in body posture from the others or still moves or kicks.

Approximately 2 minutes after sticking pigs need to be **dead due to blood loss**. This means the bodies and heads on the slaughter-line have to be floppy. Make sure to look at all pigs hanging on the slaughter-line and see if any of them stand out – due to a different body posture or movements. After 2 minutes of bleeding out, kicking and movements are unacceptable. Likely the pigs have not been cut properly and have not lost enough blood and are thus regaining consciousness. After re-stunning, the cut has to be checked (and if necessary corrected) to make sure the pig loses enough blood.

**In case of doubt, do not take any risk → re-stun the pig immediately. If these signs occur after the pig was cut, do NOT forget to also check that the size of the incision is large enough (and if necessary, correct it) to ensure profuse bleeding.**

The best is to also have an intelligent monitoring system to detect signs of consciousness, alert your workers on the spot, and ensure they act immediately by restunning the animal. Find more information in [Chapter 7. Smart surveillance](#).

## 6. Bleeding-out

### General

**The importance of a proper cut is often underestimated.** If a cut is performed poorly, death may not result quickly from blood loss, and the time interval since stunning will be such that the animal may become conscious during the slaughter procedures ([scalding tank](#), cutting off ears, hooves, etc.), resulting in extreme pain and panic. This is totally unacceptable. The cut must create a large open wound where blood rushes out quickly. Should the incision from the cut not be large enough or is not kept open, the blood can clot and the flow stops. It is important that lots of blood leaves the body after the cut is made so that the animal is fully dead before any further action is taken. Make sure the following is respected:

- ☑ Only perform the cut or stick when the pig is showing **clear signs of unconsciousness**. See [Chapter 5. Stunning >>](#)
- ☑ The **cut should be made just below the sternum**. Insert the knife, rotate it by a quarter and push down towards the tail. Please see below two video's showing a good cut. The cut should be made in one fluent movement (not back and forth).



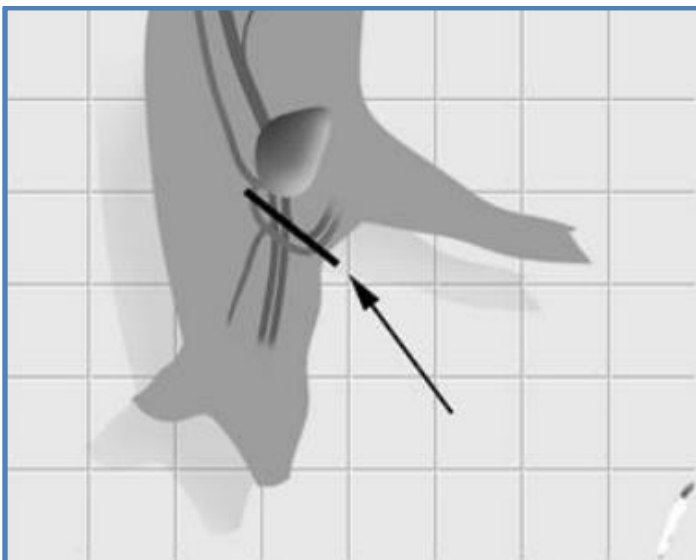
*Proper cut and bleeding out of pigs*

- ☑ The knife blade should be at least 16cm long and have a **cutting edge on both sides**. Make sure the cut is not too small or shallow, the blood flow should be rapid and voluminous. Best are blades of 21cm or even longer. <sup>239</sup> [Good and long knives with two-sided cutting edges can be ordered here >>](#)



*Use a knife blade of 16cm minimum with a cutting edge on both sides.*

- ☑ When the cut is performed correctly, all major veins and arteries which arise from the heart and sometimes also part of the heart, are severed (see HSA drawing below).<sup>240</sup> This will cause rapid blood loss and the pig to die.<sup>241</sup> Make sure pigs are properly stunned until death sets in.



