

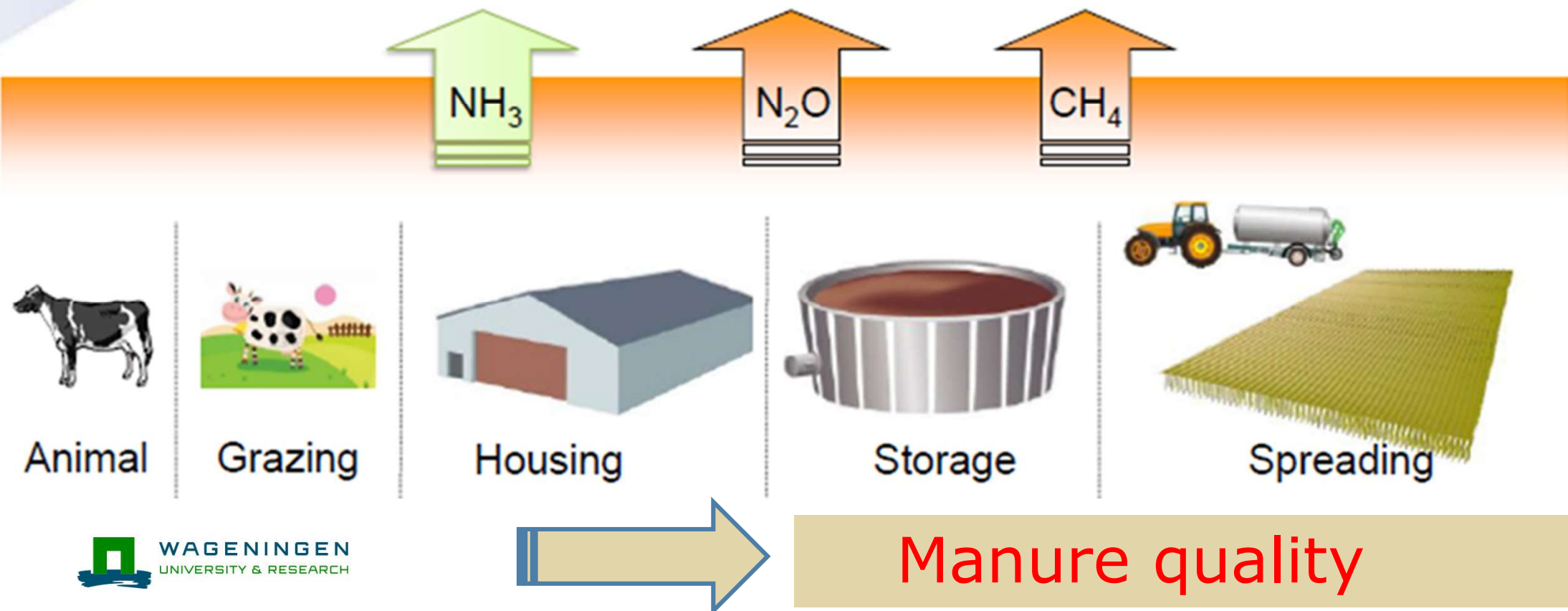
Emissions and manure quality in future cow barns

