



# Applicability and sustainability of products from processed manure

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## Introduction

Surpluses of animal manure in the Netherlands → caused by intensive livestock farming and imports of animal feed

The surplus of phosphorus (P) is higher than that of nitrogen (N) and potassium (K) → **surplus on national P balance**

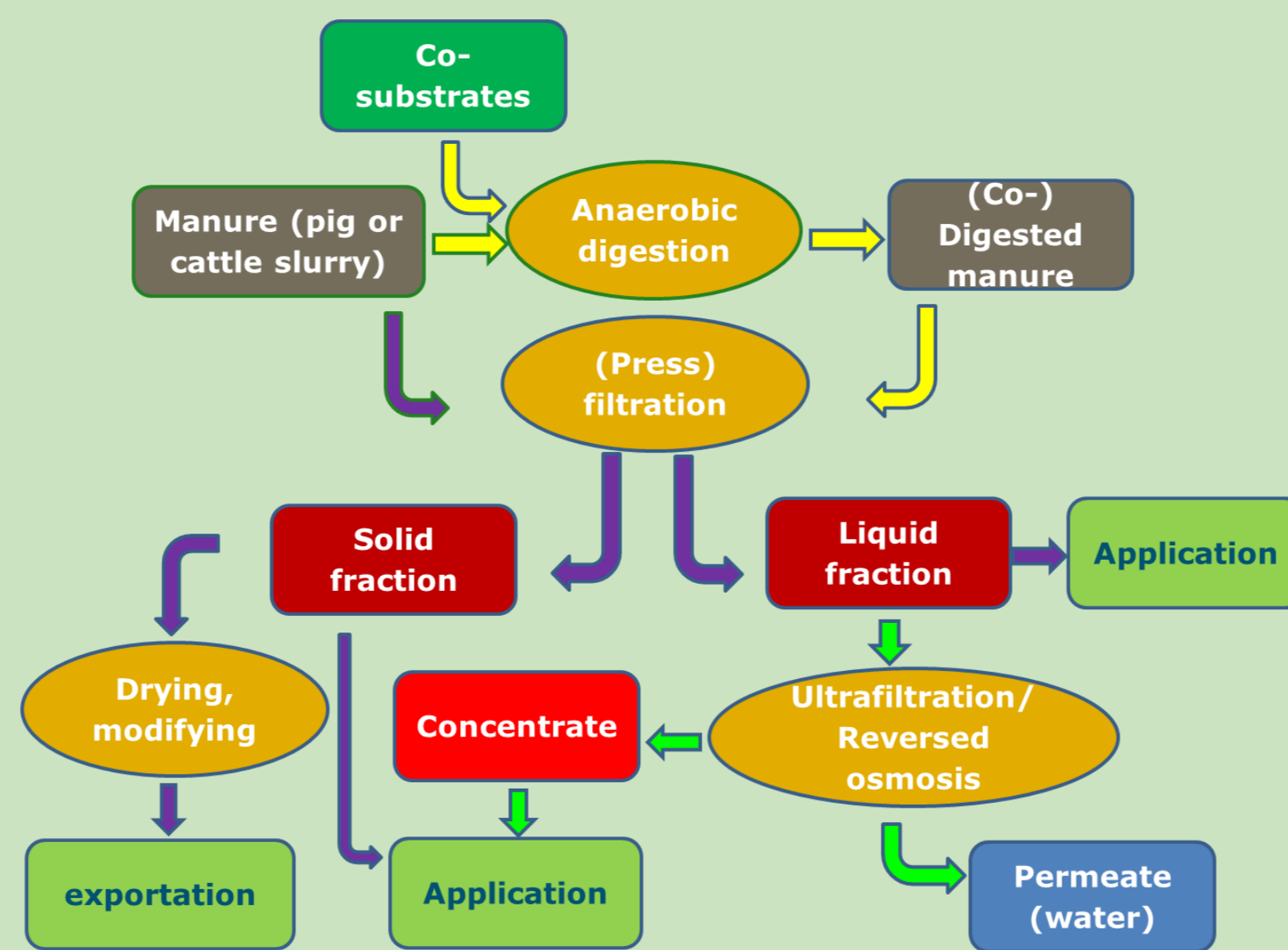
Increased interest in manure processing because of:

- Better defined products
- Separation of N, K ↔ P, organic matter
- Efficiency of nutrient use may be improved