*During the cut all major blood vessels from the heart should be severed. Source: HSA, 2013*



- ☑ Make sure pigs bleed out for a sufficient amount of time so they are dead (due to blood-loss) before they enter the scalding tank. The recommendation is 3-5 minutes minimum.<sup>242 243 244</sup> If pigs are not dead yet from blood loss, there is a risk that they regain consciousness during the scalding process, where they cannot be emergency stunned safely and where they will [burn and drown](#). This is totally unacceptable.
- ☑ If the cut (stick) is correct, there should be a rapid, strong and pulsating blood flow. If the blood-flow goes slowly – make sure you re-stun the pig and also make a new proper cut after stunning. Be aware that an improper cut can cause an animal to regain consciousness and suffer tremendously.



*Good blood flow; rapid, strong and pulsating*

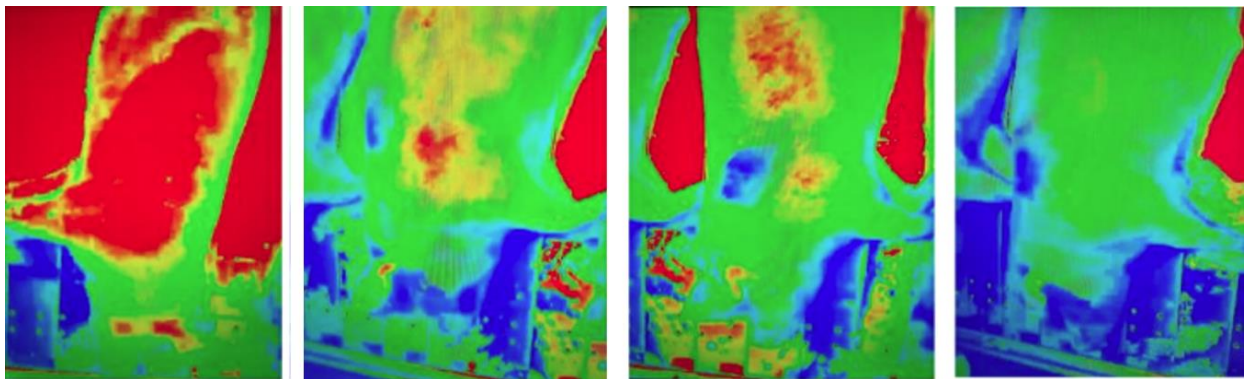
- ☑ Be aware that **after approximately 2 minutes of bleeding out a pig should be dead due to blood-loss.**<sup>245</sup> Their bodies should be **hanging limp**. Movements or convulsions are not acceptable at this point. See [Chapter 5. Stunning](#) for more information.
- ☑ At Tönnies pig slaughterhouse in Germany the pigs are weighed before and after sticking to measure if they have lost enough blood to ensure that the pigs do not regain consciousness during the slaughter process.



*At Tönnies there is a monitor showing the amount of blood that a pig has lost in kilograms*

- ☑ Use **intelligent camera-systems (Artificial Intelligence) and sensors** to detect if all pigs have been cut/stuck and the blood flow is strong, pulsating and rapid. In case of failures, an alarm should go off. Slow blood-flow can be caused by a poor cut, low quality knives or blood clots.

The [FX-1000 VSA system](#) has been developed to monitor the bleeding of slaughtered animals using camera and sensor-based technology (see the illustration below). It visually indicates if enough blood has left the body. It has a capacity of up to 10,000 animals per hour.



*The FX-1000 VSA uses smart cameras and sensors to visually indicate how much blood has exited the body as time progresses. Copyrights: FX-1000 VSA*

Another system that can be used to detect if a pig has been bled is [VisStick](#). This system employs cameras to detect whether blood is flowing from each pig. In the event of no blood flow, the operator is alerted to ensure proper bleeding.

## Electric stunning

- ☑ An electrically-stunned pig should be stuck/cut and bled-out as soon as possible and at least **within a maximum of 10 seconds after the electric stun**. During the cut/stick the pig has to be in the tonic (rigid) phase and not in the clonic phase. This often means they have to be cut before being shackled.



