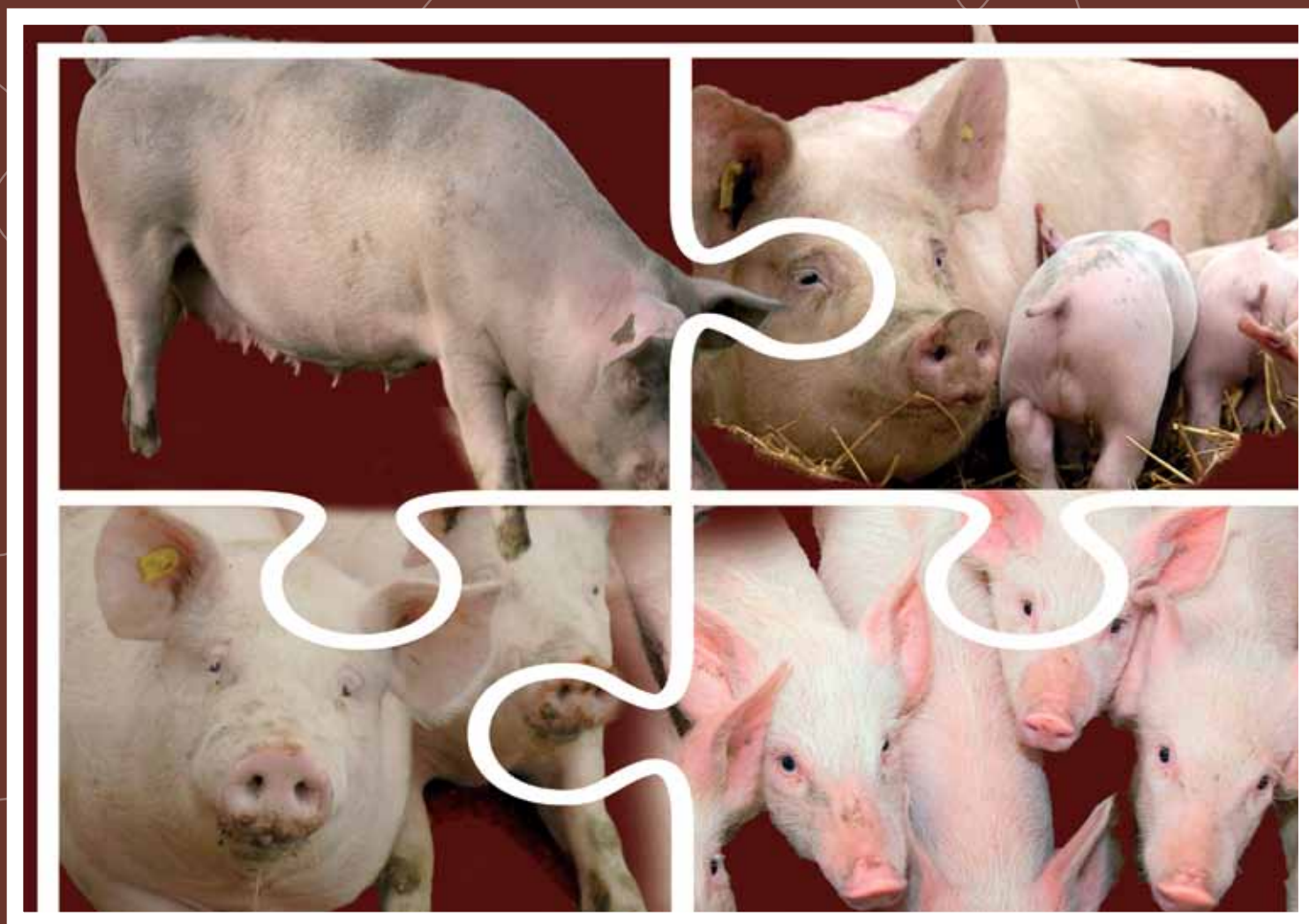


What the pig wants

From needs to husbandry designs



WAGENINGENUR

For quality of life

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Editors: Jessica Cornelissen, Carolien de Lauwere, Karel de Greef

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Keeping and caring for pigs

In The Netherlands, pigs have become an important topic of debate in the media, particularly in newspapers and on television. Main issue is their quality of life. But pigs are also put central in books on other themes. To show how intensive pig husbandry works in practice, all the products that can be made from

pigs, how much fun pigs are, how they can become the subject of philosophical contemplation or how they can be elevated to the status of art. There is therefore a great deal of interest in pigs, and Wageningen UR is chipping in with this brochure to help giving animals a better life by meeting their needs.

Most pigs are never seen by the public: they live in stables in the countryside. We don't see them until they end up on our plates as pork chops. A lot of attention has been devoted to the lives of pigs raised for pork in recent times. Initiatives are taken from different sides to improve the balance between pig happiness and other interests such as the farmers family income, the environment, society and the landscape.

This brochure focuses on the pig. We provide an answer to the question: 'What does the pig want?'. By means of an animal-oriented approach, we demonstrate what is important for the pig, divided into the following categories of pigs: gestating sows, lactating sows with piglets, weaned piglets and fattening pigs. We therefore look at

the pigs from birth to slaughter, but also at the sows, whether gestating or nursing their piglets.

The result of the project is not only an overview of the needs of pigs. We also provide a number of example designs for those wanting to design animal-oriented housing in practice. The building blocks of an animal-oriented design are the needs of the animal in terms of the requirements imposed on the housing system. These requirements arise directly from the animal's needs. In the chapter 'From needs to husbandry designs' we provide a number of example designs to demonstrate how to take into account the needs of pigs within a husbandry system, from small steps to upgrade existing systems to giant leaps for future housing.

This brochure is primarily intended as a reference work for pig farmers wishing to improve the welfare of their animals. This booklet is, however, also of interest to a wider range of parties who are connected to pig husbandry in some way, such as policy makers, animal protection agencies or agricultural organisations.

We hope it provides inspiration in the quest for feasible and socially-accepted pig husbandry.



The result of an animal-oriented design serves various functions:

- **Information** about the needs of the animal and the corresponding requirements imposed on the husbandry system
- **Inspiration** for the route towards sustainable livestock husbandry systems by sketching 'ideal stables'
- **Support** for considerations between the interests of the animal and economic aspects (amongst other things)
- **Providing guidance** in the modification of existing stables in order to improve animal welfare

Animal welfare... a definition

We all want our animals to have a good life. But that is not always possible, and there is not always agreement on what a 'good life' is. Our vision on animal welfare for present study is presented below.

Academics have different starting points when trying to define animal welfare. Some see animal welfare as the correct biological functioning of the animals and focus primarily on the physiological processes in the animal's body. Others define it as the prevention of inconvenience and the stimulation of positive experiences, about which the behaviour of the animal in question provides important information. Good animal welfare can also be defined as being able to lead a natural life. In that case, a comparison is made with their conspecifics living in the wild.

Within society at large there are also differences of opinion regarding what animal welfare means and even individuals can have differing judgements at different times. A person who hears information on the news at home about animal transportation gains a different sense of what animal welfare entails compared with the feelings of that same person buying meat later at the supermarket. If the same person takes a tour of a farm-based camp site, his or her view may be different again. The animal is seen as pitiable when being transported or kept in intensive farming conditions; cute when foraging around outside on the farm; and tasty when served as a piece of juicy meat at dinner.

In an attempt to make animal welfare a less abstract concept, the Comfort Class approach has been formulated. Here, the starting point is the assumption that the animal perceives its quality of life as being good if all its needs are satisfied. **In other words, welfare is good if the housing and the care provided offer the animal everything it requires.** In this project (Animal-oriented Designs for Pigs), we adopt this vision of animal welfare. We want to offer the animal every opportunity to exercise influence over its environment through its repertoire of behaviour and thus to satisfy its characteristic needs. The pig farmer plays an essential role in this; after all, he or she must create the right conditions to make this possible.

For present study, animal welfare thus means a good life for the animal concerned, seen from the perspective of the animal itself. This is a conscious, practical definition. Other (cultural, ethical and aesthetical) notions such as a natural life and pleasant appearance are societally important as well, but we restrict ourselves now to the perspective of the animal itself. The central question for now is therefore: What does the pig want?

Nothing more, nothing less.



Pig categories



Pigs come in many different shapes and sizes. In modern day pig farming, we therefore don't talk about *the* pig, but about different categories of pigs.

In the Netherlands, pig farmers define different categories of pigs based on e.g. age or body weight: gestating sows, lactating sows with piglets, weaned piglets, fattening pigs and breeding boars. There are good reasons for these distinctions. A gestating sow, for example, is different from a lactating sow with piglets: she has different behavioural and physiological needs. Equally, a weaned piglet enters a new stage of life without its mother. When a piglet is around 10 weeks old and weighs 25-30 kg, it reaches yet another stage, when it is transferred from the breeding farm or stable where it was born to the finishing facility where it will be fattened until slaughter age. Currently, two thirds of Dutch pig farms are 'closed'. That means that the pig stays on the same farm from birth to slaughter. The category-change at 25-30 kg from weaned piglet to fattening pig is not a natural one, but the result of changes in management and housing of the animals.

The Dutch Pig Decree also refers to animal categories. Once the weaned piglet exceeds 30 kg in body weight, it 'changes' into a fattening pig. It then needs to be kept on a partly solid floor instead of a fully slatted floor. As the body weight increases, so do the norms related to minimal surface area.

Yet the different categories of pigs do not have such differing needs. They all need a comfortable place where they can lie with other pigs, they need a stimulating and challenging environment and a life without hunger or stress. However, as the animal grows, its needs relating to the dimensions of the lying area, the width of the eating area and the ideal temperature change too. Piglets need smaller, softer distraction material than fattening pigs. Furthermore, some categories have certain specific needs, such as the need for sexual behaviour for sows in heat, the sucking need of newborn piglets and the urge of the gestating sow to build a nest.

The designs in this brochure have been created for each animal category separately, to present distinct solutions for the differences in needs. The last design in chapter nine ignores the 'artificial' categorisation of pigs and represents an integrated family pen.

There is no explicit focus on the barren sow or the breeding boar in this brochure, but their needs are fairly similar to those of gestating sows.

Pig Decree

The 1994 Pig Decree describes regulations with respect to keeping pigs. It imposes standards on pig pens and care of the animals. From 1 January 2013, the end norms apply. This means that pig farmers must then fulfil all requirements relating to pig welfare. The most noteworthy changes relate to the minimum surface area for fattening pigs and the obligation to keep gestating sows in groups.

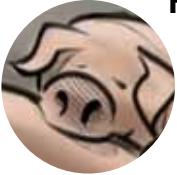
Pigs' needs

Before designing a new pen or adapting an existing pen with the aim of optimally fulfilling pigs' needs, we first need to know what those needs are. We distinguish thirteen different needs: rest, satiation, excretion, body care, exploration, social behaviour, thermoregulation, safety, health, locomotion, sexual behaviour, nest building behaviour and maternal behaviour.

As each animal category generally has similar needs, we will not distinguish between the different categories. When there is a difference, we will indicate this.

The building blocks for animal-oriented designs – the requirements that the animal imposes on its housing and management – are a direct consequence of those needs. The elements of the husbandry system on which a requirements is imposed are highlighted in orange.

Rest



Farmed pigs spend the majority of their time lying down, preferably in the company of other pigs in quiet surroundings.

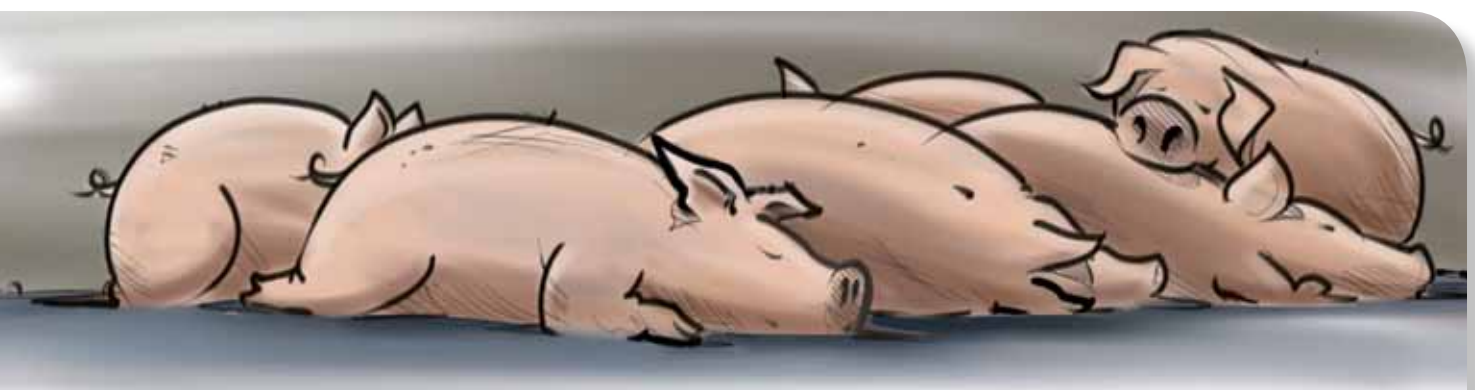
The **size of the lying area** must therefore be big enough to enable all the pigs to lie down together. The **layout of the lying area** must enable quiet and undisturbed resting for the pigs. It should therefore be separate from the area in which penmates eat or play. Protection and a good

overview are also important features of the lying area so that the animals cannot be attacked or disturbed unexpectedly by other pigs or humans.

For comfort, the **floor in the lying area** must be dry and not too hard. At the same time, it must offer sufficient grip, so that the pig can stand up and lie down normally. In order to prevent injuries when the pig stands up or lies down, the floor must not be too rough or have sharp edges.

When rest is even more important

For some animal categories, such as newborn piglets, lactating sows, and sick animals, rest is even more important. The living environment must allow these animals to rest undisturbed and in comfort, i.e. in soft and thermo-comfortable conditions.





Satiation: eat and drink

Eating and drinking are necessities of life for pigs. If it were up to them, pigs would eat and drink unrestrained. However, this is not always possible (see box).

In order to fulfil their physiological needs, **the quality and composition of the feed** and **the quality of the water** must be correct. That implies that water must always be fresh and that food leaves the pig feeling satisfied and provides sufficient nutrients in the right proportions so that it feels well and can grow, nurse or produce piglets.

However, only providing good quality food and water is not enough to satisfy the pigs' needs for eating and drinking. The pig is a social animal and likes to eat with other pigs.

The **layout of the feeding and drinking areas** must provide for this need. The eating area must be big enough and offer sufficient feeding places of the right size to allow several pigs to feed at the same time without being disturbed or chased away by other pigs. This is even more important when the pigs are on a restricted feeding regime. It is also important to have sufficient drinking places in the pen. The positioning of drinking troughs or drinking nipples near the feeding area seems a good solution so that the pigs can alternate between eating and drinking or have easy access to water after eating. In order to prevent the ground becoming wet and slippery, it is wise to place a drinking trough above a slatted floor and not above a solid or bedded floor, or otherwise to ensure sufficient drainage.

