Description of Søndergaard farm

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Centre for Herd-oriented Education, Research and Development
Department of Large Animal Sciences
University of Copenhagen

Contents

Introduction

The aim of the PigIT project is to improve the welfare and productivity of weaner and finisher pigs by using advanced ICT methods. Observations of behavioral problems and data related to climate is used to create an early warning system, that can detect patterns reflecting impaired production and welfare. Data is collected from several herds and this is a description of the herd owned by Søren Søndergaard.

The farm consists of a sow unit of approximately 1000 sows and the weaner and finisher production is distributed over 4 different production sites. The annual finisher production is close to 20.000 pigs and around 10.000 weaners are sold for fattening. 9-10 employees are working in the different units and they are of both Danish and foreign nationality.

The herd has a conventional health status, and animals are vaccinated against pneumonia. There is a home production of breeding animals and nucleus management is practiced.

The data collection at this farm is originally related to an experimental project regarding intact tails and the prevention of tail biting. Since data for relevant parameters is already being registered, the data is being included in the PigIT project as well.

Data collection is taking place at only one of the properties owned by Søren Søndergaard. The unit is located at his personal residence in Randbøldal outside of Billund in Jutland. This production site was constructed in 2006. The unit consists of two weaner and two finisher sections, but only one of each is being monitored. Hence, data for both weaners and finishers is available for the PigIT project.

The following report will contain a general description of the experimental conditions at this farm, and it will serve as documentation for the PigIT project.

Chapter 1

Buildings

1.1 Pen design

1.1.1 Weaners

At Søndergaard farm, only one weaner section is used for data collection in the PigIT project, and Figure 1.1 shows the general layout of this weaner section. The section consists of 6 double pens equalling 12 single pens. 4 double pens are used for data collection, and Figure 1.2 is a sketch of the general layout of these pens. Each single pen measures approximately 2.4 m x 5.9 m and contains 40 weaners, and the 8 single pens used in the study are randomly selected at insertion. The floor composition in the weaner pens are 29% solid, 8% drained and 63% slatted, which can be seen in Figure 1.3.

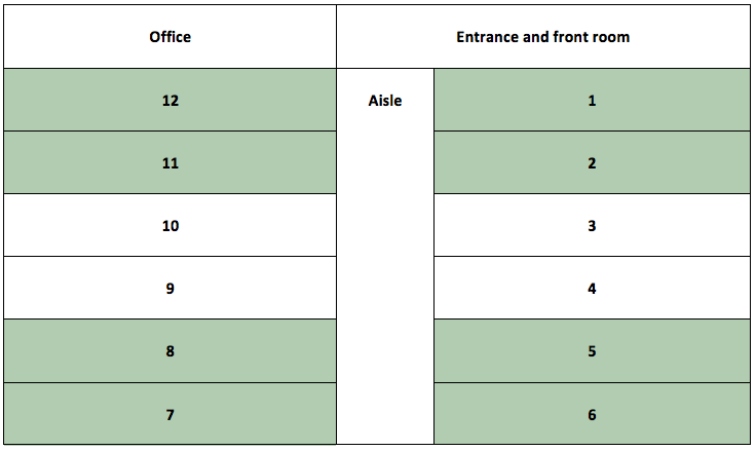

Figure 1.1: Weaner section at Søndergaard farm, where the colored pens where studied at the time of the visit.

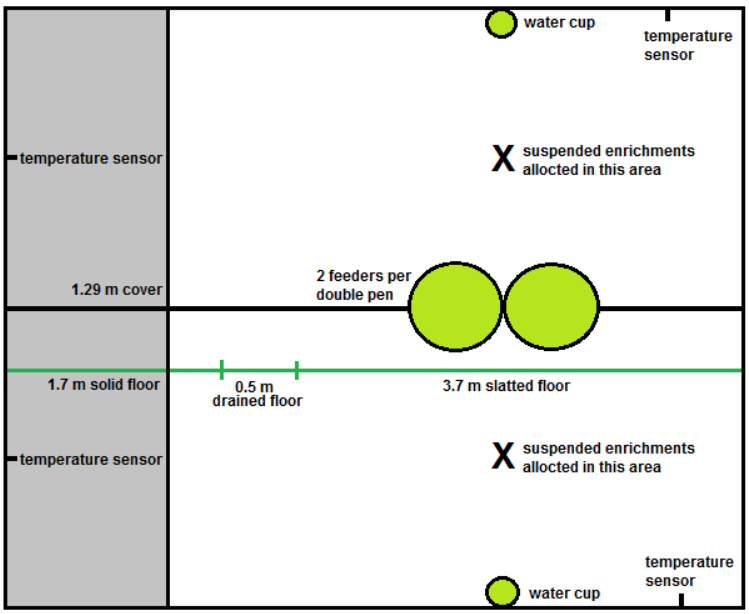

Figure 1.2: General layout of the weaner pens.

