

## Case studies on innovative combined indoor/outdoor organic pig systems

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### Abstract

*In many European countries, organic pigs are housed indoors with a concrete outdoor run. However, previous results have shown that combined systems with indoor housing and access to pasture have some advantages concerning animal welfare and environmental impact compared to sole indoor systems. These combined systems vary considerably across countries. Some farmers have only specific age categories on pasture, some provide limited access and others developed new approaches to management or infrastructure.*

*The goal of this study, which is part of the CORE Organic Cofund POWER project, was to analyse specific innovations in combined systems for weaners, fatteners and sows in Denmark, Italy and Switzerland. For example, the selected innovations comprise a self-constructed mobile pen on a trailer, which is large enough to keep the pigs on the trailer if the weather does not allow them to use the pasture. Another example was a mobile pen that can be moved, including the attached fences. Moreover, farms with innovative management practices were included, like the alternating use of grassland, cropland and forest.*

*The selected farms have been visited four times between summer 2019 and autumn 2020. Trained observers assessed individual animal health and welfare status according to a common protocol. Indicators were, for example, species-specific behaviour, lesions, lameness or body condition score. Farmers provided extensive data regarding farm management, feed production, housing etc., to analyse the different systems and identify their strength and weaknesses. The farmers' experiences, the collected data and analysis of the different innovative systems were summarised in factsheets to use this knowledge for advising other farms. These factsheets can help to diversify and improve such combined systems.*

### Introduction

Free-range management of pigs allows the animals to show their innate behaviour in a natural environment. Organic pig production systems aim at a high animal welfare status with low environmental impact. However, free-range pig farming is not mandatory due to the EU regulation on organic farming. With optimal management, free-range farming has several advantages regarding animal welfare and health status, as already investigated in the CORE Organic project ProPig (Leeb et al., 2019). On the other hand, the free-range management of pigs poses several challenges. Ecological factors such as the destruction of grass cover must be balanced with economic factors such as workload or feed consumption. Several farmers have developed individual systems to keep the pigs outdoors during the vegetation period or the whole year to overcome these challenges. These strategies differ between European countries as a result of varying climatic conditions as well as different regulations, national or association based. Such innovative systems were investigated within the CORE Organic project POWER in the three countries Denmark, Italy and Switzerland. Based on this research advantages and disadvantages of the systems were identified. This knowledge can be used for

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further research and agricultural consulting to promote the wider adoption of free-range elements in organic pig production.

## Material and methods

The project group has organised workshops with stakeholders to identify innovative practices in the three countries. As a result, two systems per country were chosen to be investigated within the POWER project.

Specific protocols were developed to assess the impacts of the innovations on animal welfare, environment, economy and the resilience and vulnerability of the whole farm (**Error! Not a valid bookmark self-reference.**). All farm visits are carried out according to a common standard operating procedure. Each farm was visited once every season to identify the differences between the seasons.

**Table 1: Overview of the protocols**

Protocol	Content	Collected data
Welfare indicators	Animal-based indicators	Behaviour observation, soiling, consistency of faeces, runts, ectoparasites, body condition, eye inflammation, ocular discharge, ear lesions, injuries, shoulder lesions, vulva lesions, tail length, tail lesions, lameness, sun burn, etc.
	Resource-based indicators	Hospital pens, flooring and pen hygiene, provision of water, elements of pen design and enrichment
Lifecycle Assessment	Data on environment and economy	Management, productivity, manure storage, labour, costs, feed components, on-farm feed production, grass cover, nutrition input into soil, use of medication
Resilience questionnaire	Data on resilience and vulnerability	Reactions of the farms to various scenarios, impact of changes on farms, possibilities for farms to adapt to changes (e.g. climate, input costs, labour, legislation, outbreak of pig diseases, price for pigs and pork etc.)

## Results

The results of the analyses are not yet complete and will be published at the end of the project. This chapter provides an overview of all innovative farms that participated and summarises the factsheet evaluation. The advantages and disadvantages of the systems are shown in Table 2. Except for CH1 in Switzerland, all farms were certified organic.

### Italy

**IT1:** The farm had one boar and ten sows of the local breed *Cinta Senese*. The sows in gestation were kept together with the boar outdoors on a vast area with bushes, trees, and grassland and access to small huts. For the farrowing and lactation period, the sows were kept in groups in a stable with access to an outdoor run. Growing, fattening and finishing areas were in a stable with permanent access to arable land that was part of the crop rotation. The animals foraged directly on the cultivated crops. Due to sown fodder plants made available at the ripened stage, up to 40% feeding could be saved during the fattening period. The farmer experimented a lot with different plants and thus optimised this innovative husbandry and feeding system.

**IT2:** The farm had one boar and twelve sows of the local breed *Cinta Senese*. The breeding area was located between a large field and a forest to take advantage of the different climatic

conditions in the seasons. The pigs were kept in the forest from growing to finishing period with access to small huts. After a few months of grazing, the forest recovered for one or two years. The innovative approach of the system was to create an environment as natural as possible with minimal infrastructure and at the same time to use and preserve the forest ecosystem sustainably.

## **Denmark**

DK1: This farmer bred pigs and sold seven weeks old piglets just after weaning. The sow breed is Danish Landrace-Yorkshire. The herd consisted of 112 sows. The farmer developed movable huts for four sows in order to allow better working conditions, higher efficiency and better animal welfare. Each hut provided feed and water and contained all elements of a permanent breeding barn. In addition, the piglet nest was equipped with electricity and heat to reduce piglet losses. A tractor moved the huts after each lactation (approx. eight weeks) and integrated the sows into the crop rotation to reduce soil nutrient loss.