In the pig's best interests

Eating is an important part of a pig's life. The animal would like nothing better than to eat all day long. Research has also shown that pigs prefer eating over spending time with other pigs or enrichment in their pen. Even a slight restriction in the amount of food provided matters to pigs. However, it is not always in their interest to allow pigs to eat unrestrainedly. Gestating sows, for example, would become too fat, causing problems when giving birth and preventing them from walking or standing properly. In this case, what the pig wants is not what is good for it. The reason for this can be found in the fact that farmed pigs don't have to do much to get food, it is simply provided to them. In contrast, animals living in the wild have to spend a large part of the day foraging for food. This restriction only applies to sows, fattening pigs are generally allowed to eat as much as they want.



Excretion: defecating and urinating



A pig is a clean animal. It keeps its own sleeping and eating areas as clean as possible.

It is therefore important to have a **separate area** where the pigs can defecate and urinate. The **layout of the excretion area** must take into account the fact that pigs are active together. The excretion area must therefore be big enough for a number of pigs to defecate or urinate

at the same time. It is also important to provide protection: while defecating and urinating, the pig adopts an unstable position whereby the animal arches its back and sits on its haunches. The animal therefore prefers a quiet, secluded place. The **floor of the excretion area** must provide sufficient grip to avoid slipping.

In order to maintain **good hygiene**, the excretion area can best be situated where there is optimal drainage.

Did you know...?

that pigs defecate and urinate more in a place which is partially shielded by pen partitions than in a place which is fully shielded? It is not clear why: they may want to keep the most comfortable area (the fully shielded area) clean so that they can

use this as a place to rest and therefore defecate and urinate in the less comfortable area. Furthermore, it appears that pigs follow the example of their companions and, as a result, a group of pigs often chooses the same spot for excretion. In the

Netherlands, farmers are advised to provide a fully closed pen partition in areas with solid floors (so that animals are tempted to lie there) and partially closed pen partitions in areas with slatted floors (so that they defecate and urinate there).



Body care

Body care or comfort behaviour is important for a pig because the animal wants to protect itself from itching or skin irritation caused by skin damage or external parasites. Scratching itself, rubbing, rolling and taking a mud bath ('wallowing') are elements of body care.

The **size of the living environment** must be large enough for the animal to turn around. We then know for certain that the animal also has room to adopt the most space-consuming position for body care, i.e. standing on three legs and using its hind leg to scratch behind its ear. Due to the unstable position adopted by the pig when it scratches or rubs itself,

the **floor in the living environment** must give the animal sufficient grip to prevent slipping.

Providing the pig with a **place to rub itself** is another important element of body care. This could be a rubbing post or a tree, for example, or even a partition or protruding corner in the pen. It is still unclear whether taking a mud bath (wallowing) is an indispensable part of body care. By taking a mud bath, the animal can rid itself of external parasites and regulate its body temperature (important for thermoregulation). In the wild, or where pigs are kept in natural conditions, this behaviour is regularly observed.





Exploration

Pigs love to explore their surroundings. They explore with their snouts. They do this because they are looking for food ('foraging') or because they want to map out their environment. The former is about satisfying their hunger, while the latter is more about curiosity and safety. Mapping out the environment is just as important as looking for food. It enables the pig to find out what is happening in the surroundings, where it might find new sources of food or where it can seek shelter.

Pigs that are unable to explore 'normally', for example because the surroundings are too barren and where the ground is not suitable for rooting, may direct their desire to explore towards other objects in the pen, such as the concrete floor, a partition, or other pigs. In the latter case, this can result in undesired behaviour like tail biting, ear biting or other forms of biting behaviour.

Did you know...?

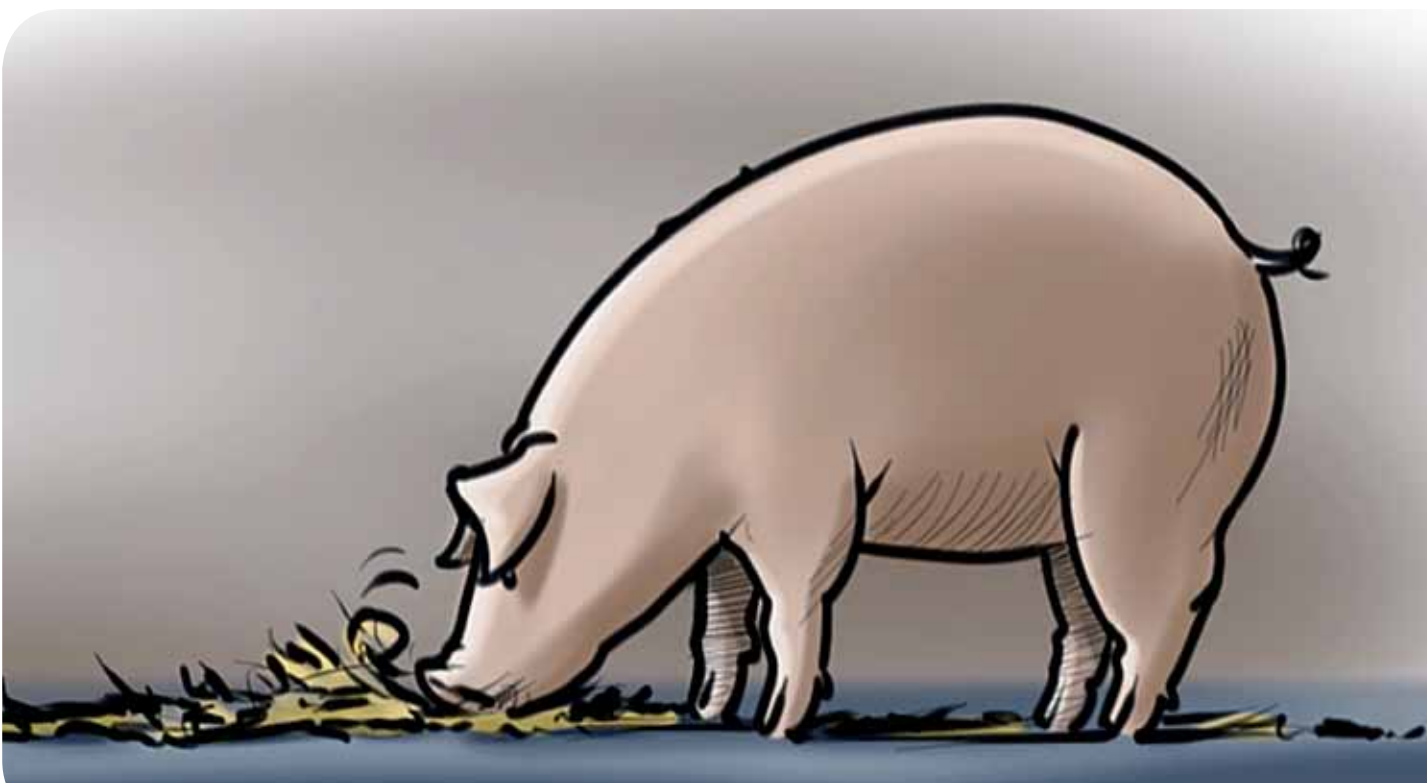
that pigs will root even more if they were temporarily denied the possibility to root? Pigs which have constant access to food and therefore do not need to forage also

continue to display exploring behaviour. Obviously, the ability to explore is very important.



The living environment of pigs must give them the opportunity to explore. This not only relates to the **layout of the exploration area**, but also to the **permanent availability of sufficient and adequate exploratory (enrichment) material**. Because pigs like to explore together, the area must be big enough to facilitate the synchronisation of exploring behaviour. A spatial separation between exploring behaviour and other activities is also important so as not to disturb other

animals who are resting or defecating and to avoid soiling of the exploratory material. The exploratory material must be available in sufficient quantities. Furthermore, the living environment and the exploratory material must be sufficiently stimulating, varied and inviting for the pig to continue to explore. Exploratory material that the pig can manipulate, transform and break and which rewards the animal (for example with food) retains the pig's interest.



Social behaviour



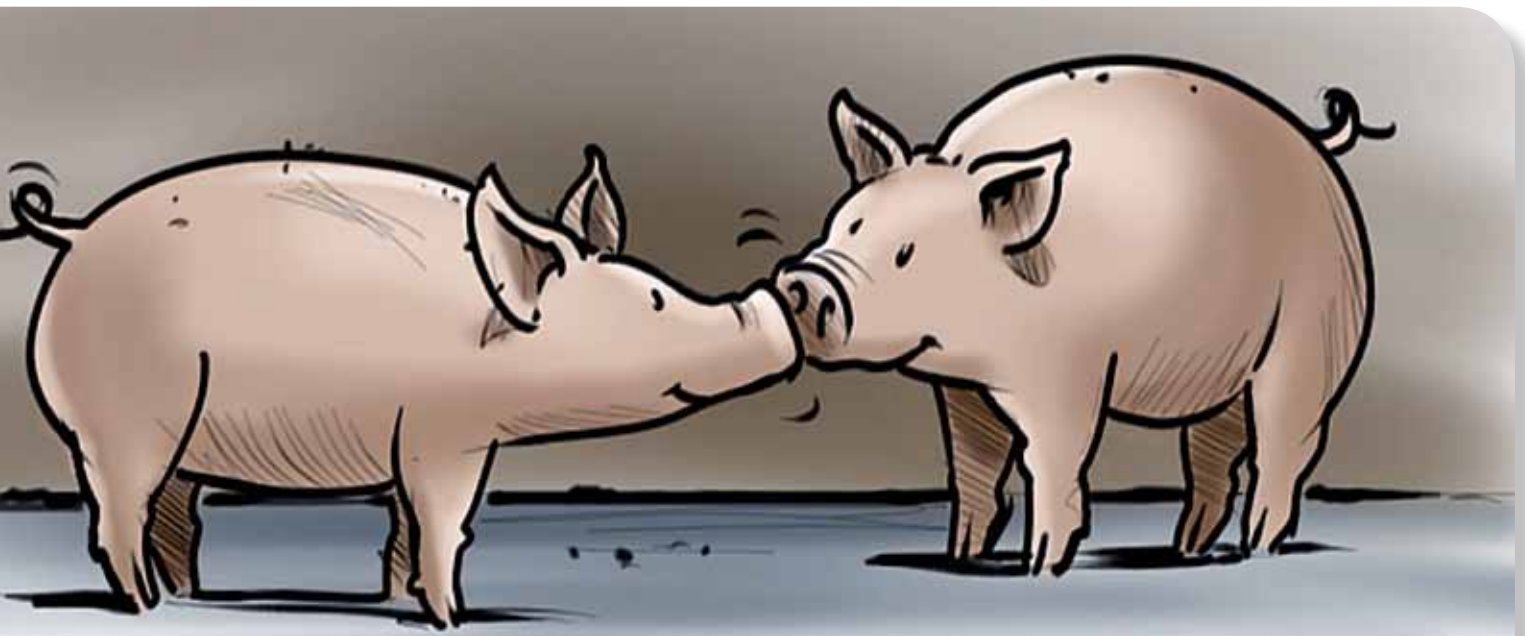
By nature, pigs have a strong social hierarchy. In the wild, pigs live in family groups consisting of several generations of sows with their piglets. Female offspring often stay with the group after weaning. Boars do not stay in a family group; they first live in a bachelor group until they are fully grown and after that they live on their own. The family groups form stable social units.

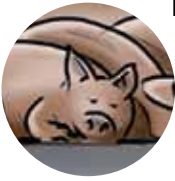
In pig farming, too, pigs are best kept in stable social groups. Individual housing of female animals and young animals should therefore be avoided and the mixing of animals should be kept to a minimum. This prevents aggression and unrest caused by animals constantly having to redefine the social organisation, thus reducing the risk of damage or injury to animals.

In order to allow the pigs to display normal social behaviour, they must be able to choose which pigs they wish to be with and what distance they wish to keep from others. It is therefore vital to provide enough **space in the living environment** to ensure that the animals can circle each other while playing or fighting. Another important aspect is the **floor of the living environment**. This must provide sufficient grip to avoid slipping during social interactions. The **layout of the living environment** is also important for social contacts. Pigs want to be able to withdraw from a fight, give way to a stronger animal or move out of their field of vision. Partitions can therefore be placed for this purpose. Finally, **visual, physical and verbal contact** must be possible between the animals, i.e. they must be able to see, feel and hear each other. The light level must therefore be adequate to enable normal social interactions and the noise level must enable the pigs to hear each other properly.

Piglets in the crèche?

An adult pig learns about normal social behaviour as a piglet. It is therefore vital for young piglets to learn how to interact with each other while playing, with their mother and with other pigs. Piglets given the opportunity to play-fight in a normal way will later also be able to fight and interact 'normally' in the group. If pigs do not learn normal social behaviour at a young age, they and their future pen mates will be bothered by this later on.





Thermoregulation

The living environment must be designed so that the animals can regulate their body temperature. One can use either the comfort zone (the zone within which the animal can keep its body temperature constant without doing anything) or the thermo neutral zone (the zone within which the animal must be able to respond with suitable behaviour to keep its body temperature constant). In any case, the environment must have an **optimal temperature range**, i.e. not too warm and not too cold. The living

environment must be **free of draughts** (excessive air speed) and **not too damp or dry** (optimal relative humidity).

If the thermo neutral zone is taken as the starting point, it is important that pigs can adapt their behaviour to their surroundings if they are too hot or too cold. They can do this by lying in a cool or damp place or taking a mud bath, water bath or shower if it is too hot, or by lying with other pigs in a thick bed of straw if it is too cold.

Did you know...?

that a pig cannot sweat? It loses heat by evaporation through its nose or by panting. It is therefore important that pigs can

regulate their body temperature with their behaviour if they are too hot or too cold.

Differences in temperature needs

Each pig is different and this is certainly the case with respect to temperature. For example, sows which have just given birth to piglets need to be slightly warmer than sows with older piglets. Newborn piglets need to be even warmer than their mother. After birth, the temperature needs of sow and piglet differ considerably. Temperature needs within an animal category vary too. A sow whose piglets have just been weaned needs to be warmer than a heavily pregnant sow and heavier animals like to be cooler than lighter animals. Sick animals may also have different temperature needs from healthy animals.

Due to the varying temperature needs, it is possible to influence pigs' behaviour by adjusting the temperature. For example, because pigs need more warmth while resting than while eating or exploring, it is possible to ensure that pigs rest in a certain place in the pen by raising the temperature at that spot.