*At Naturverbund slaughterhouse (DE) pigs are stuck/cut within a few seconds after stunning. The pigs are still in the tonic (rigid) phase.*

About 30 seconds after electric stunning pigs can regain consciousness. If you perform the cut later than 10 seconds, there is a risk the pig will regain consciousness while still alive as not enough blood has flowed out of the body yet. The brain only stops functioning after about 20-60 seconds of blood-loss. Prompt sticking after stunning is therefore very important to prevent pigs regaining consciousness before they are dead.<sup>246</sup> Read more in [Chapter 5. Stunning – regaining consciousness and stun-to-stick times >>](#)

- ☑ **Make sure only one pig is stunned and stuck/cut at a time.** Only proceed to stun the next pig when you are finished sticking/cutting the previous one. The previous one should be clearly dead and insensitive to pain before performing any other procedures to the body. This is also a legal EU requirement.<sup>247</sup>

## CO2 stunning

- ☑ A pig stunned with CO2 should be bled-out as soon as possible. Maximum stun-to-stick intervals strongly depends on the level of CO2 and exposure time. With

an exposure time of 120 seconds, sticking should be performed within 20-30 seconds after leaving the CO2 cage.<sup>248 249</sup> Please refer to [Chapter 5. Stunning – Exposure-time and stun-to-stick intervals](#) for more details.

## Captive bolt stunning

- ☑ After stunning with a captive bolt gun, the pig has to be stuck/cut as soon as possible, **within 15 seconds maximum**. Remember that a pig is not always dead after it is being shot, this depends in the level of brain damage.<sup>250</sup>

## 7. Smart surveillance

### Smart cameras and sensors

Normal video surveillance is compulsory in medium to large Dutch slaughterhouses<sup>251</sup> but no one has the time to watch all the hours of footage that is recorded every day. Therefore many violations to animal-welfare largely go unseen and untreated.

**We therefore recommend slaughterhouses to install smart cameras.** Violations and animal-welfare problems will then be identified automatically and effectively. For example pigs that cannot walk properly, workers or drivers being abusive to pigs or pigs showing signs of regaining consciousness. Instead of having to watch hours of footage, you can focus solely on deviations detected by the cameras and ensure that your workers are acting appropriately.

Smart cameras can help reduce suffering inside slaughterhouses tremendously. Unlike people they do not become tired, desensitized or influenced by social pressure. Several slaughterhouses in The Netherlands now use smart cameras on a daily basis, such as Gosschalk, Compaxo and VION.

Research has shown that slaughterhouse workers, including managers, behave more calmly and appropriately with animals when they know they are being filmed. For example, if workers are alerted by intelligent camera systems that a pig is showing signs of consciousness, they are more likely to act immediately and restun the pig, as this deviation and its follow-up will be recorded and seen by the managers. This improves animal welfare, positively influences meat quality (resulting in less PSE meat), and helps prevent your plant from encountering legal issues. More information about intelligent camera systems can be found in the boxes below.

### **Argus VCA A.I.**

Uses sensors and intelligent cameras to detect and monitor several critical values in the slaughterhouse, such as:

- when an emergency stunner is being used
- how often animals are being prodded
- stress-related behavior
- animal-human interaction
- signs of consciousness after stunning

Selected video clips can be easily reviewed and assessed.

[Read more about the Argus surveillance system >>](#)

### **AI4A – Deloitte**

This smart camera program by Deloitte was developed together with VION, the Dutch Society for the Protection of Animals and Eyes on Animals. With smart cameras several critical processes in a slaughterhouse can be detected and monitored, such as:

- pigs lagging behind during unloading and when moved through the raceway
- workers being rough with the animals (hitting, kicking, unnecessary prodding in single-file automatic electric stunning system).
- bottle-necking
- signs of consciousness after stunning
- group sizes

[Read more about the Deloitte smart-camera surveillance system here >>](#)

### **AnimalGuard - Genba Solutions**

Uses sensors and intelligent cameras to monitor animal welfare parameters, such as:

- [climate conditions inside the lairage >>](#)
- [critical parameters of the CO2 stunner >>](#)
- [sound level >>](#)
- [electric prod use >>](#)
- [group sizes >>](#)
- [signs of consciousness after stunning \(if pigs show signs of consciousness, workers will be alerted immediately via a light and acoustic signal, ensuring prompt restunning of the pig\) >>](#)

[Read more about AnimalGuard here >>](#)

Furthermore, [Neurinos GmbH, FX-1000 VSA](#) and the [Danish Meat Research Institute](#) are also active in the field of artificial intelligence and smart sensors in slaughterhouses. [Read more in this publication by EURCAW >>](#)

### **When using cameras make sure of the following:**

- Make sure your camera system also records sound in sync.** Images without sound are much less valuable, as sound helps you interpret stress-behavior much better. If you watch footage with no sound at all, it often looks much less serious than it in fact is. Many current smart camera-systems, including Argus and Deloitte as of now (April, 2024), lack sound recording, which is in our opinion a very important missed chance. We therefore recommend all companies offering smart cameras to also record sound in sync and we recommend all slaughterhouses to put this request in when in discussion with companies that sell smart camera surveillance systems. If there are privacy concerns, because conversations between staff could be recorded, use smart technology to delete the human sounds.
- Make sure to use an adequate number of cameras to cover all areas where live animals are being moved through and use good-quality cameras.** The best are (fisheye) cameras with remote control that can zoom in and out and that can turn, so all areas can be observed closely. Make sure no areas in the slaughterhouse where live animals are moved through go unseen. Good-quality cameras with excellent lenses are also crucial as cheap ones usually get foggy.

Keep in mind the conditions inside the slaughterhouse - usually humid due to cleaning and misting systems and with great variations in temperature due to garage doors opening and animals coming and going.



*Fisheye camera with zoom- and turn function at Feenstra slaughterhouse in NL.*

- ☑ Let workers and drivers know there is active camera surveillance. To make them aware of this you can hang banners that warn them they are being filmed, or even better: big video screens showing them in action!



*Sign at Tönnies slaughterhouse (DE) and Pali slaughterhouse (NL) informing workers that they are being filmed.*

- ☑ Ensure that deviations, such as pigs showing signs of consciousness, employees handling the animals roughly, or pigs unable to walk, are not only digitally detected, but also immediately lead to a warning light or sound on the work floor. This way, intervention can be prompt and on-site, rather than afterwards. See for example the [warning system of Genba Solutions](#) when a pig shows signs of consciousness.



- ☑ Infrared cameras can also help detect pigs with fever or in (heat)stress. See for example the temperature sensor system of [Genba Solutions >>](#) Remember that there is more chance of PSE meat from pigs with increased temperatures.<sup>252</sup> A temperature increase of 3-6°C in a pig will result in heatstroke or death! There is also an app available that can detect pigs with a fever, infection or heat-stress. More info: [Degree2act-app](#).
  
- ☑ Should you not yet have smart camera surveillance, make sure there is a protocol to make efficient use of the footage from your normal camera surveillance system, which includes:
  - The frequency of viewing images, for example, 2-3 times a day at varying times for 30 minutes each session.
  - Identification of personnel responsible for viewing the footage; it should be dedicated staff who genuinely care about animal welfare (for example a motivated Animal Welfare Officer) and who rotate duties.
  - Clarity on to whom any misconducts or violations are reported.
  - Establishment of a plan of action in the event of misconduct or violations, including the number of warnings before dismissal and specifying penalties such as additional training or reassignment to a position without contact with animals.
  - Guidelines on how video material is utilized for employee training, with good and bad practices being addressed regularly. Make sure to also implement positive reinforcement measures; ensure that good practices are complimented, recognize an "employee of the month," or provide extra payment to workers who work in a very calm but professional manner.

## Sound

Pigs are very sensitive to new or abrupt noises <sup>253</sup> such as yelling people, gates that bang when closed, hissing machines or loud herding tools, such as clappers and rattles. They are able to hear sounds that humans cannot, such as ultrasound, but they cannot localize the direction of sound as well as we can. <sup>254</sup> **Pigs therefore experience less stress in a quiet area** – this will also ease handling and improve meat quality. Sound is also an important animal-welfare parameter. The more pigs squeal (high pitch), the more stress they experience.

