HEALTH AND WELFARE OF PIGS

A Handbook for Pig Farming

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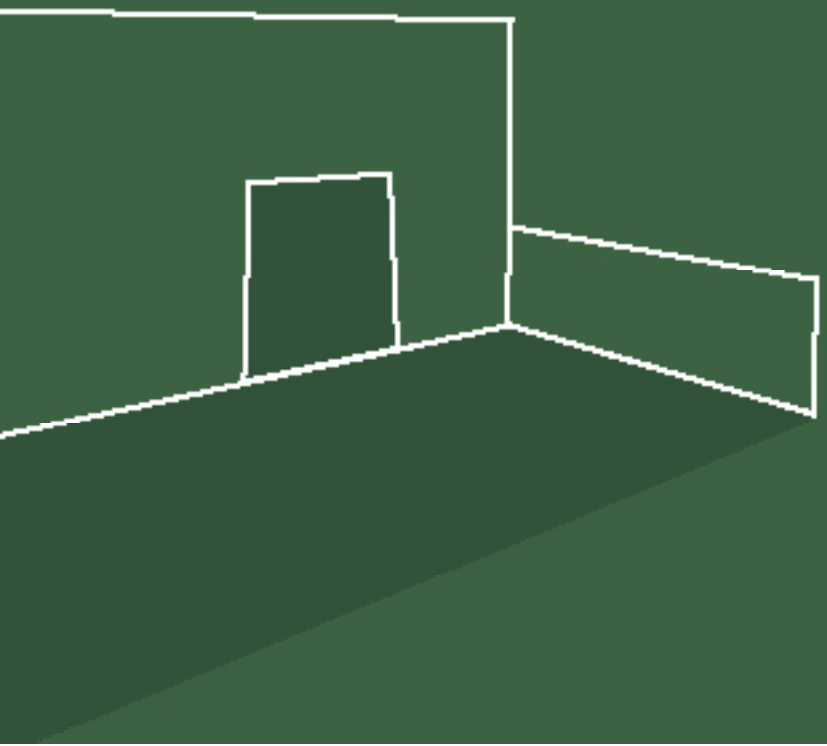


IMPRESSUM

Introduction

As part of the **ProPig project** researchers and advisors assessed animal health, welfare and environmental impact on 75 organic pig farms across eight European countries and different housing systems. Based on these assessments, possible improvement strategies were developed together with pig farmers and compiled in this booklet.

Organic pig production has to deal with various challenges. On the one hand consumers ask for a product based on a high animal health and welfare standard and, on the other hand, the price they are willing to pay is limited. Therefore pig farmers are under constant pressure to fulfill economic as well as animal welfare targets.

Organic housing and production regulations do not inevitably result in a good animal health and welfare status of the pigs. Rather, the farmer's carefulness and attentiveness is decisive for pigs' well-being. This booklet will help to guide farmers or advisors in adapting their pig production towards optimal animal health and welfare.

How to use this handbook

This handbook provides useful information and possible measures to address the main challenges of animal health and welfare in organic pig production:

- Fertility
- Diarrhoea
- Respiratory problems
- Injuries
- Other health and welfare problems

In each chapter you find subchapters guiding you to different areas, such as feeding, housing or management.

✔ Indicates highly important measures

The handbook summarizes the knowledge of farmers, advisors, researchers and existing text books. Take the handbook with you into the barn or to the field – it is designed for that!

Fertility Problems

Housing
Feeding
Management
Treatment

Fertility Intro

Records of all events regarding reproduction help to keep track of fertility performance and problems. Records can be written on “sow cards” where every event of that individual sow is noted, or in software developed for this purpose. There are even some online applications. Some systems allow identification of the sow by their ear tag with a pocket computer or via the electronic sow feeder. This allows the stockperson to enter and view data directly in the barn beside the animal and, for example, adapt the feeding instantaneously. Use of software will facilitate analysis and evaluation of your records.

Records to collect around **insemination/mating** and during **gestation**:

- Identity of female
- Dates of heat
- Dates of artificial insemination or natural service
- Reference of the semen or identity of the boar
- Date of pregnancy diagnosis
- Date of abortion
- Other observations

Records to collect around **farrowing**:

- Identity of female
- Date of farrowing
- Farrowing assistance
- Number of mummies, dead born and live born piglets
- Date, number and reason of dead piglets
- Number of piglets cross fostered
- Number of weaned piglets
- Date of weaning
- Date, diagnosis and treatment of health problems
- Other observations

Fertility Intro

Fertility is often evaluated by indicators of performance like number of litters / sow / year, number of live born or weaned piglets/litter. These performance indicators strongly depend on feed, breed, lactation duration and housing system. Therefore, comparisons should only be made within similar systems. In organic agriculture, other indicators may be more important, as for example:

- Number of weaned piglets during the sow's lifetime
- Number of litters during the sow's lifetime
- Number of weaned piglets/number of live born piglets (survival rate)
- Sow replacement rate

How to recognize fertility problems?
Fertility problems can be revealed by low performance and by various symptoms:

Delayed or absence of heat after weaning, repeat breeders, abortions, small litters, mummified, dead born or weak piglets.

Fertility problems are multifactorial and nearly every factor in the sow's environment can be involved. Approximately 70 % of fertilty problems are due to non-infectious reasons (thermal stress, social stress, transport, hygiene, etc.), the rest is caused by infections such as Parvovirus or PRRS. It is important to know whether all sows, some groups of sows or only single sows are affected. **Records** of sows and boars help to identify possible problem areas.

Check	Measures
Do you take measures on hot or very cold days?	✔ Provide cooling measures like wallows, showers, air ventilation and enough shade to gilts, sows and boars. Comfort temperature for sows in gestation with adequate bedding is around 10–20 °C ✔ Install enough drinkers with high flow rate ➜ p. XX ✔ Provide sufficient dry bedding material on cold days and prevent draughts *Why? Hot or very cold temperatures may lead to abortions and repeat breeding (seasonal fertility disorder)*
Is housing of gilts appropriate?	✔ If replacement gilts are bought in, they should be placed in a comfortable quarantine area and progressively adapted to the local germs by e.g. exposing them to sows' manure ✔ Use time in quarantine (6 weeks) to deworm and vaccinate animals if necessary ✔ Allow for regular human contact to facilitate subsequent handling

Fertility – Sows

Check	Measures
Is the service area appropriate?	✔ Provide sufficient light and space ✔ Make sure the floor is not slippery ✔ Provide an appropriate lying area (sufficient space for all animals, soft bedding, no draught)
Is housing in the farrowing pen appropriate for the sow?	✔ Move sows to the farrowing pen at least 5 days before birth ✔ Maintain the farrowing area clean and dry, especially around birth. Provide a sufficient amount of straw for nest building behaviour ✔ Avoid excessive ambient temperature (> 25 °C) at the sow level. This will cause heat stress and inhibit her appetite ✔ To reduce piglet mortality follow recommendations in the chapter “piglet mortality”

Outdoor:

- ✔ Consider using a specially designed service tent to house the boars and give better control of natural or artificial insemination
- ✔ In hot weather, as well as providing wallows and shades, provide extra ventilation in huts by opening panels in the back or roof. In cold weather add extra straw in the huts and block any draught holes between hut and ground. In wet weather make a straw «doormat» at the hut entrance to keep the bedding drier
- ✔ Insulation of the huts will improve the thermal environment and reduce risk of condensation causing damp bedding.