EAAP Porto 2022, 6 September

Paul Galama, Emma van Boxmeer, Hendrik Jan van Dooren, Herman de Boer

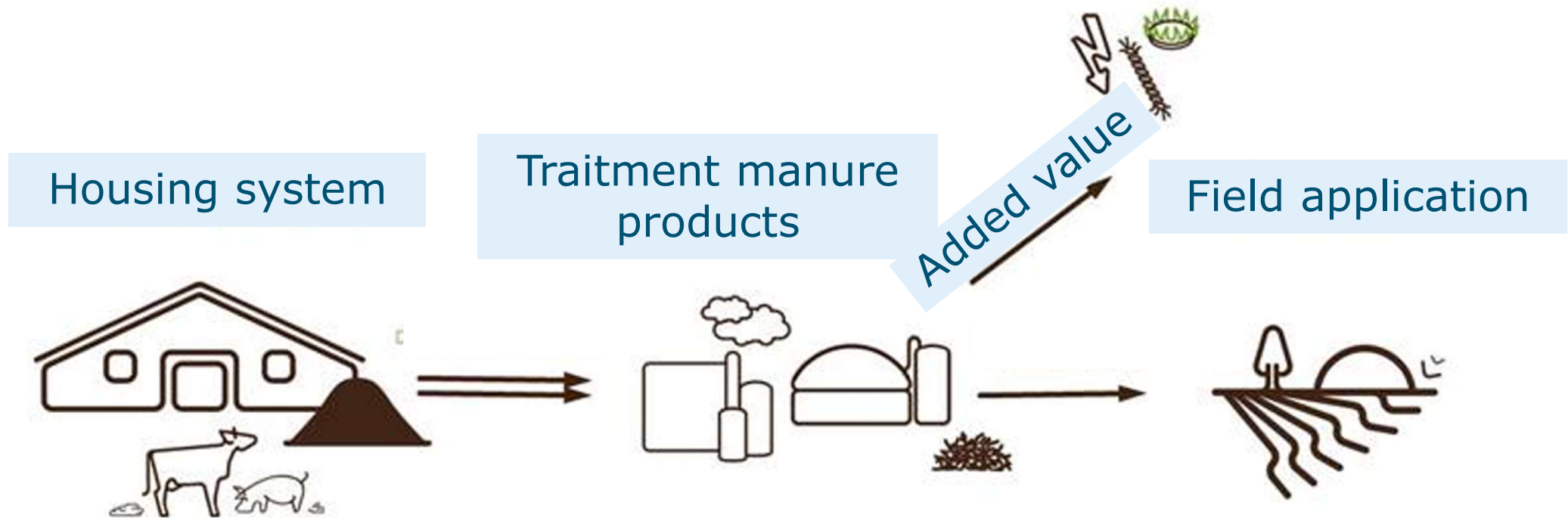


Discover best strategies in the whole chain

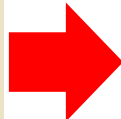


Optimizing manure chain

Emissions (ammonia, GHG), manure quality, economics

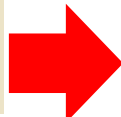


