BalticSea2020

A healthier Baltic Sea will require many measures

Reduced nutrient load of Phosphorus (P) and Nitrogen (N), from industrial animal husbandry, is one of several measures
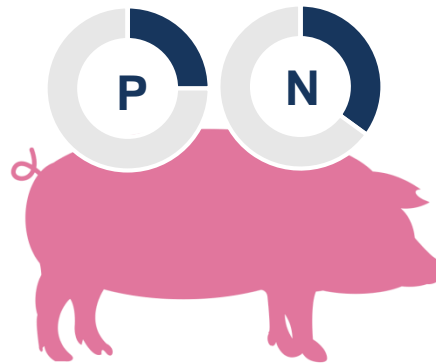
A few facts about industrial animal production

10%

P   **N**

Many large animal farms produce as little as **10%** of the food needed for their own production.

The rest is imported

The pig consumes about **25%** of the (P) and **35%** of the (N) given through the food to grow. The rest of the nutrients are lost to manure and air

Like humans, the pig is an inefficient production system!

The manure is diluted with cleaning water, rain water etc. which makes it difficlut to handle

(TS 4-6%)

But, if managed correctly it becomes a valuable resource!

About "our" farm

Production numbers

- 60 000 piggs (100-110kg) per year

- Approx. 900h of arable land for fodder production

(To achieve a circular nutrient management the farm would need approx. 3500h of arable land)

Challenges

- Produces approx. 55.000m3 of manure yearly

- More that 60% of all Nitrogen is lost to the air as ammonia.
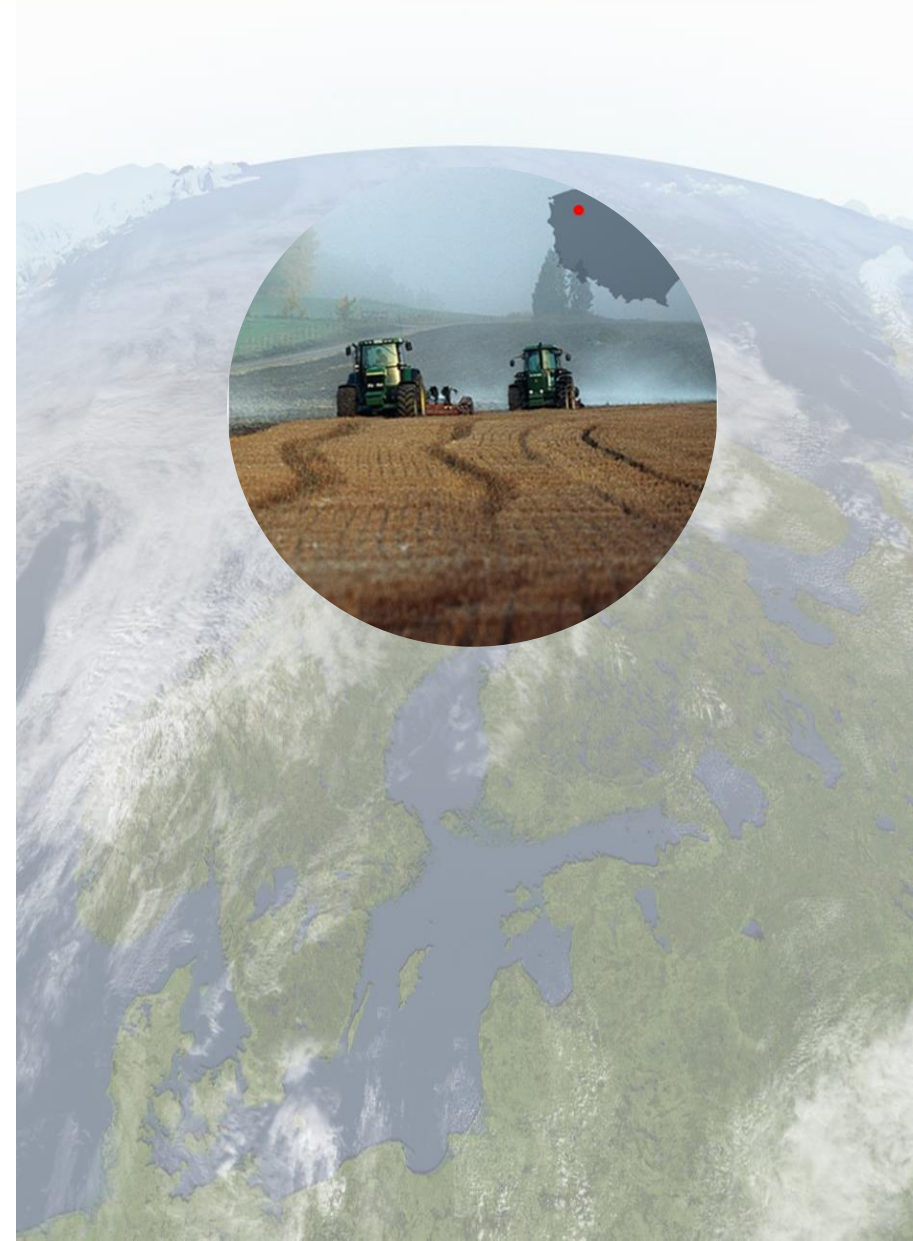
- No Phosphorous management at all