Safety

Every pig needs to feel safe. It is therefore important that the **layout of the living environment** prevents anxiety, stress, pain and injury. Aspects to be considered include shelter and an overview in the living areas, so that resting pigs can see potential 'danger' and that defecating pigs are not vulnerable to attacks from other pigs while in an unstable position. Disturbance in the eating area should also be avoided by separating it from other areas and by offering sufficient numbers of feeding places. Providing a pleasant

temperature and sufficient fresh air protects the animals from hypothermia, hyperthermia or suffocation. Of course, the pigs must also be able to move safely through the living environment without injuring themselves on gates, partitions or other parts of the pen. The floor must prevent slipping or stumbling over wide slats on the floor. With respect to preventing anxiety, stress, pain and injury, the way in which the animals are treated or interventions performed can have a great impact.

Did you know...?

that anxiety and stress can be beneficial? They prevent pigs from approaching potential danger too fearlessly. Aggression

is a natural part of normal social behaviour. However, the pig must always be able to avoid anxiety and danger so that this fear

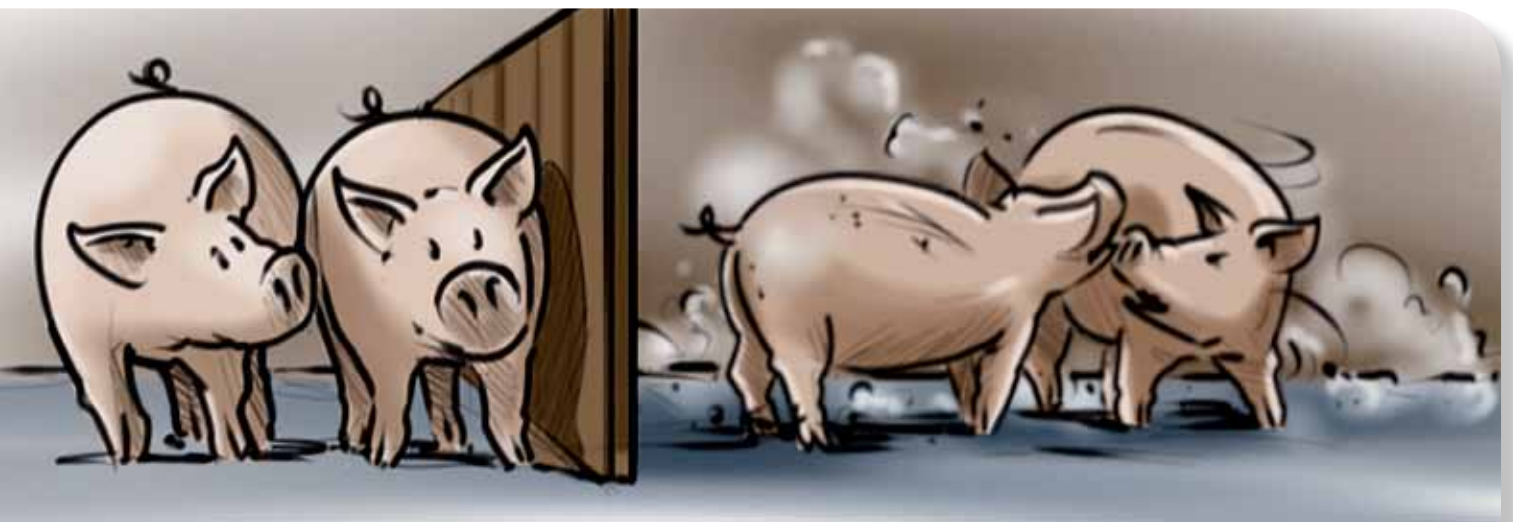
does not become chronic.

Good treatment is important

It is impossible to leave farmed pigs entirely alone. The farmer looks after his animals every day, the vet or advisor regularly visits and the animals are moved and finally transported to the slaughterhouse. Anxiety and stress can be limited by always treating the animals gently and with respect.

Interventions no longer necessary

Interventions such as tail docking, castration of piglets, tooth clipping or ear tagging are painful and stressful, but are part of daily practice. Tails are docked to prevent worse suffering, such as tail biting. However, this is not a solution to the problem, but more a form of treating the symptoms. New designs for a housing system based on the pigs' needs should make such interventions no longer necessary.





Health

No pig wants to be ill. That means that it must be able to live free from clinical and sub-clinical symptoms and be protected from excessive germs and high infection levels. Providing a 'clean' living environment can promote good health. Good hygiene, fresh air, appropriate pen design and no overcrowding are important elements of a clean living environment. Pigs should have access to clean, dry bedding, and accumulation of urine or manure on the floor should be prevented in order to combat excessive bacteria growth. Of course, good quality food and water must be available, with a limited number of bacteria and fungi. With respect to the relative humidity, an overly dry environment must be avoided because this can affect the mucous membranes which can increase the risk of airway infections. High humidity levels

are not bad for the pigs per se but are detrimental to the hygiene in the pen. It can promote the growth of bacteria on the floor and in the air and thus increase the risk of bronchial infections and other infections among the pigs.

Animals must also be prevented from injuring themselves on parts of the pen or obstacles or from the consequences of an overly rough or smooth floor. Injuries and wounds can indirectly cause health problems. It is therefore also best if interventions such as tail docking and the castration of young piglets are abolished as these can cause infections. Skin damage as a result of fighting when animals are mixed or when animals compete for feed is a well-known risk that may be avoided with a sound layout of the pen and with animals that have good social skills.

Illness strikes?

If, despite all the precautions, a pig does become ill or get injured, the animal should be treated as soon as possible in the appropriate way. The animal must be given the chance to recover in a special sick bay. This helps prevent the spread of certain diseases and protects other pigs in the group. If the animal becomes so ill that no other treatment is possible, animal-friendly euthanasia should be applied. It is best if this is done on the farm, so that no further transport is required. An animal that is a bit off colour does not necessarily want to be isolated from the group. A pig is a social animal and, in the wild, would run a greater risk of being attacked by predators if it were alone.





Locomotion

Locomotion is important for pigs in order to keep them fit. It is also thought to be important for a normal birthing process and for a good metabolism.

However, it is not certain whether pigs really need exercise. In the wild, they obviously move much more than in a pen environment, but this is also related to the need to find food. Pigs mainly tend to move just to get from one place to another. The **floor of the living environment** should be sufficiently firm, smooth and free of obstacles so that the

animals do not slip, stumble or are otherwise prevented from walking through the pen. The animals must also have enough **space in the living environment** to pass each other easily and walk around each other. The walkways must therefore be sufficiently wide.

If the pigs' pen or living environment has **separate areas** for eating, resting, exploration or excretion, the pigs have no choice but to move from one area to the other. In that case, we can assume that the animals get enough exercise.

Interrelated

The ability to move normally is important for every type of behaviour. A pig that is crippled or restricted in its movement - through illness, for example - will have difficulty accessing the various areas in its living environment. The pig may also have difficulty lying down or standing up if its movement is impaired, as well as problems adopting an unstable position necessary for body care or excretion. It may also mean that the pig is less able to defend itself from aggression by another pig. Other social behaviour can also be affected if the pig cannot move normally. So there is every reason for ensuring that the pig's locomotor system remains in good condition.



Exercise especially important for young piglets

Although all pigs need exercise, it is particularly important for young piglets. It ensures a normal development of the locomotor system and movement pattern, a normal social development and the development of normal play behaviour.





Reproduction

Without reproduction, there would be no new pigs. The 'drive' or rather the 'necessity' for reproduction can be fulfilled

by sexual behaviour, nest-building behaviour and maternal behaviour, i.e. making piglets, giving birth to piglets in a place which is most suitable and caring for piglets.

Did you know...?

that in the wild a sow leaves the group to find a suitable nesting place two days before the birth? She digs a pit in which to lie and creates a nest built of a framework

of twigs covered with softer material like grass and leaves. The nest is situated in a place which offers shelter as well as a good view of any potential danger. Around 10

days after the piglets are born, she leaves the nest with her litter and rejoins the family group.



Sexual behaviour

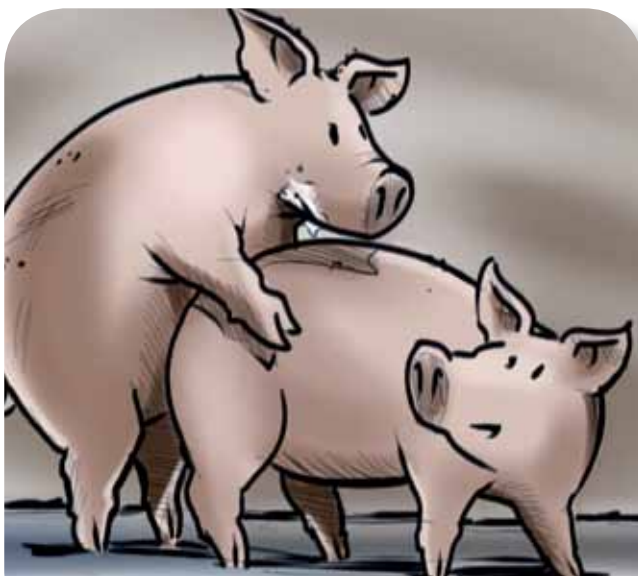
When the sow and the boar mate, they need enough **space** to move around each other. The **floor** must provide enough grip so that the animals do not slip when walking round each other or when the boar mounts the sow.

These features are also important in non-mating situations. Young boars can display sexual behaviour from time to time. Mounting each other can lead to aggression and injury. Groups of sows can also cause unrest when they are in heat because they harass their pen mates. Pigs which are not exhibiting mating behaviour also need enough room and a floor which offers a good grip so that they can withdraw to a more secluded area.



Nest-building behaviour

After mating, the sow gives birth to piglets around 115 days later. Several days before the birth, she develops a strong urge to build a nest. A pen or living environment geared to the needs of the sows must offer her the opportunity to do so. The pen must therefore have a **separate nest-building area** to which the animals can retreat to give birth. The area must be well protected from the rest of the pen, while offering a sufficient overview. There must also be **enough and adequate nesting material** present, such as twigs, grass or similar materials. The **floor of the nesting area** should preferably be compressible so that the sow can make a pit, It should also offer sufficient grip to enable her to move normally and lie down carefully in the nest without crushing the piglets.

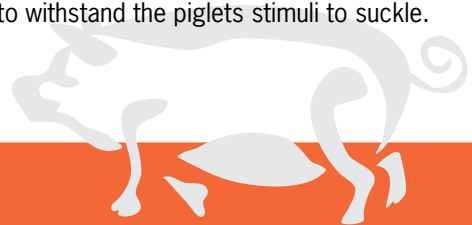




Maternal behaviour

Shortly after birth, the piglets begin to suckle almost constantly. There is also regular nose-to-nose contact. When the piglets are a few hours old, the constant suckling changes into short consecutive suckling sessions. These get fewer as the piglets get older. It is important to take into account the **moment of weaning**. Gradual weaning is preferable (see box). This ensures the good health and normal social development of the piglets and prevents stress among the sows.

It is important that the **nursing area is big enough** to allow the sow to lie on her side so that all the piglets can reach a teat. The number of piglets in a litter must not exceed the number of teats. **Verbal contact in the nursing area** must also be possible. The pen must be sufficiently quiet so that the piglets and the sow can hear each other. Unnecessary unrest should be avoided as much as possible. The **floor in the nursing area** must offer sufficient grip so that the sow does not slip when she lies down and to prevent the piglets sliding away from their mother's teat. The ground should also be compressible to prevent injuries to the sow's shoulders and the piglet's front legs. Later in lactation, the sow must be able to withstand the piglets' stimuli to suckle.



Gradual weaning

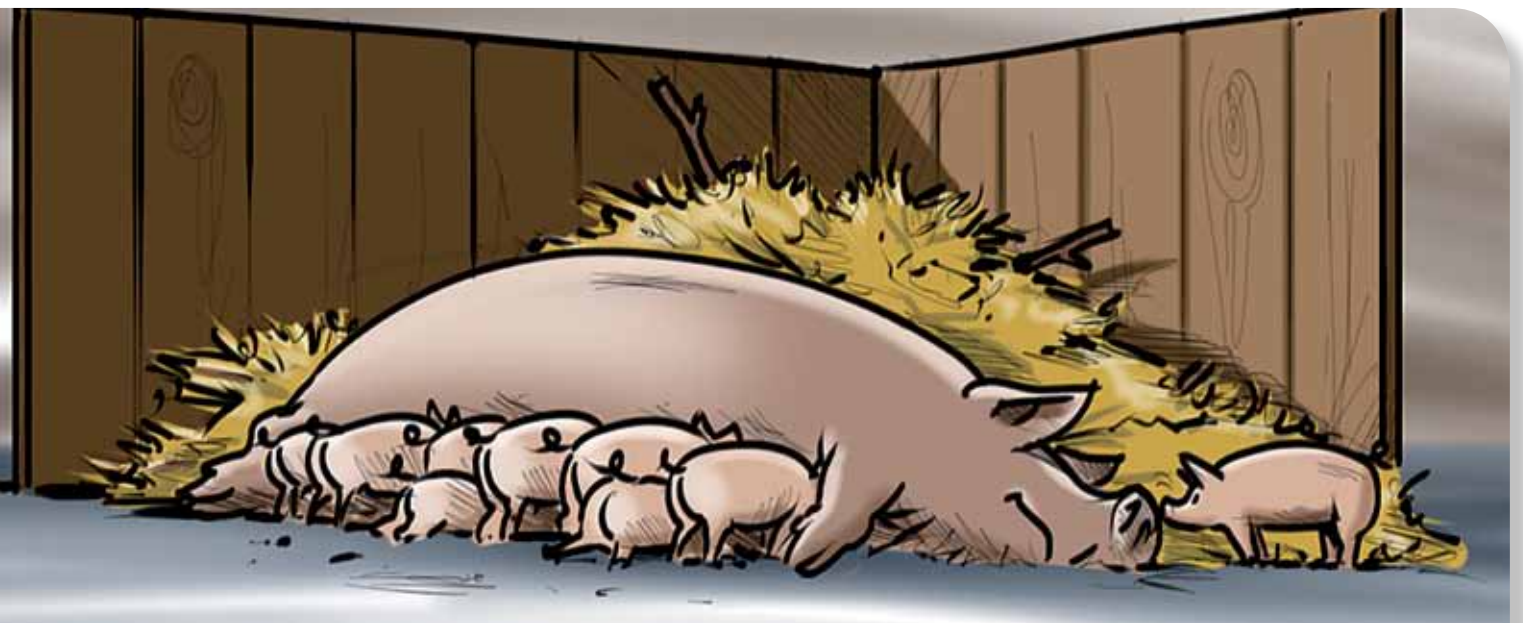
In the wild, the piglets are weaned gradually. This happens between 9 and 17 weeks of age. During this period, the sow spends less and less time with her piglets. The time she spends nursing them subsequently declines too.

Did you know...?

that sow and piglets communicate a lot during the nursing period? At the start of the nursing period - the weeks when the sow suckles her piglets - the sow usually takes the initiative for suckling. Later on the piglets start to take the initiative. The pig-

lets massage the sow's udder until she lies down and allows her piglets to drink. When a sow starts nursing, she makes a sound which lets her piglets know that it is time to drink again. The piglets also make sounds to each other and their mother when

suckling. And when they are at risk of being crushed by their mother they also make a sound, causing the sow to stand up. The area in which the sow and the piglets are kept must therefore be quiet enough for the animals to hear each other.