Figure 1.3: Floor composition in weaner pens.

1.1.2 Finishers

The finishing unit consists of two identical sections, however only one finishing section is used by the PigIT project. The section consists of 12 double pens equalling 24 single pens, and the general layout of the section is shown in Figure 1.4. Furthermore, Figure 1.5 shows a sketch of the general layout of the finisher pens. Each single pen measures approximately 2.4 m x 5.9 m and there are 20 finishers in each pen. Again, the pens are randomly selected at insertion. The floor composition in the finisher pens is 34% drained and 66% slatted, as can be seen in Figure 1.6. The picture in Figure 1.6 is taken in the finishing section not used for data collection, as the experimental section had been emptied and cleaned at the day of visit. Hence, the section was unfit for documentation purposes, and the analogue section was used for documenting the floor composition and general layout.

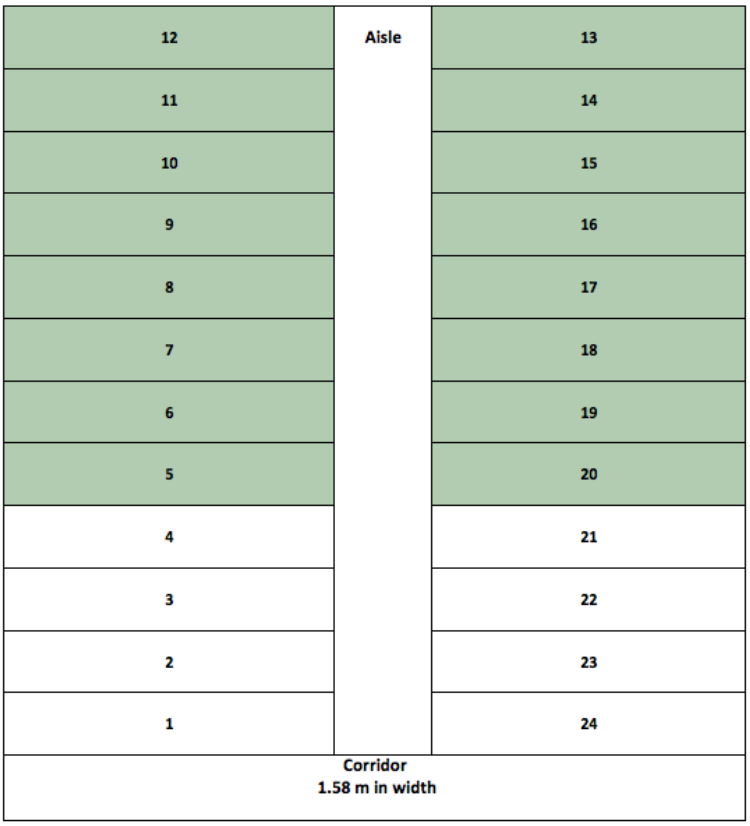

Figure 1.4: Finishing section at Søndergaard farm. At the time of the visit, the section was empty, however, the colored pens in this sketch represent the pens used just prior to the farm visit.