Adult pigs are not typically “prey animals” and let themselves be heard when stressed or in pain - so open your ears and listen! But be aware that very young piglets,

although they might be considered to squeal quickly, sometimes suffer in silence as at this young age they are “prey” animals and thus have evolved to not show their weaknesses as much as adults do.

Sounds above 80-85dB, especially when sudden, lead to increased stress in pigs (elevated heart rate and restlessness) and have a negative effect on meat quality (PSE meat).

- ☑ Hang up **large monitors showing the decibels recorded in the plant**, linked with a green smiley face or red unhappy face/, to make employees aware of the noise level and motivate them to aim for lower decibels<sup>255</sup> at several places in your slaughterhouse; especially at the unloading area and along the raceway.



*Decibel monitors in Dutch slaughterhouses. Left: 86.6 dB at the unloading dock, right: 77.3 dB in the lairage.*

The best is a monitor that does not only display the decibel level, but also records it. This way it can also be used to monitor, score and safeguard the animal-welfare level in the slaughterhouse. [For more information on such a decibel monitor click here >>](#)



*A decibel monitor helps to motivate workers to aim for low decibels in the slaughterhouse*

- ☑ You can manually set the ideal noise limit. At the beginning, aim for 75 decibels in the lairage and 85dB maximum along the raceway. This is still realistic and will not de-motivate employees. Then with time and experience, one can set the maximum noise level lower and lower. Aim to not have any abrupt noises as these are the most stressful of all.

## Banners

Hang up **big banners** at several places inside the slaughterhouse (the unloading docks, lairages, raceways, canteen) with clear instructions to remind workers and drivers what kind of behavior or tools are not accepted and what the consequences are when they are being violated. Make sure they are translated into the languages that your workers speak so all workers and visiting livestock truck-drivers understand them well.

Slaughterhouses should have a clear animal-welfare policy and communicate it clearly and regularly to all people involved: drivers, employees, veterinarians, inspectors, visitors and also the farmers and collecting centers that deliver the pigs.

### Examples of instructions on the banners:

- ☑ Electric prods are forbidden in this slaughterhouse



Banner at unloading dock at Gosschalk slaughterhouse (NL) where electric prods are not allowed

- ✔ Be quiet! Noise causes stress in pigs and makes them more difficult to handle.
- ✔ Unload and move pigs in small groups, one compartment at a time (max 12 pigs), to ease the flow and reduce stress.



Banners at unloading dock of Pali slaughterhouse in Geldrop (NL)

- ✔ Kicking, hitting and yelling is not allowed in this slaughterhouse. Anyone seen abusing animals is not welcome in this plant and legal follow-up action will be

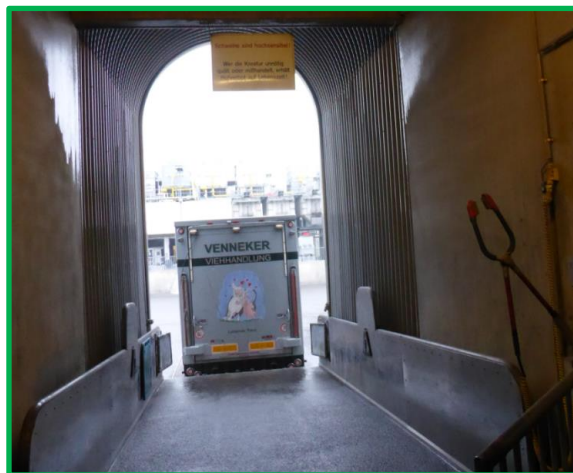
taken.

- ✔ Only use your hands, a board or a flag to guide animals silently. Guiding tools are never to be used to create noise or fear.



*Banner at Pali slaughterhouse in Geldrop (NL) to improve handling*

- ✔ Stun and kill all pigs that show signs of discomfort. We do not want to prolong their suffering. Inform the lairage manager immediately.

