Sustainability at Trouw Nutrition -

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Nuterra:
Focus Areas

1. Sourcing of feed ingredients

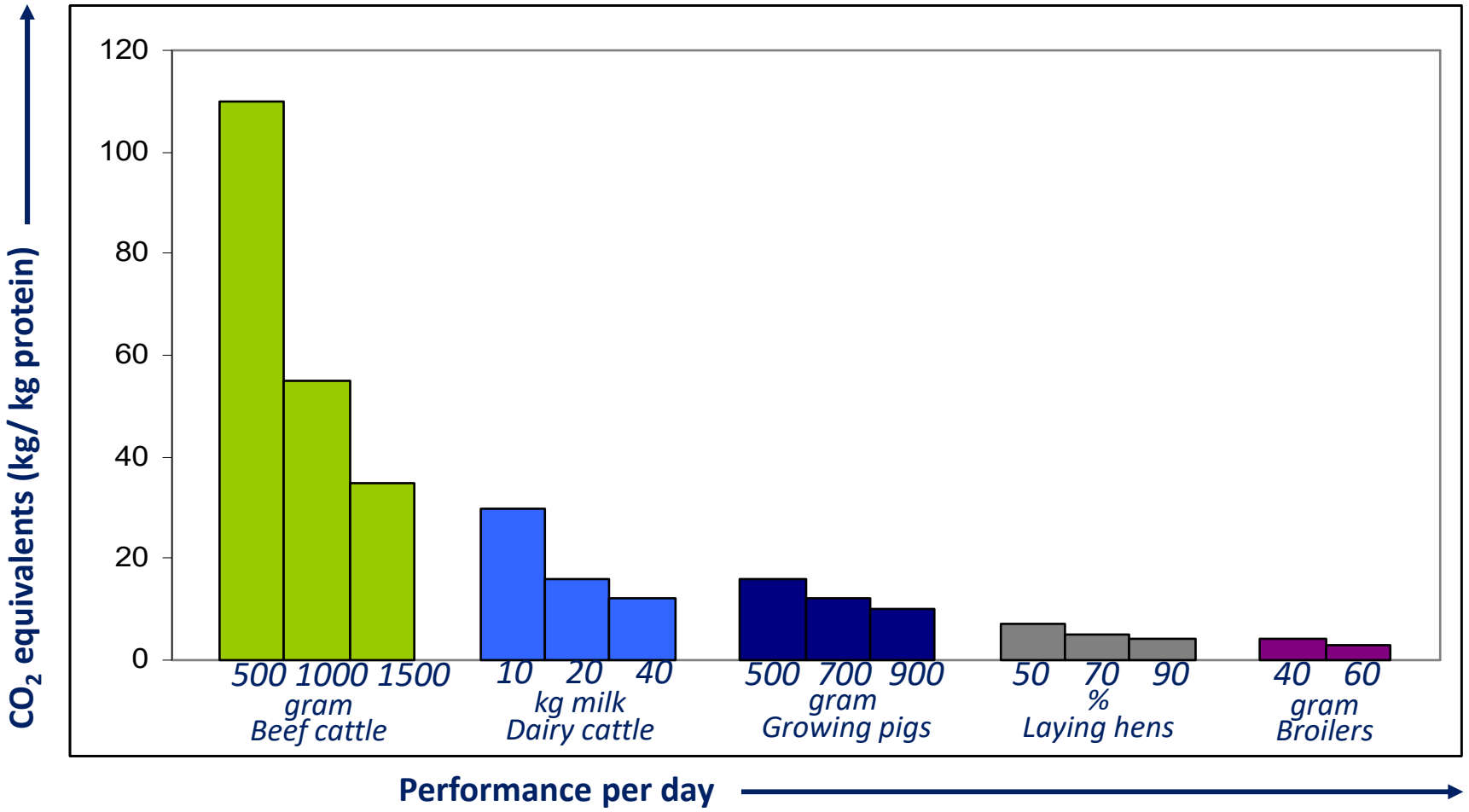
2. Development of nutritional solutions

3. On Site production of feeds and feed ingredients

4. Distribution of finished products

Emissions per kg edible protein

Carbon Footprints for Food of Animal Production (*Flachowsky & Hachenberg, 2009)*



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Efficiency:

Wageningen University & Research (Mollenhorst & de Haas, March 2019)

- Breeding reduces environmental impacts of animal products by about 1% per year.
- Without specific selection on environmental traits, but as an indirect response of the current breeding goals for each species, which is a combination of health, growth, and **(feed) efficiency.**
- For dairy cattle, with the current breeding goal, methane production per cow per day increases, but methane intensity (i.e. methane production per kg milk) decreases.

Efficiency: Feeding programs, longevity, nutrient efficiency, rumen efficiency, additives, reproductive efficiency …….