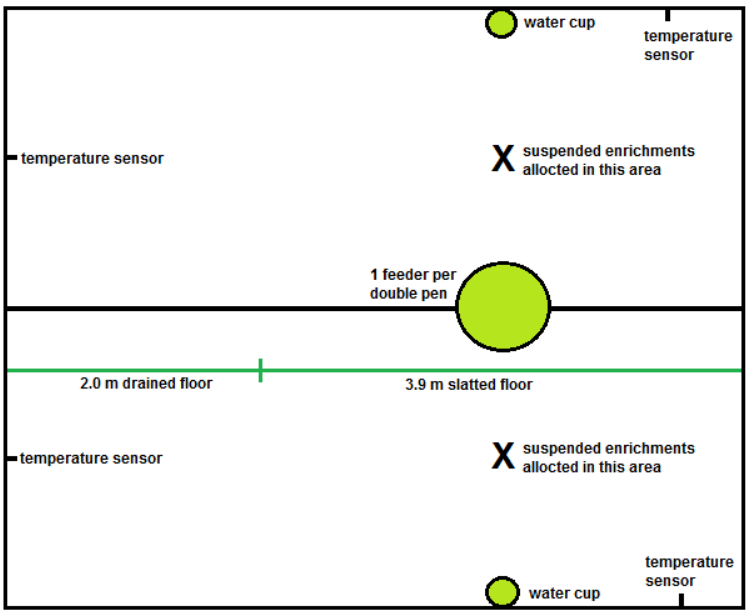

Figure 1.5: General layout of the finisher pens.

Figure 1.6: Floor composition in finisher pens.

Table 1.1: This table shows the installed criteria of the ventilation and overhead showering in both weaner and finishing sections at Søndergaard farm.

Step	**Weaner sections**	**Finishing sections**
Stop at outside temperature	-10 degrees Celsius	-10 degrees Celsius
Temperature at 1 % ventilation	1 degree Celsius	-2 degrees Celsius
Temperature at 100 % ventilation	6 degrees Celsius	6 degrees Celsius
Start of shower cycle	08.00 AM	08.00 AM
Stop of shower cycle	22.00 PM	22.00 PM
Cycle time at 1 % ventilation	01:00:00	01:00:00
Time on at 1 % ventilation	00:01:00	00:02:00
Cycle time at 100 % ventilation	00:30:00	00:30:00
Time on at 100 % ventilation	00:02:00	00:02:00

1.2 Climate

At Søndergaard farm, under pressure ventilation systems are installed in both the weaner and finisher sections, and are controlled by climate computers manufactured by Skov A/S. The climate in the two sections used for data collection, is controlled by the same Dol 234 two-section-control computer shown in Figure 1.7.

Ventilation of the weaner section is facilitated by a pit ventilation system, 18 ceiling inlets and one exhaust fan, as can be seen in Figure 1.8, Figure 1.9 and Figure 1.10. Meanwhile, the finishing section has 38 ceiling inlets and 4 exhaust fans, as seen in Figure 1.11 and in Figure 1.12. Furthermore, all weaner and finisher pens have overhead showers installed above the slatted floor. The ventilation and showering criteria for both the weaner and finishing section can be seen in Table 1.1.

In regards to temperature, the weaner section has floor heating, which is set to 35-40 degrees Celsius at insertion. The heat is turned on for a minimum of 2-3 weeks, and there after, the employees assess whether the section is hot enough for the heat to be turned off. The desired room temperature in the weaner section is 24 degrees Celsius at insertion, and the following weeks, the temperature is lowered by 1.5 degrees per week until reaching 18 degrees. The finishing section does not have floor heating, yet the temperature in the starts at 23 degrees Celsius and is reduced by 1 degree per week until reaching 18 degrees

The production site also has an alarm system installed, which ensures that the sections are ventilated even if power failure should occur. The alarm is also manufactured by Skov A/S, an it can be seen in Figure 1.13. During a power failure, the alarm system will inform the farmer of the problem and the flaps of the ceiling inlets and the exhaust fans will open fully, as to allow fresh air to enter the sections and prevent build up of harmful gasses, such as ammonia.

Figure 1.7: Dol 234 two-section-control climate computer from Skov A/S.

Figure 1.8: Pit ventilation in weaner section.

Figure 1.9: Ceiling inlets in the weaner section.

Figure 1.10: Exhaust fan in the weaner section.

Figure 1.11: Ceiling inlets in the finishing section.

Figure 1.12: Exhaust fans in the finishing section.

Figure 1.13: Alarm system installed at Søndergaard farm.

Chapter 2

Cameras and sensors

For the PigIT project sensors and cameras are placed in the experimentally used pens. There are no differences between the sensor setup in the weaner and finisher pens, hence the description of the sensors and cameras are merged together into one general description.