Fertility – Sows

Check	Measures
Is feeding appropriate for gilts?	✔ Do not feed gilts like fatteners. Rather use the diet for pregnant sows with a lot of high quality roughages
Is feeding appropriate for pregnant sows?	✔ Provide a high amount of feed with adequate protein (“flushing”) to sows in the 5–7 days before breeding to stimulate ovarian function ✔ Adapt diet and amount of feed during pregnancy according to body condition score. Optimum is a score of 3 at farrowing ✔ Increase feed in cold weather if necessary to maintain condition ✔ Provide sufficient high quality roughages to avoid hunger and aggression. Roughages are also help to prevent constipation at birth ✔ Cut down feed 2 days before farrowing. Substitute with bran and high quality straw

Outdoor:

- ✔ If feeding on the ground, make sure the feed is widely distributed in a dry area of the field
- ✔ Consider feeding in a long trough to reduce wastage and attraction of birds which might bring diseases

Fertility – Sows

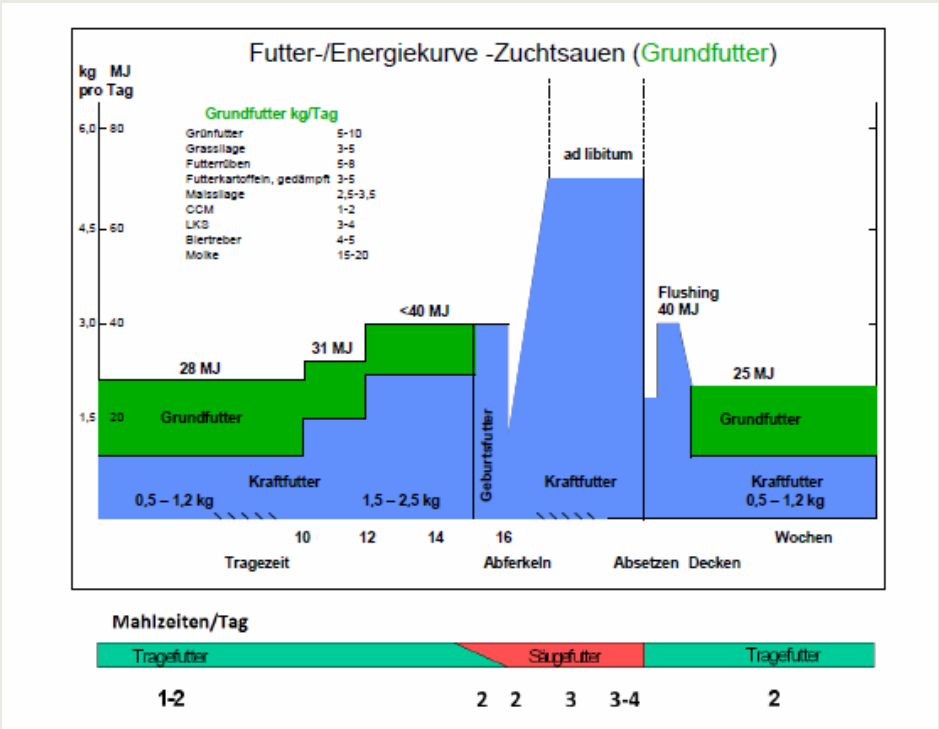
Check	Measures
Is feeding sufficient for lactating sows?	✔ Avoid excessive body condition loss during the suckling period (>1 condition score) to prevent subsequent fertility problems. Sows should be fed ad libitum with a palatable diet during the main part of lactation.
Is nutrient content of the diet appropriate?	✔ Regularly conduct feed analysis and recalculate your ration ✔ Check for sufficient provision of protein, energy, lysine, phosphorus, and calcium, especially during lactation. Equilibrium between nutrients is also important: optimal Ca:P ratio is 1.3 to 1.5

Fertility – Sows

Check	Measures
Is your feed and water free of harmful substances?	✔ Ensure high quality of straw during harvest and storage ✔ Analyze your straw and feed for mycotoxins and other harmful substances. They are responsible for a lot of fertility (and other) problems ✔ Regularly check flow rate of drinkers (➜ p. XX) and analyze annually quality of drinking water (take samples as close as possible to drinkers or from natural water sources being used). Analyze also for E.coli, enterococci and coliform bacteria ✔ Clean water storage tanks regularly

Bacteriological water analysis	Chemical water analysis
< 100 total bacterial germs / ml < 50 coliform bacteria / ml	pH at 20 °C: 6,5 to 8,5 Nitrate: <50 mg/ml Iron: <0.3 mg/l

Fertility – Sows



Fertility – Sows

Thin	= **Score 1 or 2:** Ribs, backbone and hip bones obvious (or easily detected with pressure);
Moderate	= **Score 3:** Ribs, backbone and hip bones barely visible (or barely felt with firm pressure);
Fat	= **Score 4 or 5:** Ribs, backbone and hip bones cannot be seen (or felt even when pressure is applied) or fat deposits are clearly visible.

Check	Measures
Is your insemination procedure appropriate?	✔ Monitor oestrus status of your sows twice a day in the presence of a boar. He will stimulate ovulation and heat expression. Test, if sow stands rigid as a response to pressure on the back ✔ Inseminate 12–24 hours after the first positive back pressure test, then again 12–24 hours later ✔ Store semen in good conditions (temperature between 16 and 18 °C), maintain good hygienic conditions during insemination
Do you keep a boar?	✔ Use the boar for 2 to 4 services per week; even less if the boar is younger than 16 months. Do not use boars under 7 months of age and older than 3 years ✔ If only natural service is performed, keep one boar for 2–4 sows per batch ✔ Perform natural service with the boar for repeat breeders ✔ Do not keep the boar permanently beside the sows – stimulation effect is higher, when they get only temporary access

Fertility – Sows

Check	Measures
Is management of pregnant sows appropriate?	✔ Either group sows at weaning or wait until after day 28 of pregnancy ✔ Keep stable groups throughout the production cycle and thus minimize mixing of unacquainted sows ✔ Check for pregnancy by heat detection or ultrasound (day 21–30)
Do you observe purulent vaginal discharge after insemination or birth?	✔ Treat urinary tract infections before insemination ✔ Improve hygiene at insemination. Clean vulva with a dry disposable cloth, do not use water. Use disposable catheters ✔ Improve hygiene when assisting at birth. Clean your hands, arms and sow's vulva. Use disposable gloves and lubricant. Only intervene if necessary ✔ Check with your veterinarian whether treatment is necessary.