It's not as complicated as it might seem...

From reading all about pigs' needs, you might feel that designing a pen or a living environment which fulfils all requirements is a complicated process. In fact, it's not. Some elements can play a role in fulfilling several needs; for instance the floor, pen partitions, space and enrichment material.

- It has often been said that the floor must offer sufficient grip to allow the pigs to walk, stand up, lie down, play, fight or escape in the pen without slipping. The floor must be compressible so that the pigs can lie comfortably and build a nest.
- The importance of partitions in the pen has also been mentioned: as protection, to lie against, to rub against or hide behind. Partitions are in any case necessary in the pen or living environment to separate various function areas, so these needs can quite easily be fulfilled. This also facilitates synchronisation of behaviour, because a group of pigs resting together in one area will not be disturbed by pigs involved in a different activity in another area.
- Offering sufficient space has also been mentioned for several needs, for synchronisation of behaviour, for prevention of disturbance and for the ability to perform different behaviour to the full.
- And then there is the enrichment material or substrate which must be available in the pen or living environment: to lie in, to root in or explore, to forage in and for building a nest. This material does not need to be the same for each behaviour type per se – the material for lying in may be different from the exploration material – but it can be the same. For example, straw is nice to lie or roll in, fun to root in and suitable for building a nest.

So designing a pen or living environment which fulfils all the needs of the pigs is not that complicated at all, it is about making clever combinations to fulfil multiple needs.

The Comfort Class experimental facility, designed to meet all needs for fattening pigs. This innovative housing system is the result of Animal Oriented Design and built by a partnership between the Dutch farmers organisation (LTO), the Dutch animal protection agency (Dierenbescherming) and Wageningen UR





Issues about animal welfare in today's

The needs of the pig were set out in the previous chapter. This chapter focuses on today's pig husbandry and the main bottlenecks relating to animal welfare. We also provide possible solutions to improve welfare, which will be used in the chapter 'From needs to husbandry designs'.

Gestating sows in individual cubicles

In Dutch pig husbandry, almost half of all sows are housed individually in cubicles during gestation. These allow the animals limited freedom of movement. They can stand up and lie down, and that's about it. Pig farmers who house their sows this way have good reasons for doing so. It makes it easier to check whether the animals are in good health and whether they are in heat. The cubicles also offer the pig farmer good protection as he or she does not need to walk about among the animals. It is also easier to tailor the amount of food provided to each individual sow on the basis of what she needs at that time. And if one sow needs a little more than the others, she cannot be pushed away from her food by other sows. As the sows are not able to turn around in the individual cubicles, the sows' manure and urine always end up at the back of the cubicle. It can therefore be removed easily, keeping ammonia emissions to a minimum.

In spite of all the advantages for the farmer, however, it is not pleasant for the sow to be locked up individually. When locked up for the first time, a sow may panic and try to escape, causing stress and potentially injury. After that, boredom sets in. Through the combination of being locked up, an non-stimulating environment, and often also limited food, these sows live in a state of constant stress. This is expressed in stereotypical behaviour. In addition, the limited

space in the cubicles means the sows are not able to move enough. This puts them at a greater risk of developing joint problems, reduced muscle mass and pressure sores.

There is every reason to make individual cubicles a thing of the past. Work is in progress to achieve this, as the individual housing of gestating sows will be prohibited throughout Europe from 2013. From then on, all gestating sows will have to be kept in groups. These may be small (of 6 to 20 sows) or larger groups (of up to 400 sows). If the sows are kept in larger groups, use is generally made of feeding stations. Every sow has a transmitter which allows her to collect her daily ration of food from the feeding station. There are advantages and disadvantages to this system. If sows live in a group, they will need to 'decide' amongst themselves who is in charge. In some cases there are fights before each pig knows its positions are in the hierarchy. Low-ranking animals can suffer a great deal of stress as a result. By ensuring that the sows do not have to fight over the food and are sufficiently protected while eating, and by arranging their housing in such a way that there is sufficient space and opportunities to escape from and avoid each other, it is possible to prevent low-ranking animals in particular from suffering too much under the rule of their higher-ranking pen mates.



pig husbandry

Limited satiation of gestating sows

Most gestating sows in the Netherlands are given only limited food. They receive all the energy and proteins they require through their daily portion of concentrated feed. With regard to the nutrients they require, they therefore don't suffer any shortage. However, their appetite is not satisfied by eating only feed concentrate, so they are left feeling hungry for a large part of the day and to such an extent that the sows are still hungry even after just having eaten. In the wild, sows go looking for food when they're hungry. The search for food takes up most of her day. A sow being kept in a stable is generally not able to do this. This can cause stress, leading to abnormal behaviour and eventually to stereotypical behaviour.

The feeling of satiety in sows has three components: physiological satiety, mechanical satiety and behavioural satiety. A sow can become physiologically satiated if she consumes sufficient nutrients. Mechanical satiety occurs when the stomach is sufficiently full. Fibre-rich feed can make an important contribution in this respect. There are types of fibre-rich feed with and without fermentable fibres. In addition to the feeling of a fuller stomach, fibre-rich food with fermentable fibres also gives the animal extra energy for several hours after the meal as the fibres are broken down by bacteria in the large intestine in a process known as fermentation. The energy released during this process means

the sows retain a satiated feeling for longer after the meal. Fibre-rich food without fermentable fibres mainly results in extra filling of the gastrointestinal tract and brings about a feeling of satiety in both the short and medium term.

Physiological and mechanical satiety alone are not sufficient. For full satiety, a sow must also experience behavioural satiety. This means that she needs to be able to satisfy her need to forage. If she is kept in a stable, this can only be achieved if sufficient material – or substrate – is provided in which to forage. Straw or silage feed are ideal for this purpose, for example – the animals can root and sniff around it, bite it and chew on it.

In summary, we can reduce the feeling of hunger in sows given limited amounts of feed through the provision of feed concentrate containing fermentable fibres and through the provision of a suitable substrate to satisfy their need to search for food. This will help the sows to get through the day with a reasonable feeling of satiety. Another option is to provide unlimited feed or unlimited roughage (chopped up if necessary) on the floor or in a trough in addition to the daily portion of feed concentrate. This will benefit the sow's behavioural satiety and, depending on the type of roughage, will also ensure extra physiological satiety.





Lactating sows in farrowing pens

Once sows have given birth to their piglets, they are almost always kept separately in farrowing pens. Contact with other sows is problematic or even impossible at that stage. In the earliest stages, when the piglets have only just been born, this is not such a problem, as sows in the wild separate themselves from the group while they give birth. In the wild, however, they return to the group within a week or ten days, whereas if they are kept in a pen, they generally need to stay with their piglets for the entire nursing period.

Another issue is the sow's limited freedom of movement in the farrowing pen. In order to prevent the sows from lying down on top of their newborn piglets and crushing them to death, they are shut inside a kind of cage in the farrowing pen from which they cannot get out but which their piglets can enter and exit freely. They are unable to turn around or attend to their piglets in a normal manner; they cannot walk away from the piglets if they feel the need to; they cannot go and investigate things or look after themselves, etc. This

results in stress for the sows and an increased risk of damage to the skin and legs.

There are, however, advantages for the pig farmer in keeping sows in farrowing pens. It allows him or her to look after the piglets more easily without the sow getting in the way. A sow with piglets can be quite a dangerous animal if anyone approaches her piglets. However, the safety aspect is not the most important reason for pig farmers shutting their sows inside cages. They are primarily concerned with preventing the piglets being crushed to death by their mother. A great deal of research has been done into this. There are many factors that jointly determine whether or not a piglet is crushed to death by its mother. Most of the attention of such research has so far been devoted to protecting the piglets when the sow lies down, for instance by installing shackles or sloping walls in the pen. In addition, it has become clear that factors such as behaviour and the condition of the sow as well as the behaviour and vitality of the piglets have important roles.

Mixing weaned piglets

In today's practice, many piglets, once weaned, are mixed with piglets from other litters because many pig farmers want uniform groups of piglets and they want to keep the males and females separate, as they have different feeding requirements to ensure optimum growth and slaughter quality. However, pigs have a strong social hierarchy. Within a litter, such hierarchies are formed within the first few days. If a group of unfamiliar piglets is brought together, the hier-

archy needs to be established again by means of fights. This unconventional situation can result in wounds to the skin or legs and generally leads to reduced growth. Mixing piglets (and older pigs) should be avoided as far as possible. In the Netherlands there is therefore a legal stipulation that pigs intended for slaughter should only be mixed with unfamiliar pigs once in their lives, and that this should take place within a week of weaning.



One relatively simple solution is to keep litters of piglets together until they are slaughtered. This prevents fights over the hierarchy of the group and all the resultant stress and risks of injury. Moreover, this research has demonstrated that litters of piglets that have been kept together throughout their lives suffer fewer health problems – and therefore less loss of production – because of the reduced transmission of pathogens.

Should it prove necessary to mix litters, it is important to prepare piglets well for a confrontation with unfamiliar piglets. Piglets that have learned 'good social skills' during the nursing period are able to establish a new hierarchy with unfamiliar pigs faster and with fewer injuries than piglets that

have not developed good social skills. In order to develop good social skills, it is important that piglets have sufficient stimulation. They should not have to grow up in a bare pen; they need a stimulating environment with materials to play with and sufficient distractions.

If a confrontation nevertheless arises with unfamiliar piglets, the potentially negative consequences must be limited as much as possible, for example by providing a floor offering sufficient grip and opportunities to escape from one another in the space in which the mixed group is kept. The provision of sufficient enrichment materials when the piglets are mixed together can also help. Curiosity evidently takes precedence over aggression in that case.

Stereotypical behaviour



Stereotypical behaviour is a fixed pattern of behavioural elements that are continually repeated without any purpose. Frequently seen examples of such behaviour in sows in individual cubicles are chewing with an empty mouth, biting the bars of the cubicle and grinding their teeth. Other examples include the excessive drinking of water or 'playing' with the water nipple. Stereotypes are very rare in the wild. If stereotypes occur, it means that the animal is unable to satisfy its needs and is seeking an outlet by displaying 'purposeless' behaviour. Stereotypes are therefore an important indication that something is or was wrong in the stable.

When animals display stereotypical behaviour, their brains produce endorphins, substances that resemble morphine and that make the animals calmer, or at least give them the strength to cope with their situation. And in the same way as real morphine, the animals can become addicted to it. That is why the animals keep repeating their purposeless behaviour. Humans also produce endorphins if they find themselves in an extreme situation, for instance when competing in top-level sports events or when under great pressure or very scared. And when polar bears and other animals pace around their enclosure at the zoo...? Well, now you know why.



Boredom among pigs

In Dutch pig farming, the use of enrichment materials (such as straw, hay, wood, compost and peat) to combat boredom among pigs is seen as a problem. Pig farmers consider it impractical, as the materials can block the manure disposal system and make the stable dirty as well as being labour intensive and bringing additional costs. In today's pig husbandry, the provision of 'chain plus' variants (chains with balls or PVC piping) are preferred as a simple, easy, affordable and sustainable alternative. However, such 'enrichment material' does not satisfy the needs of the pigs to a sufficient extent.

Environment enrichment is intended to stimulate the intelligent and social pig by presenting challenges. This can take many different forms. Social interaction with both pen mates and humans is a form of 'social enrichment'. But 'physical' enrichment material remains the most important kind: materials that the pig is able to manipulate, break or reshape are suitable.

There should always be sufficient enrichment material available to the pigs and it needs to be interesting enough to keep them amused on a daily basis. Materials that the animals can chew on or break are ideal. However, what pigs like best is material that is also edible or digestible, such as chopped up green maize which occasionally sheds a grain of maize by way of reward.

The manner in which the enrichment material is presented is also important. While sniffing, rooting around and manipulating, the pig has its head near the floor. Enrichment material can therefore best be presented on the floor.

Tailored enrichment materials – something to suit every pig

One type of material may be more suitable for one type of pig than for another. Multiple enrichment variants can be provided for fattening pigs and weaned piglets such as ropes to chew and break, reward balls which occasionally release a treat in the form of food, a rooting device offering rewards and of course straw. The material provided for weaned piglets needs to be suitable for the age of the animals, i.e. not too big. For sows in the lactation period, the correct enrichment material is self-evident: straw and loose twigs, i.e. the materials the animals require to build a nest. This material is also suitable for the suckling piglets to play in and to develop their normal social behaviour. Enrichment materials are extra important for gestating sows, as these animals are given only limited quantities of feed. The provision of roughage has a satiating effect and also offers exploration opportunities. It is therefore an outstanding enrichment material for gestating sows.

Straw is very versatile



Straw is often portrayed as the ideal material for promoting the well-being of pigs. This is because straw can be seen as a multifunctional way of satisfying needs. It can be used as recreational material for exploration, as additional feed (roughage) and it also provides thermal and physical comfort as warm and soft bedding.

From needs to husbandry designs

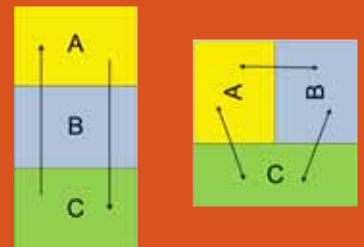
In this chapter, we present designs for each animal category and a design for a family pen in which animals of different ages live together.

The designs take into account the problem areas addressed in the previous chapter. On the left-hand side, attention is devoted to a design that results in improvements to the current conventional housing systems. These designs can therefore be seen as a step in the right direction. On the right-hand side, we show a leap forwards in terms of the design of systems that have yet to be built. The designs demonstrate

that it is possible to produce suitable housing for pigs by satisfying their needs. They provide a line of thought and are intended as a source of inspiration and discussion. Some aspects have not yet been tested extensively and require further investigation. The drawings are therefore not finalised floor plans. Consultation with experienced advisers is required to this end.

Separate functional areas and routes of movement

The figures shown on the right hand clarify what is meant by the separation of functional areas. The image on the left shows that the animals always have to walk through area B in order to move from area A to area C, and vice versa. The functional areas are therefore not truly separate from each other. In the image on the right, the routes of movement are arranged in such a way that the animals can always move from one area to another without having to pass through yet another area. The scene depicted on the right is therefore preferable as the functional areas are genuinely separate from each other.







A need for rest means a need for space





A pig's need for rest is important and requires sufficient space to allow all the pigs to rest at the same time without being disturbed. In the designs, the total floor space required for this is indicated in a red box. This makes it clear that a number of 'step-by-step' designs do not always provide sufficient space for all the pigs to lie down in the resting area.