2.1 Cameras

Cameras are placed in both weaner and finisher pens. The video recordings, see Figure 2.1, are intended for weight assessment and to ultimately quantify the activity and behaviour performed by the pigs. The video recordings are collected by the assigned technician at every visit and sent to Research Centre Foulum to be analysed. A single camera is mounted to the ceiling of every studied pen, hence 8 cameras are installed in the weaner section and 16 in the finisher section. the cameras used can be seen in Figure 2.2. To ensure the best view, the cameras are placed above the center of the solid floor in the back of the pen. This camera view is not obstructed by feeding pipes and other installments, as can be seen in Figure 2.3.

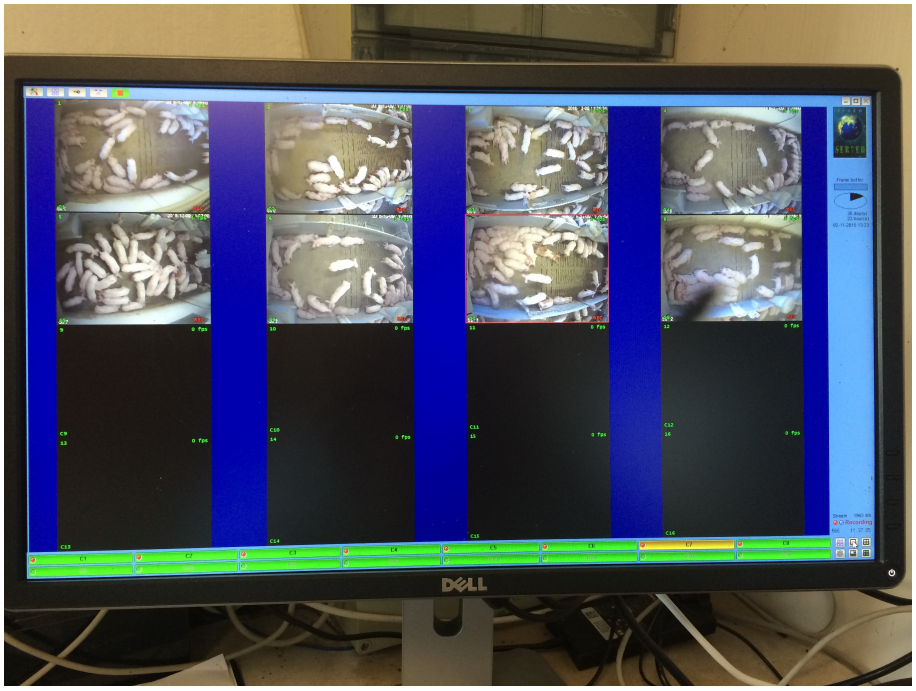

Figure 2.1: Computer interface showing video recordings. The 8 top video feeds show the weaner pens. The video feed for the finishing section is turned off, as the section had been emptied at the visit.

Figure 2.2: Cameras used at Søndergaaard farm.

Figure 2.3: Camera view.

2.2 Sensors

Sensors in the weaner and finisher pens are installed to measure certain parameters at pen level. Sensors collect data on the two following parameters:

- Temperature (at two positions)
- Water consumption

2.2.1 Temperature

Two temperature sensors are placed in each pen. First sensor is placed on the pen wall between the gate and the feeder approximately 0.5 m from the middle aisle, and the second sensor is centered on the back wall. All temperature sensors are placed 40 centimeters above the floor. The placement of the temperature sensors can be seen in Figure 1.2 and Figure 1.5, and pictures of the actual sensors can be seen in Figure 2.4 and Figure 2.5.

The temperature data, which is transferred to a computer placed in the office, is retrieved by the technician at every visit. He collects the data on a USB drive at and sends it to Research Centre Foulum. There, it is entered into a database, which is available to the PigIT project. The computer programme showing the temperature registrations can be seen in Figure 2.6. General data on temperature and humidity is not extracted from the sections' climate computer at this farm, hence not included in the PigIT project.

Figure 2.4: Temperature sensor placed on pen wall.The placement is analogues in finisher pens.

Figure 2.5: Temperature sensor placed on back wall. The placement is analogues in finisher pens.