Feces



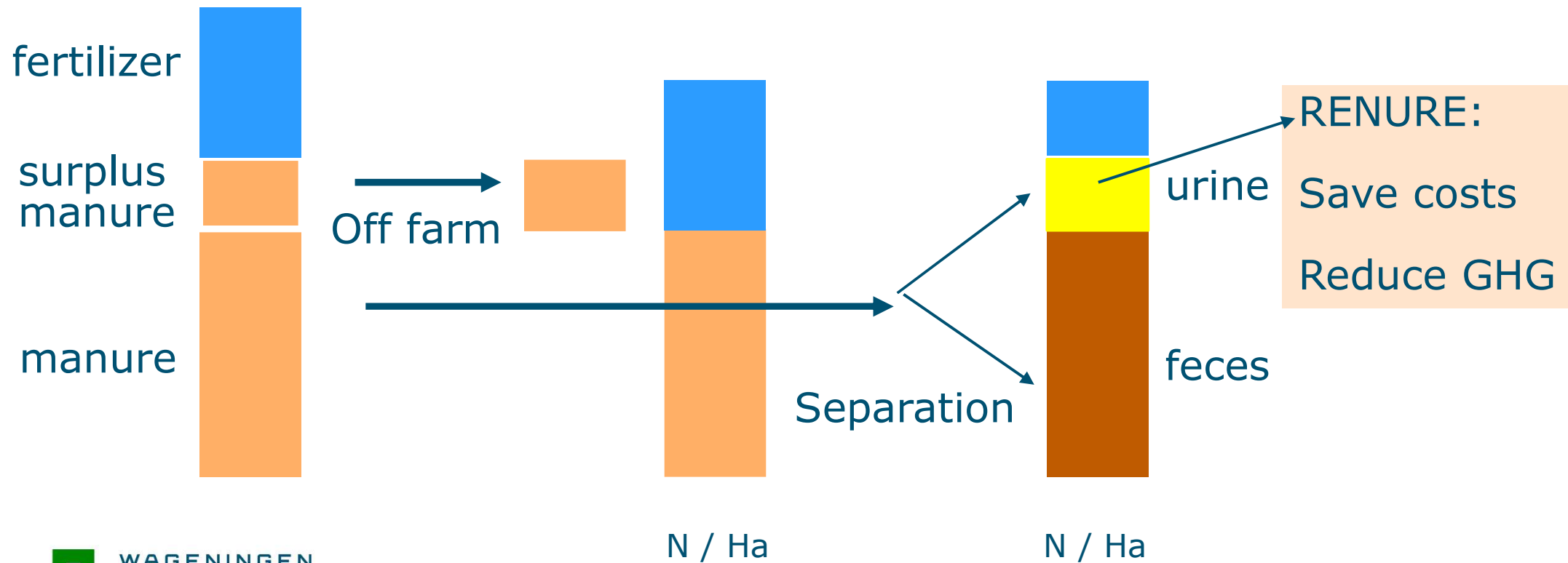
Organic fertilizer or soil improver

urine

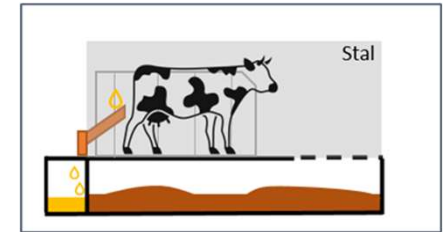


Recovered Nitrogen from Manure

Why focus on renure? (example N per ha)

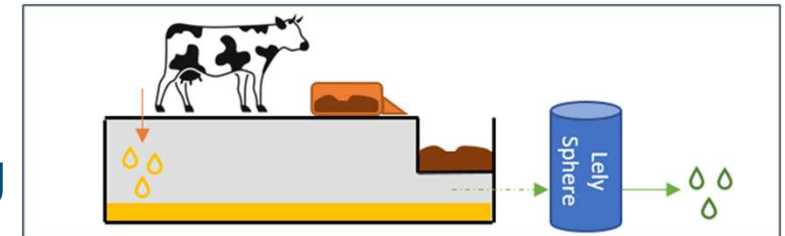
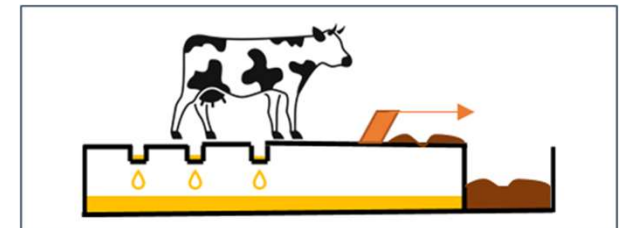
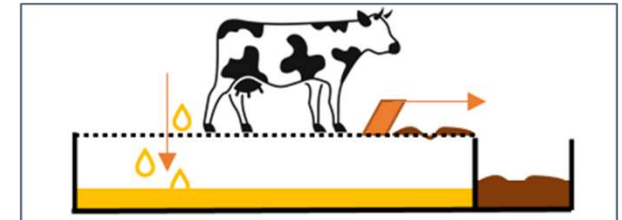