## Objectives

- Characterisation of products of processed manure
- Applicability in fertilization plans of arable farms
- Evaluation of sustainability

## Manure processing in the Netherlands

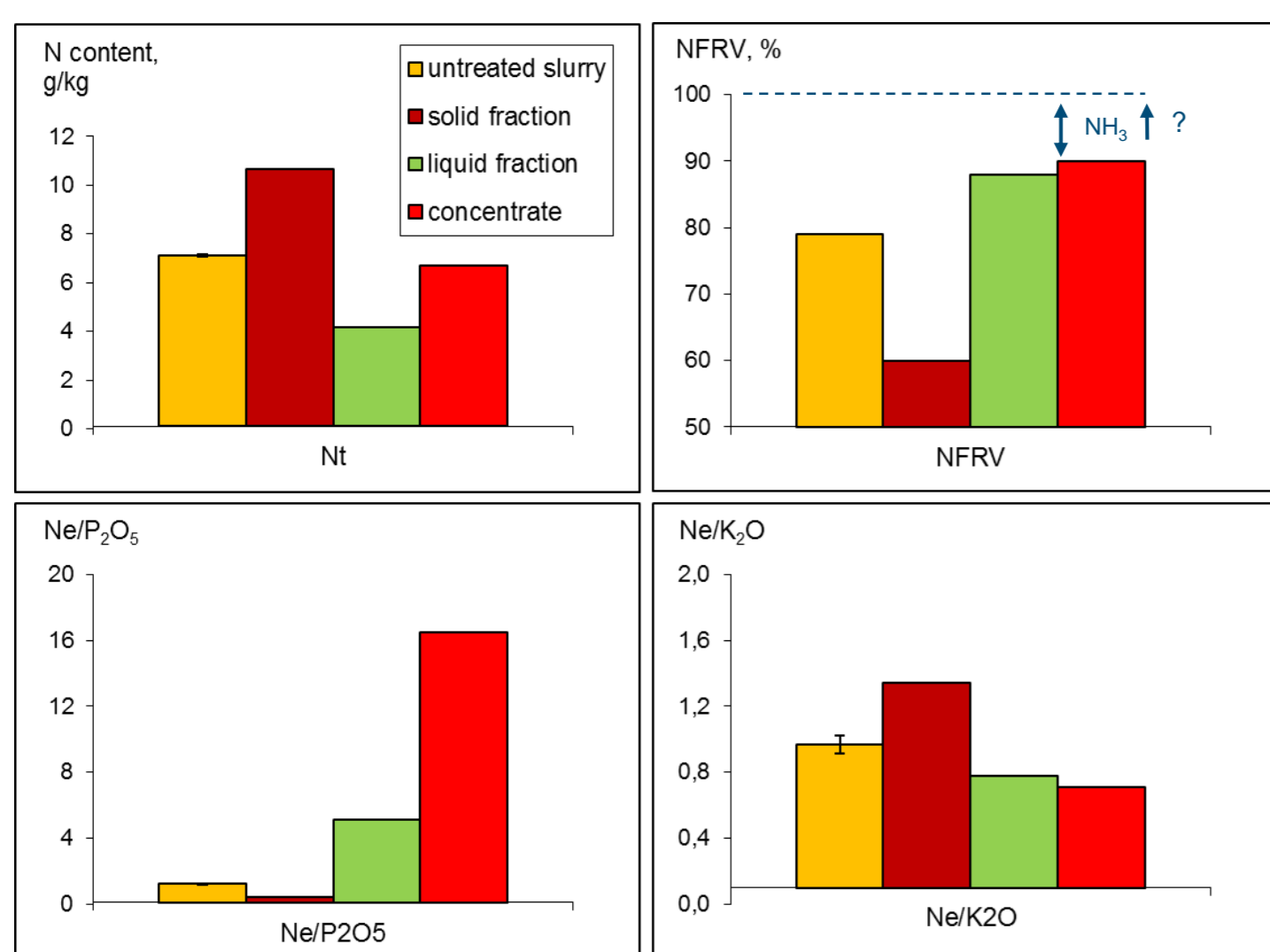


## Activities - methods

- Selection of products to be considered
- Characterisation of products of processed manure, e.g.
  - Nutrient contents, N fertilizer replacement value
  - Dry matter, organic matter contents, pH, etc.
- Applicability on arable farms, based on
  - Properties of products from processed manure
  - Nutrient requirement of crops / soil types of various model farms in NL
- Sustainability of products, based on
  - Energy consumption
  - Greenhouse gas (GHG) emissions
  - Ammonia volatilization

