

Animal welfare

Reflections on social enrichment and social interactions of minipigs

Helle Lorentsen, DVM, Ellegaard Göttingen Minipigs

Introduction

This article will cover animal welfare issues and potential gaps mentioned in the RETHINK report I, section on minipig welfare. Minipigs refer to The Göttingen Minipig, bred and raised at Ellegaard Göttingen Minipigs A/S in Denmark.

Fundamental welfare issues regarding housing and management have been discussed and outlined elsewhere. In the following the focus will be on learning more about the behavioral pattern of minipigs and from there, if possible, draw some cautious conclusions on how to match these behavioral traits.

Most knowledge about pig behavior in general is also applicable in minipigs and therefore differences in behavior and welfare parameters often refer to the different rearing conditions, breeding goals, and final usage of conventional pigs and minipigs.

Rearing and housing of minipigs in barriers for more than 20 years has provided us with a general insight in minipig behavior in relation to environment, conspecifics and humans. This knowledge should be shared with anyone interested in and concerned with the best possible conditions for minipigs used in the experimental field.

Articles on minipig behavior and minipig welfare have been published over time. In general the scientific approach is a valid way of investigating fields of unknown territory. When it comes to subjects as behavior and understanding of the minipig nature science needs to be looked upon very carefully and results need to be interpreted. Data are presented in ways that give meaning to us, humans.

What if our interpretations of minipig behavior is merely poor guesswork or even misinterpretations? At the end of the day, how can we be sure that we draw the right conclusions from what we observe from the animals' behavior? And can a scientific approach give us all the answers?

Bearing that in mind this text should be looked upon as a supplement to existing knowledge of minipig behavior. Rather than based on standardized tests or scientific results the text is based on hands-on experience and empirical knowledge of minipig welfare that has proven to work in practice so far. Subjective as it may be these reflections are still believed to add value to the complex field of understanding the behavior of minipig and from there conclude, how they can be enriched in the right way.

People get lost if they think animal welfare is destination. Because we will never get there! Animal welfare is rather a long road of processes which should be discussed, accepted, implemented, repeated, and maybe rejected again. It should be an ongoing process where focus is not alone a matter of doing the right things but even more a way of doing things the right way. Therefore continually reflections of why and how we look upon animal welfare are crucial for optimizing the conditions for the animals.

Fundamentals

Regulatory frames in regard of animal welfare in experimental animals is outlined in the EU directive 2010/63/EU. The directive is implemented in each member state in national regulations and includes specific guidelines on animal welfare.

Another perspective on the subject Animal Welfare are the Five Freedoms, expressed by the Farm Animal Welfare Council. These Freedoms or rights, originally aimed at farm animals, are applicable in any species, research animal or not. It takes into consideration both the physical and not least the mental state of animals.

Freedom from Hunger and Thirst
Freedom from Discomfort
Freedom from Pain, Injury or Disease
Freedom to Express Normal Behaviour
Freedom from Fear and Distress

Some of the freedoms seem more straightforward than others: we are engaged in providing the animals with feed and water and to keep them in enclosures of the right dimensions. Efforts are made to ensure that the animals are not suffering, mentally as well as physically.

But when it comes to ensuring normal behavior in the animals the picture tends to become a little bit more blurred. Meeting these rights takes to know normal species specific behavior.

In the following the five freedoms are the base line but specific attention will be on the minipigs' right to express normal behavior and how we, as responsible for their wellbeing, can meet their needs in the best possible ways.

Ethics

Any minipig, inclusive the Göttingen Minipig, is a descendent of the wild boar, which lives in the nature and spends most of its time rooting and searching for food. The wild boar is a prey animal and as such by nature wary and ready to escape if something threatening or unforeseen happens. Taking this into consideration it is obvious that keeping minipigs indoor in a clean pen with smooth surfaces and a limited space can be a challenge, as they can't choose their pen mates, they can't escape etc. The challenge regards not only the nature of a pig but also in the context of using them in research.