Manure quality



1. Freestall, cubicles

1. Separation feces and urine
2. Separation and sucking air form urine storage

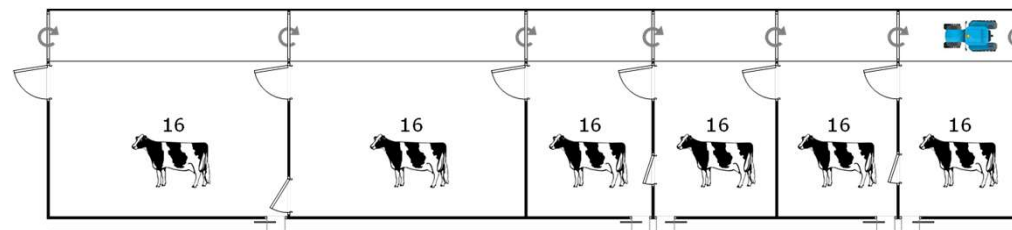


2. Freewalk housing

1. Composting bedding
2. Separation feces and urine in sand bedding



Separation techniques on Dairy Campus



Floor types



Permeable floor (ZeraFlex), Dairy Campus

Concrete separation Floor,
farm van Boxtel

Cowtoilet, on Dairy Campus



Collects about 35% of urine

Indication ammonia emission 2 separation techniques



Permeable plate

Cowtoilet



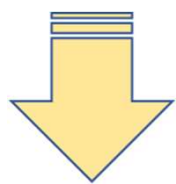
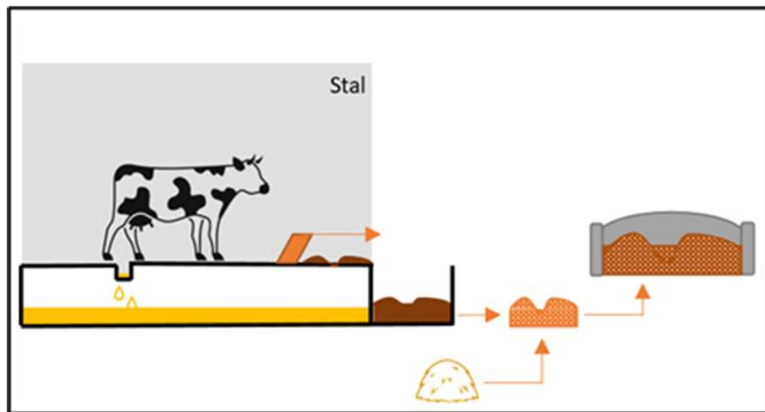
Separation technique	NH3 reduction %	Kg NH3 per Lu per year
1. Permeable plate		
a. Plate 1	+ 34%	17.4
b. Plate 1 and acidification	- 19 %	10.5
c. Plate 2 and acidification	- 46%	7
d. Extra flushing plate	- 50%	<6.5
2. Cowtoilet	- 35 %	8.2

Methane no reduction

Preliminary results

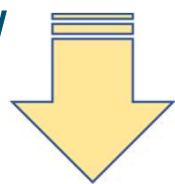
Two examples concrete separation floor

Boxtel:
urine storage under floor



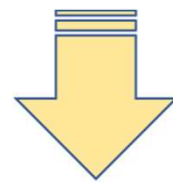
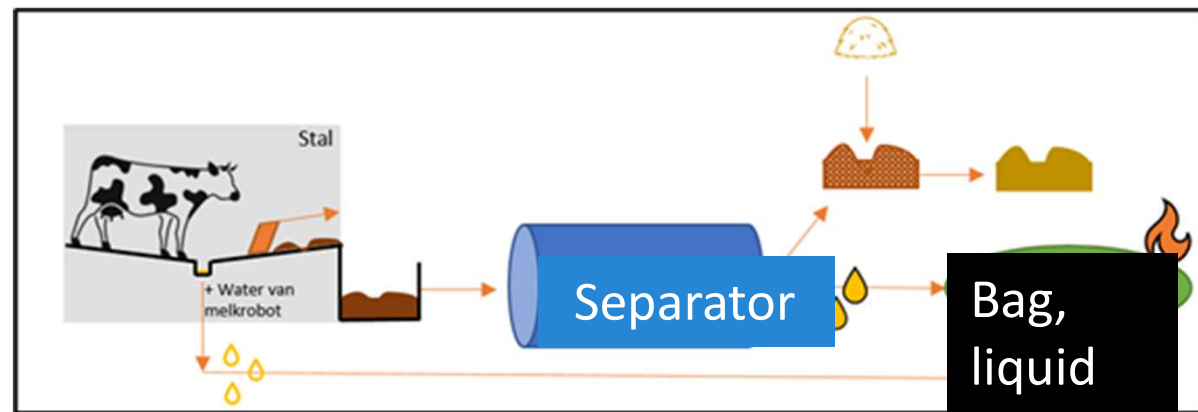
Urine

Adding straw

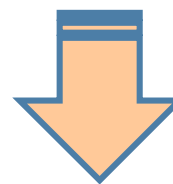


Fermented feces

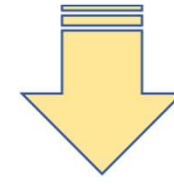
Roessel:
flushing urine through gutter, separate feces



