



# CIRCULAR ECONOMY SOLUTIONS FOR SUSTAINABLE FOOD & FEED PRODUCTION



# EFFPA – General Information

- Founded in January 2014
- Closely related to FEFAC (European Feed Manufacturers Association)
  - EFFPA associate member to FEFAC
  - FEFAC hosts EFFPA's secretariat
- An estimated 5 million tons of former foodstuffs processed every year in Europe
- Potential for a significant increase of volumes is still possible based on current practices and current strategic planning of the EC towards food waste reduction



- FULL MEMBER
- ASSOCIATE MEMBERS
- OBSERVER MEMBERS





**10 YEARS ANNIVERSARY**

**Circular Economy Solutions for Sustainable Food & Feed Production**

19 October 2023 – ACE Events, Brussels

# What are former foodstuffs?

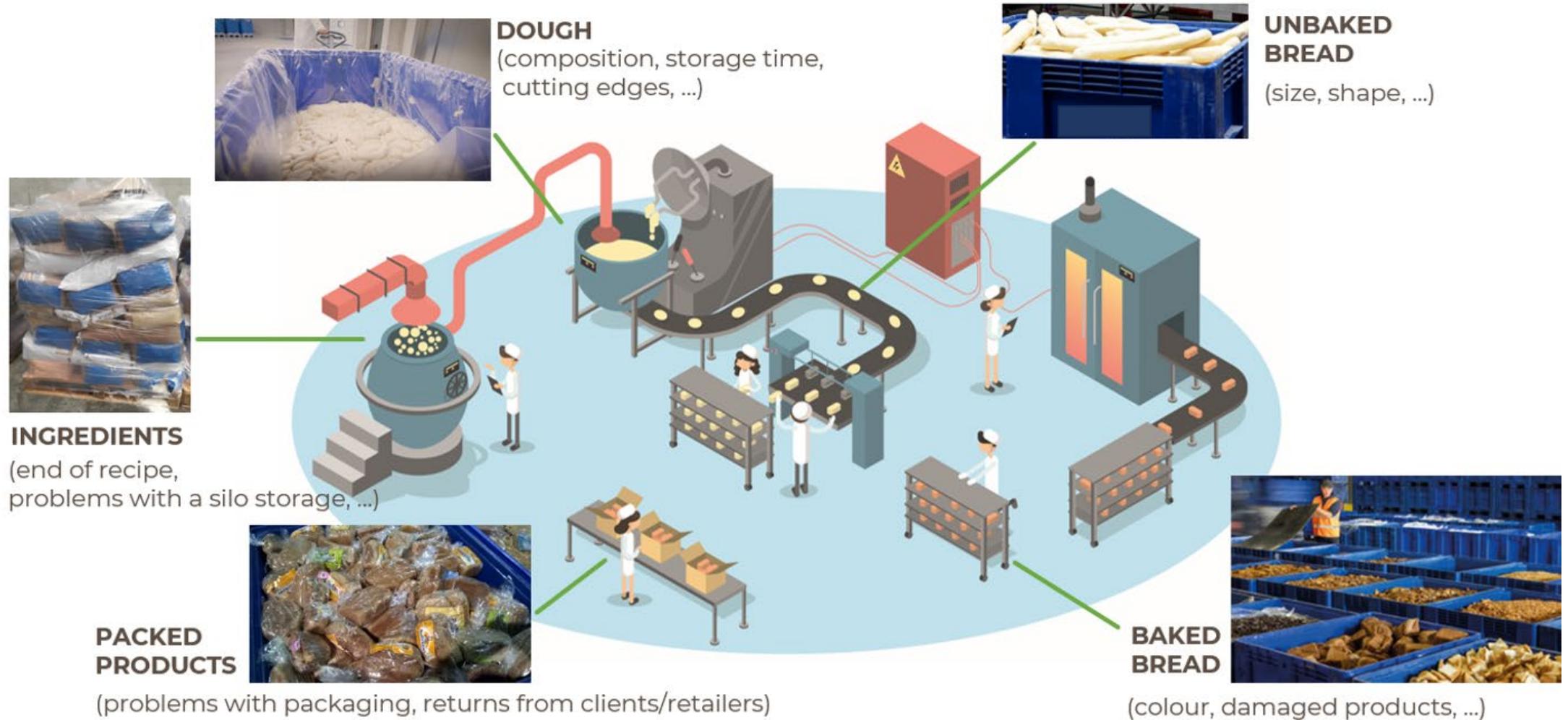
## Food losses unintentional and unavoidable:

- 95% of material collected intermediate/unfinished/incorrect products, mostly collected from the food industry
- Seasonal products (Easter, Christmas, Halloween, etc)
- Products removed from the market only for commercial reasons. Responsibility of food manufacturers/retailers to consider donation to food banks where possible

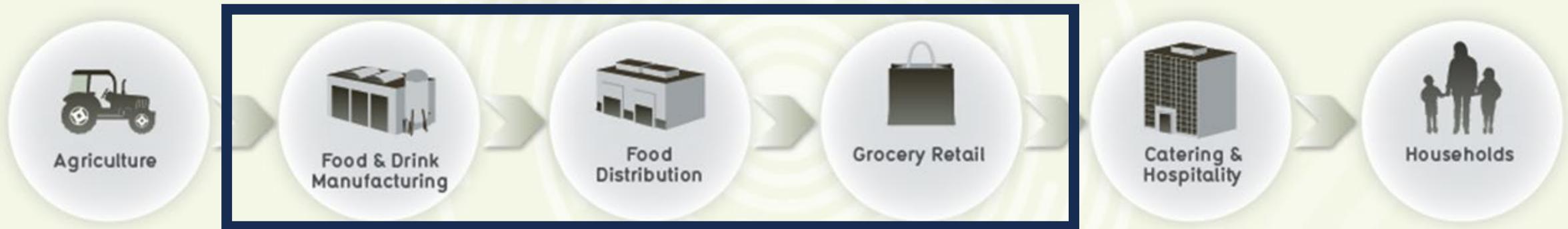
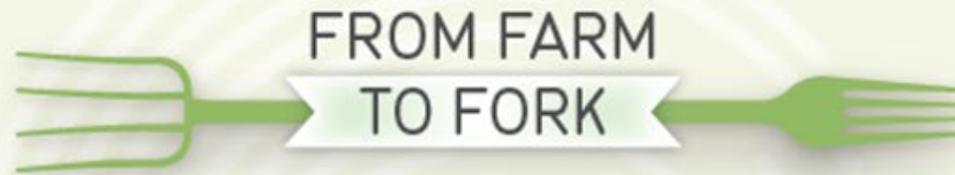
## Properties:

- These products are never 'waste', but valuable feed materials, and food manufacturers/retailers must treat them as such
- High dry matter and high energy (sugars, fats, cooked starches)
- Examples: bread, biscuits, chocolate, pasta, pastry, confectionary, breakfast cereals, crisps, syrups, yoghurts