Legend for the designs

-  = solid floor
-  = floor with holes
-  = slatted floor
-  = bedded floor

-  = water
-  = feed
-  = roughage
-  = rubbing facility

-  = routes of movement
-  = required floor space for resting
-  = exploratory material
-  = sprinkler for cooling

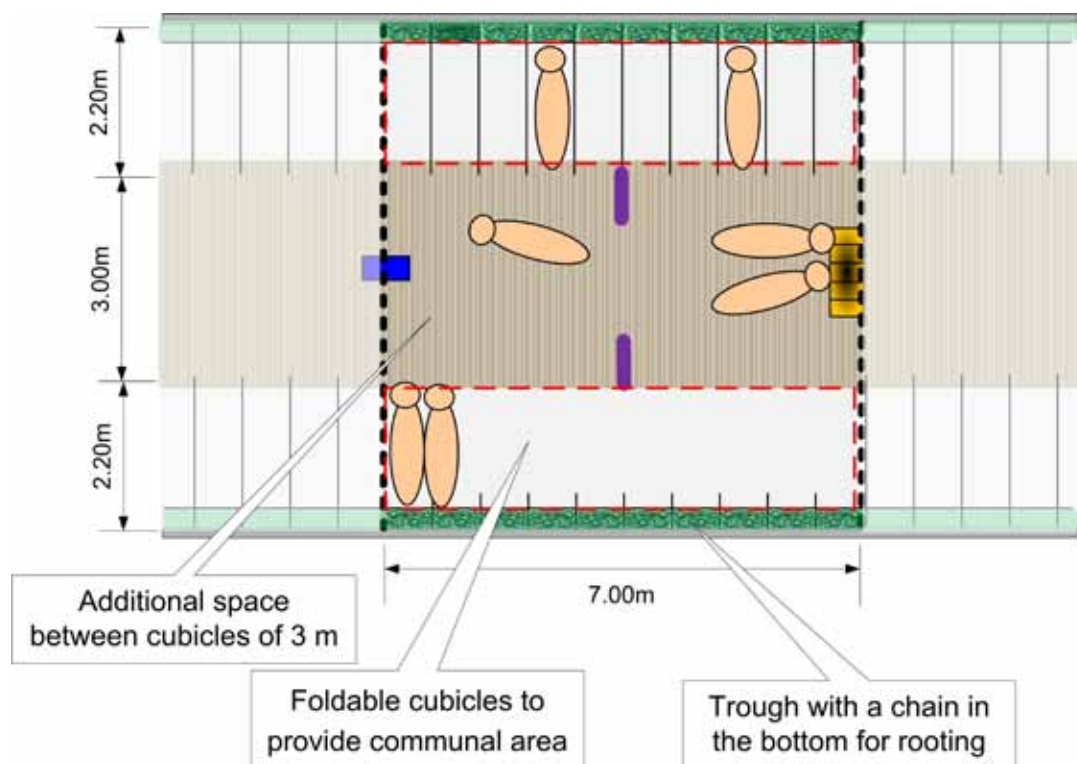


Space+

20 gestating sows in individual cubicles with additional space in which to roam about

Today

After fertilisation, gestating sows are housed in group pens for more than three months, and some farms will keep gestating sows in individual cubicles up until 2013. In individual cubicles, the sows are unable to move about, lack social contacts and are given only a limited amount of feed. In housing combining individual cubicles with an additional space in which to roam around – a form of 'group housing' that is frequently applied in today's practice – opportunities for movement and social contact are provided, but issues remain relating to limited feeding, a non-stimulating environment and the pigs not being able to lie down and rest at the same time.



Step:

The Space+ design can be implemented with a number of simple modifications in the stable, for instance in an existing stable for twenty sows kept in individual cubicles with an additional space. Thanks to the provision of a rubbing post, the sows have the opportunity to groom themselves and a chain is attached to the bottom of the trough to allow them to root around. The spaces between the cubicles have also been widened. In addition, a number of individual cubicles can be temporarily folded away so as to create space for the provision of a communal area in which to lie down and rest in order to improve social contact between the sows.

Improvements in the step and leap design compared to the current practice (the more pigs, the greater the improvement)

Gestating sows

Space+

	Rest
	Satiation
	Excretion
	Body care
	Exploration
	Social behaviour
	Thermoregulation
	Safety
	Health
	Locomotion

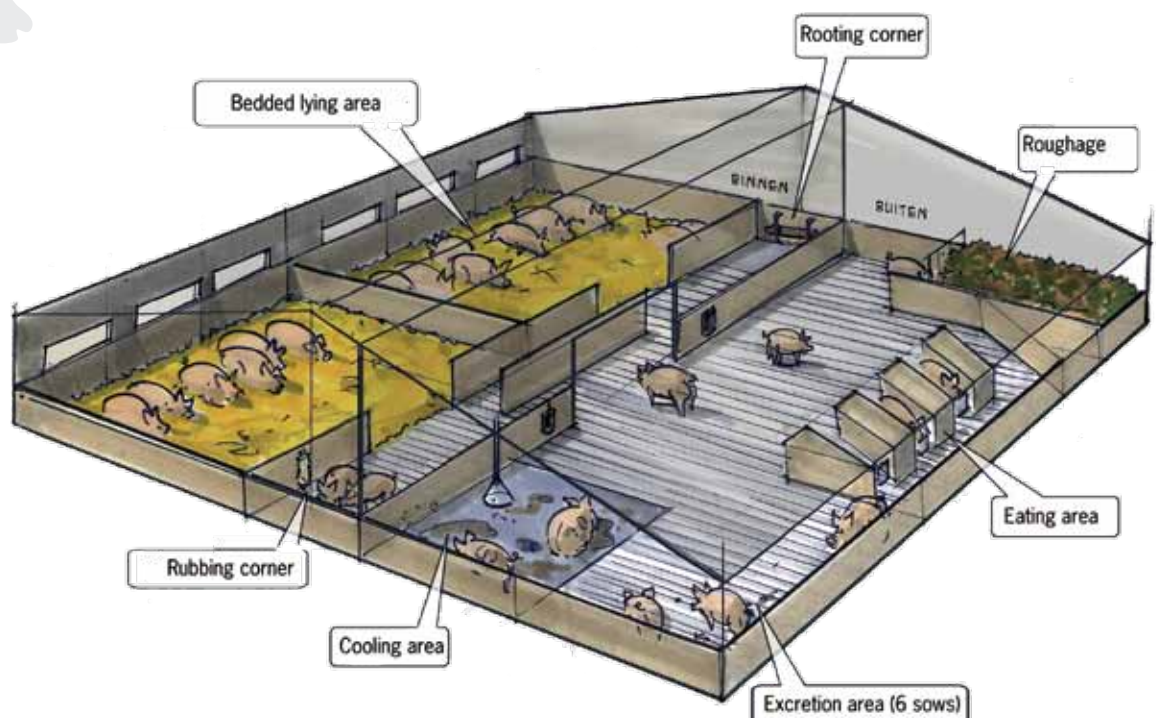
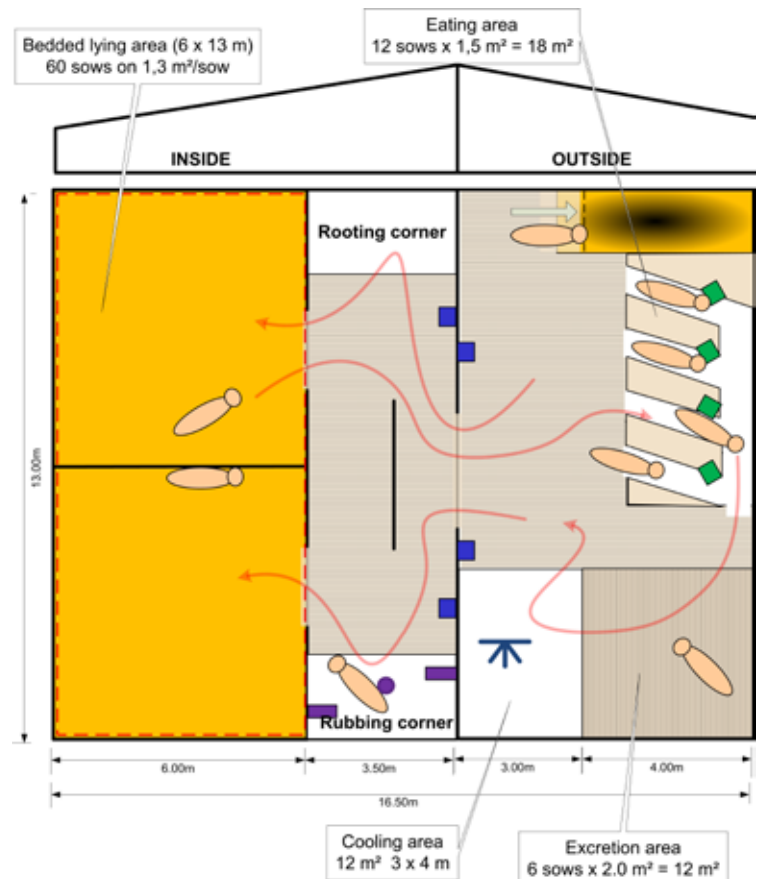


Bedding and outdoor space

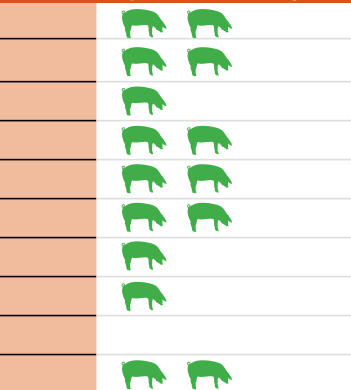
60 gestating sows in a straw stable with outdoor space

Leap:

The design entitled Bedding and outdoor space is characterised by a strict division between functional areas. The communal resting area occupies a central position, and the other functional areas are laid out in such a way that logical movement routes are created. This is necessary in order to steer excretion behaviour to make a clean, hygienic environment available to the sows. The option of four feeding stations was chosen for the feeding of the sixty sows, which is a relatively small occupancy rate. Moreover, the sows have unlimited silage available to them, so they can eat until satiated, reducing the negative effects feed restriction and the pressure on the feeding stations.



Bedding and outdoor space



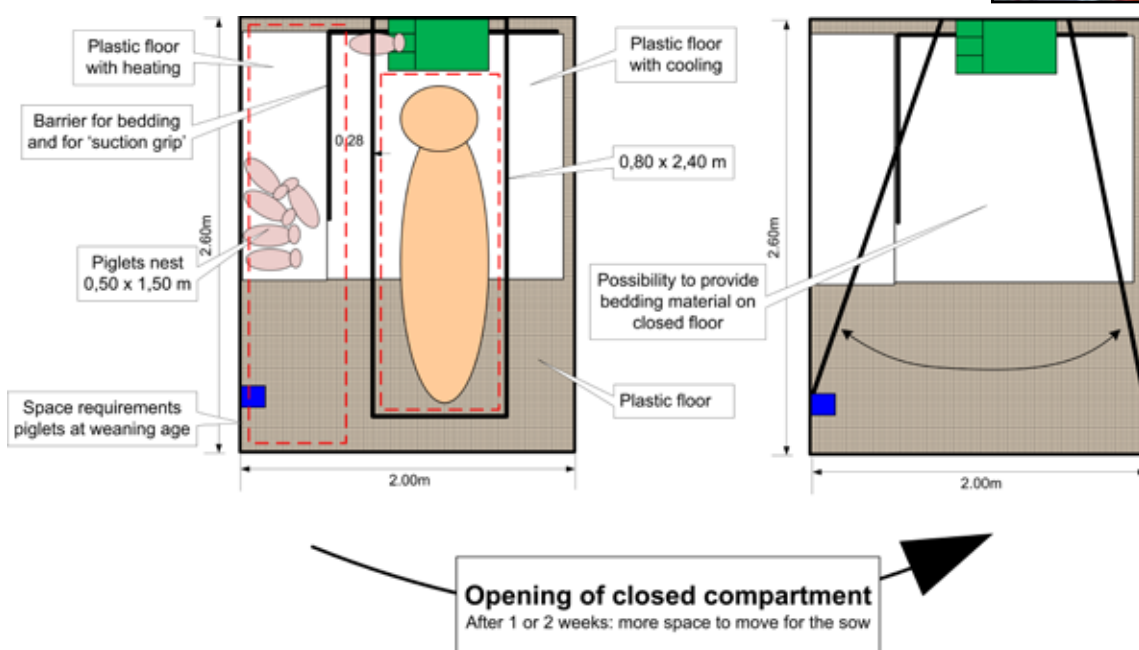


Enrichment and freedom

lactating sows in more spacious and enriched farrowing pens (2.60 x 2.00 m)

Today

In practice, lactating sows are kept in farrowing pens from a week before giving birth until about four weeks afterwards. The pen measures approximately 1.80 m by 2.50 m. The sow has limited space in which she cannot move around as she is kept in a compartment within the pen in order to prevent the piglets being crushed to death when she lies down.



Improvements in the step and leap design compared to the current practice (the more pigs, the greater the improvement)

Lactating sows

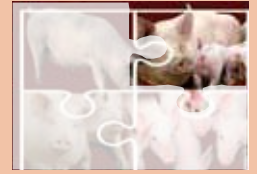
Enrichment and freedom

	Rest
	Satiation
	Excretion
	Body care
	Exploration
	Social behaviour
	Thermoregulation
	Safety
	Health
	Locomotion
	Nest-building behaviour
	Maternal behaviour

Step:

In the design Enrichment and freedom, the sow is given additional freedom of movement from one or two weeks after giving birth as the sides of the compartment are opened up. Moreover, the solid floor towards the front of the pen has been enlarged, creating a suitable substrate on which litter can be spread. The feeding trough of the piglets is positioned beside that of the sow in order to simplify the process of learning how to eat solid feed. All the newborn piglets are able to lie down in the piglet nest with under-floor heating. Once the piglets have reached weaning age and weigh approximately 7 kg, the piglet nest still has sufficient space for about half of the piglets; the rest have to lie down outside the piglet nest on the solid floor or on the slatted floor.