Fertility – Sows and Boars

Check	Measures
Do you consider fertility when selecting gilts or boars?	✔ Choose lines without seasonal fertility disorders ✔ Choose lines with reasonable litter sizes: number of total born piglets should on average not exceed 14 ✔ Choose lines with good maternal abilities (e.g. nest building, careful lying down, reaction to piglet)

Outdoor:

✔ Ensure that the ratio of sows to boars does not exceed 4:1 in a group and that all boars are healthy, not lame and not too fat

✔ Run a catch boar in the field with the sows after service to detect any returns to oestrus.

First aid measures:
Call your vet if you observe one of the following:

- Vulva discharge (purulent or brown, smelly) despite good hygiene at insemination and farrowing
- Frequent repeat breeders (> 10 %)
- Frequent abortions (> 1 %)
- Frequent mummies (> 1 % of total piglets) or dead born piglets (> 10 % of total piglets)
- Frequent small litters
- Fever (> 39.3 °C) one day after farrowing and lack of appetite in the days following farrowing in numerous sows (see chapter on MMA)
- Symptoms of pain of the urogenital system: Contracted belly and curved back

Aborted foetuses – all same size, quite late pregnancy: Can be due to stress or infectious disease (e.g. PRRS)

Long term approach

1. Identify possible causes related to feeding, management and housing of reproductive animals ➜ previous pages
2. Reduce prevalence of lameness, MMA, parasite infestations and other health problems
3. Check for signs of infection and consult your vet for a diagnosis. Check the vaccination program with your vet. Recommended vaccinations preventing fertility problems may differ between regions; the more frequent ones are against
   - PRRS
   - Parvovirosis
   - PCV2
   - Influenza
   - Erysipelas

A catch boar in the sow group will detect any returns to oestrus

Long term improvement of general health is an important part of fertility measures

Diarrhoea

Housing
Feeding
Management
Treatment

Diarrhoea Intro

Diarrhoea is very common, especially in suckling and weaning piglets. It may lead to **high mortality rates** due to dehydration. Diarrhoea is a **multifactorial disease** and can be triggered by many causes.
Most often pathogens are involved. Different types of viruses and bacteria can colonize different parts of the intestine and impair gut health. Most pathogens are harmful only if the immune system is not able to react properly. It takes several weeks for a pig to acquire a mature **immune system** able to mount its own proper reaction. Sufficient colostrum intake – keyword MMA – and good immune quality of the colostrum is essential to supply piglets with antibodies against pathogenic bacteria and viruses.

Special attention at weaning
Weaning occurs in a very sensitive period: Maternally derived passive immunity has decreased since birth, but the piglet's own active immunity is not yet fully developed. Weaning is a shock for piglets in terms of feeding (abrupt change from milk to solid feed), housing (new pen, new pathogen spectrum), and social environment (from mother to group of partially unknown piglets). Therefore, most diarrhoea episodes occur shortly after weaning (approximately within the first 10–14 days).

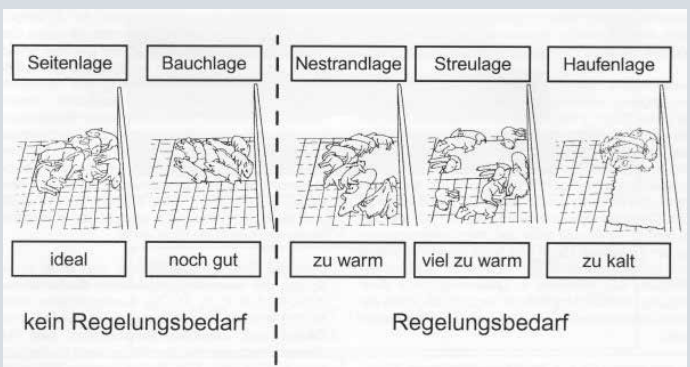
All measures, which facilitate adaptation during this transition period, will help to reduce diarrhoea incidence!

Diarrhoea – Piglets

Check	Measures
Do piglets have a suitable nest?	✔ Measure the temperature at different points in the nest. Optimal on floor level is • 30–34 °C (1. week) • 28–30 °C (until weaning) ✔ Close access to the outdoor run, for example with a curtain, to prevent draught ✔ Provide sufficient dry and clean bedding material. Observe lying behaviour of piglets. They should not be lying in a heap. Illustration ➜ p. XX
Can piglets socialize with later pen mates?	✔ Allow piglets to have access to other farrowing pens after the first week of life (as long as they are healthy) ✔ Allow group suckling ✔ Keep groups as stable as possible *Why? If piglets know each other when regrouped for weaning, they have less social stress and are less prone to infections*

Diarrhoea – Piglets and Weaners

A warm nest helps to prevent diseases and is even more important if piglets suffer from diarrheoa!



Lying in a heap indicates too low temperatures

Diarrhoea – Weaners and Finishers

Check	Measures
Is housing adequate around weaning?	✔ Keep piglets in the farrowing pen for some days after weaning. This allows them to adapt to the situation ✔ Provide a warm and dry nest for weaners without draughts. Optimal temperature on floor level is: • 27–29 °C (1. week after weaning) • 22–27 °C (afterwards) ✔ House pigs in litters or in small groups (< 20 animals) as they are easier to observe and sick animals are detected more quickly
Are sick animals separated from the group?	✔ Separate sick animals from the group ✔ Runts should not be reintegrated into the group. Thus enough «hospital pens» should be available *Why? Sick animals and runts often transmit diseases*

Diarrhoea – Piglets and Weaners

Outdoor:

- ✔ Use a «fender» to keep piglets in the farrowing hut initially, but once they start to jump this, remove it so that piglets can socialise with other litters
- ✔ At weaning, temporarily confine piglets in a hut with a fenced run area for the first week so that they do not wander away seeking their mother and become lost
- ✔ Have a special «hospital» hut for small piglets who may have difficulty adapting to weaning
- ✔ Provide an adequate depth of clean, dry straw bedding
- ✔ Block any holes between the hut walls and the ground with mud
- ✔ Use a curtain at the doorway to reduce heat loss