# What are Former Foodstuffs (FF)



# Origin of former foodstuffs



**EFFPA**



**TRACEABILITY**

**HACCP**

**EFFECTIVE  
DEPACKING  
PROCESS**

**CONTINUOUS  
QUALITY  
TESTS**

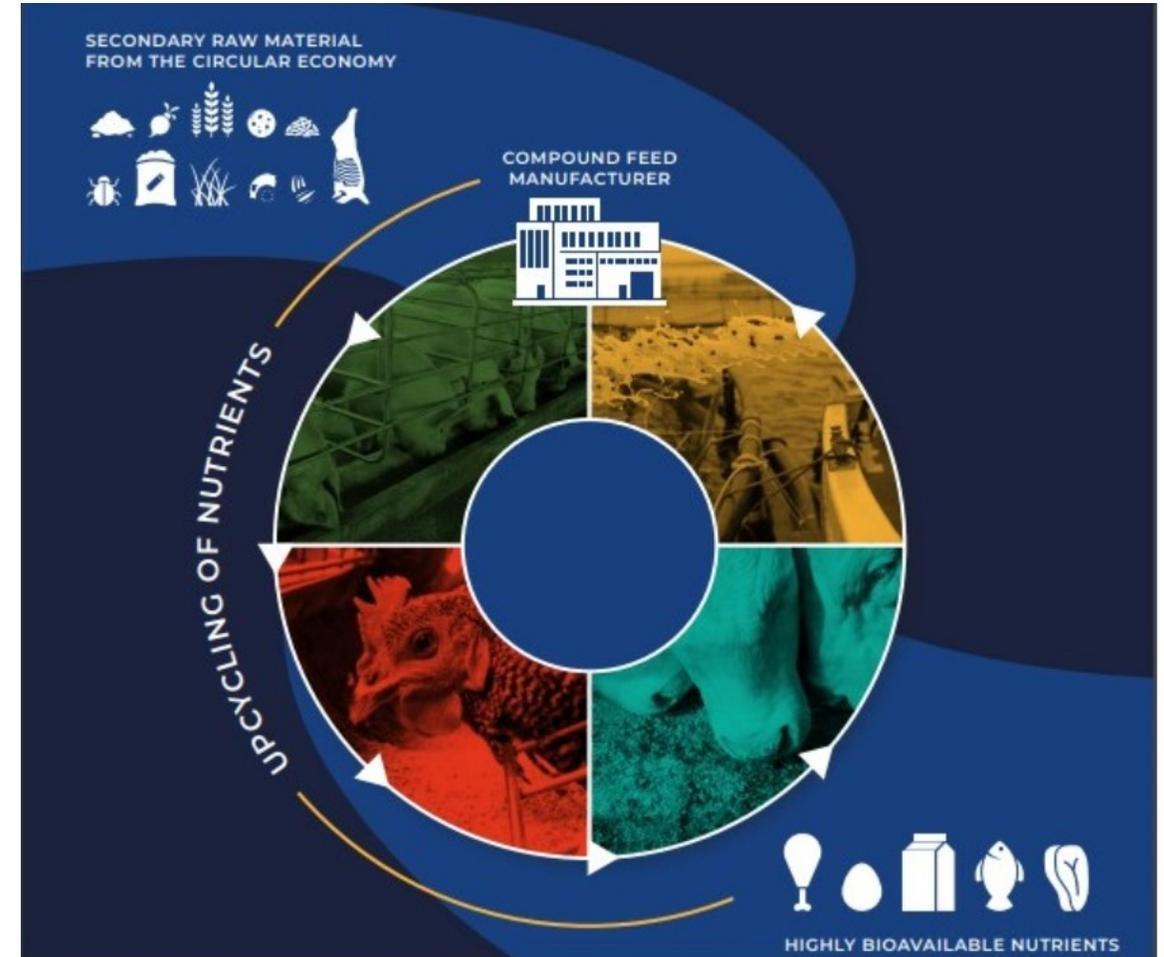
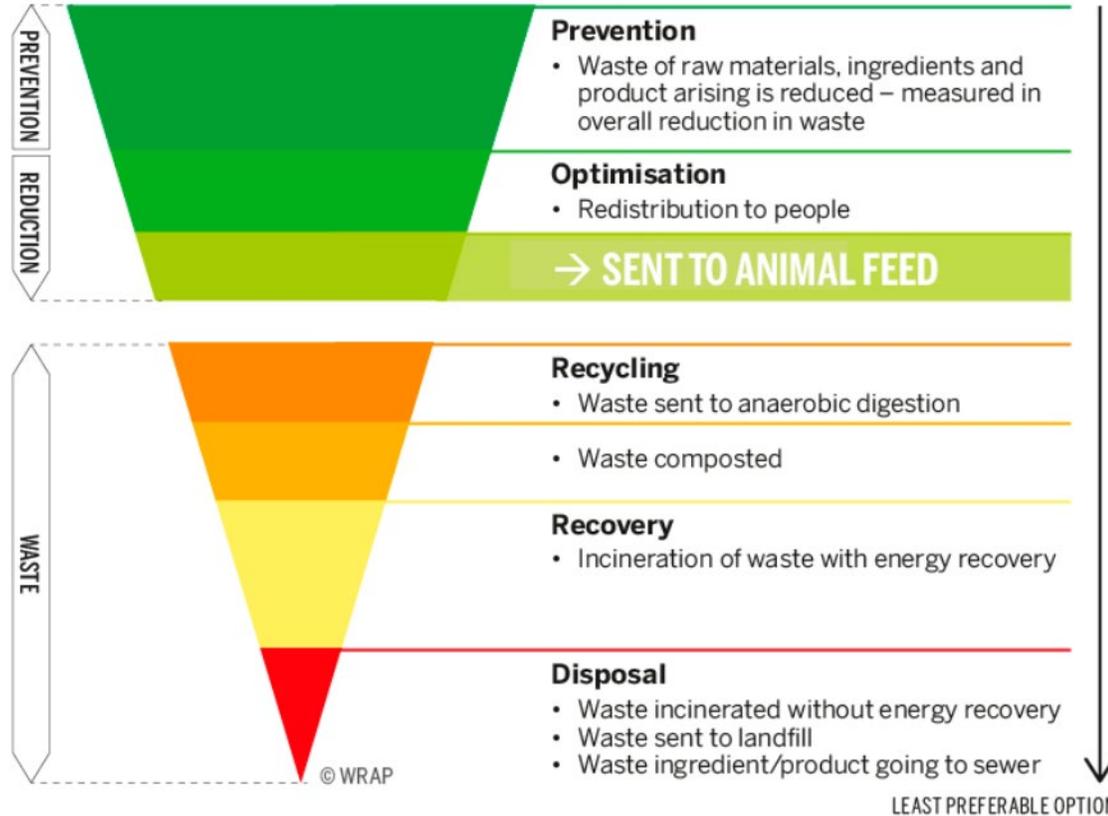
# The Final Product: An ingredient of the complete feed



