DEVELOPMENT OF A **BIODIVERSITY ASSESSMENT METHOD** WITH FOCUS ON CROP CULTIVATION FOR **INNOVATIVE VEGETABLE** AND **ANIMAL-BASED FOOD PRODUCTS**

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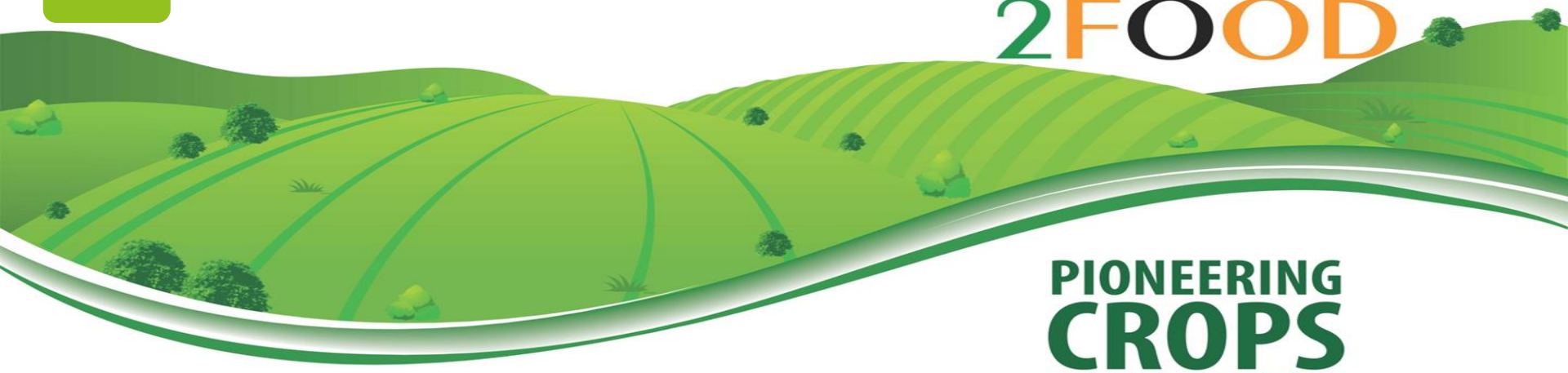
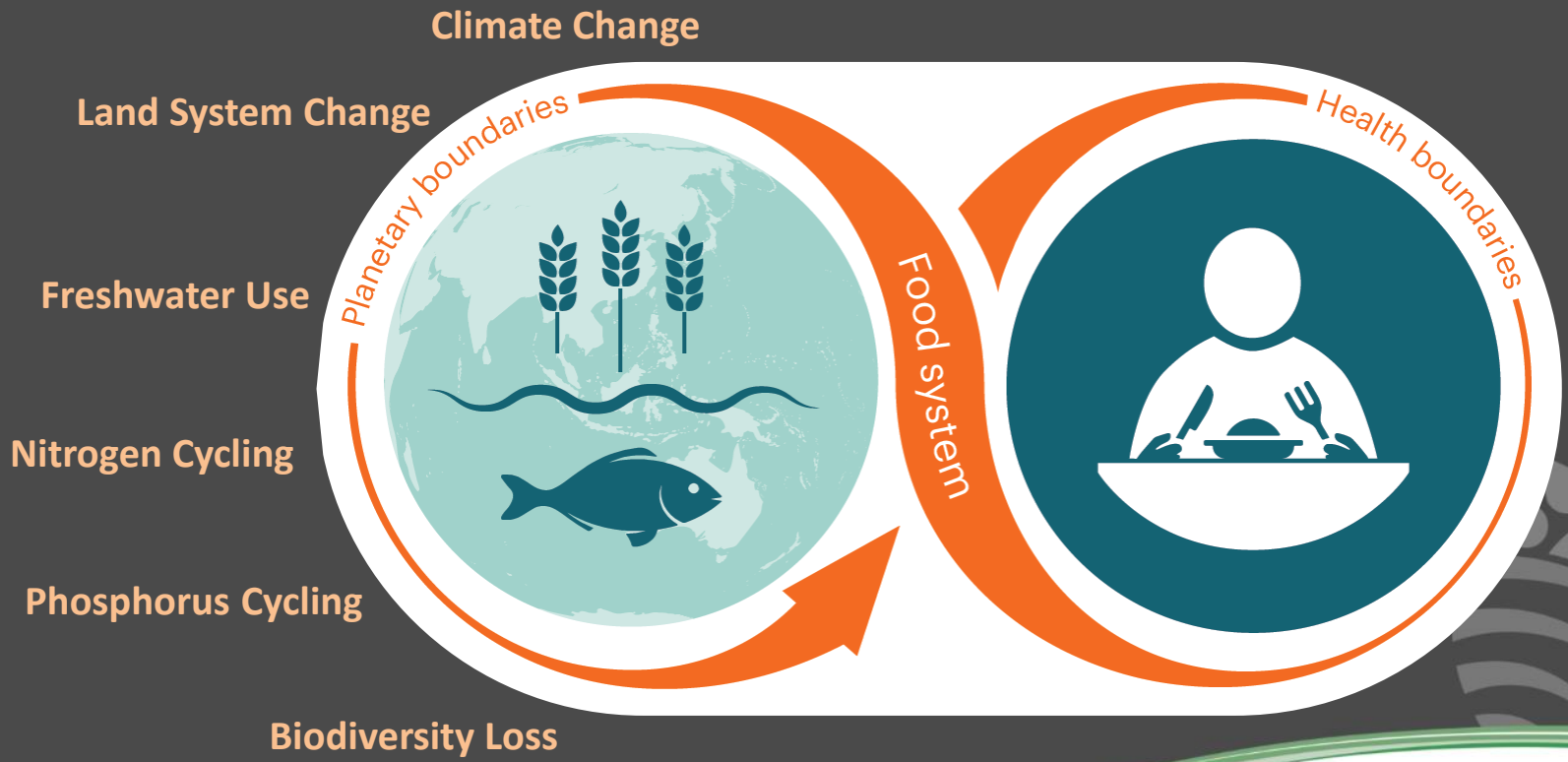