## Properties of products from processed pig slurry

- NFRV= N-fertilizer replacement value (N availability in comparison with Calcium Ammonium Nitrate)
- Ne= effective N, calculated as total N \* NFRV



## Nutrient requirement of arable crops

- Based on fertilizer recommendations
- Differs between crops, soil type and nutrient availability in soil (variation regions / fields)

	Ware potatoes (basal application)	
	clay	sand
kg N/ha	175	175
kg P <sub>2</sub> O <sub>5</sub> /ha	85	0
kg K <sub>2</sub> O/ha	170	120

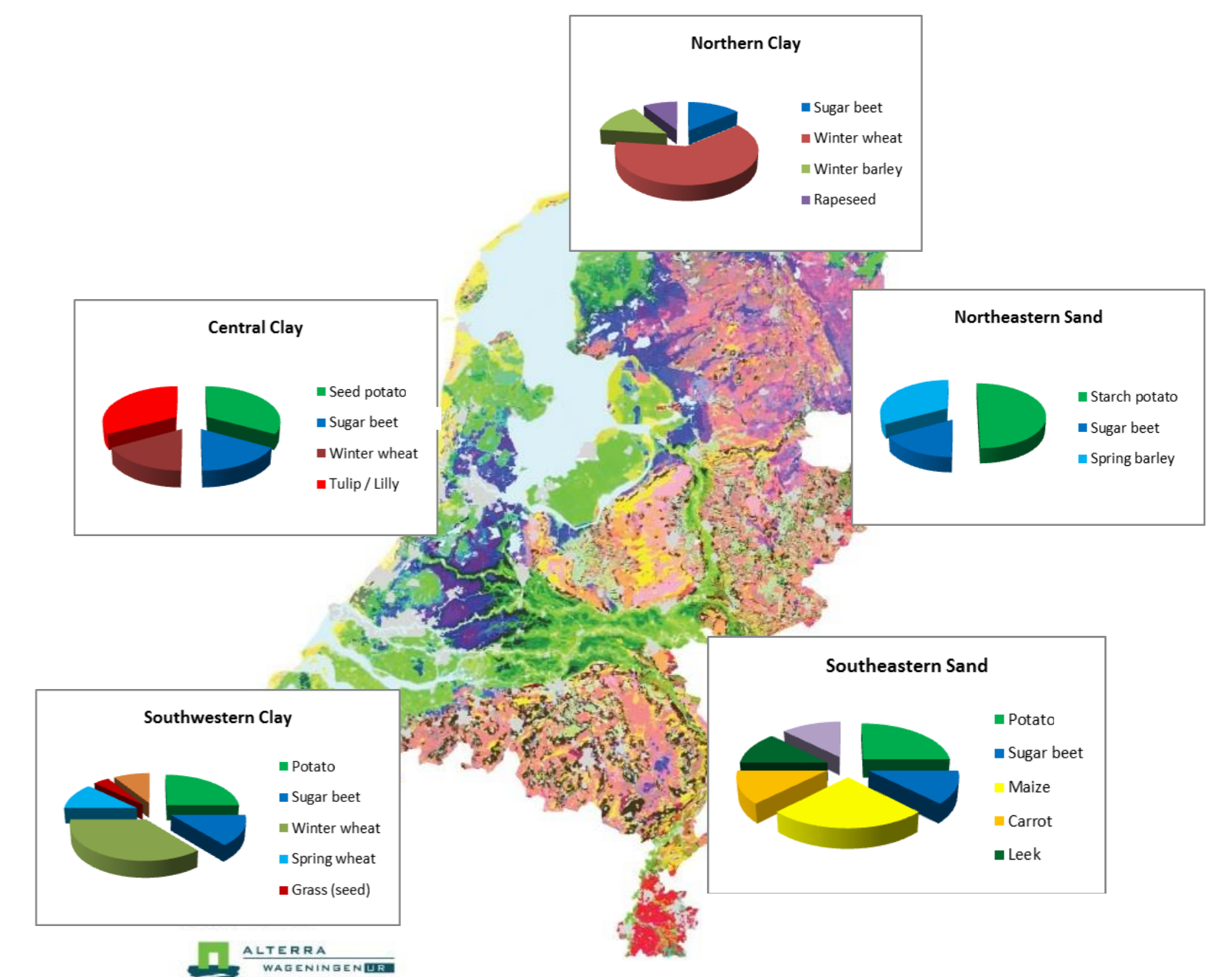
	Sugar beets	
	clay	sand
kg N/ha	150	150
kg P <sub>2</sub> O <sub>5</sub> /ha	40	0
kg K <sub>2</sub> O/ha	45	120