# Sustainability: TWO SIDES OF THE SAME COIN

## Food and drink material hierarchy

MOST PREFERABLE OPTION



# Former foodstuffs in pig feed

Nutrition & Sustainability

# Key aspects

- Pigs are traditionally farm animals that has good physiological capabilities to digest residual biomass flows, including former foodstuffs
- Processed former foodstuffs are particularly common in piglet feed formulation, due to nutritional needs for high energy feedstuffs
- Compared to other farm animals, pigs are a more common destination also for liquid former foodstuffs

# Nutritional value in feed of former foodstuffs underpinned by research

- 30% inclusion former foodstuffs in growing/finishing pigs (University of Milan)
  - No detrimental effects on growth performance or live body/carcass composition<sup>1</sup>
  - Changes fatty acid profile, no significant difference in amino acid profile, no negative effects on technological/nutritional quality of meat<sup>2</sup>
  - Nutritional evaluation FF bakery products: “fat-fortified version of common cereals used as energy source in swine”<sup>3</sup>
- IBO Thessaloniki
  - 20% inclusion FF in growing/finishing pigs → no significant negative consequences for the final product<sup>4</sup>

# Nutritional value processed former foodstuffs compared to cereal grains

	Former foodstuffs – Typical Pig Feed	Barley	Wheat
Dry matter	88.0%	88.0%	88.0%
Crude protein	10.0%	11.0%	12.4%
Lysine	0.38%	0.38%	0.34%
Crude fat	14.5%	2.8%	2.1%
Crude fibre	2.2%	5.5%	2.7%
Starch	41.0%	51.6%	59.2%
Sugar	14.0%	2.2%	2.4%
Metabolisable energy pig (DE)	<b>16.75 MJ/kg</b>	12.95 MJ/kg	14.43 MJ/kg

Source: NRG, VDLUFA, INRA

Target Species: Monogastric – 52 weeks/year requirement

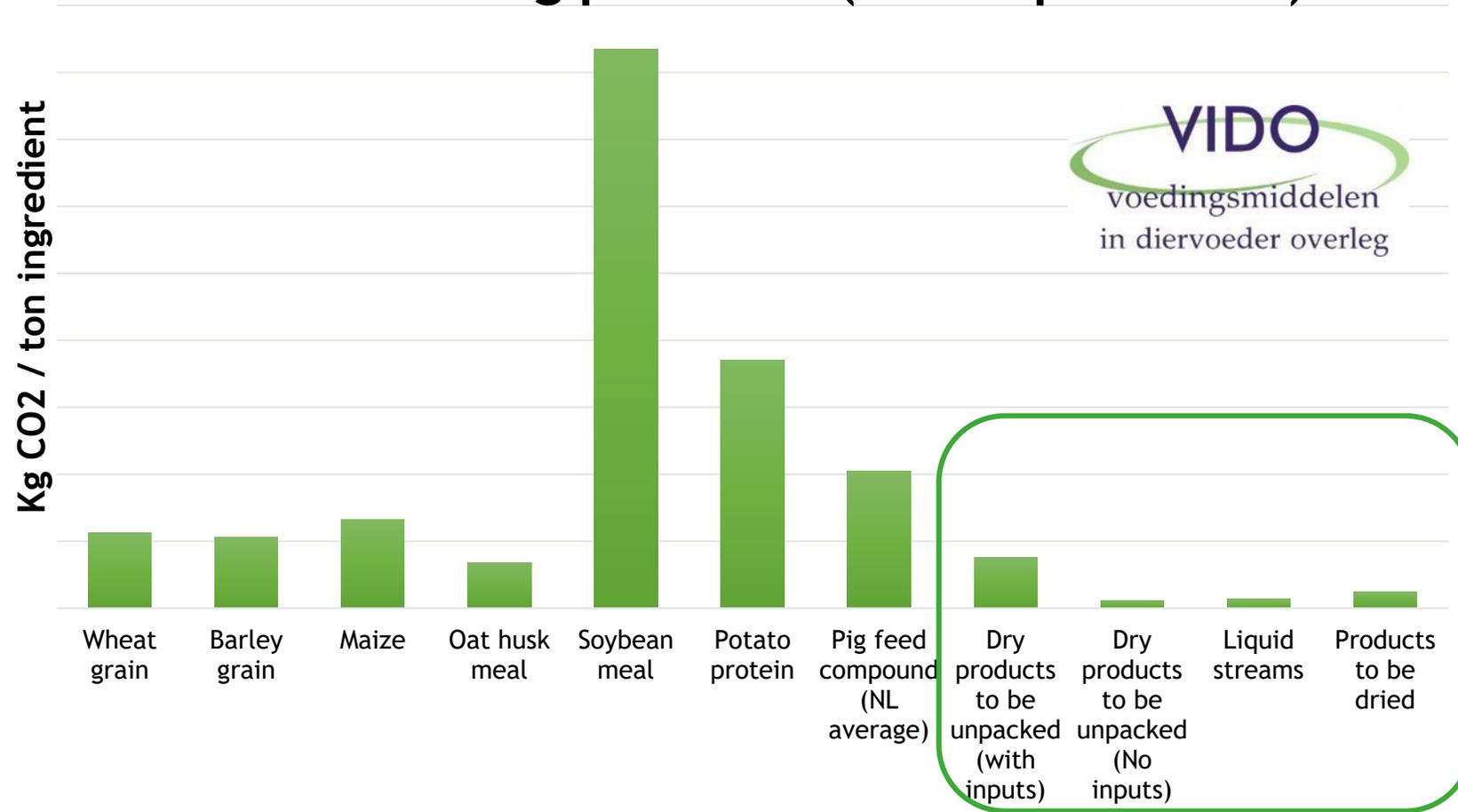
# Carbon footprint - sector data EFFPA members