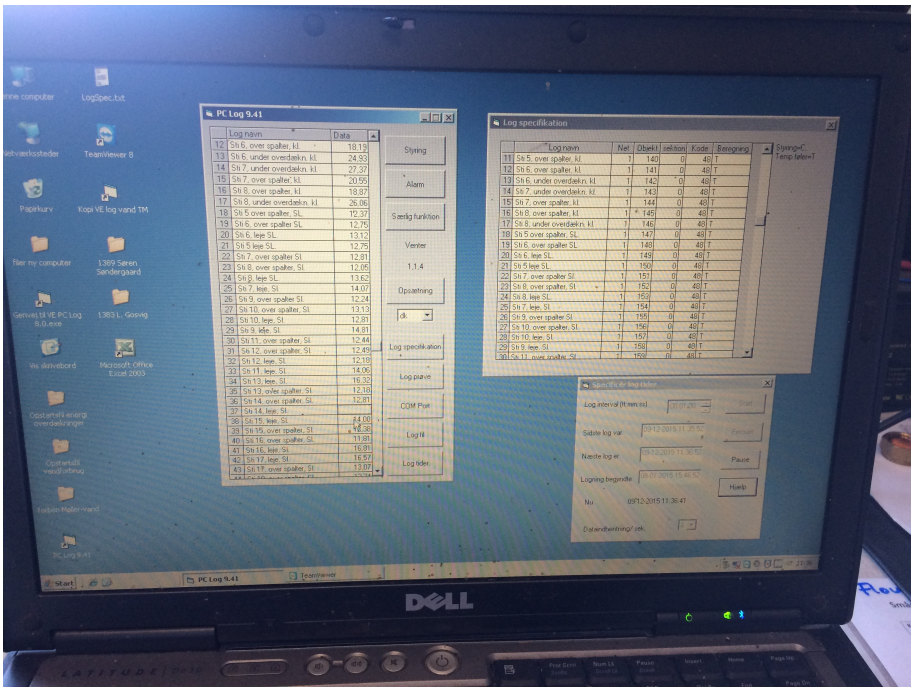

Figure 2.6: Computer interface showing temperature registrations.

2.2.2 Water consumption

Water consumption is indirectly measured by water flow meters. One flow meter is installed for every water cup - one for each of the 8 weaner pens and 16 finisher pens. A flow meter can bee seen in Figure 2.7.

The data used for determining water consumption is also retrieved by the technician and send to Research Centre Foulum. The computer interface showing water flow measurements can be seen in Figure 2.8.

Figure 2.7: Water flow meter installed on the water pipe of a water cup.

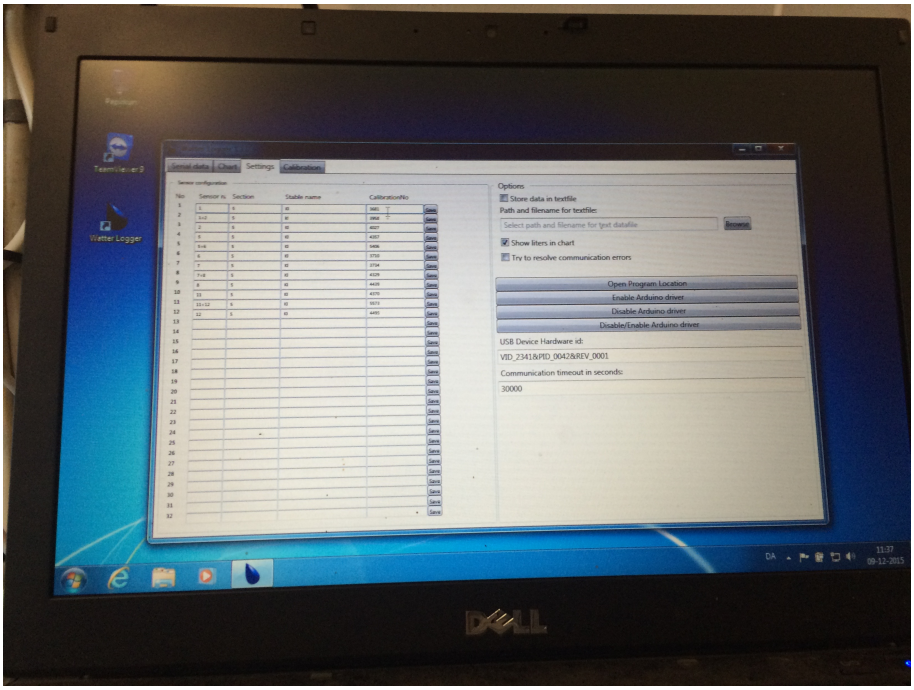

Figure 2.8: Computer interface showing water flow registrations.