FCR

Input/ Output

Carbon Footprint

LCA

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Examples for Trouw Nutrition

Life Cycle Assessments for new innovations & customer production systems

NutriOpt: Feed analysis & production models

Examples for Trouw Nutrition Ireland

Grain sustainability study & LCA

On Farm feed Programs incl new Beef Efficiency Model

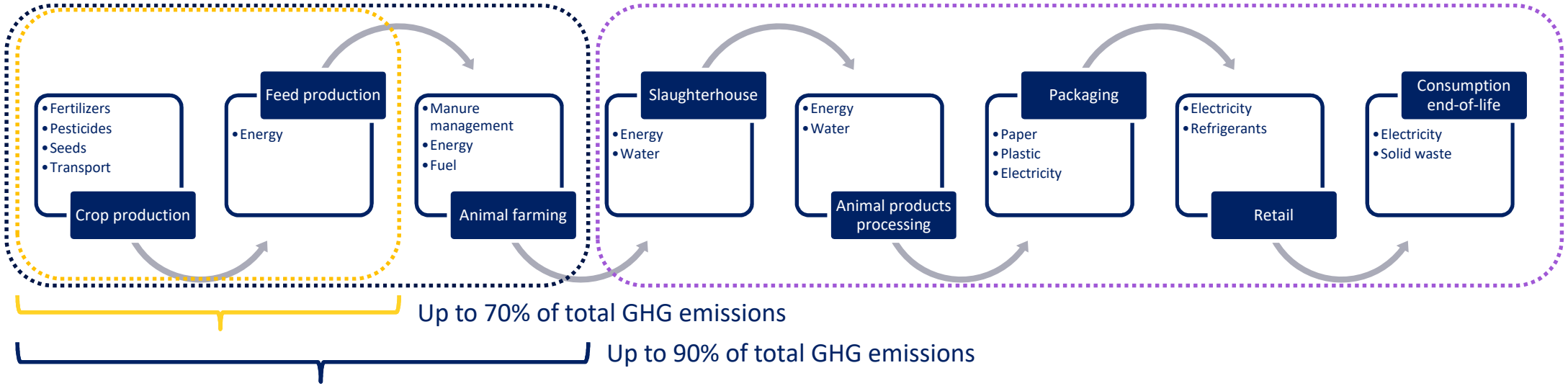
GrassWatch

Additives: Rumen efficiency, Ammonia Reduction….