Diarrhoea – Piglets

Check	Measures
Do piglets have continuous access to fresh water?	✔ Check flow rate regularly, it should reach 0.8 l / min for piglets ✔ Check functionality and cleanliness of drinkers every day
Are piglets sufficiently supplied with iron?	✔ Guarantee sufficient supply with iron (check organic compatibility). Pale skin colour is a sign of iron deficiency *Why? Iron is important for the immune system*
Do piglets eat enough before weaning (250 g per day)?	✔ Provide piglet feed next to the sow's, so piglets can learn from their mothers' behaviour ✔ Start to feed early, when piglets are 7–10 days old ✔ Repeated provision of small amounts of feed enhances attractiveness and taste *Why? Sufficient feed intake prepares the animals to eat only solid feed and prepares the digestive tract to digest nutrients from plants*

Diarrhoea – Piglets

Outdoor:

- ✔ Observe the skin colour of the piglets. Additional supply with iron is often neccesary, even if piglets have access to soil. Sandy soils have a low iron content
- ✔ Once the piglets start to range from the hut, provide a protected creep feed area which the sows cannot get to and ensure piglets have an accessible source of clean drinking water

Diarrhoea – Weaners and Finishers

Check	Measures
Do weaners have restricted access to feed?	✔ If the farm has diarrhoea problems, provide feed to weaners at least in the first 10–14 days post weaning only restrictively in at least 3–5 meals ✔ All piglets should have simultaneous access to restricted feed. A pipe cut in half can serve as feed trough, if feeding technique does not allow for all animals eating at the same time *Why? Overeating can increase the amount of non-digested nutrients in the intestine which are then used by pathogens, especially E. Coli*
Do pigs have continuous access to fresh water?	✔ Check flow rate regularly (see page XX) ✔ Install in weaning pens the same drinker type as in farrowing pens, so that weaners already know the drinker type ✔ Check functionality and cleanliness of drinkers every day ✔ Place additional drinking troughs in the first week after weaning

Diarrhoea – Weaners and Finishers

Check	Measures
Are pigs provided with feed stuff suitable to decrease stomach pH?	✔ Provide high quality silage containing lactic acid bacteria and organic acids ✔ Provide probiotics like effective microorganisms or organic yogurt to support digestion (check organic compatibility) ✔ Provide water diluted fruit vinegar. Add 1% to the feed ration (check organic compatibility) ✔ Provide soil or compost for rooting which contain humic acids ✔ Avoid diets with excess buffering capacity (e.g. high calcium)
Do pigs have access to high quality feed?	✔ Check daily for cleanliness of troughs, eliminate spoiled feed ✔ Check that the nutrient content (minerals, energy, amino acids) of the diet fullfills the nutrient requirements of the pigs that vary with live weight

Diarrhoea – Weaners and Finishers

Check	Measures
Are weaners fed with an adapted diet around weaning?	✔ Blend old and new feed steadily for one week, start 10–14 days before weaning ✔ Restrict amounts of protein and minerals during the first 10 days after weaning to 150 g / kg crude protein and 6 g / kg calcium ✔ Feed may be diluted with components rich in fibres (barley, triticale, oat, wheat bran, hay, silage). Fibre content should be increased around weaning to 5–6 % ✔ If suckling piglets were mainly eating from the sows trough, provide them with the sow's feed for the first days after weaning

Diarrhoea – All ages

Water

Sufficient and continuous provision of clean water is the best prevention strategy. This is even more important when there is diarrhoea in a group. Drinkers should be adapted to the age category and installed on slats to avoid wet areas in the pen. If possible drinkers should be installed outdoors (attention: frost!) because pigs tend to urinate in wet places. Install at least 1 drinker per 10 animals and at least 2 drinkers per pen. Regularly check flow rate of drinkers. Clean water pipes regularly, e.g. with 0.2 % fruit vinegar, formic or citric acid (check organic compatibilty).

Bowl drinkers correspond to natural drinking behaviour but are more prone to contamination

Check functionality and cleanliness of drinkers daily. Annually analyze water quality ➜ p. XX**.**
Would you drink this water?

	Flow rate (litres/min)	Daily demand (litres/animal)
Suckling piglets	0.4–0.5	0.7–1
Weaners	0.5–0.7	1–3
Fatteners (< 50 kg)	0.6–1	3–6
Fatteners (50–80 kg)	0.8–1.2	5–9
Fatteners (80–120 kg)	1.5–1.8	8–11
Pregnant sows	1.5–1.8	15–20
Lactating sows	2.5–3	20-35

Diarrhoea – All ages

General hygiene guidelines

- Perform work routine «from smallest to biggest», starting with lactating sows and suckling piglets followed by weaners, fatteners and pregnant sows
- Limit movements of animals and people
- Keep newly bought animals in a quarantine area
- If necessary install a hygiene sluice
- Perform all-in-all-out management
- Clean pens with high-pressure cleaners, allow for sufficient drying and an empty period of at least 4 days
- Disinfect pens if there are known pathogens in the barn. Disinfection can be performed with steam or disinfectants compatible with organic standards
- Remove old/mouldy food under/in troughs
- Control flies and rodents which are often vectors for pathogen transmission

Outdoor:

✔ Rotate farrowing and weaner paddocks regularly to reduce pathogen and parasite infestation

✔ Huts should be cleaned and moved within paddocks between each batch of pigs

✔ Disease introduction from wildlife should be avoided by using bird proof plastic curtains, lidded hoppers for food and (electric) fences.

Diarrhoea – Piglets, Weaners and Finishers

Check	Measures
Is the chain of infection sufficiently interrupted before farrowing?	✔ Clean pens after every batch with high-pressure cleaner, allow drying and a period without any pigs (> 4 days) ✔ Shower the sows with warm water before moving them to the farrowing pen. Clean carefully also ears, claws, legs and teats ✔ Keep pens clean and dry, especially after birth and in the farrowing area
Do pigs have a sufficiently working immune system when weaned?	✔ Ensure sufficient intake of colostrum of all piglets ✔ Prolong suckling period to at least 49 days *Why? Piglets weaned with 49 days or later show less diarrhoea and need less treatment than when weaned with 42 days*
Is a good hygienic status ensured?	✔ Prevent spreading of faeces between pens, e.g. at cleaning ✔ Provide enough space per animal to reduce pathogen load ✔ Follow the “General hygiene guidelines” ➜ p. XX

First aid measures

- Make sure there is unlimited fresh water in every pen
- Provide electrolyte solution in a trough
- Add 1% kaolinite clay to the diet. It will serve as a digestive bandage and alleviate symptoms
- Pigs which suffer from diarrhoea should be fed restrictively several times a day in small amounts. Additionally high quality hay or silage may be provided
- Provide a warm lying area for the piglets
- Keep watching the hygienic conditions: don't spread the germs to other pens

Call your vet if:

- Piglets show diarrhoea on two subsequent days which is not responding to treatment
- You discover a new type of diarrhoea or a new age group is affected. The vet can take samples to identify the bacteria and to perform an antibiogram (identifies effective treatment with antibiotics)

Treatment should be finished as recommended even if animals show signs of improvement. Otherwise there is high risk of resistance development
Treatment of single animals is preferred to group treatment in most cases