Chapter 3

Animals

Every 14th day, after 5 weeks of suckling, weaned piglets will enter the weaner sections weighing approximately 7 kg. The pigs stay for 6 weeks, after which they are moved to the finishing sections and weigh approximately 28 kg. The pigs stay in the finishing sections until they reach the desired slaughter weight of approximately 100 kg. Before inserting pigs into both weaner and finishing sections, all pigs are weighed at pen level using the scale seen in Figure 3.1.

As part of the original experiment, regarding the prevention of tail biting, half of the pigs have intact tails, while the other half serves as controls with docked tails. Hence, 4 studied pens hold weaners with intact tails, while another 4 pens hold the docked controls. The same principle applies to the finishers, where 8 studied pens hold finishers with intact tails and another 8 pens hold the docked controls.

As the original experiment is designed to investigate the prevention tail biting, there is a difference in the allocation of rooting and enrichment materials between pens housing pigs with docked and intact tails. All control pens are provided with standard wooden sticks, as seen in Figure 3.2. Pens housing pigs with intact tails are allocated several different enrichment and rooting materials, which include the following:

- Suspended Biterite
- Febrimin
- Wood shavings
- Straw in restricted quantities
- Pelleted alfalfa green meal
- Sisal rope tied
- Wooden sticks (allocated loosely on the floor)
- Suspended wooden sticks in chains
- Mineral block

Figure 3.1: Scale used for weighing pigs before insertion into a new section.

Figure 3.2: Enrichment and rooting material in control pens consist of standard wooden sticks.

Figure 3.3: Suspended enrichment materials in weaner pens housing pigs with intact tails.

Figure 3.4: Suspended enrichment materials in finisher pens housing pigs with intact tails.

Figure 3.5: Cart containing wood shavings, pellets of alfalfa green meal, straw and sisal rope.

Chapter 4

Feed

4.1 On farm mixing

Both weaners and finishers are fed on-farm mixed dry feed. The used mixing equipment is located in the neighbouring barn, and includes a Big Dutchman feeding computer, two identical mixing vessels and a combined grain cleaner and roller mill. The equipment can be seen in Figure 4.1 and 4.2.

Figure 4.1: Big Dutchman feeding computer used at Søndergaard farm.

Figure 4.2: Combined grain cleaner and roller mill. Mixing vessel no.1 can be seen in the background.

Table 4.1: Content of the first dry feed diet allocated to weaners at Søndergaard farm.

Ingredients	**Percentage, %**
Homegrown wheat	64.50
Soy protein concentrate	12.50
Standard fish meal	5.00
Vegetable fat from soy	3.00
Vitfoss mineral mixture, 6-9 kg	15.00

Table 4.2: Content of the second dry feed diet allocated to weaners at Søndergaard farm.

Ingredients	**Percentage, %**
Homegrown wheat	66.03
Soy protein concentrate	7.50
Soybean meal	17.27
Vegetable fat from soy	2.30
Vitfoss mineral mixture, 9-15 kg	6.90

4.2 Diets

4.2.1 Weaner diets

The weaners receive 3 different dry feed diets during their stay in the weaner section. The first mixture is given at insertion to pigs weighing 6-9 kg and the content can be seen in Table 4.1. The second feed mixture is given when the weaners weigh 9-15 kg, and the content is shown in Table 4.2. The third and last weaner dry feed diet is given when the pigs weigh 16-30 kg, and the content is shown in Table 4.3.

Table 4.3: Content of the third dry feed diet allocated to weaners at Søndergaard farm.

Ingredients	**Percentage, %**
Homegrown wheat	65.94
Soybean meal	25.56
Vegetable fat from soy	1.60
Vitfoss mineral mixture, 9-15 kg	6.90

Table 4.4: Content of the first dry feed diet allocated to finishers at Søndergaard farm.

Ingredients	**Percentage, %**
Mixture of homegrown grains	77.90
Soybean meal	18.50
Vegetable fat from soy	0.50
Vitfoss mineral mixture	3.10

Table 4.5: Content of the second dry feed diet allocated to the finishers at Søndergaard farm.