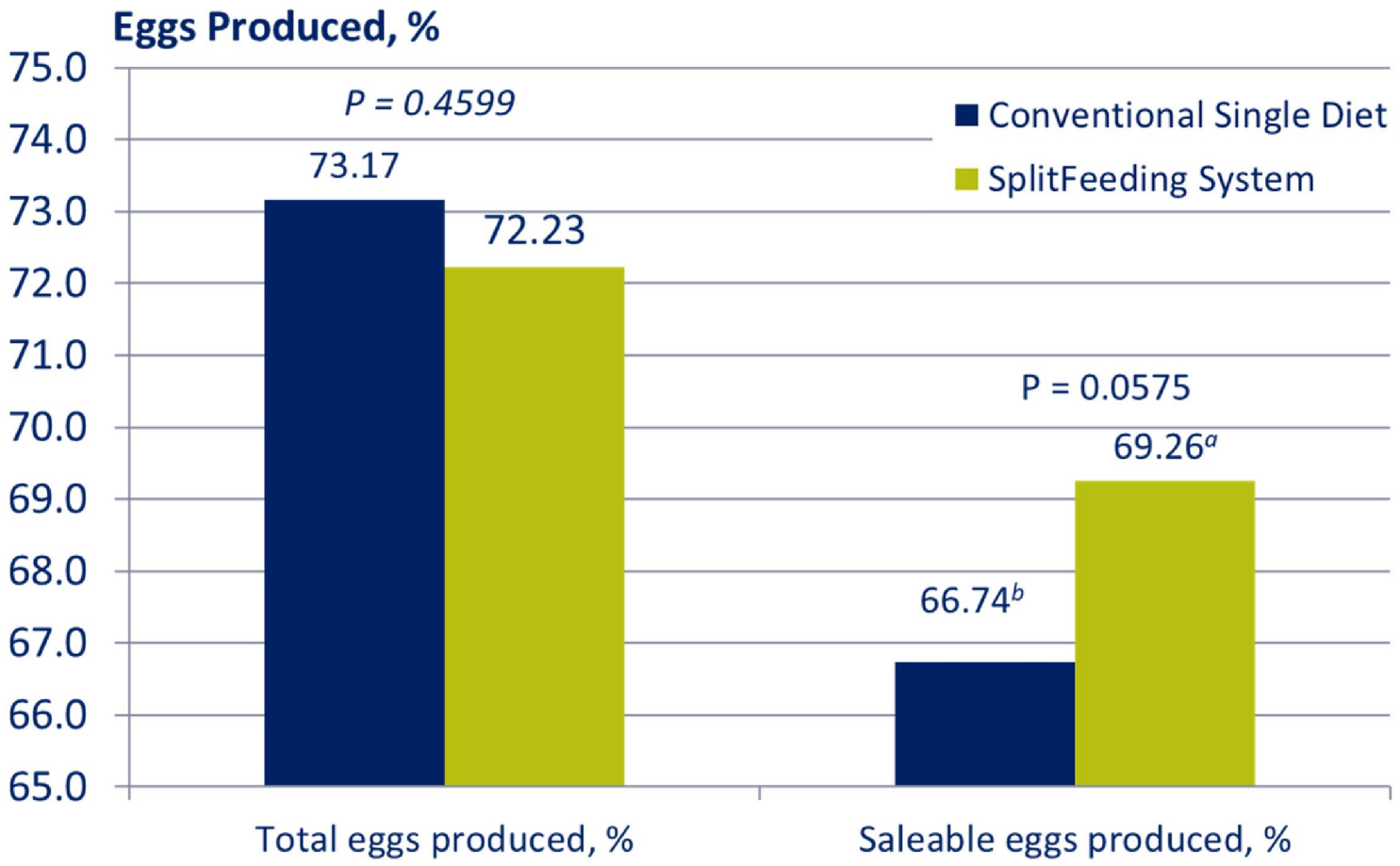
NutriOpt Sustainability Module

Life Cycle Assessment

- Methodology to investigate the environmental impact of products and supply chains. These methods give insights in possible improvements in the supply chain.



Poultry Trial; Sustainability Assessment Conventional v Split Feeding System



ISA brown laying hens:

- Conventional single diet from 91 – 94 weeks
- **Same hens** – split-feeding diet from 95 – 98 weeks

Source: De Los Mozos Garcia et al., 2015

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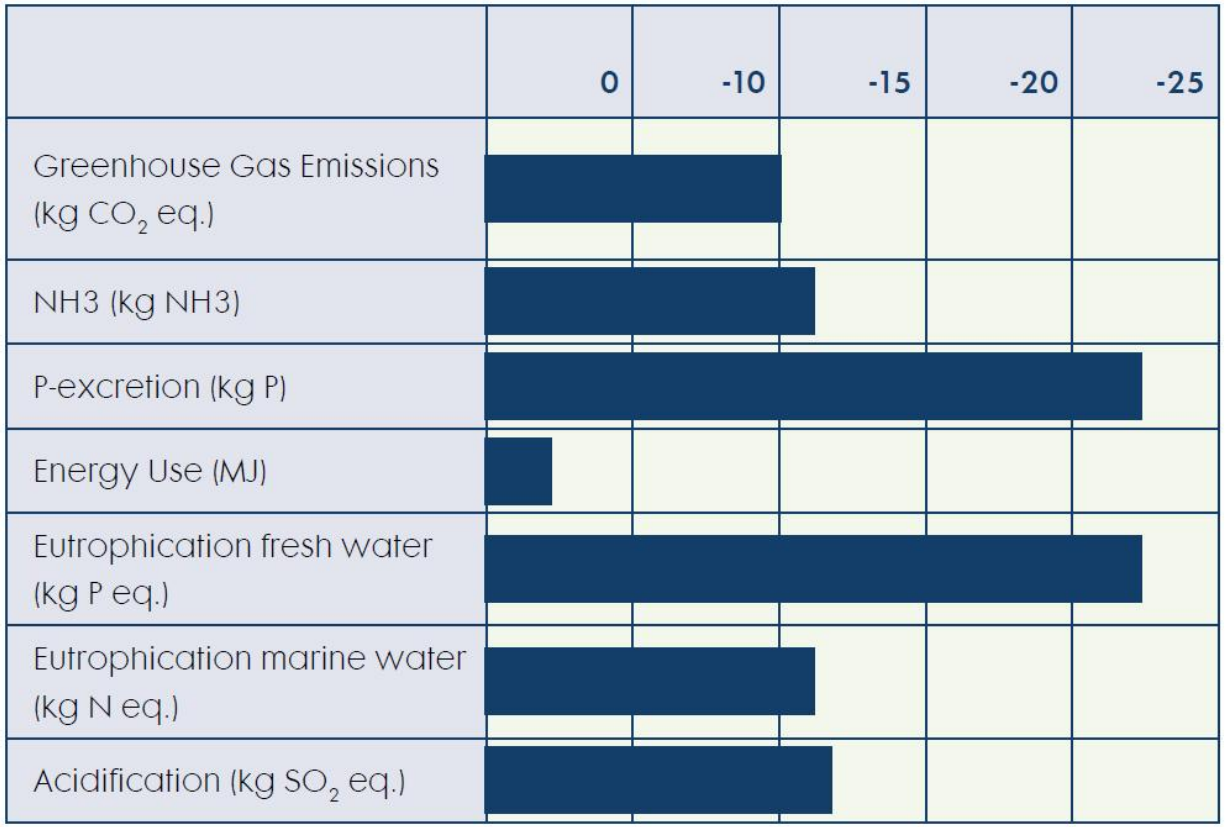
Optimized feeding system reduces emissions 10-25%