One could say that the minipig has an advantage to the dog and the monkey because man has been keeping pigs for consumption "always" and therefore usage of pigs in the experimental field should not be of much concern to anyone. It is a little more complicated than that.

Not only does the regulation pose stricter demands for pigs used in research compared to farm pigs (eg space requirements and socialization of individual animals). It seems that when the context is research, pigs for consumption move from a species general accepted for commercial use to a species which is looked upon at the same level as dog and monkey. But the dog is said to be man's best friend and the monkey as a primate is considered at nearly the same cognitive level as man. Pigs are neither one of them but does this ratify their use in research? According to some, inclusive animal rights activists, there is no such distinction between species as they claim that any research with animals should be forbidden, regardless of species.

One could conclude that even though pigs in research according to others would be an obvious choice from an ethical point of view it will be more correct to say that any animal in research should be treated with respect to and in compliance with its species specific features.

In Maslow's hierarchy of needs factors regarding hunger, thirst, pain, disease, discomfort and more are conditional for fulfilling the level of self-realization of humans. One could transfer the same concepts to animals, substituting the word self-realization with opportunities to express normal behavior. Not only does this make sense from an ethical perspective. Being able to express normal behavior is also believed to reduce the amount of stress perceived by the individual which is desirable.

Reducing stress is a matter of keeping a balance between routines and new impressions. Too little challenge and changes can result in boredom - on the other hand too many changes can result in lack of coping with circumstances. Both conditions can be perceived and expressed as stress in the individual animal.

The issue is then: what is normal behavior? Is it normal in the sense of a wild boar or as an animal adapted to research? Shouldn't parameters like age, gender, life cycle and field of usage be taken into consideration before drawing conclusions on normal behavior?

In the following will be discussed empiric fundamentals regarding animal welfare of minipigs. Special attention will be on their right to express normal behavior under the given circumstances.

Types of enrichment facilitating minipigs' ability to express normal behavior

In the list below are mentioned types of enrichment which from the author's point of view are fundamental for minipig welfare. The proposals are not prioritized but rather ordered in the matter of time and involvement required from the staff.

- Group housing
- Environmental enrichment - rooting and chewing
- Social enrichment - socialization with other minipigs
- Social enrichment - socialization with humans
- Habituation to procedures (handling and dosing)

Group housing is basics and it is very little time consuming for the staff once established; whereas refinement in regard of handling and dosing requires attention and expertise from the involved staff. This and more will be covered as follows.

Group housing

At Ellegaard all minipigs are from birth raised in groups. At weaning female and male minipigs will be split up and grouped in new pens of maximum 16 animals. This regrouping takes place quite undramatically. They seem to accept the new pen mates quickly and the first night they sleep in a pile in the corner of the pen.

As minipigs are herd animals they quickly establish a pecking order which normally will result in a social stable group. From the age of 3 months a new animal being introduced to the group or an animal being removed from the group can interfere with the hierarchy and possibly lead to a change in the pecking order. At the breeder this is sometimes the case when an animal is picked for sale or new groups for logistic reasons are formed. Under normal conditions the hierarchy will settle within a few hours.

Male minipigs can live in groups up to the age of 1 year or more, if they have been in the same stable group for a long period. In nature male adult pigs would live solitarily; keeping this in mind group housing of male adult minipigs can pose a challenge and should only continue as long as the group is stable. There is another reason for cautiousness regarding keeping male adult minipigs in groups namely that sexual behavior like mounting each other can be massive and quite hard for the ones being mounted. The front claws of the mounting minipig can result in scratches on the other ones backs which can be painful and undesirable.

Stress related to forming new groups can be reduced considerably by rich amounts of food scattered in the bedding material. It will keep the animals occupied with searching for food and reduce the interest for the other animals.