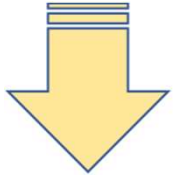
Urine



Feces

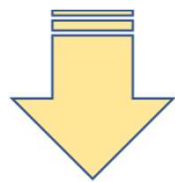
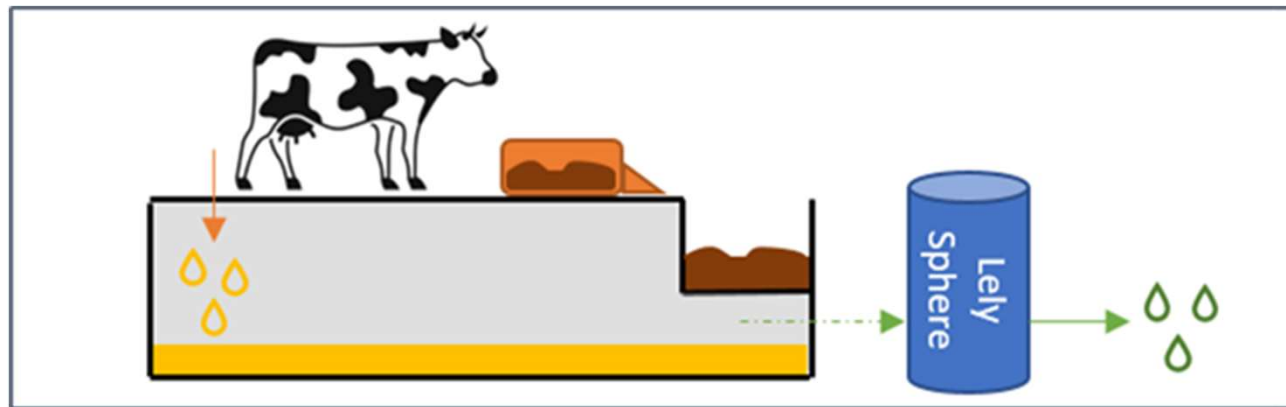


Solids

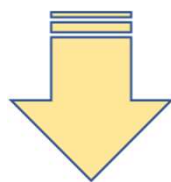


Liquid and
urine

Three products from Lely Sphere



Liquid (K)



Feces (P)



Ammonium Sulphate (N)