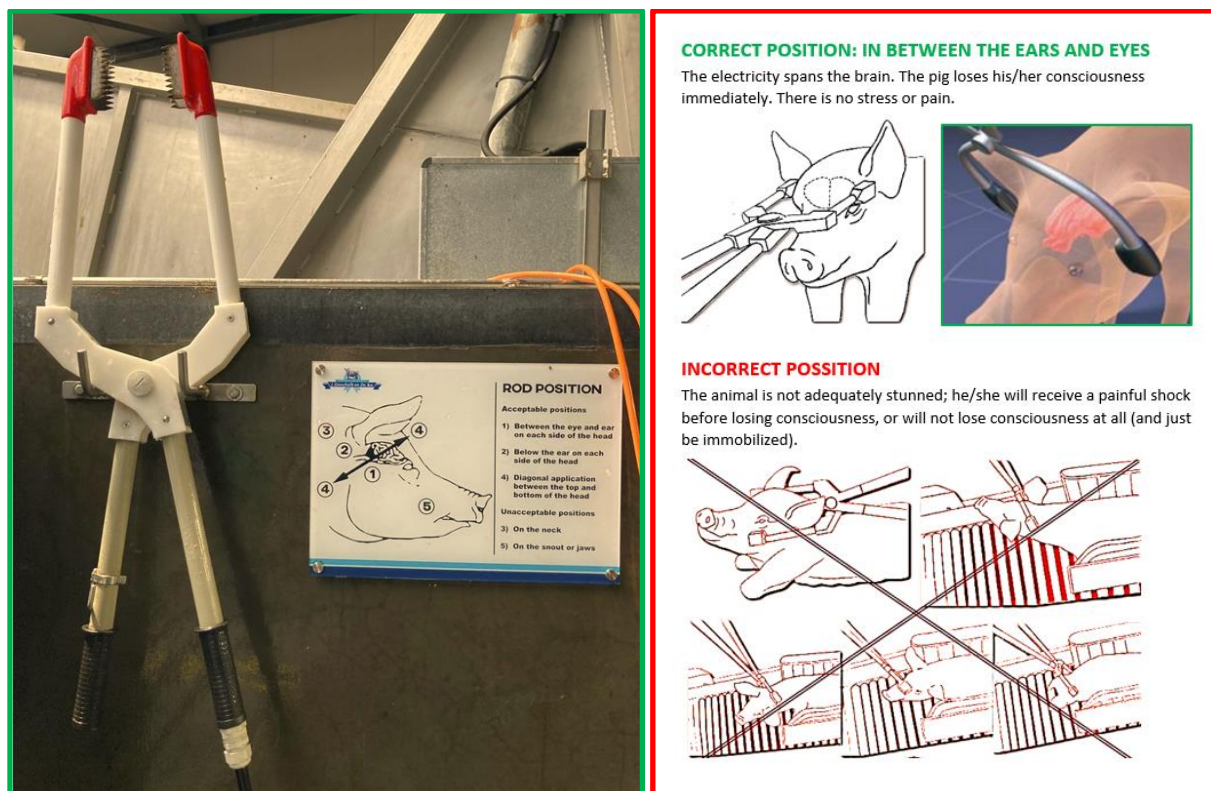


*Banner at unloading dock at Tönnies pig slaughterhouse in Germany (DE): "Pigs are sentient beings. Mistreatment results in a lifelong ban".*

Ensure that your banners display clear photos of pigs that require emergency

stunning, to eliminate any potential for discussion or ambiguity.

- ✔ Make sure the electrodes of the emergency mobile electric stunner are placed correctly on the head of the pig. For a correct stun, the brain has to be in-between the electrodes.



Left: Banner at Gosschalk slaughterhouse in Epe (NL) to improve the placement of the electrodes. Right: example banner (click on it to enlarge).