- Data on former foodstuffs available in the GFLI Database

	kg co2 eq/ton product		
	UK	NL	DE
Former food, dried, with carriers	147,3		
Former food, dried, without carriers	153,2	114,8	144,2
Former food, dry, unpacked and processed, without carriers	28,2	34,2	18,1

# Footprint former foodstuffs compared to other feed ingredients

Global warming potential (CO2 equivalents)



# Footprint of a processed former foodstuff product vs the nutritional equivalent

- Breadmeal vs 96% wheat, 4% oil
- RER = EU economic region

Product	Footprint in kg CO2 eq/ton product
Breadmeal NL (Sector data, VIDO)	147,3
Breadmeal UK (Sector data, UKFFPA)	153,2
96% Wheat grain, dried, RER production mix + 4% crude vegetable oil blend, RER	535,0

# Zonvarken concept

Conventional sow feed	kg CO2 eq/ton
Corn	570
Barley	447
Wheat bran	306
Rapeseedmeal	802
Wheat	450
Sunflowerseedmeal	424
Beetpulp	423
Soybeanmeal	4487
Palmkernel expeller	618
Cane molasses	222
Flaxseed	1446
Soybeanhulls	2136
Synthetic amino acids	
Vitamins and minerals	
<b>Total feed:</b>	<b>639</b>

Circular sow feed	kg CO2 eq/ton
Crispbread	130
Wheat bran	306
Breadmeal	120
Sunflowerseedmeal	424
Maizegluten	1412
Beetpulp	423
Malt germ	295
Cane molasses	222
Oat hulls	271
Sprinkles	54
Potato chips/crisps	42
<b>Total feed:</b>	<b>354</b>



# Benefits of former foodstuffs for compound feed pellet production & quality

- Feed for fattening pigs
  - Control → 40% Wheat
  - Feed 1 → 40% Wheat + Palmkern oil
  - Feed 2 → 40% Breadmeal

- Energy usage pelleting press in kWh/t:

Throughput kg/h	40% Wheat	40% Wheat + Palmkern oil	40% Breadmeal
200	26,0	24,9	23,7
250	21,5	20,2	19,4
300	18,4	18,3	17,0

- Difference in durability after 24h max 1%

- Pellet hardness 24h:

	40% Wheat	40% Wheat + Palmkern oil	40% Breadmeal
Average pellets hardness (Newton)	73	62,2	50,7

# Concluding remarks

- The use of processed former foodstuffs in pig feed in Europe is already very common, however there is room for further growth boosted by sustainability concepts
- Key constraint in several countries (in particular Southern Europe) for further uptake of former foodstuffs in animal feed are food production standards which require 'plant-based feed' or mandatory use of cereals
  - This excludes former foodstuffs due to common presence of milk, eggs, honey, gelatine
- Key challenge for the European former foodstuff processing sector at large is the competition from the biomethane sector for the same residual flows

# Sources scientific literature

1. DOI:[10.1016/j.animal.2023.101019](https://doi.org/10.1016/j.animal.2023.101019)
2. DOI:[10.1093/jas/skae070](https://doi.org/10.1093/jas/skae070)
3. DOI:[10.1080/19440049.2017.1306884](https://doi.org/10.1080/19440049.2017.1306884)
4. DOI:[10.3390/su151914385](https://doi.org/10.3390/su151914385)



# THANK YOU!