DK2: The farm kept 150 growing pigs from farm DK1 in mobile self-constructed wagons. The wagon, including fencing, was moved jointly 1-2 times a day to provide new pasture areas for the pigs, depending on the season and pig size. It ran on caterpillar tracks and was moved by tractor. A camera pointed at the pasture area connected to a tablet in the tractor secured no pigs get hurt when moving the wagon and fence. The size of one hut was about 108 m<sup>2</sup> with a fenced area of about 150 m<sup>2</sup>. The huts were only moved as far as half and three-quarter the size of the fenced area to obtain an even distribution of nutrients. The farmers' main production was crop production, and he used the pigs for fertilising the fields. This was achieved by continuously moving the mobile hut and thus evenly spreading the manure. Thus, the pigs were on pasture all season.

## **Switzerland**

CH1: The farm worked with the traditional English breed Berkshire. There were 15 sows and 3 boars on the farm. Pigs of all age categories and production stages were kept in different groups on pasture all season. The farmer used professional huts from England that could be easily built and were quickly moved by tractor. The pigs were integrated into an alternating pasture system and were moved once every year to a new area. Sows and their piglets have been kept together for three to four months. The farm's innovative approach was year-round free-range farming in a country that traditionally keeps pigs indoors and rarely outside during summer. This system was enabled by the insulated huts and the robust alternative breed.

CH2: The farm created a trailer on which ten fattening pigs can be kept in compliance with organic conditions. The trailer included a feeding place, drinking troughs, a lying area with straw, and a small activity area with a slatted floor. Faeces and urine fell through the slatted floor and were thus distributed on the pasture. The area around the feeding and sleeping zones that were intensively used by the pigs did not result in over fertilisation and silting of the area. This innovation protected the grass cover as the pigs were kept on permanent grassland and were not integrated into the crop rotation. Two doors on the trailer could be opened to different fenced areas if the weather allowed it. After one of these areas was intensively used by the pigs, this door can be closed, and the other door can be opened to use the other pasture without moving the trailer. The so-called "Sau Karawan" ("Pig Caravan") could be moved by tractor. The farmers kept their own crossbreed of pigs called Distelschwein mixed with the German breed Schwäbisch Hällische Landschweine. The sows and piglets were kept in a permanent barn with access to an outdoor run and during summer to pasture.

**Table 2: Advantages and disadvantages of the different innovative systems**

	<b>Advantages</b>	<b>Disadvantages</b>
<b>IT1</b>	<ul style="list-style-type: none"> <li>• Efficient use of nutrients</li> <li>• Protection of the soil through regular plot changes</li> <li>• Feed savings</li> </ul>	<ul style="list-style-type: none"> <li>• High labour input for fencing the areas</li> <li>• High planning effort for integration into crop rotation</li> <li>• Land-intensive</li> </ul>
<b>IT2</b>	<ul style="list-style-type: none"> <li>• Natural environment for pigs</li> <li>• Use of forest area for food production</li> </ul>	<ul style="list-style-type: none"> <li>• High labour input for fencing the areas</li> <li>• Land-intensive</li> <li>• Biosecurity risk</li> </ul>
<b>DK1</b>	<ul style="list-style-type: none"> <li>• Efficient use of nutrients</li> <li>• Reduction of piglet losses</li> </ul>	<ul style="list-style-type: none"> <li>• High technical effort</li> <li>• Only possible on flat land with crop rotation</li> </ul>
<b>DK2</b>	<ul style="list-style-type: none"> <li>• Efficient use of nutrients</li> <li>• High working efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• High technical effort</li> <li>• Expensive investments in infrastructure</li> <li>• Only possible on flat land with crop rotation</li> </ul>
<b>CH1</b>	<ul style="list-style-type: none"> <li>• Low labour input for fencing the area and moving the huts</li> <li>• Little infrastructural input</li> <li>• Also possible on hilly terrain</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of nutrient leaching</li> <li>• High risk of parasites and pathogens</li> <li>• Strong impacts on the soil structure and grass cover</li> </ul>
<b>CH2</b>	<ul style="list-style-type: none"> <li>• Protection of grass cover</li> <li>• Efficient use of nutrients</li> <li>• Low labour input for fencing the area and moving the trailer</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive investments in infrastructure</li> <li>• High labour input for constructing the self-made trailer</li> </ul>

## Discussion

To protect the health of the soil, it appears that farms are pursuing either land-intensive or infrastructure-intensive systems. If the pigs are integrated into the crop rotation, the influence on soil structure and nutrients can be balanced with tillage and the following crop. When pigs are kept on permanent grassland, the protection of the grass cover has a high priority so that no weeds can develop on the bare soil. Free-range pig production systems should be adapted to the topography of the area and the climatic conditions. Four of six farms work with alternative breeds that are traditionally kept and bred outdoors. These breeds have a pigmentation that protects them against sunburn; they have more hair and higher fat than conventional breeds. These characteristics make them more robust and well adapted to outdoor conditions.

## Suggestions for research and support policies to further develop organic animal husbandry

The combination of indoor and free-range pig farming systems can be further developed. Based on the size and orientation of the farm, the appropriate combined system or innovation should be analysed and selected. This could primarily be a task for advisors from the various organic labels.

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## References

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