Farm balans before measures

490kg/h Nitrogen   (Nitratedir. Max **170**kg/h N)

95kg/h Phos.   (HELCOM. Max **25**kg/h P)

Some of the local challenges

- The farm already fulfilled the legal requirements set by the EU

- Economic reality overshadow ambitions, weak profitability spurs low ambitions "the consumer get what they pay for"

- The knowledge of the circulation of plant nutrients is generally low

- (Language difficulties)

- No demand for technical solutions, therefore low expertise in the country

Our objectives

Objective

Minimal losses if nutrients (P & N) outside current legislation and recommendations

How

Use cost efficient best practices and no chemicals

Dissemination

Scientific monitoring, popularized white book and demonstration capabilities

How the program was set up

1 Identify and evaluate technologies for treating, storing and spreading manure <u>on the farm</u> and <u>nearby farms</u>
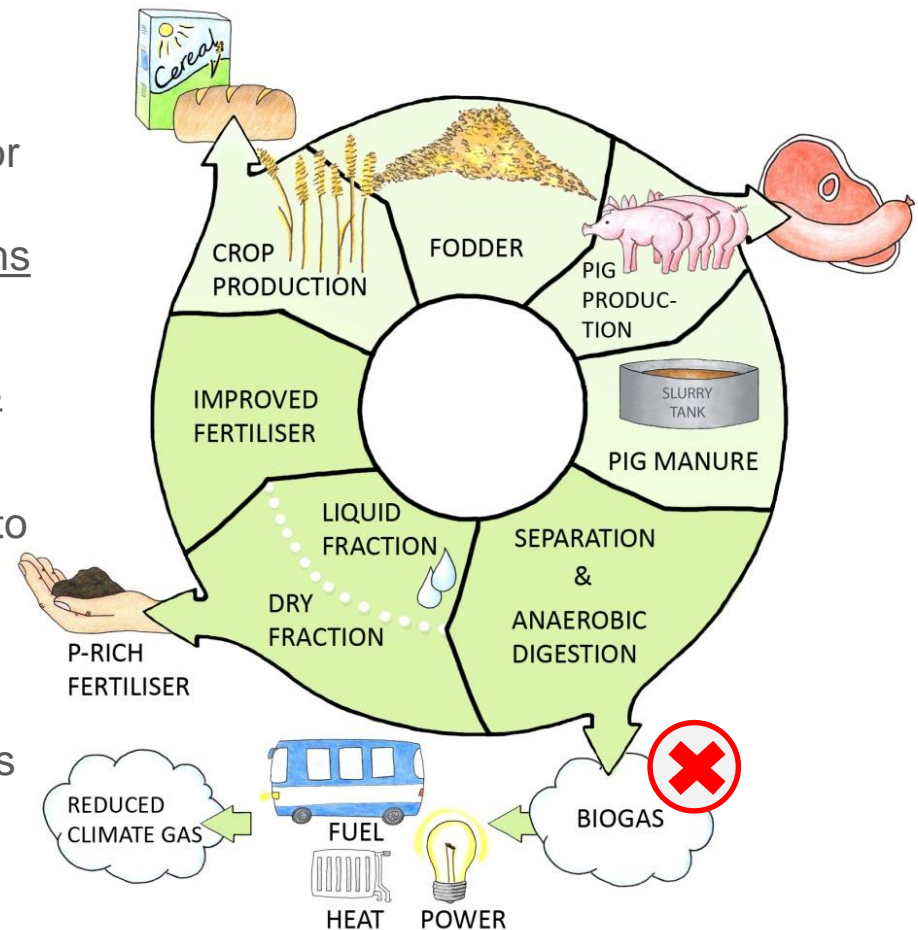
2 Measure and optimize nutrient flows through application of <u>farm balances</u> and <u>plant growth plans</u>