Environmental impact (per tonne of eggs)	Baseline	Split-feeding	Reduction impact split-feeding vs. Baseline (%)
Greenhouse Gas Emissions (kg CO_2 eq.)	420	379	10*
NH3 (kg NH3)	3	2	23
Energy Use (MJ)	1711	1669	2
Eutrophication fresh water (kg P eq.)	0.2	0.1	23
Eutrophication marine water (kg N eq.)	1.7	1.5	12
Acidification (kg SO_2 eq.)	7.4	6.5	12



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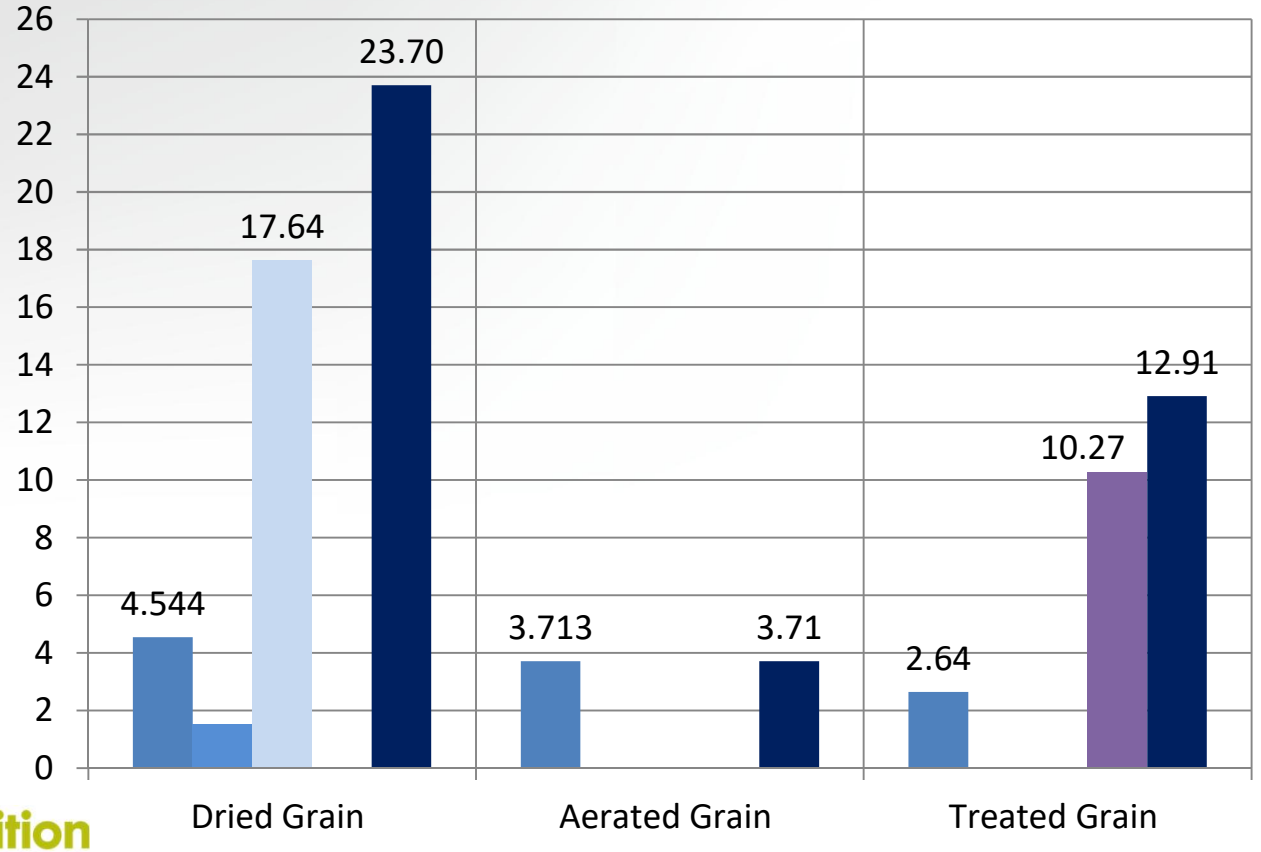
Grain Management Analysis