Air suction

Freewalk housing with bedding composting wood chips



30% less ammonia, but 30% more methane emission

Freewalk housing with bedding cleaner



Sand bedding to separate urine



Organic bedding ..to digester

Free Living with sand bedding in development

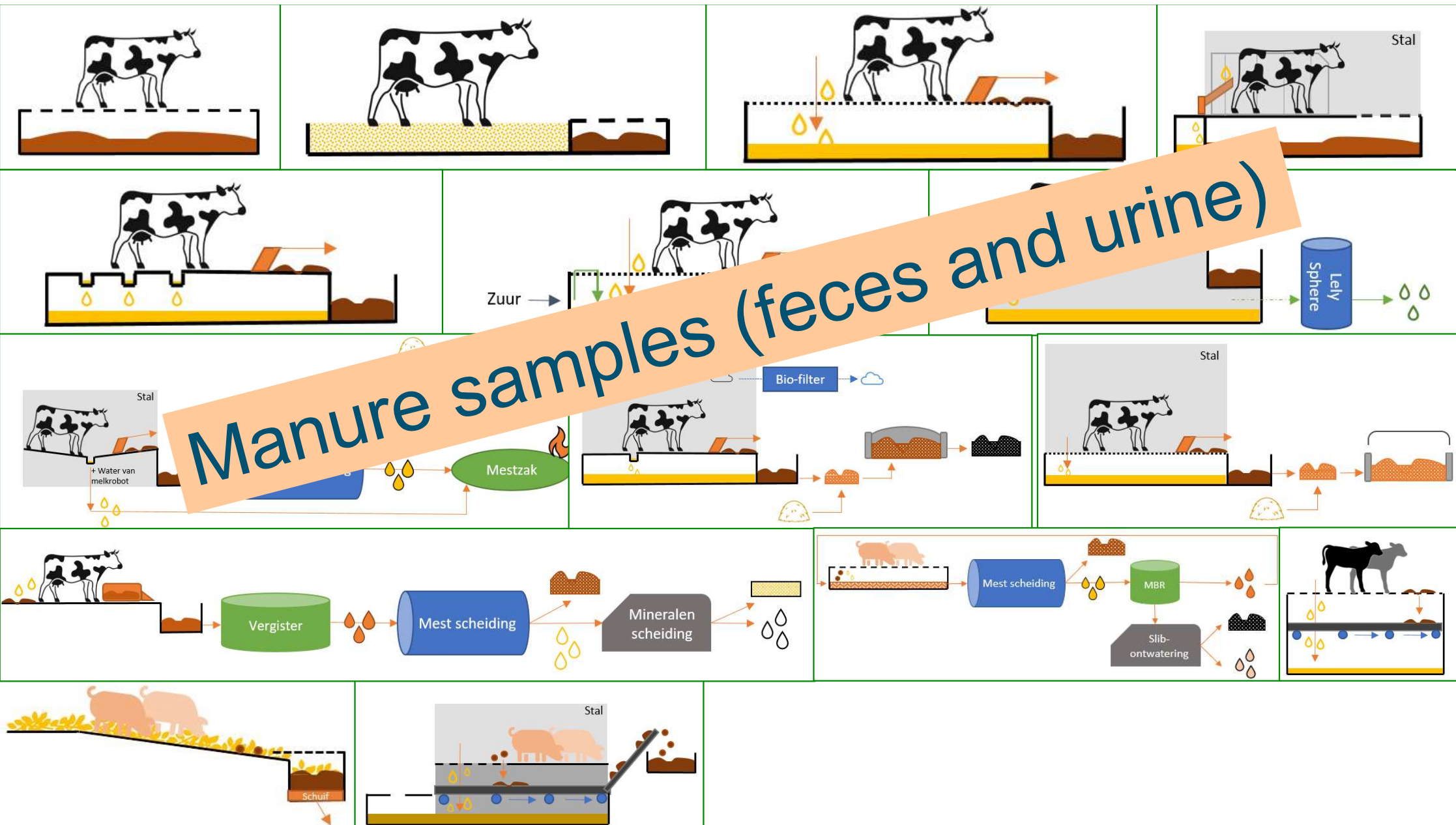


Feces with sand

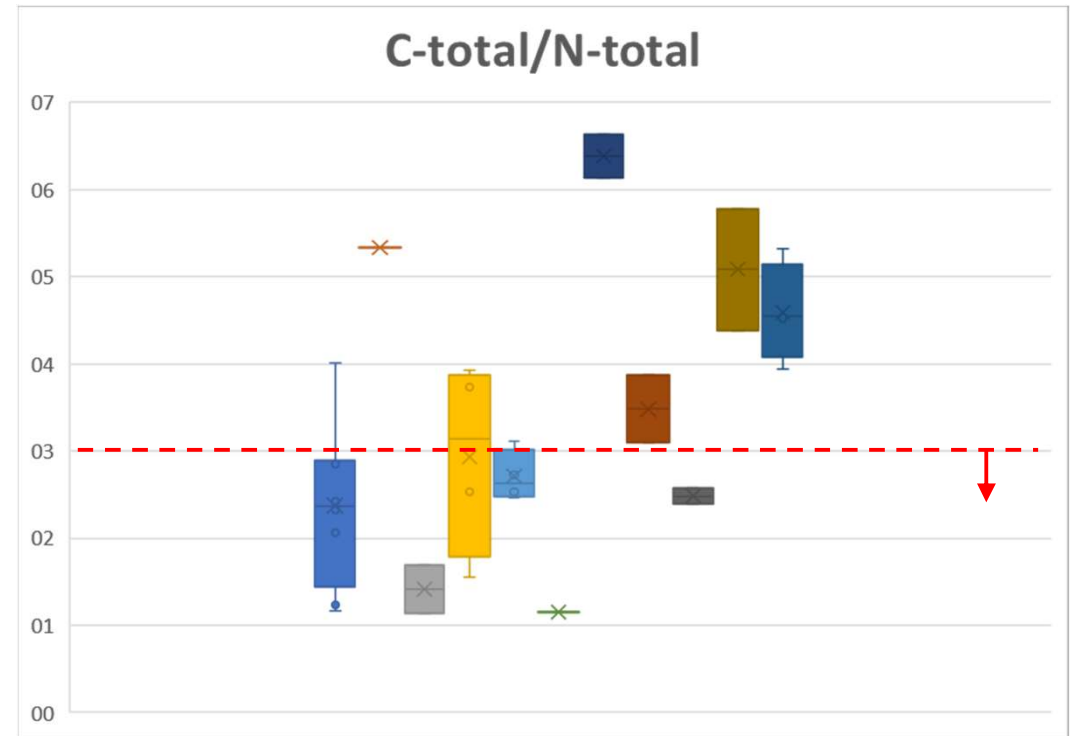
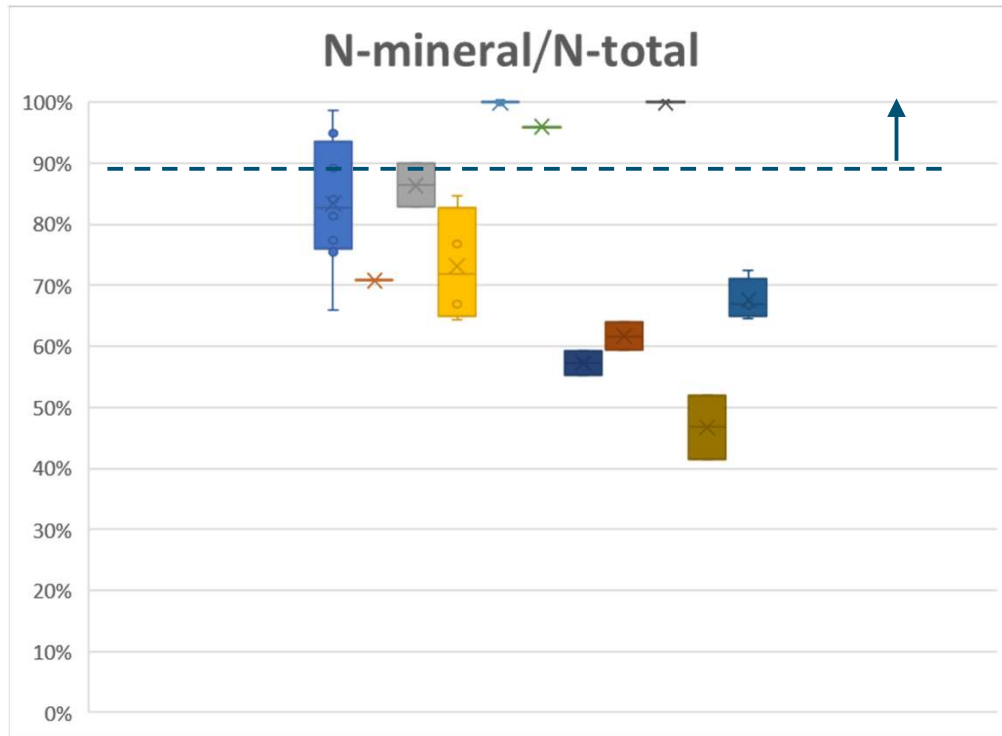


urine

Manure samples (feces and urine)



Criterion for Renure, $N\text{-mineral} / N\text{-total} > 90\%$ or $C\text{-total} / N\text{-total} < 3$



Permeable plate, liquid fraction

LelySphere, liquid fraction

Jumpstart, digestate

Jumpstart, effluent

Rubber floor, liquid fraction

LelySphere, scrubbing liquid

Jumpstart, liquid fraction digestate

Concrete separation floor, liquid fraction

Cowtoilet, urine

Freewalk sand, liquid fraction

Jumpstart, ammonium sulfate

Points of attention

1. Cowtoilet best separation. In 2022 final emission factor
2. Permeable floor good separation, in development
3. Lely Sphere. Working on final emission factor
4. Freewalk housing in development (especially sand)

Conclusions, Dairy housing and manure quality

Housing system	Renure	Organic fertiliser	Soil improver
Cowtoilet: urine / slurry	++	+	
Permeable floor: urine / feces- straw	+ 0		+
Concrete floor: urine / feces	-	+	
Lely sphere: 3 products	+ -	+	
Freewalk wood chips composting			++
Freewalk sand bedding: urine / feces+sand	++	+	



N-org./N-total > 70%

Questions?