3 Scientific program by SLU & IMGW to measure <u>nutrient flows</u> and assess and optimize the <u>system</u> <u>efficiency</u>

4 Executed in close cooperation with the technology providers, universities and farmers
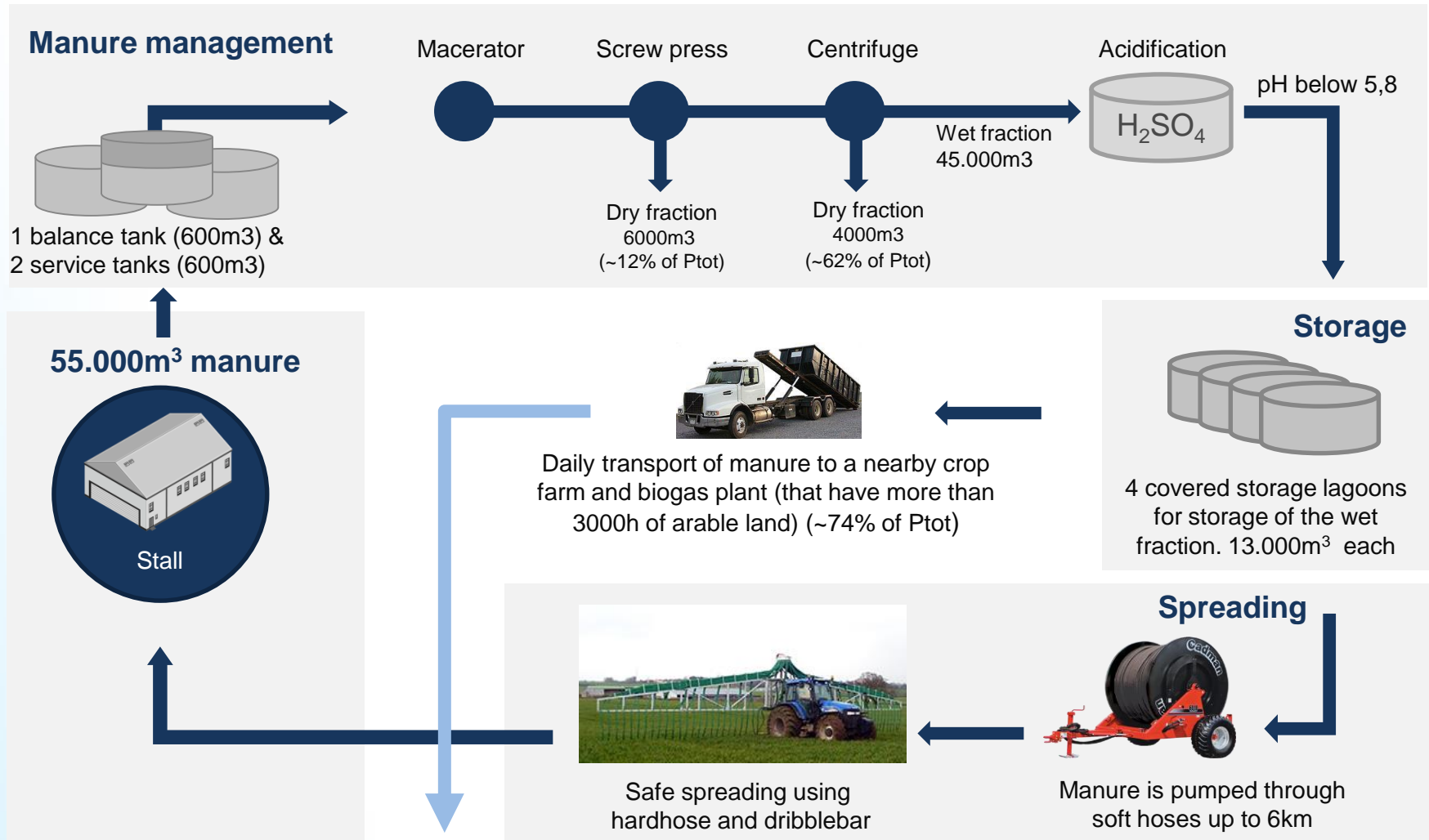
Legal manure storage within EU 2018 (approx. 40 000m3)