Sustainability Study

CO2 Emissions – Kg CO2 /tonne Grain Stored



45% less CO2 Emissions

- Kg CO2 - Electical Energy - Aeration
- Kg CO2 - Electrical Energy - Drier
- Kg CO2 - Diesel Fuel (Well to Tank)
- Kg CO2 - Liquid Preservative
- Total Kg CO2/ tonne

Fattening pigs inputs

	Baseline		Innovation		Baseline	Innovation	Baseline	Innovation	Baseline	Innovation
	Starting weight (kg)	Finishing weight (kg)	Starting weight (kg)	Finishing weight (kg)	Mortality rates (%)		Feed intake (kg/day)		Days/phase	
Growing pigs	25	40	25	40	2,00	2,00	1,2	1,2	28	28
Finishing pigs phase 1	40	**63,4**	40	**66,4**	0,50	0,50	**2,0**	**2,1**	28	28
Finishing pigs phase 2	63,4	**103,9**	66,4	**109,4**	0,10	0,10	**2,55**	**2,8**	42	42
Total/Average (25-110 kg)	25	103,9	25	109,4	2,60	2,60	1,99	1,41	98	98

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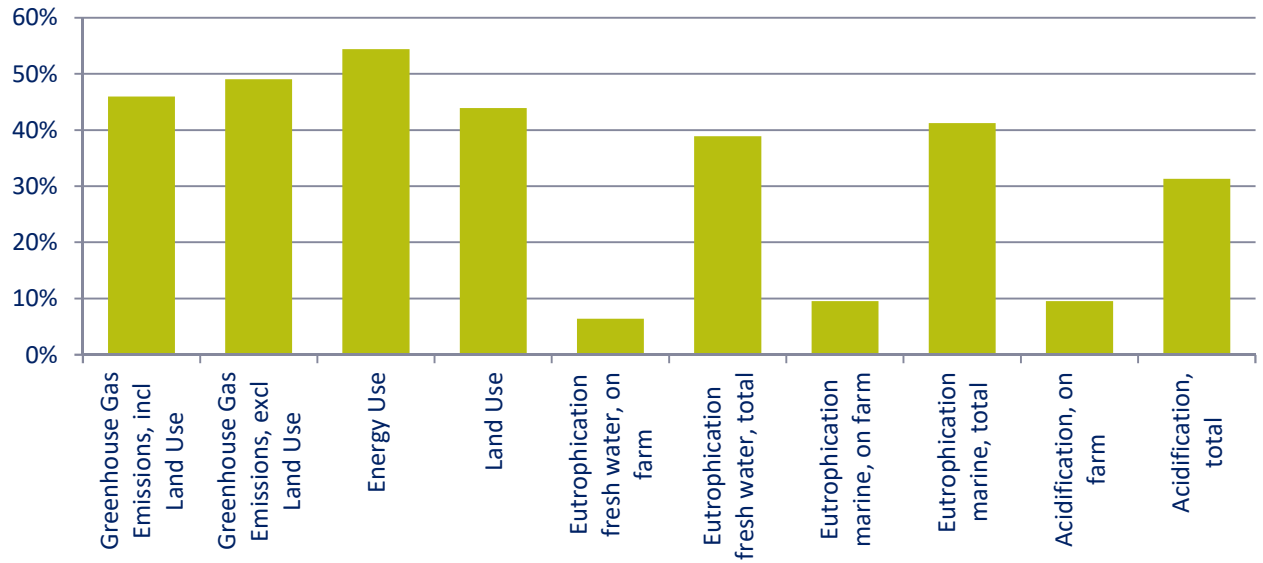
Environmental Impact Assessment

Impact Measure	Unit	Baseline	Innovation	relative impact innovation (baseline = 100%)
Greenhouse Gas Emissions, incl Land Use	kg CO_2 eq.	4708	2163	46%
Greenhouse Gas Emissions, excl Land Use	kg CO_2 eq.	1862	913	49%
Energy Use	MJ	11028	5999	54%
Land Use	m^2	4029	1769	44%
Eutrophication fresh water, on farm	kg P eq.	0,164	0,011	6%
Eutrophication fresh water, total	kg P eq.	1,230	0,479	39%
Eutrophication marine, on farm	kg N eq.	1,799	0,172	10%
Eutrophication marine, total	kg N eq.	22,423	9,243	41%
Acidification, on farm	kg SO_2 eq.	12,93	1,23	10%
Acidification, total	kg SO_2 eq.	32,53	10,19	31%