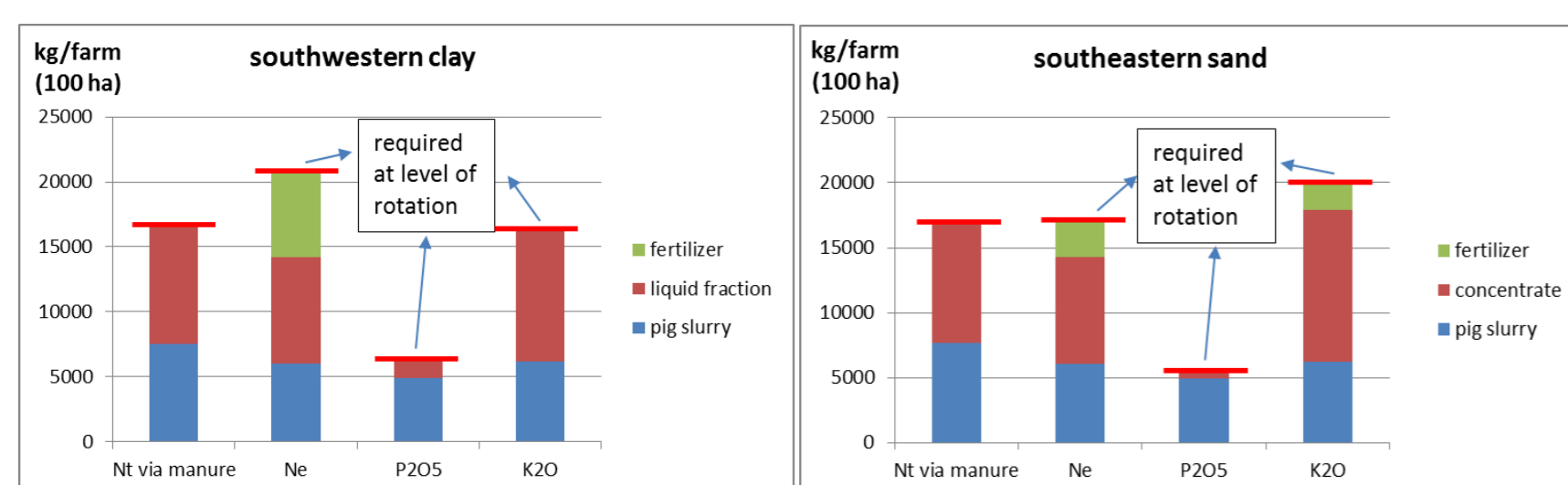
	Winter wheat (basal application)	
	clay	sand
kg N/ha	100	100
kg P <sub>2</sub> O <sub>5</sub> /ha	0	0
kg K <sub>2</sub> O/ha	0	0