The manure management system

Manure management

Macerator   Screw press   Centrifuge   Acidification

pH below 5,8

H_2SO_4

Wet fraction
45.000m3

1 balance tank (600m3) &
2 service tanks (600m3)

Dry fraction
6000m3
(~12% of Ptot)

Dry fraction
4000m3
(~62% of Ptot)

55.000m^3 manure

Stall

Daily transport of manure to a nearby crop
farm and biogas plant (that have more than
3000h of arable land) (~74% of Ptot)

Storage

4 covered storage lagoons
for storage of the wet
fraction. 13.000m^3 each

Spreading

Safe spreading using
hardhose and dribblebar

Manure is pumped through
soft hoses up to 6km

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Storage today
4x 13.000m3 = 22 olympic swimingpools

Results so far – meat production in balance with nature

- P is down to from 95kg/h to 26-28kg/h through mechanical separation only
  - Excess P rich dry fraction is transported daily to nearby farms
  - Sales of excess dry fraction to local biogas plant

- N is retained in wet fraction. Pot and field experiments show that enough N is bound to grow strong plants (reduction of mineral fertilizer up to 50%)
  - Other benefits are reduced odor through acidification

- Farm visits are possible from 2018 and the white book will be completed 2019 including the scientific studies by SLU.

A few words about investments and costs

Direct investment costs

Technology incl. lagoons	1,25m €
Ground works and buildings	280t €
Total	**1,53m €**

Project specific costs

Technology trials	30t €
Nutrient balance and fertilizer plan	30t €
Scientific monitoring and optimization	190t €
Utility costs and project mngmt.	190t €
Total	**440t €**

Operational costs

Yearly operational cost incl. Salaries, technology parts and service, Utility and project mngmt.	38t €
Total	**38t €**

Operational benefits

Reduced purchase of mineral fert.	30t €
Reduced cost for spreading (machine parts and salaries)	10t €
Total	**40t €**

Results

Approx. 46t kg P is made available

Market cost for 1kg P	**2,2€**
Cost for 1 kg captured P	**3,6€**
Cost for capturing 1 kg P in ditch dams	**300-500€**

Summary of some benefits and risks

Benefits

- Phosphorous is made available, not bound or taken out of circulation

- Increased capture of nitrogen

- Cost efficient P management compared to other measures

Risks

- Cash flow must be monitored

- Changes in legislation

- The chain is easily broken – P is missmanaged or missplaced

Thank you!

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