Staff should observe settling of new groups closely and interfere if fighting gets too massive. It is also possible to give a light sedation of eg. Azaperone which can blur the attention the other pigs. This being said some fighting should be accepted as it is the natural way of establishing a hierarchy in a group.

If for some reason minipigs are biting each other or show aggressive behavior after establishing of new groups it could be a sign of boredom and failure to thrive. Or it could be a sign of general discomfort or even pain. In any case it is of utmost importance to find the cause and take proper actions.

To know more about minipig behavior video cameras were installed at Ellegaard in order to survey the influence of being group housed vs. single housed. Both night and day the benefits of being group housed was obvious: In the daytime the group of 10 animals was more active and more occupied with enrichment like toys and bedding material than the single housed animal. In the night time the group was lying in the corner in a big pile, now and then changing position, but at no time they chose to sleep away from the others.

Whenever possible it is therefore recommended to keep minipigs housed with at least one other minipig. If the experimental setup does not allow this it is crucial that the minipig can see, hear, smell and touch other minipigs.

Single housed minipigs can in the night time profit from a corner in the pen provided with a roof to hide under. They like to hide when sleeping and they will always rest in the corner if possible.

Environmental enrichment - rooting and manipulating

Minipigs are curious animals and they spend a large part of the daytime investigating the surroundings. Therefore the environment should be designed in order to meet these traits. This being said instead of looking at minipigs over all it is worth to realize that minipigs have different needs according to age, gender and being housed in groups or not:

- Young minipigs are more active and explorative than older ones.
- Male minipigs in groups are less interested in environmental enrichment than female ones, due to the male sexual behavior such as mounting each other.
- Single housed minipigs play around less than group housed minipigs.
- Old female minipigs like to sit still and chew on something
- Weaned minipigs like to rub their nose on cotton towels placed on the floor

While the utility of different kinds of toys may differ, as mentioned, at least one trait is common for any minipig: the urge to root. The natural rooting behavior can be met by provision of rooting material such as straw, wooden chips or other chopped material which can be moved around on the floor. When it comes to straw the minipigs will probably eat some of it and it should therefore be of good quality.

Furthermore the food pellets can be distributed on the floor hidden in the bedding. This will keep them busy searching for feed and to practice rooting behavior, just as it is the case in nature. To ensure the novelty of the straw hay racks can be installed which enables the animals to pick out the straw whenever they may need it. This has proved to work out very well at the Ellegaard facility and is highly recommended for minipigs at any age.

As mentioned before when it comes to meeting the minipigs' urge to root and manipulate straw is number one. If straw or other bedding material for experimental reasons is not an option extra attention should be paid to keep the animals occupied during foraging. Food pellets stuffed in a plastic bottle with holes or commercial available devices with the same properties can be challenging and good entertainment for a while.

Likewise other items like cotton towels are very suitable as enrichment and favor the minipigs' urge to manipulate and break down. At Ellegaard this is routinely provided to the weaned minipigs at 1 month of age. They rub the snout roughly on the towels – maybe recalling the movements of drinking milk with the sow? In comparison older minipigs provided with towels pay only little attention to them.

Minipigs are sleeping a lot of the day away. The most active period is late afternoon and whenever there is human activity in the surroundings.

Some minipig facilities offer different kinds of toys for the minipigs to play with. Toys cannot replace bedding and rooting material but should more be considered as a supplementary kind of enrichment.

For the optimal benefit of the efforts it is very important to match the right toys to the right minipigs according to age and the other factors mentioned before. Apart from bedding material or straw each pen should be equipped with items that favor the minipigs' urge to chew and manipulate. Rubber biting sticks and metal chains anchored to the wall will give the opportunity to chew.

Manipulation can be countered by providing toys that can roll over. But if the item does not represent any form of resistance when moved the minipigs tend to lose interest very quickly. A ball on the floor is an example of a toy that is of little use. Opposite a plastic bucket anchored in a chain meets many purposes: it rolls over but only to a certain degree, the minipigs can bite the edge and stick their head into it, it makes noise when manipulated. From the authors point of view this solution is an all-in-one solution.