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 635727.

9th Congress [avniR] 2019, 6th & 7th of November at the Lilliad, in Villeneuve d'Ascq

Eat-Lancet Report, 2019: Healthy Diets From Sustainable Food Systems



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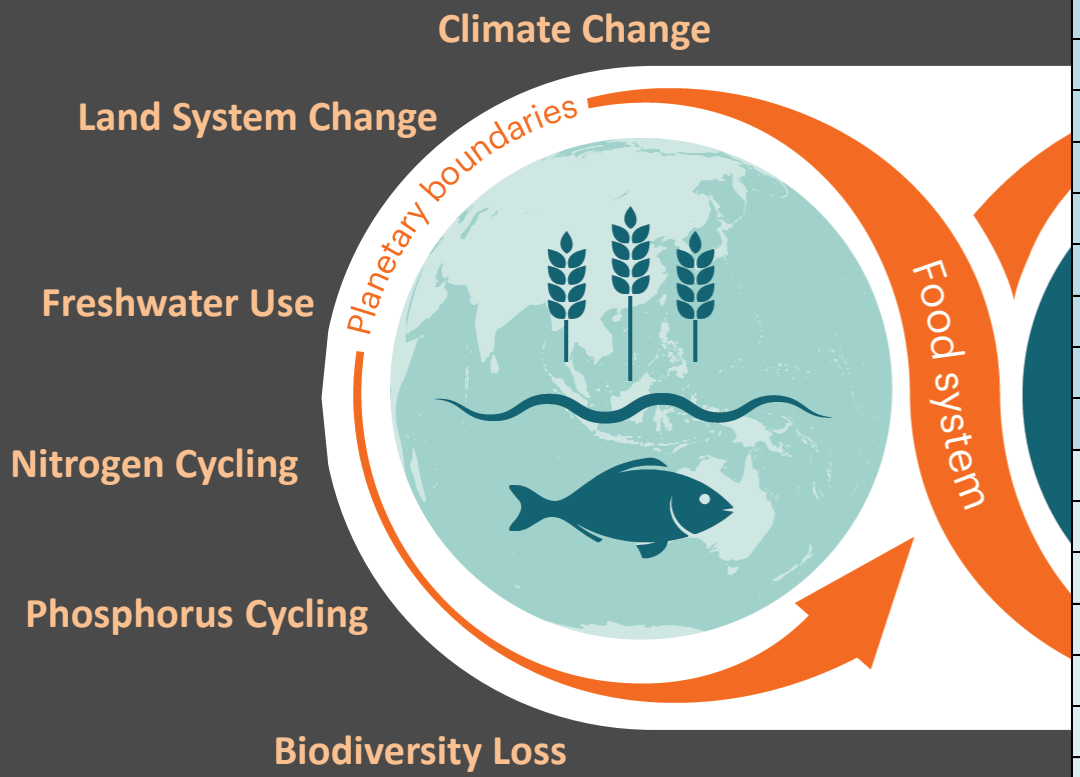
PIONEERING CROPS FOR FUTURE GENERATIONS