Electrolyte solution according to WHO:

- 1 l water
- 20 g organic Glucose
- 3.5 g Salt
- 2.5 g Sodium hydrogen carbonate (food soda)
- 1.5 g Potassium chloride

  or
- Water with 20 g / l dextrose and 4 g / l salt

Diarrhoea – All ages

Long term approach

- Identify possible causes related to feeding, management and housing of suckling piglets, weaners and fatteners ➜ previous pages
- Intergrate young sows or bought-in animals into the herd at least 6–8 weeks before farrowing
- If parasitological analysis of faeces is positive for endoparasites, deworm sows 2 weeks before farrowing
- If necessary vaccinate the sows before farrowing. Vaccination programme should be discussed with the vet and adapted to the barn's own pathogen spectrum. Vaccinations of sows and piglets are possible against
  - E.coli
  - Clostridium perfringens Type C and Type A
  - Salmonella
  - Lawsonia intracellularis

Why? Sows produce antibodies against pathogens with which they have been confronted and transfer these to piglets in colostrum. Confrontation with the herds own pathogen spectrum and/or vaccination has this effect

Diarrhoea faeces is altered in colour and/or consistency and/or smell

Diarrhoea – All ages

Taking samples
If you suspect infections, take samples and involve your veterinarian
Take fresh faeces samples with a swab from the rectum of pigs which have just become sick. In pigs which have already been sick for some days you will also find secondary pathogens
Other sampling methods are blood (by your veterinarian) or dead piglets

Eradication
In some cases, if very severe or persistent pathogens are present or if national regulations require to do so, an eradication/depopulation of the whole herd may be appropriate. Clean and disinfect pens and allow sufficient drying. Depending on pathogen (e.g. *Brachyspira hyodysenteriae*) a disinfection of all manure storage containers and pipes will be necessary.

Phytotherapeutic recipe against enteritis
- 20 g camomile blossoms
- 980 ml drinking water

Add hot but not boiling water to the camomile. Allow to cool down in a covered pot.
Administer 3 times daily the amount of one tablespoon per animal orally (with blossoms). Tea can be poured on the feed or provided in a trough.

Respiratory Problems

Introduction
Housing
Management
Treatment

Respiratory Intro

Respiratory problems are the **most common** cause for treatments in finishing pigs, but can affect all age groups.

Problems can start with mild **symptoms** such as sneezing and discharge from the eyes, progressing to coughing and conjunctivitis, lung damage, reduced growth and even death.

Respiratory problems are **multifactorial diseases** and can be triggered by many causes.
Most often pathogens are involved. Different types of viruses and bacteria can colonize different parts of the respiratory tract. Most pathogens are harmful only if the **immune system** is not able to react properly.
Housing and management decisions may strengthen or weaken pigs' immune system and decrease or increase the pathogen load.

Why are respiratory problems relevant?
Pigs are not only irritated by ocular discharge and sneezing, conjunctivitis (red eyes) and coughing are also painful conditions.

Respiratory problems are also relevant to the farmer for economic reasons:

- Impaired feed conversion rate (reduced food intake and reduced growth rate)
- Increased mortality
- Additional work load by treating sick animals
- Treatment costs

Bad environmental conditions, as one origin of respiratory problems in pigs, can also affect the farmer's health and job satisfaction

How to recognise problems?

Normal, healthy eye and nose – bright, no discharge, not sunken, conjunctiva not visible

„**Tear staining**“ – increased production of tears caused by irriation of eye (e.g. draught, dust, foreign body, infectious agent)

Coughing/sneezing:
Mild problems: one cough/sneeze per 20 pigs/5 minutes
Severe problems: frequent coughing/sneezing, laboured breathing; purulent/bloody discharge from nose

„**Red eyes**“ – conjunctivitis (red, swollen conjunctiva) caused by prolonged irritation of eye

„**Rhinitis atrophicans**“ – infectious disease causes distorted/shortened snout (skin folds on nose), possibly bloody discharge

Respiratory – All ages

Check	Measures
Can you smell ammonia? Do your eyes or nose burn during the daily routine work?	✔ If bedding or animals are dirty with faeces • Improve urine drainage • Increase frequency of dung removal • Improve possibilities for mechanisation of dung removal ✔ Avoid deep litter in summer ✔ Check and improve ventilation – mechanical/natural ✔ Increase access to outside run or outdoor area
Is humidity appropriate? Can you see water drops along the windows/pipes?	✔ Measure humidity – recommended is a range of 60–80 %, depending also on temperature ✔ Improve ventilation ✔ Increase access to outside run or outdoor area ✔ Replace your old building with a new, naturally ventilated barn

Respiratory – All ages

Check	Measures
Do suckling and weaner piglets have a suitable nest?	✔ Measure the temperature at different points in the nest. Optimal on floor level is • 30–34 °C (1. week) • 28–30 °C (until weaning) • 27–29 °C (1. week after weaning) • 22–27 °C (afterwards) ✔ Sit down to check, if the floor is dry. If not: ✔ Improve drainage and increase amount of bedding ✔ Observe lying behaviour of piglets ➜ p. XX. All piglets should be able to use the nest at the same time
Do fatteners and sows have an appropriate lying area?	✔ Observe the animals to check if lying area is large enough for all animals to lie at the same time ✔ An optimal lying area is closed on three sides and has a well drained, dry, draught-free floor

Respiratory – All ages

Check	Measures
How many animals are within one airspace? Are different age groups together?	✔ Maximum number of animals within one airspace should not be more than 200–300 animals (optimum 150) ✔ A larger room volume is advisable (>3–4 m^3 room volume / pig) ✔ Avoid keeping younger animals together with older ones in the same airspace to interrupt the chain of infection

Outdoor:

✔ Ensure huts are kept dry and draught free

✔ Regularly provide straw to avoid dust accumulation in the hut

Check	Measures
Are there layers of dust and eyes and nose are irritated when working in the pig barn?	✔ If feed is very dusty • Consider to add oil or molasses to ration • Do not feed too finely ground particles (>50 % of particles <1 mm) • Use pellets instead of meal or add water when feeding If bedding is very dusty • Check straw quality • Optimise harvest time and management to achieve high quality of straw • Store straw in a covered place • Add regularly fresh straw to avoid very small particles ✔ Check and improve mechanical or natural ventilation ✔ Increase access to outdoor area *Why? Dust causes irritation of the respiratory tract and predisposes mucous membranes for infections. It is also a vehicle of pathogens and endotoxins.*