Minipigs tend to lose interest in the toys after some time. Therefore toys should be removed and replaced on a daily basis.

Social enrichment with conspecifics

Group housing of minipigs meets their need to socialize with other minipigs. In cases where group housing is not possible or not allowed for scientific reasons it is of utmost importance to make sure that each individual can see, smell, hear and preferably touch other minipigs. This can be encountered by a pen design with bars or holes in the wall and front door. The walls should furthermore have transparent areas which helps the animals to keep up with activities in the room.

If no contact to other minipigs is permitted the front door can be designed with bars in a convex shape to the corridor. This makes it possible for the animal to come forward and see other minipigs and activities in the corridor in general.

Both single housed and group housed minipigs can benefit from meeting new minipigs. At the breeder a socialization routine is implemented where minipigs are let in the corridor for 30 minutes. This has proven to be beneficial not only for the ones let in the corridor but also for the ones in the other pens. The ones in the corridor can investigate new surroundings and other minipigs. The ones in the pens will experience new impressions they being visual, olfactorial etc.

When piglets in the farrowing section are used to being let in the corridor with the sow it has proven to be much easier to move them to new pens later in life because they are used to new situations, new minipigs and new staff. This is the same situation with minipigs up to 4-5 months of age – at this age they will sprint up and down the corridor and furthermore profit from some exercise. Whereas older adult minipigs will wander around more slowly and take time to investigate the new surroundings.

Regardless of age letting minipigs out of the pen 30 minutes pr. day is rated of good value when it comes to ability to express normal behavior. It is costless and means only a small change in the daily routines to implement it.

Some report good experience with letting minipigs from different pens out in a play area with toys and straw. There is a risk though that they will start to fight and establish a new pecking order. Such situations should be observed closely in order to avoid an undesirable situation.

If minipigs are biting each other or show aggressive behavior it could be a sign of boredom and failure to thrive. Or it could be a sign of general discomfort or even pain.

Sometimes it is seen that minipigs in a social stable group for some reason start fighting. Maybe changes in sexual cycle in one or more individuals create turmoil, but often there is no plausible explanation to the changes in behavior. In any case the staff should interfere and take the necessary measurements to restore stability.

Acclimatization and socialization with humans

Soon after birth efforts are made to habituate minipigs to human contact. Merely by the presence of staff in the pen and in the corridor the piglets get accustomed to human presence.

After weaning staff sit in the pen some time each day making the young ones come forward and investigate the person's smells, clothing and appearance. The same routines should be implemented after moving to new facilities.

During transport any measurement is taken to make the transport as smooth as possible. The transport boxes are equipped with straw and water and for longer transports food is provided. When possible the minipigs can be placed two in the same box to keep them with company. At ordering it is important to that subsequent group housing is taken into consideration to avoid unnecessary regrouping later.

After transport when opening the truck door the minipigs are always laying and sometimes sleeping. This could be indicating that it is not the transport time in itself which is most stressing: it is likely to be the time before and especially after transport.

Following transport to the research facilities a minimum of 14 days are required for the minipigs to acclimatize to new surroundings and personnel.

Ideally the best thing after arrival at the destination would be to let the minipigs freely walk out of the boxes whenever they feel comfortable with the new environment. Unfortunately this is not possible while the transport boxes are returned with the truck.

An attempt to use disposable boxes of cardboard has been made but was for not a satisfactory solution. So the time after arrival is likely to be quite a stressing period. Leaving some of the bedding material from the transport box in the pen can simulate that at least not everything is new.

In this first period in new surroundings it is important to establish trust. Interacting with the animal with a gentle voice and a scratching behind the ears or elsewhere makes it more confident in being handled. It is recommended to have a formal acclimatization program in place which covers any aspect from general socialization to gradually implementation of specific habituation to future handling and dosing procedures.