SOWS

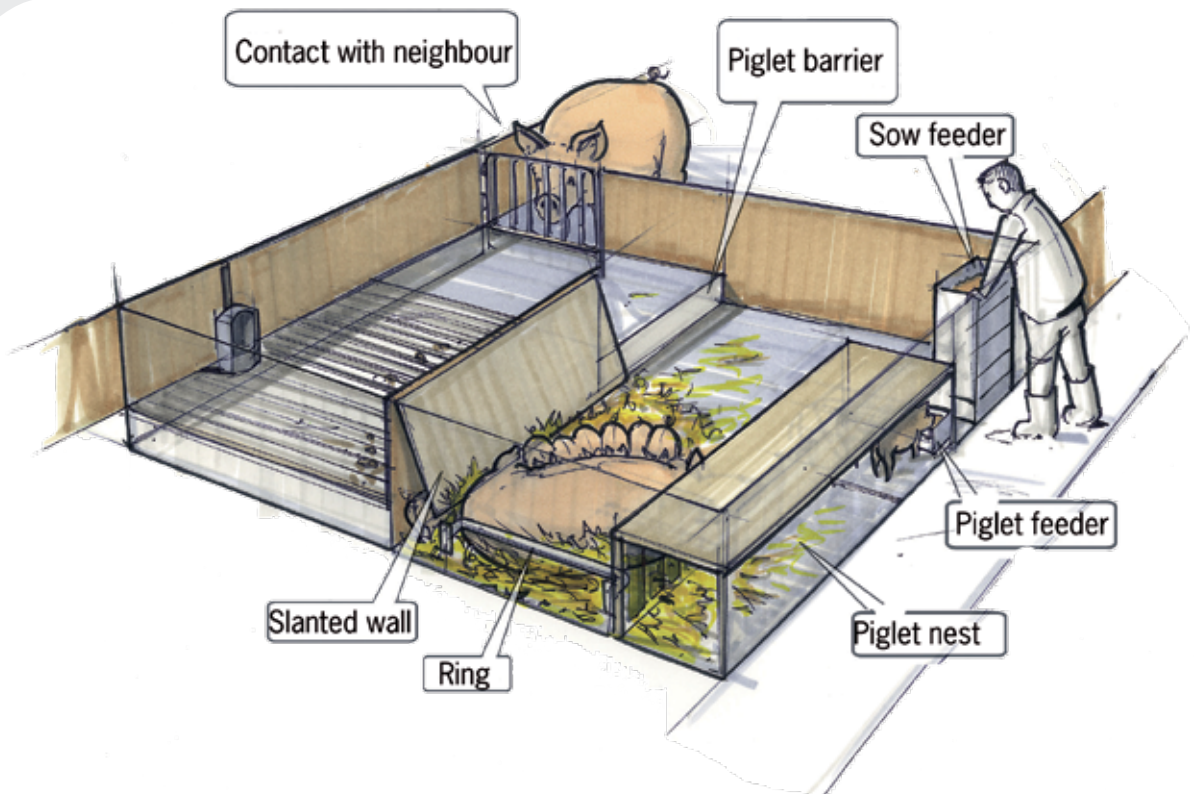
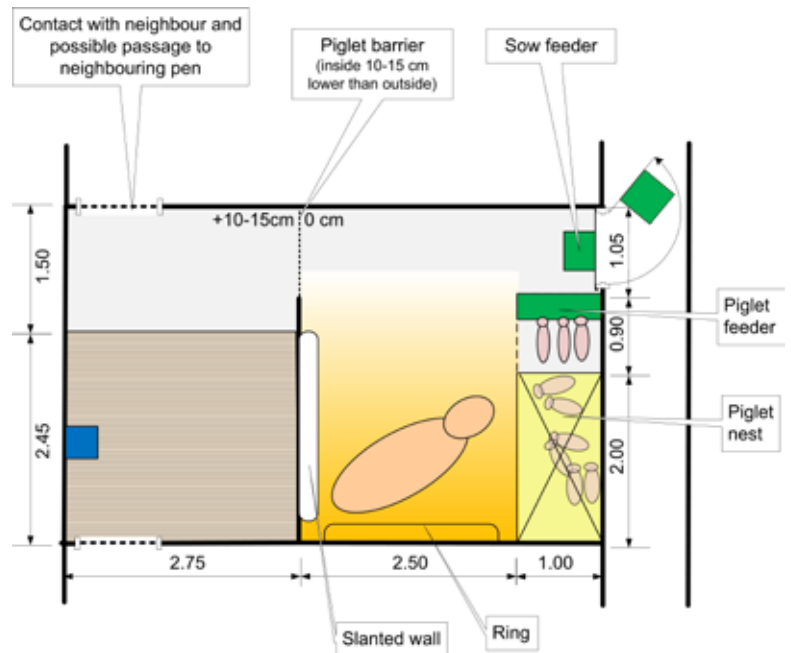


Free Sow

social contact between piglets and sow, in a spacious and enriched environment

Leap:

In the forward-thinking design Free sow, the sow has full freedom of movement. She has nesting materials available to her and there are separate functional areas. More interaction with the piglets is possible and the sow can briefly get away from the piglets if she feels the need to by going to the raised extra area with drinking water and an excretion area. There, the sows can also maintain social contact with the neighbouring sows through an open section in the railings of the side wall. The piglets have a supply of litter in their large piglet nest and can eat from their own trough in small groups.



Free sow





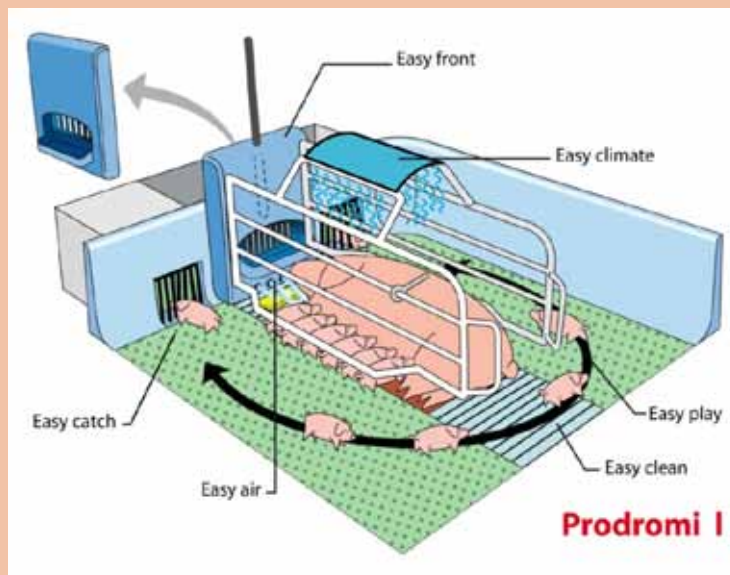
Pro Dromi

To better meet farmers and pigs needs



A Dutch farmers network took up the ambition to design alternatives to the conventional farrowing facility. They focussed on comfort for the sow and piglets and comfort for the people providing the care and management. Two products were delivered: Pro Dromi I and the more revolutionary Pro Dromi II

On this page, the challenge of Animal Oriented Design is taken a bit further as the farmer's needs are also incorporated. Farmers that wanted a better housing for both their animals and themselves designed housing for lactating sows. Their ambition was to make it that appealing that it would be seriously considered or accepted by 50% of sow farmers.

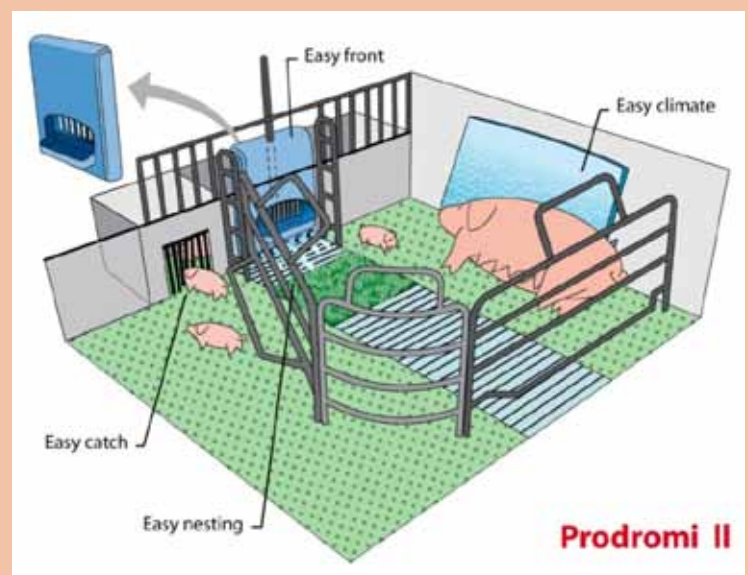


Pro Dromi I

Pro Dromi I is an improved farrowing and lactation facility. It is the result of a design process of a pig farmers network aiming to integrate / combine farmers and pig needs. The four main ideas of the farmers "fast and good cleaning", "entering the pen is not necessary", "better climate for the sow" and "more comfort for the sow and the piglets" were used to improve the conventional sow pen. The 8 easy's (Easy Play, Easy Front, Easy Catch, Easy Clean, Easy Climate, Easy Baby Climate, Easy Air and Easy Nesting) are regarded as modules that can be used in other designs too.

Pro Dromi II

Pro Dromi II takes the first design a step further by adding freedom of movement for the sow, the possibility of contact between neighbour sows and the choice for the sow and piglets where to lie down. "Easy climate" and "baby easy climate" from pro Dromi I are transformed in one "easy climate": a solution with a board (oblique) against the wall for giving shelter to the piglets (micro climate). Furthermore, there is a cooling lying board on the floor available for the sow. Another idea is to introduce playing hours for piglets, which are also resting hours for the mother. Prodromi II is especially fit for farmers who want to invest in additional animal welfare



SOWS

LEAP



Farrowing house

A safe learning environment

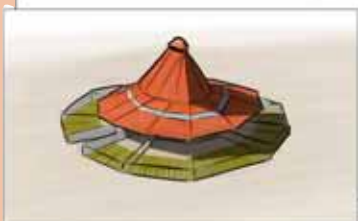
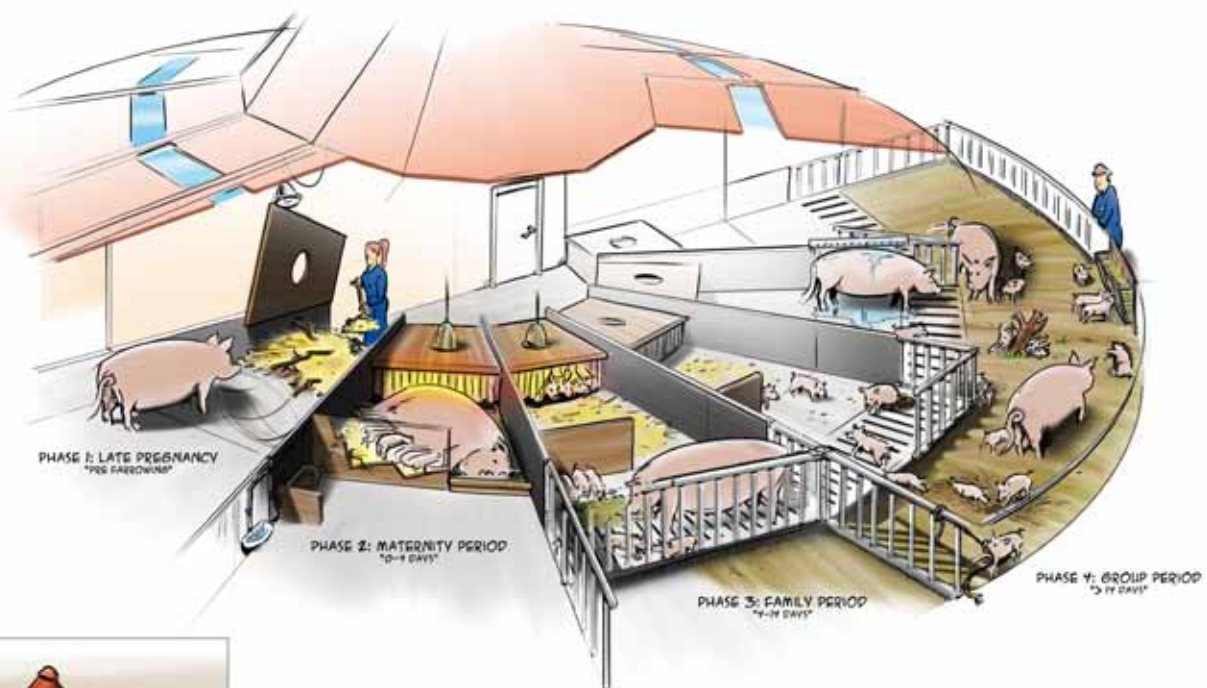
The three key functions (see post-it) and the related needs of the sow and piglets served as the starting point for designing a farrowing and lactation unit. The result is a housing system that changes with the animals as they progress in the production cycle and is called the Farrowing House.

The housing system has private areas (for a sow and her piglets), which are enlarged and connected further in the production cycle thereby creating communal areas. The lactation period is divided into four periods – from late pregnancy, to maternity, to family, to group period - providing peace and security to the sow and piglets in the beginning and enabling more social contact with others as times progresses.

Based on recent insights in learning processes of pigs, an extra design was made for the sow with her piglets. Three key functions that were taken into account were:

- Freedom for the sow
- Keeping piglets alive
- Learning for the piglets

FARROWING HOUSE



Phase 1: Late pregnancy The sow has access to the maternity area so that she can build her nest

Phase 2: Maternity period The sow and her piglets stay in their enclosed maternity area

Phase 3: Family period The area is enlarged, making room for interaction between sows while still keeping the private areas. The piglets are still young and stay in the nest. The sow can withdraw from her nest and have contact with other sows.

Phase 4: Group period The separate units are connected, creating a communal area. Now also the piglets go out of the nest and sows and piglets of several litter interact with each other. This enables socialisation of piglets before weaning.

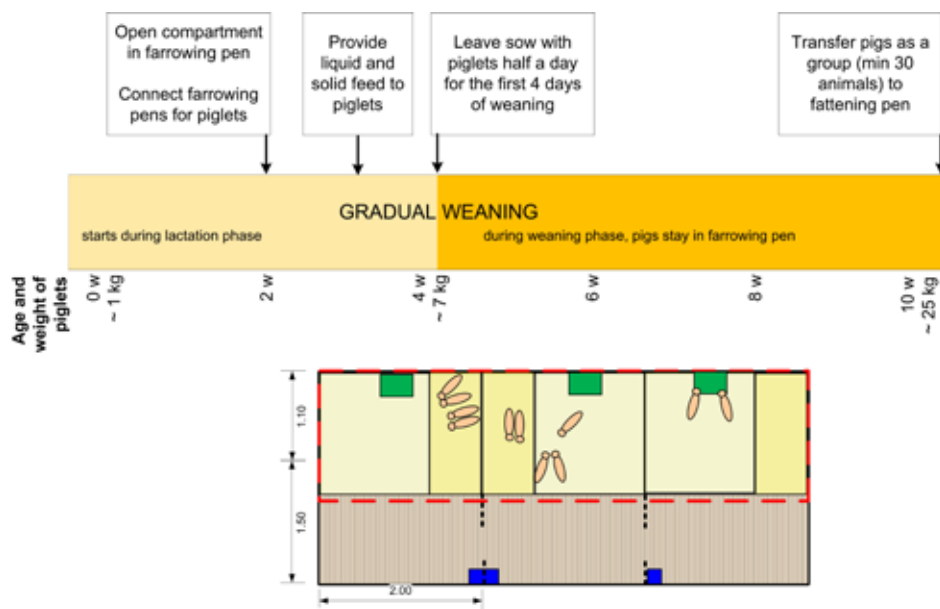


Gradual weaning

pen for 33 weaned piglets with phased management measures for gradual weaning

Today

After weaning at the age of about four weeks, most of the weaned piglets in the Netherlands are kept in groups of twenty to forty animals, generally on a fully slatted floor (often plastic) with approximately 0.4 m²/animal until they weigh about 25 kg. The many changes at once can result in a vulnerable health status as well as problems with well-being due to a lack of pen enrichment.