## 8. Training

### Importance and effect

Intensive research on pig-welfare during slaughter EFSA concluded that **almost all hazards (29 out of 30) were caused by staff** (lack of appropriate skills or fatigue).<sup>256</sup> Even in the best-designed slaughterhouse, bad attitude, frustration, low level of education or high work-pressure will result in serious animal-welfare problems. This makes **proper training of staff and good working-environment (not exhausting them, keeping them satisfied and motivated)** the two most important factors in a slaughterhouse to assure animals are being treated as humanely as possible and protected from unnecessary stress and pain.

Additionally, the professionalism of the staff is totally dependent on the attitude of the management personnel and if managers are good role models. As long as the management personnel has no interest in animal welfare, it is unlikely its workers will act differently.<sup>257</sup>

*“The most important factor determining whether a slaughterhouse has good or bad animal welfare practices is the attitude of management personnel. Until the owner or manager is convinced that proper handling practices pay off economically, it’s unlikely that employees will follow procedures day-in and day-out.”*

Temple Grandin - 1998

## Content and effectiveness

### A good training:

- ☑ should be followed by both the staff and management personnel. The knowledge amongst the management personal is just as important as knowledge amongst the staff.
- ☑ uses both theory (e-learning or a PP-presentation) and practice. To illustrate hazards and good practices, use videos (from camera surveillance), photos and drawings. By asking questions (instead of preaching), workers will become creative in coming up with solutions and better practices themselves. They will spend more time thinking and more likely put better ideas into practice! The practical component should never be underestimated – most people learn and retain information best when learning by doing. A good training can never just be in theory!
- ☑ **is specific and not just general. It focuses on the individual task(s) and position(s) of the worker.** The training should inform the worker in detail how to perform his or her specific task and what to do in different (emergency) situations. General welfare trainings work less well! Make use of the camera-surveillance footage to show good and bad handling by each person.
- ☑ **is provided in a language that is well understood by the workers.** For training sessions, a professional translator who is dynamic and well-versed in the subject matter is crucial.

Tönnies slaughterhouse in Germany uses small, pocket-sized translating devices from Vasco to communicate with their workers. With these devices, you can translate both spoken word and text. They work online (with no internal vocabulary storage) using Wireless LAN and include a SIM card. They operate worldwide with no additional fee. However, they may perform less effectively in very noisy environments. [Click here for more information >>](#)

While a translating device can assist with communication during daily practices, it is not sufficient for training sessions. Make sure to have a good professional translator.

- ☑ communicates clearly about the high animal-welfare standards in your company.
- ☑ is clear about who should be contacted when there are questions or concerns.
- ☑ Appoints a calm and professional worker in your slaughterhouse as a “**buddy**” to train new workers.
- ☑ After the training the worker needs to **pass an exam**. To see if he/she has listened and understood the material well and now has the skills to perform his/her tasks correctly. An exam also helps determine if he/she has the right attitude towards animals (calm, kind and respectful with sufficient knowledge about animal behavior). The use of camera-surveillance can help to see if workers perform their tasks well if they are not (clearly) being watched.

Make sure impatient and hot-tempered workers as well as workers with bad habits that are too stubborn to change, be positioned in a place without live animals. Do not let people with such characteristics work with live animals!

- ☑ A good training is not rushed and should be regularly repeated. A one-day training session is not sufficient. The training must be long enough and regularly repeated so that correct handling becomes second nature. The more you invest in thorough training, the fewer headaches you'll have down the road and the more satisfied your staff will be. It's a win-win situation!



## Animal Welfare Officer checklist

In Europe bigger slaughterhouses are required to have an Animal Welfare Officer (AWO). The AWO makes sure legislation and Standard Operating Procedures (SOP) are being respected. He/she is also the point of contact for issues regarding animal welfare. Smart managers invest in extra training for their AWOs, for example, sending them to interesting conferences or lectures on the subject of animal welfare during slaughter and animal behavior. Professional AWOs regularly read research papers and stay on top of animal welfare developments and new, better slaughter techniques!

The AWO has a wide range of tasks and a lot of responsibility. GenbaSolutions has developed a checklist-app especially for AWO's. This checklist structures the daily tasks and helps to perform and register them accurately. [More can be read here >>](#)

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