Minipigs are easily startled by noise and sudden changes. Therefore they should be approached with slow movements and a quiet, calm voice. Normal behavior of the minipig when a human enters the pen is that it curiously will come forward and investigate everything new. If this is not the case they are likely to need more time to accustom to new staff. In this regard giving treats as an “air breaker” is a way of drawing their attention. As they are not used to any other food than dry pellets they probably need to get accustomed to the new smell and taste of the treat. Any treat can be used; in practice many go for bites of apples or other fruit.

Habituation to procedures

Habituation to the sling, scale, new equipment and whatever procedures should be proceeded slowly and always in combination with treats. Minipigs are smart creatures and will rapidly learn from training as long as they are rewarded properly. Positive reinforcement by clicker training is a possible way of cooperation between animal and staff.

Much more of this is covered in the “Handling, Dosing and Training of the Göttingen Minipig”, educational package.

What could be done to do better?

There may be a lot of formal arrangements in the institution for ensuring good animal welfare, e.g. establishing a local IACUC, insertion of an institutional animal welfare officer, protocols, GLPs and more.

At the end of the day the degree of welfare perceived by the individual minipig is highly influenced by the people around it and how animal welfare initiatives are implemented in the daily routines. Often time can be a limiting factor when it comes to turning the good intentions into practice.

To establish and continue focus on animal welfare regular training of staff should be scheduled in order to share knowledge and evaluate procedures and working methods. The training can include discussions on handling, feeding, housing conditions, pain management, behavior, ethics, clicker-training, case-stories, hygiene and more. The means are to share experience between staff members – the overall goal is to improve animal welfare of the minipigs.

Non-conclusion

The recommendations in this paper are based on hands-on experience with minipig enrichment, both in the rearing facilities at Ellegaard and with customers. The aim was to put together basic knowledge contributing to the welfare of minipigs with special focus on behavioral features. The content is not the truth but merely an attempt to bring up some reflections regarding minipigs welfare – can we do better? Are we focusing on the right things? Do the minipigs get “value for money”?

It is worth to remember that animal welfare is not only about adjusting a few welfare parameters, for example introduction of new toys. Better animal welfare is about taking every single parameter into consideration and reflect if one is heading in the right direction. Provision of toys in the pens may look nice, but if the animals don't play with it is worth nothing. On the opposite opening the gate in the pen will always cause pigs in the corridor!

In general it is not a matter of doing the right things but doing things the right way: animals in a social stable group will benefit from bedding material whereas an animal not accepted by the group will to a lesser degree enjoy other types of enrichment. Likewise an animal in pain will pay only little attention to being placed in a big pen with lots of environmental enrichment. And it will under no circumstances participate in training procedures. Whereas when correctly medicated with analgesics the minipig will enjoy the bedding material and be more confident in personnel and less distressed when handled. The consequence could be more reliable study results and in the end good animal welfare.

References

1. *Ellegaard L, Cunningham A, Edwards S, Grand N, Nevalainen T, Prescott M, Schuurman T. RETHINK Project: Welfare of the minipig with special reference to use in regulatory toxicology studies* Journal of Pharmacological and Toxicological Methods 62 (2010) 167-183 <http://www.rethink-eu.dk/index.php?page=seven&id=16>
2. Five Freedoms, <http://www.defra.gov.uk/fawc/about/five-freedoms/>
3. Ellegaard Göttingen Minipigs: www.minipigs.dk
4. *Curtis S.E, Edwards S.A, Gonyou H.W. Ethology and Psychology* Biology of the Domestic Pig Pond W.G, Mersmann H.J Cornell University Press
5. *Bollen P.J.A, Hansen A.K, Olsen Alstrup A.K. The Laboratory Swine. Sec. edition* CRC Press 2010
6. *Guide for the care and use of laboratory animals. Eight Edition, 2011.*
7. *Federation of Animal Science Societies: Guide for the care and use of agricultural animals in research and teaching. Third edition, January 2010*