Respiratory – All ages

Check	Measures
Do you protect your sow herd against diseases from outside?	✔ Keep your herd closed ✔ Prepare an isolation barn for bought-in gilts or boars, which is on a completely seperate location ✔ Take blood samples of new animals ✔ Use time in quarantine (6 weeks) to deworm and vaccinate animals
Do you mix pigs of different sources and ages?	✔ Preferably buy weaners or fatteners only from one farm ✔ Mix animals as little as possible ✔ All-in-all-out system is preferable to continous flow
Is stocking density appropriate?	✔ Make sure, your pig house and individual pens are not over-stocked – more competition leads to more stress ✔ Avoid partly empty pig houses in winter, as it might get too cold
Is a good hygienic status ensured?	✔ Power wash and keep pen empty for few days between batches ✔ Follow the “General hygiene guidelines” ➜ p. XX

Vaccination only works, if the air quality is appropriate. It can not cover management or housing problems

Recommended order of treatments (consult your vet):

1. Vaccination
2. Non-pharmacological treatments
Phytotherapy: e.g. Thymian leaves
Homoeopathy: remedy depending on the symptoms
3. Antibiotics and anti-inflammatory treatment of
a. Individual animals
b. Group treatment

Better: eradication of the pathogen

First aid measures

Call your vet if one or more pigs show

- Increased respiration:
  Piglets > 50 / min
  Fattening pigs > 30 / min

Adult sows > 20 / min AND

- Panting/Pumping
- Fever
- High mortality (>2 % within one age group)

Move pig(s) into hospital pen

Phytotherapeutic receipe against bronchitis, catarrh and digestive disorders:

2,0–10,0 g Thymian (dried leaves and blossoms) per animal and day

Add daily to the feed

Respiratory Untertitel Register 2 oben

Long term approach

- Identify possible causes related to feeding, management and housing (see following pages)
- Identify causal pathogens by observing animals, reviewing abattoir data, taking samples and involving your vet. Require bacteriological investigation and antibiogram
- If necessary vaccinate the sows before farrowing. Vaccination programme should be discussed with your vet and adapted to the barns own pathogen spectrum. Ensure correct storage and use of vaccines
- Eradicate diseases (e.g. PRRS/Mycoplasma) by partial or total depopulation, cleaning, disinfection and empty period of the buildings followed by repopulation with pathogen negative stock

Respiratory Disease	Pathogen	Vaccination
Porcine Enzootic Pneumonia (EP)	Mycoplasma hyopneumonia (bacteria)	Suckling piglets, weaners, fatteners
Flu	Swine Influenza Virus	Sows and suckling piglets
PRRS (Porcine reproductive and respiratory syndrome)	PRRS Virus	Sows or suckling piglets
Porcine Circovirus Associated Disease	Porcine Circo Virus type 1 or 2	Sows or suckling piglets
APP (Actinobacillus pleuropneumonia)	Actinobacillus pleuropneumonia (bacteria)	Uncommon. Possible for suckling piglets
Atrophic rhinitis	Pasteurella multocida (bacteria)	Sows

Injuries

Skin lesions
Tail lesions
Lameness
Vulva lesions
Swellings

Skin lesions

Skin lesions range from superficial scratches to deep wounds. Such lesions originate from equipment or from social interactions. The impact for animal welfare certainly depends on the depth of the wound. However, also small scratches may act as a gateway for pathogens to cause infections and inflammations.

Ectoparasites, such as mange, cause strong itching which leads to increased scratching and thus potentially skin lesions.

First aid measures

- Treat open wounds with disinfecting and wound healing sprays or ointment
- Make sure lesions were not caused by infectious diseases (e.g. erysipelas)
- Remove any sharp edges of barn equipment or flooring

Injuries Untertitel Register 2 oben

Check	Measures
Are there a lot of injuries caused during fights at suckling?	✔ Check that litter size does not exceed number of functioning teats Carry out cross fostering if necessary ✔ Make sure the sow does not suffer from MMA (➜ p. XX)

Piglets have sharp teeth with which they can cause lesions when fighting for a place at the udder

Injuries Untertitel 2 unten

Check	Measures
Is there a lot of fighting in general?	✔ Keep mixing to a minimum. Keep groups as stable as possible ✔ Provide increased area and visual barriers - in general and especially at the time of mixing ✔ Widen passages such as from the indoor pen to the outdoor run ✔ Supply more and/or improve access to resources such as feed, water, resting area - in general and especially at the time of mixing ✔ If each animal does not have its own feeding space (at least 33 cm for a fattening pig), feed should be provided ad libitum ✔ Rooting material, straw and roughages should be provided ad libitum
Is there equipment in the barn which might injure pigs?	✔ Routinely check that equipment is safely installed and without sharp edges ✔ Routinely check that floors are intact, and not slippery. ✔ Provide sufficient bedding material

Injuries – Sows

Check	Measures
AIs there a lot of fighting at regrouping?	✔ Provide sufficient space and visual barriers especially when regrouping unfamiliar sows ✔ Regrouping should be done on pasture or at least in an outdoor run ✔ Keep groups stable throughout the production cycle

Outdoor:

✔ Avoid keeping pigs on ground with sharp stones

✔ Ensure huts are well maintained to avoid sharp edges

Tail biting and tail lesions

Tail biting has serious animal welfare implications and appears mostly in groups of weaners or finishers. Even though tail biting is more pronounced in indoor conventional housing systems, outdoor rearing does not exclude tail biting. The causal mechanisms of tail biting are not fully understood and its occurrence is difficult to control. Tail biting is considered to be multi-factorial involving factors such as diet, feeding, water access, space allowance, environmental climate, environmental enrichment, bedding, rooting/ foraging material, health problems, parasite infestation and breed type.

First aid measures

- Separate biting as well as injured animals in single hospital pens
- Treat and disinfect wounds
- Provide ad libitum rooting material, roughages, concentrate feed and water to the remaining pigs
- Provide «toys» like balls, carton boxes, empty canisters etc.
- Treat lesions of the remaining pigs with bitter tasting spray
- Provide salt lick

Injuries Untertitel Register 2 oben

Check	Measures
Do animals have permanent access to foraging materials?	✔ Supply plenty of foraging substrate like straw, silage or hay ✔ Regularly renew foraging substrate for increased novelty value
Is feed and water management appropriate?	✔ Optimize supply of amino acids, minerals and micro nutrients according to live weight ✔ Analyze feed for micro toxins and take measures accordingly ✔ Check functionality and flow rate of drinkers (➜ p. XX)
Are animals healthy?	✔ Check for chronic health problems (see chapters on diarrhoea and respiratory problems) ✔ Check for the presence of parasites (see chapter on parasites)
Is the environmental climate adequate?	✔ Improve the air quality in the barn by reducing sources of pollutants (dust, ammonia, CO2) and by increasing air renewal ✔ Avoid sources of draughts, especially in the resting area ✔ Avoid abrupt changes in ambient temperature resulting in cold or heat stress
Is there a lot of fighting?	✔ Check measures defined in the chapter "Skin lesions" for weaners and fatteners

Injuries Untertitel Register 2 unten

Lameness

Lameness may occur due to several factors. Often floor type, floor surface or slats are not adequate for the specific age category and cause injuries. Lameness may also be one symptom of diseases like E.coli enterotoxaemia, Aujeszky's disease, erysipelas, or mycoplasma infection. Sows can suffer from too long claws or from injuries caused after regrouping. Susceptibility for leg problems is partly heritable. Lame sows have a higher risk to crush their piglets.