Improvements in the step and leap design compared to the current practice (the more pigs, the greater the improvement)

Step:

In the design Gradual weaning, the greatest benefits are realised through management measures that make the transition from suckling piglet to weaned piglet and from weaned piglet to fattening pig more gradual. For instance, from two weeks before weaning onwards, there is an open connection between the various farrowing pens in order to promote interaction with other piglets from the neighbouring pens and thus to limit the stress caused by mixing litters. In the final week before weaning, the piglets are provided with both liquid and solid feed. Weaning takes place gradually, as the sow is still with the piglets for half a day during the first four days of weaning. After weaning, the piglets stay in the farrowing pen for a further one to six weeks before moving to the fattening pig pen as a stable group of more than thirty animals.

Weaned piglets

Gradual weaning

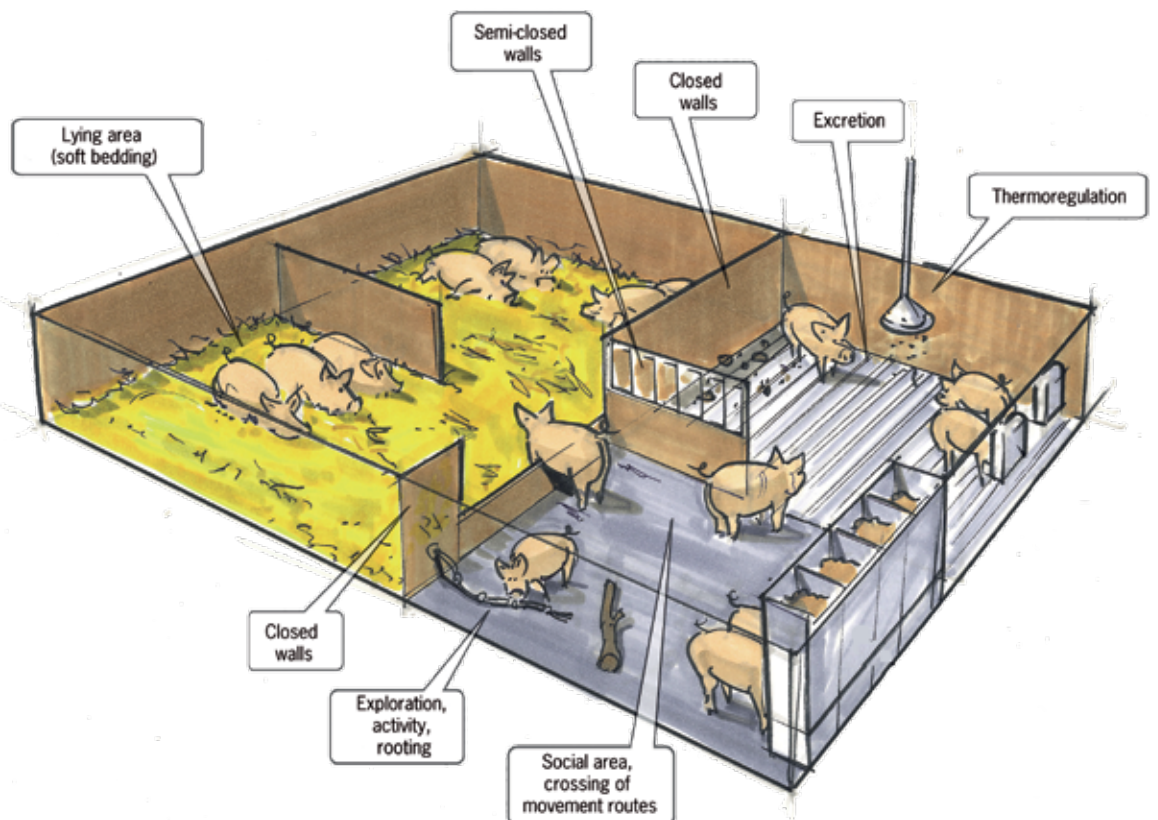
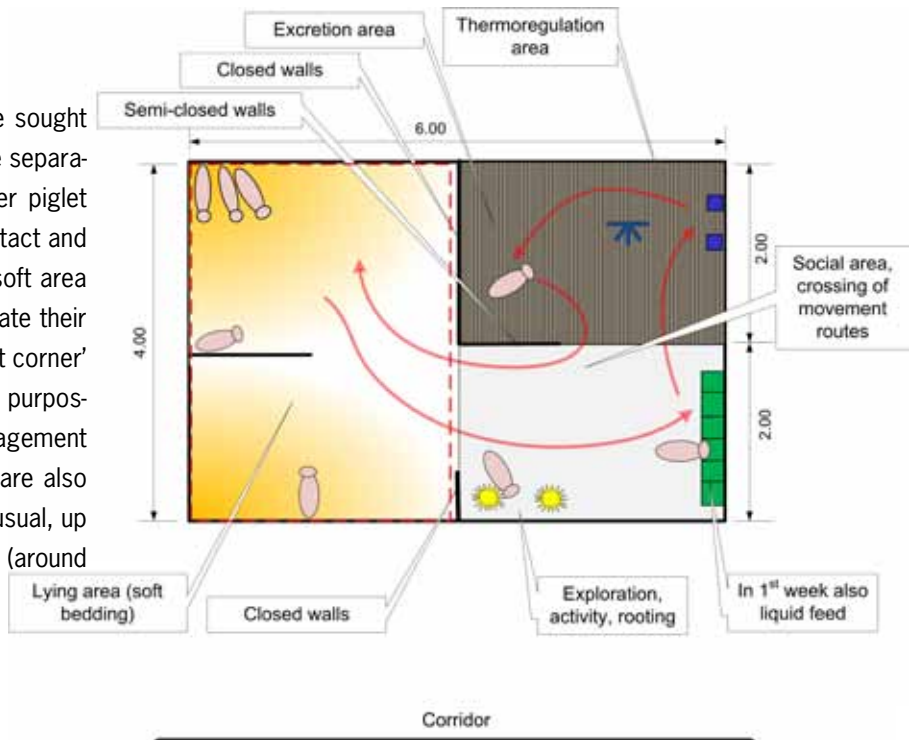
	Rest
	Satiation
	Excretion
	Body care
	Exploration
	Social behaviour
	Thermoregulation
	Safety
	Health
	Locomotion



Spacious rearing pen for 40 weaned piglets, luxurious layout in a spacious environment

Leap:

In the design Spacious rearing, solutions are sought in housing measures with pen enrichment, the separation of functional areas, and more space per piglet ($0.6 \text{ m}^2/\text{piglet}$). There is space for social contact and for exploration. The resting area features a soft area of bedding, and the piglets are able to separate their activities well thanks to the presence of a 'wet corner' with a drinking trough, a sprinkler for cooling purposes and an excretion area. In addition, the management measures from the design Gradual weaning are also applied here. Pigs can stay here longer than usual, up until the laying area becomes limiting in size (around 40 kg of body weight).



Spacious rearing



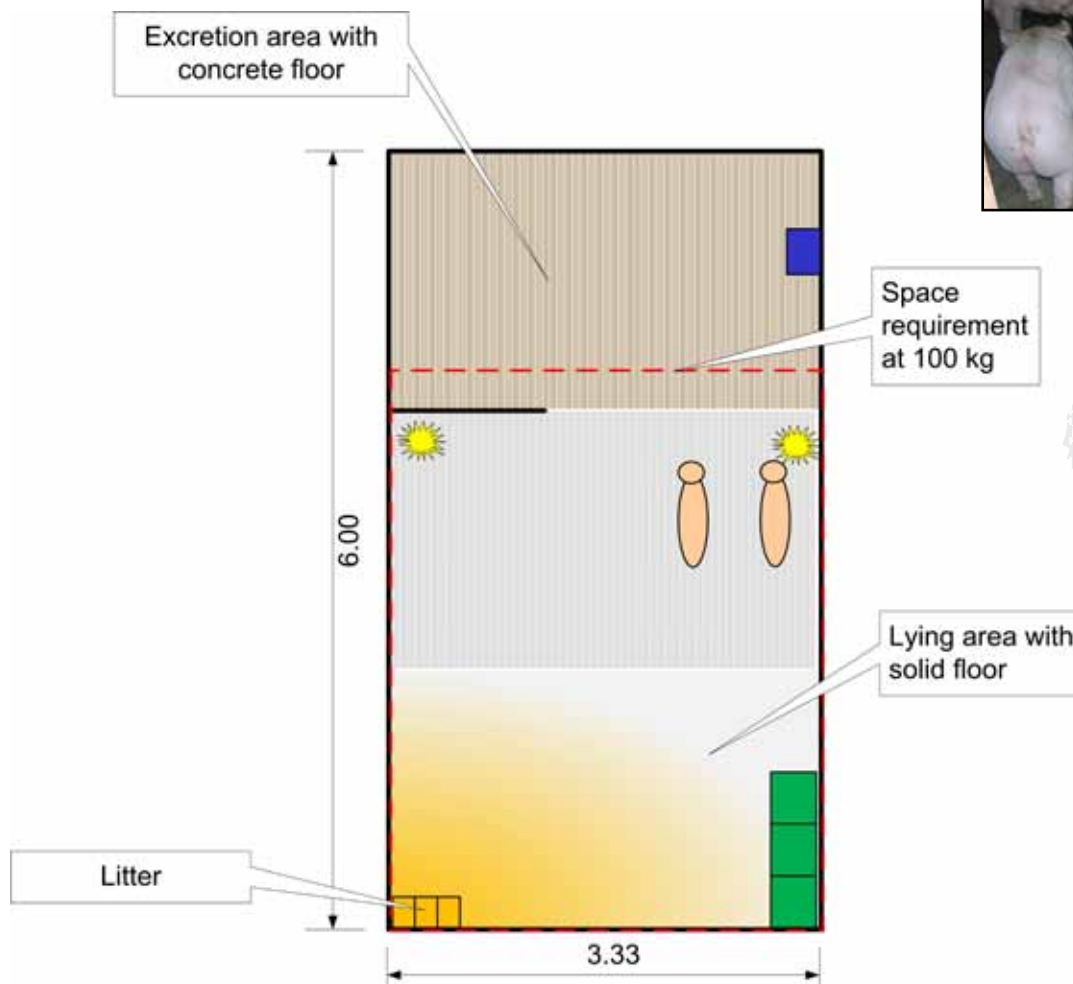


Enrichment on 1 m²

Enriched pen for 20 fattening pigs

Today

Fattening pigs grow from around 25 kg to around 115 kg in three to four months. After that, they are delivered to the slaughterhouse in two or three groups. In fattening pig pens, generally ten to twenty pigs are kept in 0.7-0.8 m² per animals, 40% of which is solid floor. There are many parallels with pens for weaned piglets.



Step:

In the design Enrichment on 1 m², the starting point is a pen with three floor types: a solid floor serving as a resting area, a floor with holes serving as an activity area and resting area for the heavier animals, and a slatted floor serving as a drinking and excretion area. In this case, the floor with holes acts as a multifunctional transitional area. Towards the front of the pen, food and litter are provided; in the middle there are enrichment materials; and water is supplied at the back.

Improvements in the step and leap design compared to the current practice (the more pigs, the greater the improvement)

Fattening pigs

Enrichment on 1 m²

	Rest
	Satiation
	Excretion
	Body care
	Exploration
	Social behaviour
	Thermoregulation
	Safety
	Health
	Locomotion

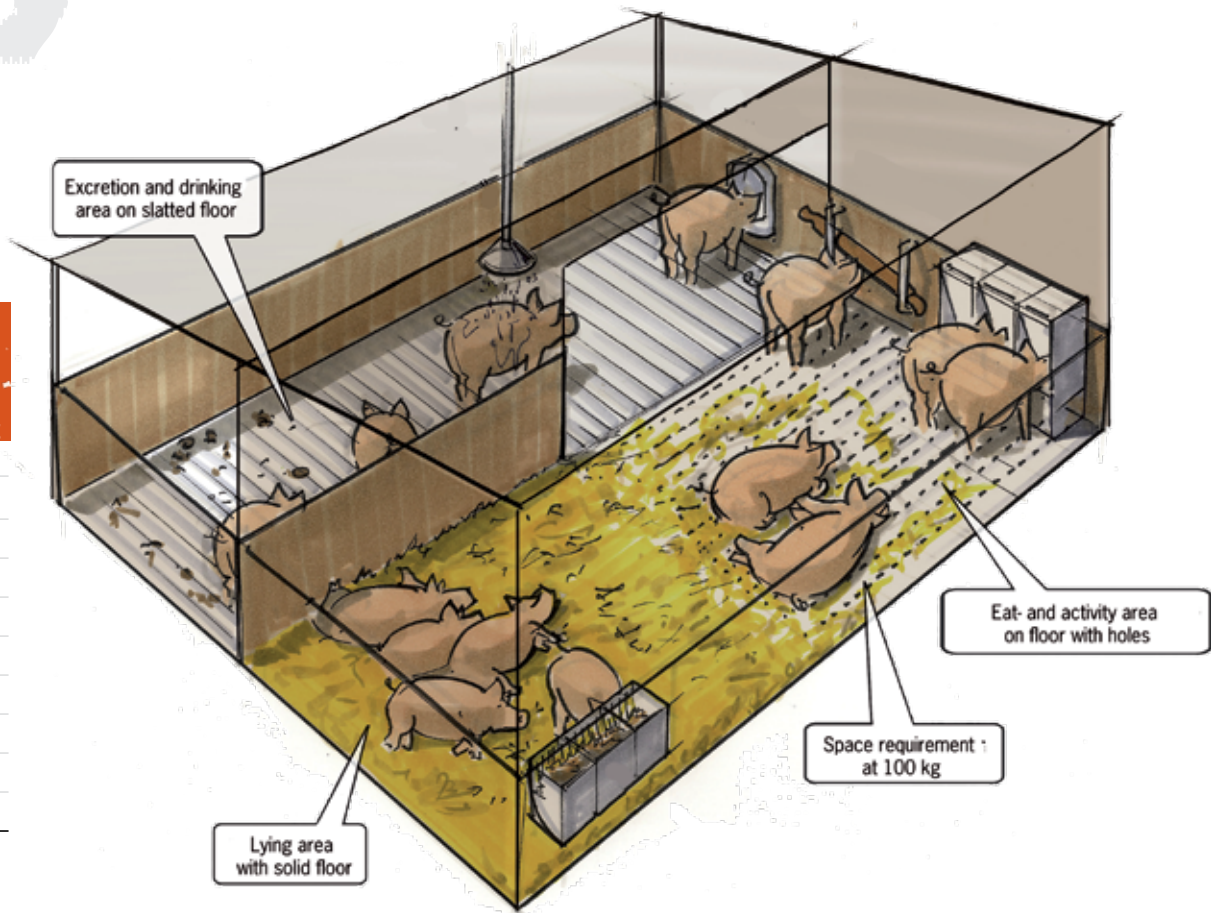
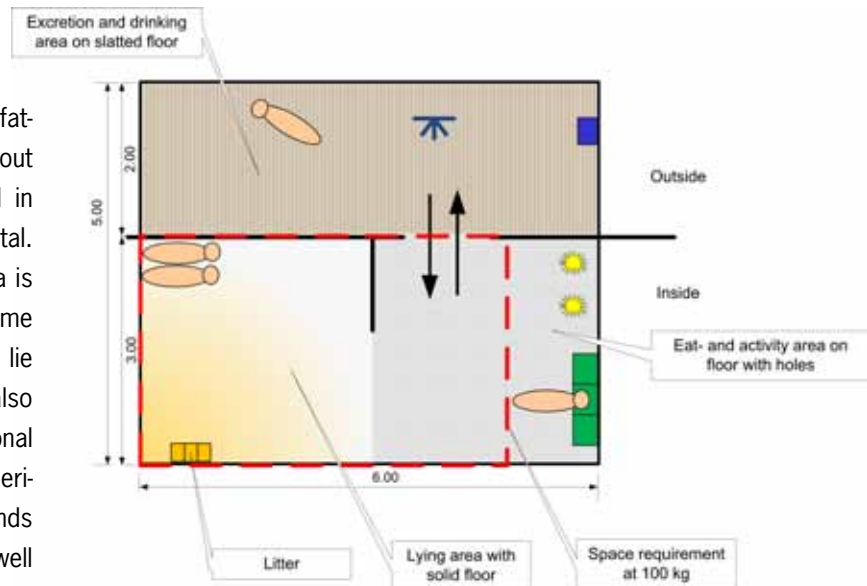