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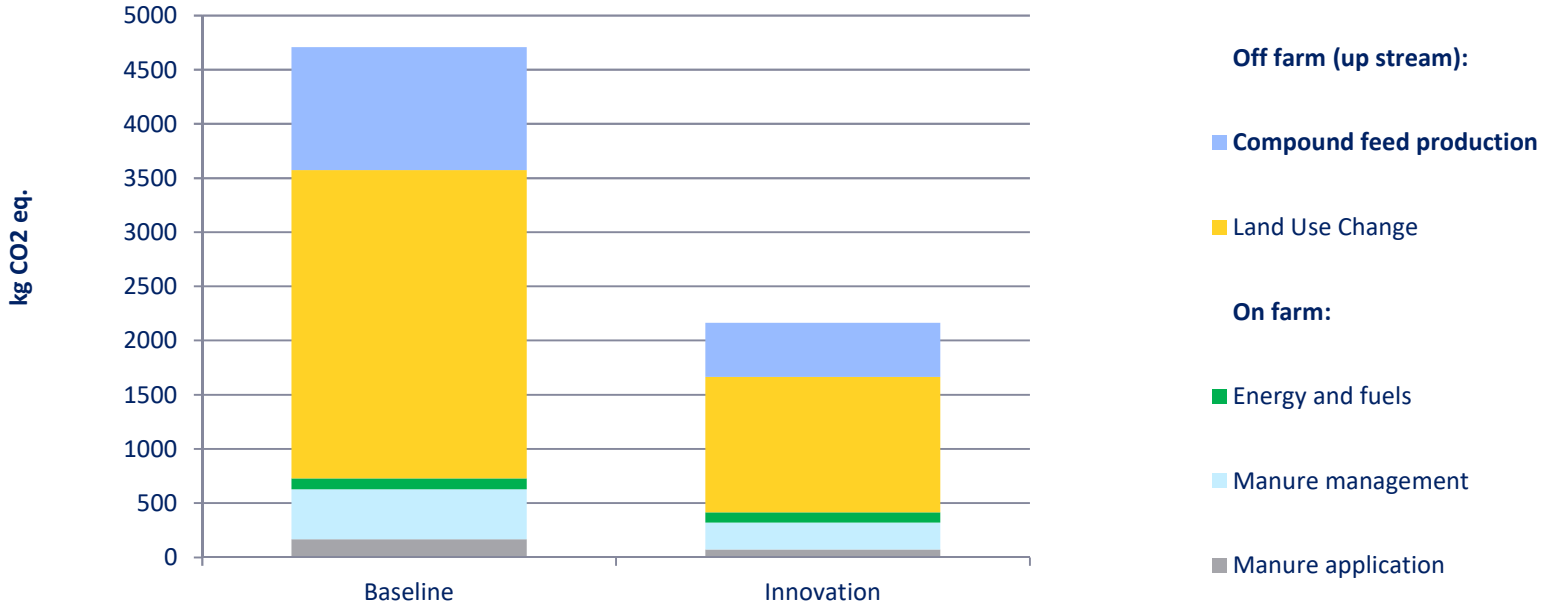
GHG results

Greenhouse Gas Emissions (kg CO_2 eq./tonne of growth)



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GrassWatch

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Application of NutriOpt at Grass

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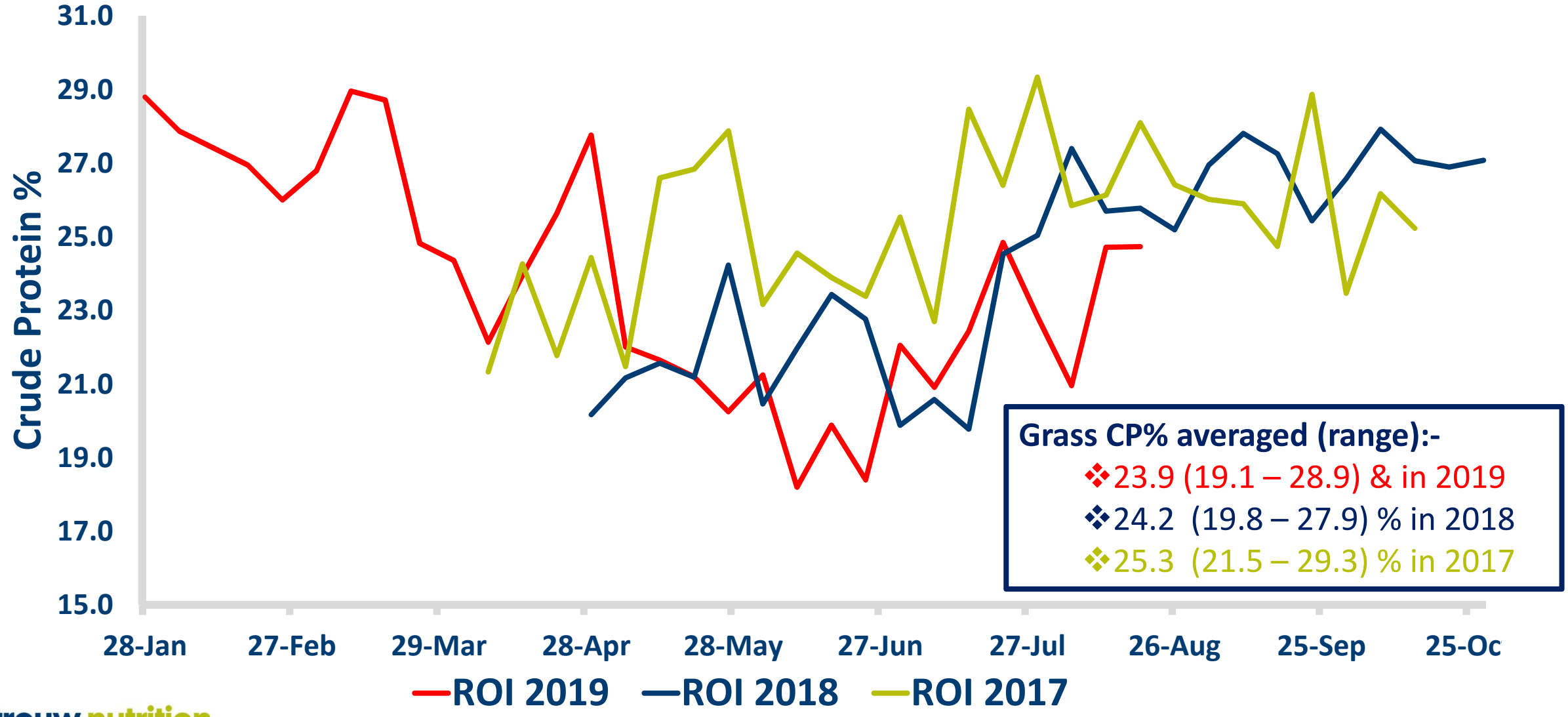
Average weekly grass CP % 2017 - 2019