Age category	Maximum gap width for slatted floors
Suckling piglets	9 mm
Weaners <15 kg	11 mm
Weaners > 15 kg	14 mm
Fatteners > 25 kg	18 mm
Sows / boars	22 mm

1.

2.

3.

1. Those claws make walking very difficult and should be trimmed
2. Too small or too wide gaps in slatted floors hold the risk of claw injuries
3. Too abrasive floors or standing in dung can harm claws

Check	Measures
Is flooring appropriate?	✔ Use enough bedding material and select solid flooring wherever possible ✔ Check appropriate gap width if you have concrete slatted floors ✔ Remove sharp edges on gaps, steps or doors ✔ Check that floors have good grip ✔ Check that floors are not too abrasive in the farrowing pen ✔ Clean pens regularly for hygiene reasons (pigs are standing in dung) and to avoid slippery floor
Are there a lot of lame fatteners after around 50 kg?	✔ Use slow growing genotypes to avoid the “weak leg syndrome” ✔ Reduce feed amount to slow down growth, especially for gilts
Is tail biting a problem?	✔ Implement measures against tail biting ➜ p. XX *Why? Tail lesions can lead to infections in the spine causing lameness*
Is the environmental climate adequate?	✔ Improve the air quality in the barn by reducing sources of pollutants (dust, ammonia, CO_2) and by increasing air renewal ✔ Avoid sources of draughts, especially in the resting area

Check	Measures
Is supply with minerals and vitamins ensured?	✔ Supply especially young sows with sufficient Ca, P, biotin, Manganese, Copper, Zinc and Vitamin D. An optimal Ca:P ratio is 1.3 to 1.5
Is claw length of sows appropriate?	✔ Regularly check length and shape of claws. Trim if necessary, also the dew claw ✔ Ensure sufficient (but not too much) abrasion by choosing slightly abrasive floors in the pregnant sow activity area
Are there a lot of lame sows after regrouping?	✔ Carry out regrouping after weaning and/or mating on pasture (or at least on an outdoor run with good grip) ✔ Keep stable groups throughout the production cycle
Is lameness a constant problem?	✔ Select for lines with good leg health

Injuries Untertitel Register 2 oben

Outdoor:

- ✔ Avoid keeping pigs on ground with sharp stones
- ✔ Avoid keeping pigs on poor draining soil where pigs are permanently in mud
- ✔ Flatten ridged field areas around hut entrances and feeding areas in winter to minimise risk from injury associated with frozen, uneven ground

Permanently standing in dung or mud favours infections in the claw area

Injuries Untertitel Register 2 unten

Check	Measures
Is sow condition adequate?	✔ Ensure all sows have a body condition score of 3 during pregnancy and a minimum of 2.5 after weaning
Are there sufficient and appropriate feeding places?	✔ If you feed all sows together: Provide more than one feeding place per sow Provide (self-) lockable feeding stalls
Is your electronic sow feeder lockable?	✔ Choose an electronic sow feeder which protects the sow within and which allows forward exit
Are your sows occupied?	✔ Provide sufficient roughage to ensure satiety of the restrictively fed sows ✔ Provide foraging material (straw, earth, etc.) and a wallowing area

Injuries Untertitel Register 2 oben

Different scarring consequences of bitten vulvas

Check	Measures
Is equipment appropriate?	✔ Check if pigs hurt themselves at the trough, slippery floor, sharp edges
Do pigs lie in the lying area?	✔ Provide cooling measures like showers or wallows ✔ Clean lying area regularly and provide sufficient dry bedding material ✔ Enlarge size of the lying area if not all pigs can rest at the same time *Why? If it is too hot pigs seek for cooling on the concrete floor but it may reduce their welfare as it provides a hard surface*
Can you exclude infectious causes?	✔ In case of frequent swellings, and possibly other symptoms like fever, apathy, and reduced appetite, check with your vet if they are caused by infections. Possible infectious diseases are: Glassers' disease *(Haemophilus parasuis), Mycoplasma polyserositis and polyarthritis or diamond skin disease (Erysipelothrix rusiopathiae)*

Injuries Untertitel Register 2 oben

Swellings (bursae) often occur on the hindleg and could be painful

Other health and welfare problems

Piglet mortality
MMA
Parasites

Piglet mortality and crushing

High piglet mortality is a serious economic and welfare problem, especially during the first 3 days post-partum with a peak within the first 24 h independent of the housing system. It is a multifactorial problem but one main reason for increased piglet mortality is high litter sizes. In large litters, piglets have low body energy reserves at birth, are competing more for colostrum and milk and hence are at risk for low growth rate or mortality. Inappropriate management, feeding strategy, environment or maternal behaviour can significantly increase piglet mortality.

Check	Measures
Do sows have permanent access to nest-building materials?	✔ Provide sufficient quantity of manipulable materials, especially straw, allowing the sow to build a nest for at least 3 days before the expected farrowing date *Why? Sows that can perform nest-building activity are calmer, have shorter duration of farrowing and are less at risk to lay on their piglets.*
Are there enough productive teats and can piglets reach the teats in the upper row?	✔ Check the number of productive teats. The number of functional teats should be larger than the number of piglets. ✔ If necessary equalize litter sizes by cross fostering between 12 and 36 hours after farrowing (optimum 24 hours) to let piglets drink colostrum from their dam and to avoid rejection by the adoptive sow
Is management of sows appropriate?	✔ Move sows to the farrowing unit at least 5 days before farrowing to reduce stress at birth ✔ Provide adequate feeding, see chapter on fertility problems

Check	Measures
Is breeding of sows appropriate?	✔ Select for sows with smaller (<14 piglets) but more homogenous litters ✔ Cull old sows if piglet mortality is high (> 20 %) ✔ Choose lines with good maternal abilities (e.g. nest building, careful lying down, reaction to piglet)
Is the farrowing pen appropriate for sows?	✔ Maintain the farrowing area clean and dry, provide a sufficient amount of straw ✔ Check temperature and other potential stress factors during farrowing *Why? High temperature in the pen (above 24 °C) as well as other stress factors lead to prolonged farrowing and more dead born piglets*
Is the farrowing pen appropriate for piglets?	✔ Provide a readily accessible creep area protected from draught where all piglets can lie on deep, dry and clean bedding. Optimal temperature in the nest at floor level is: • 30–34 °C (1. week) • 28–30 °C (until weaning)
	✔ If necessary in small pens, install rails or bars along the walls to avoid crushing by the sow. Inclined walls have a similar effect