Extension of spacious rearing

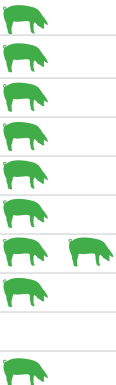
20 fattening pigs in a luxurious pen with large floor space

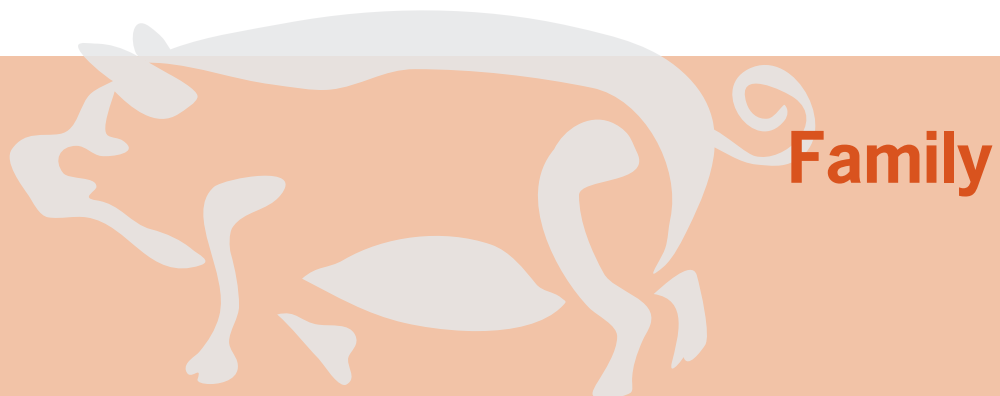
Leap:

In the design Extension of spacious rearing, the fattening pigs - like the weaned piglets - are given about double the space than which is legally required in the Dutch Pig Decree: 1.50 m² per animal in total. The resting area is indoors and the excretion area is outdoors under the long roof. Once the pigs become heavier, they can extend the area in which they lie down to rest to include a floor with holes, which also offers better cooling. The positioning of the functional areas results in better movement routes, and experience has taught us that most manure and urine ends up outside. The functional areas are in this way well separated.



Extension of spacious rearing

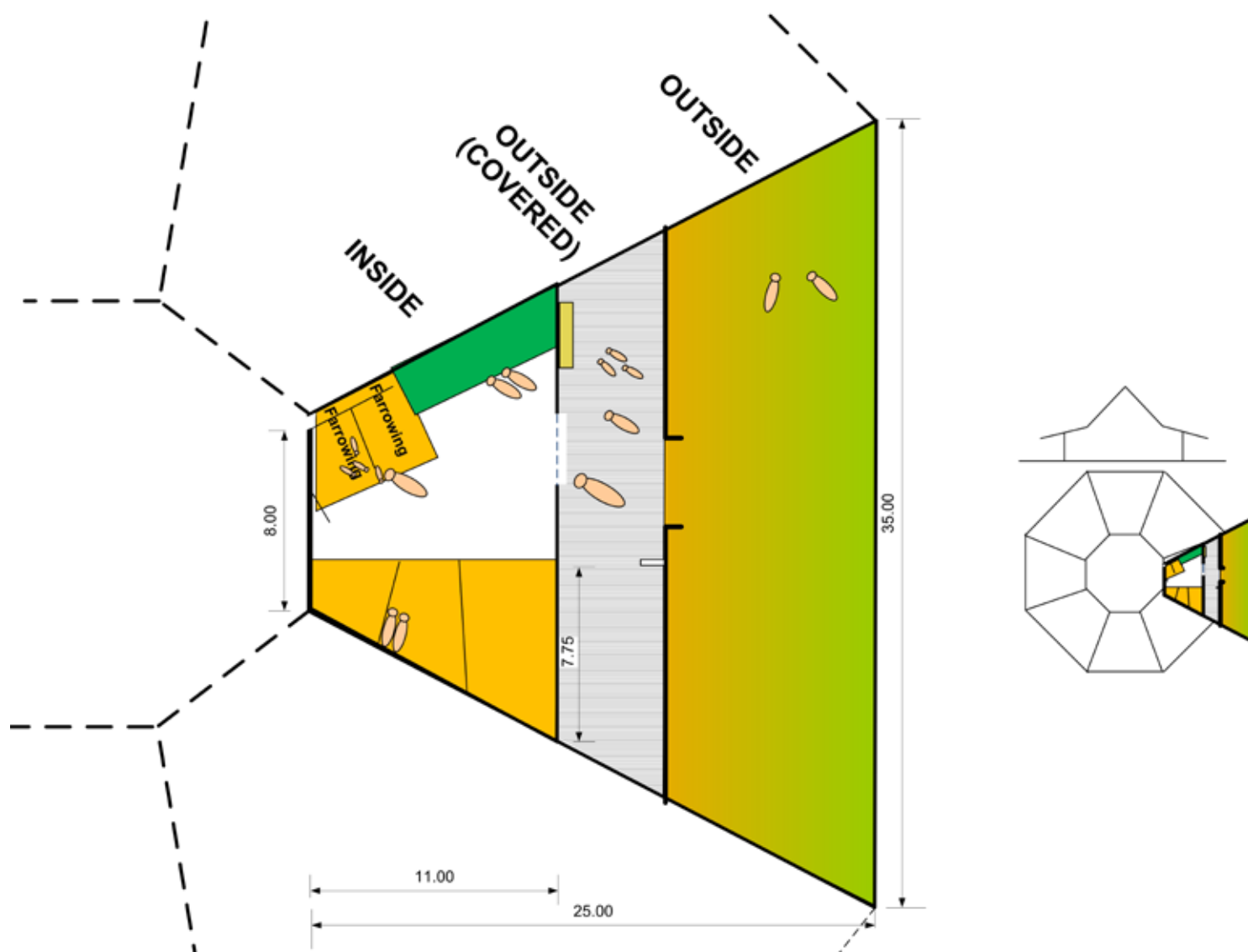




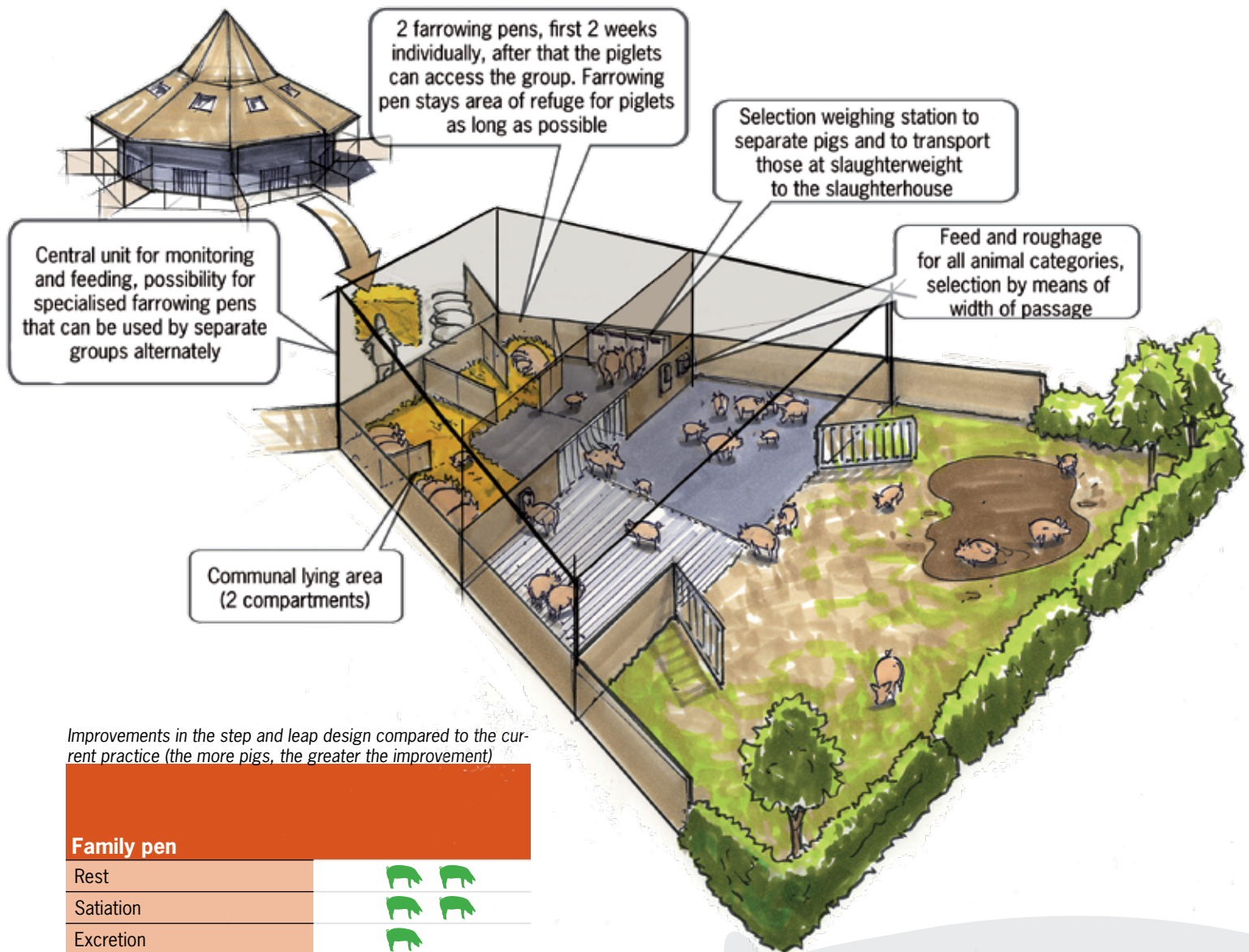
Under natural conditions, pigs live in family groups with wide-ranging ages and stages of physical development. The need for social behaviour is optimally satisfied in one situation. We have therefore tried to create a development leap for this kind of family pen. Only the farrowing pens - with six sows per unit - are kept separate from the rest of the housing system. After a week, the sow returns to the group with her newborn piglets, and sows from other units in the final stages of gestation can make use of the central farrowing pens.

There is a communal resting area, and we use the necessary electronic aids for feeding purposes in order to optimise the quantity and type of feed per age category. The heaviest pigs are separated from the other pigs by means of a selection weighing station in order to be transported to the slaughterhouse.

In the covered outdoor area, we provide enrichment and roughage. There, we try to collect the manure and urine via the slatted floor. The pigs can always go outside to forage or wallow.























pen



Improvements in the step and leap design compared to the current practice (the more pigs, the greater the improvement)

Family pen

Rest		
Satiation		
Excretion		
Body care		
Exploration		
Social behaviour		
Thermoregulation		
Safety		
Health		
Locomotion		
Nest-building behaviour		
Maternal behaviour		

Our methodology

Animal Oriented Design: designing animal friendly husbandry based on animal needs

How can one design a production system that enables a good animal welfare? We start with the animal's needs; these should be met in order to make a good quality of life as experienced by the animal possible. The facilities (housing, management) available to the animal are key. Animal Oriented Design operationalizes this challenge.

An example: Comfort Class for pigs

The Animal Oriented Design Approach was applied to pig husbandry. The 10 major needs of the pig were transformed into functions the husbandry system should make possible and requirements the animal poses on the system. By combining and integrating the best solutions to the functions and requirements, the Comfort Class housing system was designed. After that, a demonstration and study facility was built by a consortium led by the major Dutch Farmers organisation and the major Dutch Animal protection agency in cooperation with farmers.



Reflexive Interactive Design: designing fully sustainable husbandry by uniting needs of animal, farmer, environment, and consumer

Making animal husbandry more sustainable is not only about animal welfare. Other sustainability aspects – such as environmental footprint, economic viability or social acceptance – play a role as well. This multiple challenge should not be addressed by incrementally adding solutions to the current situation; structural change is needed.

Building further upon earlier experiences and incorporating methodologies from agricultural engineering, the Reflexive Interactive Design (RIO) approach was developed. This approach provides perspectives to those who struggle with the challenge to move towards sustainable husbandry systems. RIO is a set of methods to interactively re-design animal husbandry, in an effort to circumvent social and technical constraints for sustainable development. RIO has three pillars:

- **Reflexivity:** a critical scrutinizing of assumptions, roles and identities which are normally taken for granted
- **Interactivity:** involving stakeholders in order to reach common meaning and shared and concrete perspectives for action
- **Design:** starting with the needs of key actors and systematically working towards designs of a desired and feasible future

By going through this process, stakeholders are inspired and mobilised to take steps towards sustainability and provided with the necessary tools to proceed.

An example: The Roundel

The RIO approach was applied to hen husbandry in the project Laying Hen Husbandry. This resulted in two designs for 'a happy hen life, proud farmers and a satisfied society'. Both designs were translated into practical systems embedded in viable chain arrangements by stakeholders in table egg production, thereby opening up horizons for fully sustainable hen husbandry.