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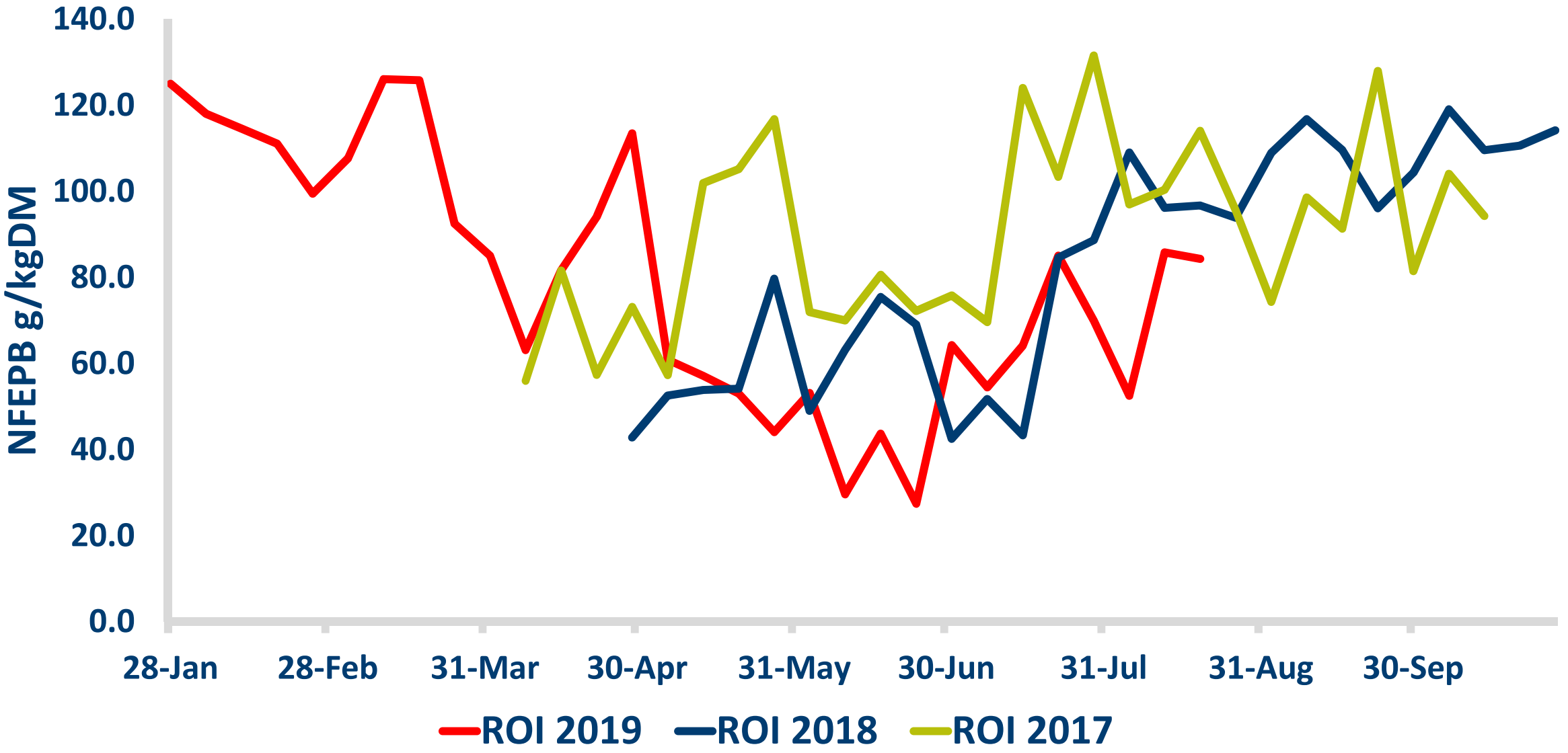
Average weekly grass NFEPB g/kgDM 2017 - 2019