Check	Measures
Do you monitor farrowing and help newborn piglets to get colostrum after birth?	✔ If a piglet does not drink right after birth, give some drops of colostrum directly into its mouth, or administer glucose solution ✔ Strongest piglets can be shut away for 2–3 hours after they have had colostrum in order to allow sufficient uptake by weaker piglets ✔ Make sure all piglets find their nest quickly to prevent hypothermia ✔ Make sure your presence and intervention on piglets do not disturb the sow *Why? Monitoring farrowing is usually positive to piglets' survival but may detrimental if it induces sows' agitation leading to prolonged farrowing*
Are your sows in a good health state ?	✔ Make sure your sows are not lame, not too fat and don't have ectoparasites like mange *Why? When the piglet gets crushed it starts to scream immediately and if the sow can react within 1 min the piglet often survives. Ectoparasites lead to restlessness and reduced milk production*

Outdoor:

- ✔ Provide an insulated hut of appropriate size for the sow to warm the airspace, especially when piglets are small
- ✔ Ensure that farrowing hut is dry and draught proof
- ✔ Provide an adequate depth of clean, dry straw bedding
- ✔ Ensure that bedding is evenly distributed over the floor of the hut and relatively flattened when farrowing nears
- ✔ Avoid excessive disturbance of the sow during farrowing
- ✔ Use individual farrowing paddocks to prevent disturbance from other sows
- ✔ Use good fencing to keep predators away
- ✔ Block any holes between the hut walls and the ground with mud
- ✔ Use a curtain at the doorway to reduce heat loss
- ✔ Use a «fender» to keep piglets in the hut initially, but once they start to jump this, remove it so that piglets can socialise

Sows and Piglet

Stronger piglets often suckle on front teats where milk production is higher

Mastitis – Metritis – Agalactia

MMA is a complex of mastitis (inflammation of the udder), metritis (inflammation of the uterus) and agalactia (insufficient or absent milk production). But all three disorders can occur on their own. The MMA complex is economically important since it may cause a big loss of piglets. MMA is caused by infections (mostly E.coli, but also streptococci and staphylococci), but problems in housing, management and feeding are predisposing factors.

First aid measures

Call your vet if:

- Sows show temperature above 39.3 °C at 12 to 24 hours after farrowing
- Together with symptoms like loss of appetite, lying on the udder, hot and red udder, purulent vaginal discharge and apathy after farrowing

A treatment with antibiotics, analgesics and anti-inflammatory might be necessary

Check	Measures
Do you detect symptoms of MMA early?	✔ Observe birth but intervene only if necessary ✔ Check rectal temperature twice daily for 3 days after farrowing and check for other symptoms of acute MMA
Is a good hygienic status ensured?	✔ Follow the “General hygiene guidelines” as described ➜ p. XX ✔ Clean sows thoroughly before bringing to the farrowing pen ✔ If you assist during farrowing, clean sows vulva and use disposable gloves and lubricant, or clean and disinfect hands and arms thoroughly ✔ Clean pen, especially remove afterbirth remainders, after farrowing

Check	Measures
Is feed and water supply adapted to farrowing sows?	✔ Reduction of calcium 5–8 days before until 2 days after farrowing can help to acidify urine and reduce the risk for urinary tract infections ✔ Provide enough roughage and water during pregnancy ✔ Twice daily provision of Glauber's salt (60 g / 100 kg body weight) or flaxseed (50 g / 100 kg body weight) around farrowing has a laxative effect ✔ Reduce concentrate feed towards farrowing to 1–1.5 kg / day ✔ Provide water after farrowing additionally in the trough ✔ Control flow rate of drinkers (2.5–3 l / min) in the farrowing pen *Why? Measures to avoid constipation will reduce the likelihood of MMA*

Parasites

Even if often not very obvious, infestations with parasites may cause serious welfare and economic damage: lesions in the respiratory or digestive tract, decrease in feed conversion since parasites divert nutrients, anaemia, discomfort, pain, impairment of the immune system or skin lesions in case of ectoparasites. Animals can get infected with endoparasites in different ways: ingestion of parasite eggs (e.g. large roundworm, Ascaris suum) or larvae (e.g. Oesophagostomum), or ingestion of an intermediate host (e.g. earth worms for Metastrongylus), passage of larvae through the skin or the mammary glands and colostrum (Strongyloides). Ectoparasites are transferred directly from animal to animal.

Ectoparasites like mange cause discomfort and restlessness

Warning
If it is not possible to eradicate a parasite from a farm, the aim is to maintain it at a low level

First Aid:

- If pigs show signs of an infestation with gastrointestinal parasites, like diarrhoea, constipation, respiratory problems or runts, take fresh faeces samples (ideally directly from the rectum) and send them to a specialized laboratory. Results will help you and your vet decide if and with which deworming agent you should treat
- If a large number of slaughtered pigs have milk spots on the liver, you have large roundworms (Ascaris suum) in your herd and should consider treatment
- If pigs show signs of ectoparasites like grey, crusty areas around ears, legs and tail and a lot of scratching, you should discuss with your vet a systematic mange or lice eradication programme

Other problems – All ages

Check	Measures
Do you treat newly bought animals?	✔ Newly bought animals should be selectively dewormed, based on faecal analyses, and inspected for lice and mange before integrating them into the herd to prevent the introduction of new parasites
Do you wash sows before bringing them to the farrowing pen or hut?	✔ Careful washing of the sows with soap before bringing them to the farrowing pen or hut removes ectoparasite eggs and larvae
Do you compost pig manure before utilisation?	✔ Manure from pigs should be composted before spreading on the field to interrupt infectious cycles
Do you clean pens regularly?	✔ Pens, especially farrowing pens, should be cleaned thoroughly between batches with high-pressure cleaners. Daily cleaning should be done, removing at least faeces. Farrowing pens should be kept dry. Deep litter systems should also be cleaned *Why? Faeces may transmit parasites. Moisture favors survival of eggs and development of some larva*
Do you conduct "All-in-all-out"?	✔ All-in-all-out strategies allow for sufficient cleaning and drying between batches and thus interrupt cycles of infestation.

Outdoor:

- ✔ Regular rotation of paddocks reduces surviving eggs and larvae over time. If possible, include pigs in crop rotation, so that pigs move to fresh ground at least once per year and the time lag before re-occupation is around 5 years
- ✔ Cut the grass regularly or adapt paddock size in order to allow pigs to decrease vegetation height
- ✔ Spare moist areas like wallows for some time as they are often a reservoir of parasite eggs and larvae
- ✔ Rotate feeding spots regularly. This will reduce the parasite load in one place. Avoid feeding on contaminated ground and consider trough feeding.

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