## Do products fit in fertilization plans of arable farms?

Regional differences: soil types and crop rotations



## Liquid fraction / concentrate: in addition to pig slurry



### Southwestern clay

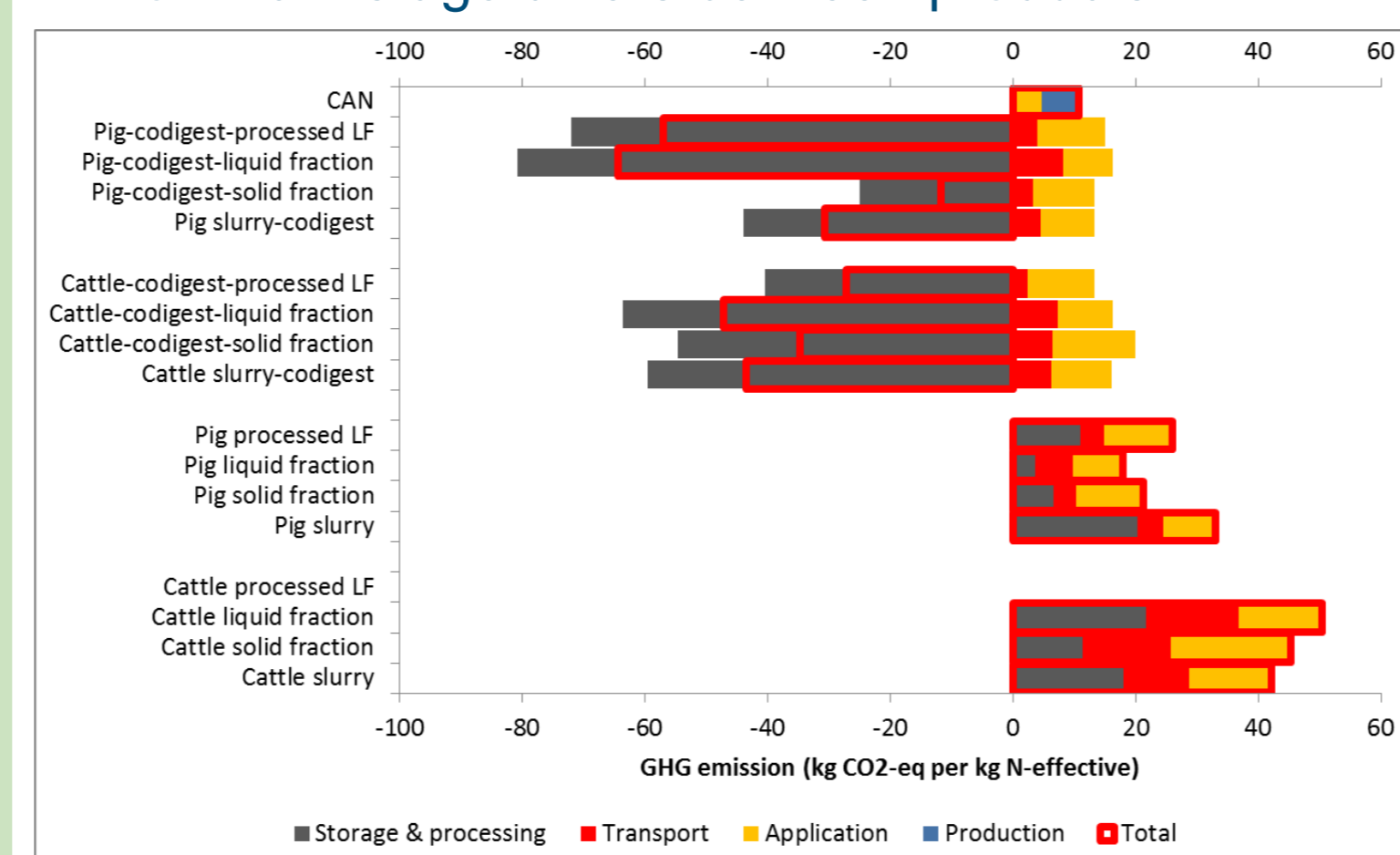
- Pig slurry is often used as a base fertilizer on farms
- Oversupply of P should be overcome
- liquid fraction in addition to untreated pig slurry
- Application in spring:
  - Risk for soil compaction
  - Logistics should receive attention

### Southeastern sand

- Pig slurry is maximally used as a base fertilizer on farms
- P supply ≈ 90% of requirement → prevent oversupply
- concentrate (very low in P) in addition to pig slurry
- Attention to logistics in spring is needed

## Sustainability: Greenhouse gas emissions

- GHG emissions during / after production, storage and processing, transport and application
- Digestion leads to negative GHG emissions → production of CH<sub>4</sub> = prevention of CO<sub>2</sub> emission
- Dominant stage differs between products



## Conclusions

- N/P and N/K ratio determine the applicability of products in addition to untreated pig / cattle slurry
- The applicability of liquid fractions and concentrates in the fertilizer plans of Dutch arable farms is rather good
- N fertilizer replacement values of liquid fractions and concentrates are < 100%, because of NH<sub>3</sub> volatilization
- The required large volumes of liquid fractions / concentrates hamper the applicability, esp. on clay soils
- The high P content in solid fractions limits its' applicability in addition to untreated pig / cattle slurry.

## Recommendations

- The applicability of liquid fractions and concentrates will be improved if the N and K concentrations are increased
- The solid fractions should preferably be modified (e.g. dried) and exported, because of the P surplus in NL