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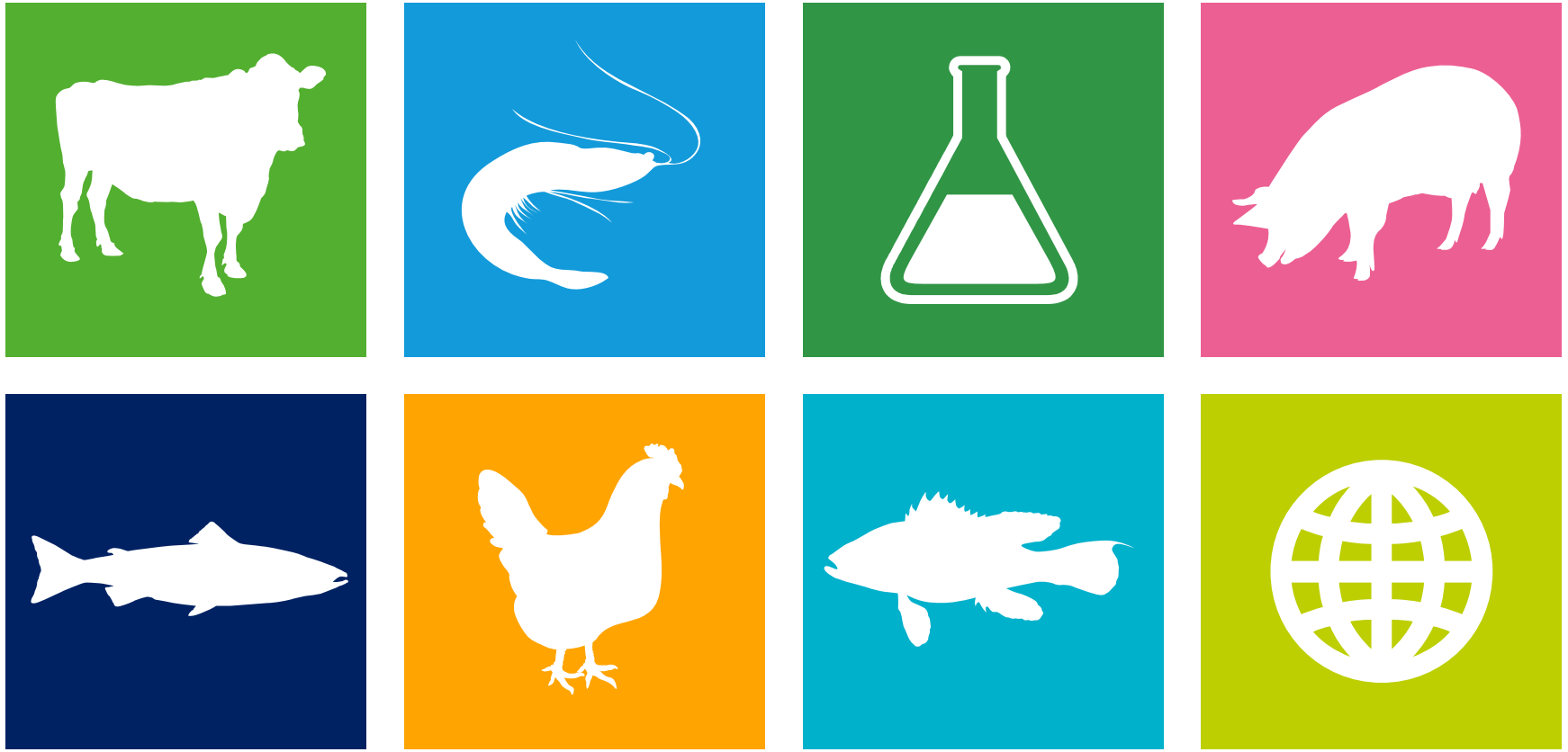
Overall conclusions

To reduce the emissions in animal production a concerted approach is required combining: animal breeding, improved nutritional and farm management and use of additives.

Challenge how to measure and monitor above

Thank you



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