Ingredients	**Percentage, %**
Mixture of homegrown grains	81.40
Soybean meal	15.00
Vegetable fat from soy	0.50
Vitfoss mineral mixture	3.10

4.2.2 Finishers

The finishers receive 2 different dry feed diets during the finishing period. Both finisher diets contain a mixture of home-grown grain, which consists of 50% wheat, 25% barley, 20% rye and 5% oats. The first diet is allocated from insertion to the finishing section, when the pigs weigh 30 kg, and they receive this diet until they reach approximately 70 kg body weight. The content of the first finishing diet can be seen in Table 4.4. The second diet is allocated when the finishers weigh approximately 70 kg, and they will receive this diet until reaching slaughter weight. The content of the second finishing diet is shown in Table 4.5.

4.3 Feeding

At Søndergaard farm, pigs are fed ad libitum from weaning until slaughter. At this production site, the feeders installed are so called "Funkimats", and the weaners have access to two feeders per double pen, while finishers only have access to one per double pen. The feeders can be seen in Figure 4.3 and 4.4.

Figure 4.3: Funkimat feeders in weaner pen.

Figure 4.4: Funkimat feeder in finisher pen.

Chapter 5

Labor and management

At this farm site, one permanently employed worker takes care of both weaners and finishers on a daily basis. He and a technician from SEGES carry out the collection of data. Every day the employee observes and records the following parameters:

- Diarrhea
- Pen fouling
- Tail biting
- Removal and insertion of pigs

The observations are recorded manually using a designed table, which can be seen in Figure 5.1. At this farm, observations are recorded using pen and paper, and are later translated into registered data by the assigned technician. Afterwards, the data is send to Research Centre Foulum and entered into a database, which is then assessable to the PigIT project. The technician and employee calibrate their observations at every insertion of new weaners, and again when the weaners are moved to the finishing section.

The protocol for the observations is described by Lyderik et al. (2016).

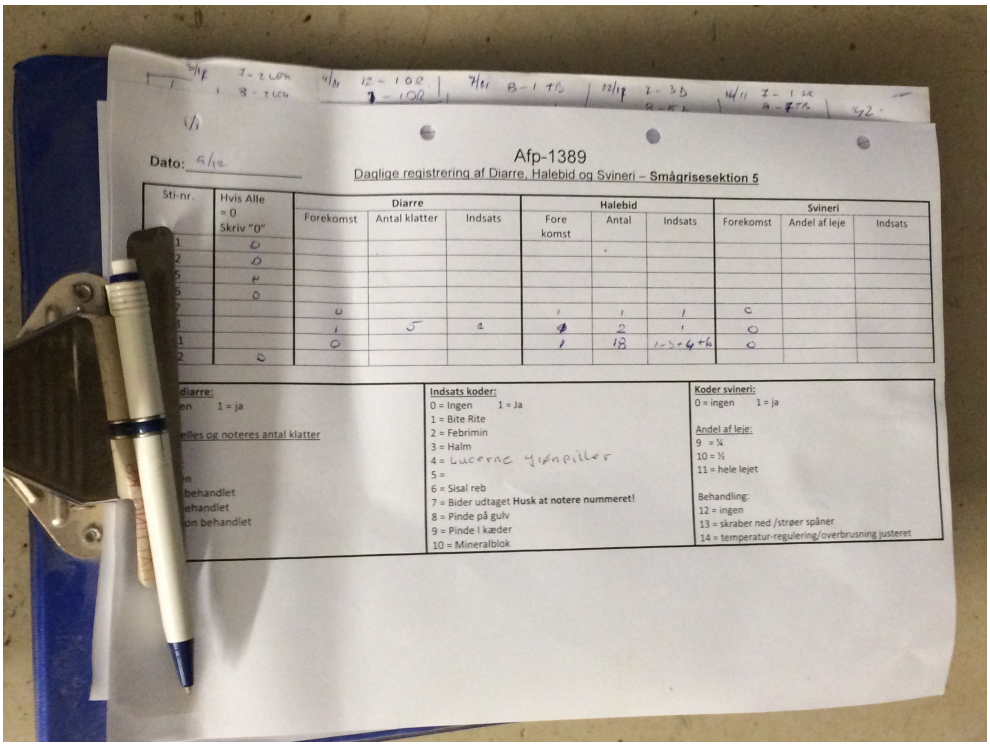

Figure 5.1: Table used for recording the daily observations at Søndergaard farm.

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K. K. Lyderik, H. M.-L. Andersen, H. H. Kristensen, and L. J. Pedersen. Protocol for daily observations in the herds of the PigIT project. PigIT Report 8, The PigIT project, Department of Large Animal Sciences, 2016.

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