PROTEIN 2FOOD

Eat-Lancet Report, 2019: Healthy Diets From Sustainable Food Systems



g/cap/d	*EatLancet*	*EU-28 Av.*
Meat (in total)	***43***	***146***
Pigmeat	7	61
Poultry Meat	29	38
Bovine/Mutton/Goat	7	25
Other Meat	0	22
Animal fats	***5***	***11***
Dairy	***250***	***433***
Fish, Seafood	28	25
Eggs	***13***	***25***
Cereals (ex beer)	232	190
Starchy Roots	50	111
Sugar	31	63
Treenuts	***25***	***8***
Pulses	***50***	***7***
Oilcrops	***50***	***9***
Vegetable Oils	40	47
Vegetables	300	182
Fruits (ex. Wine)	200	155

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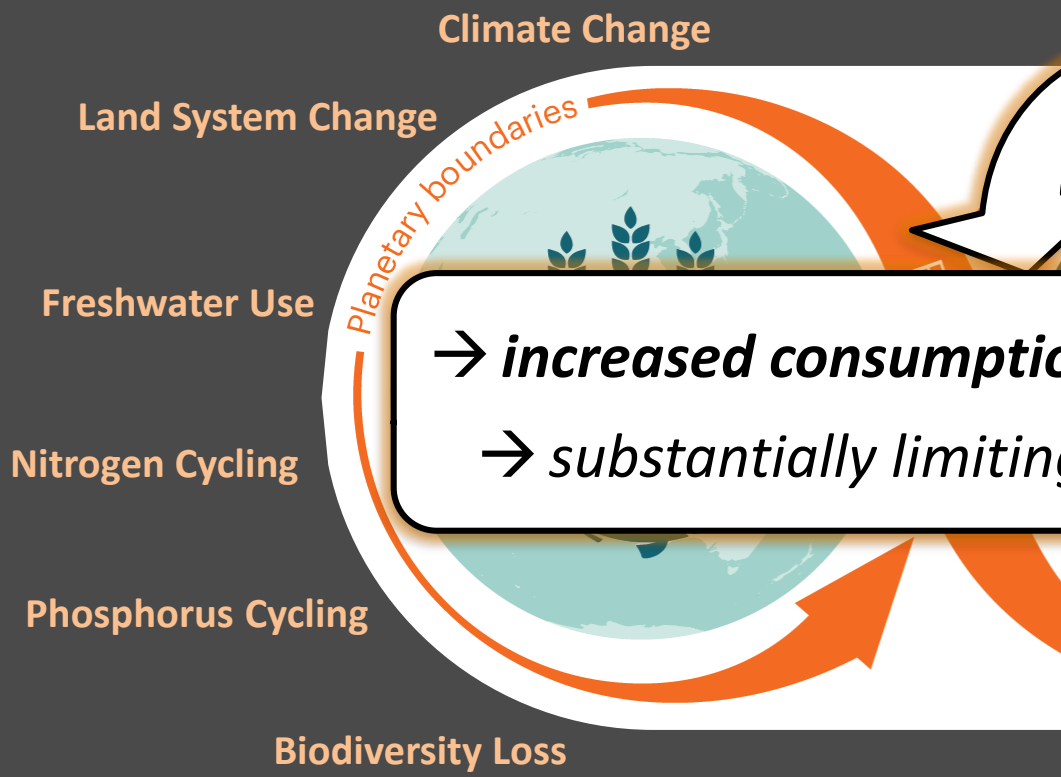

→ ***increased consumption of plant-based foods***

→ *substantially limiting animal source foods*

g/cap/d	*EatLancet*	*EU-28 Av.*
Meat (in total)	***43***	***146***
[illegible]gmeat	7	61
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PROTEIN 2FOOD

PROTEIN2FOOD

…..will create innovative, high quality, protein-rich food crops and products, to sustain human health, the environment, and biodiversity

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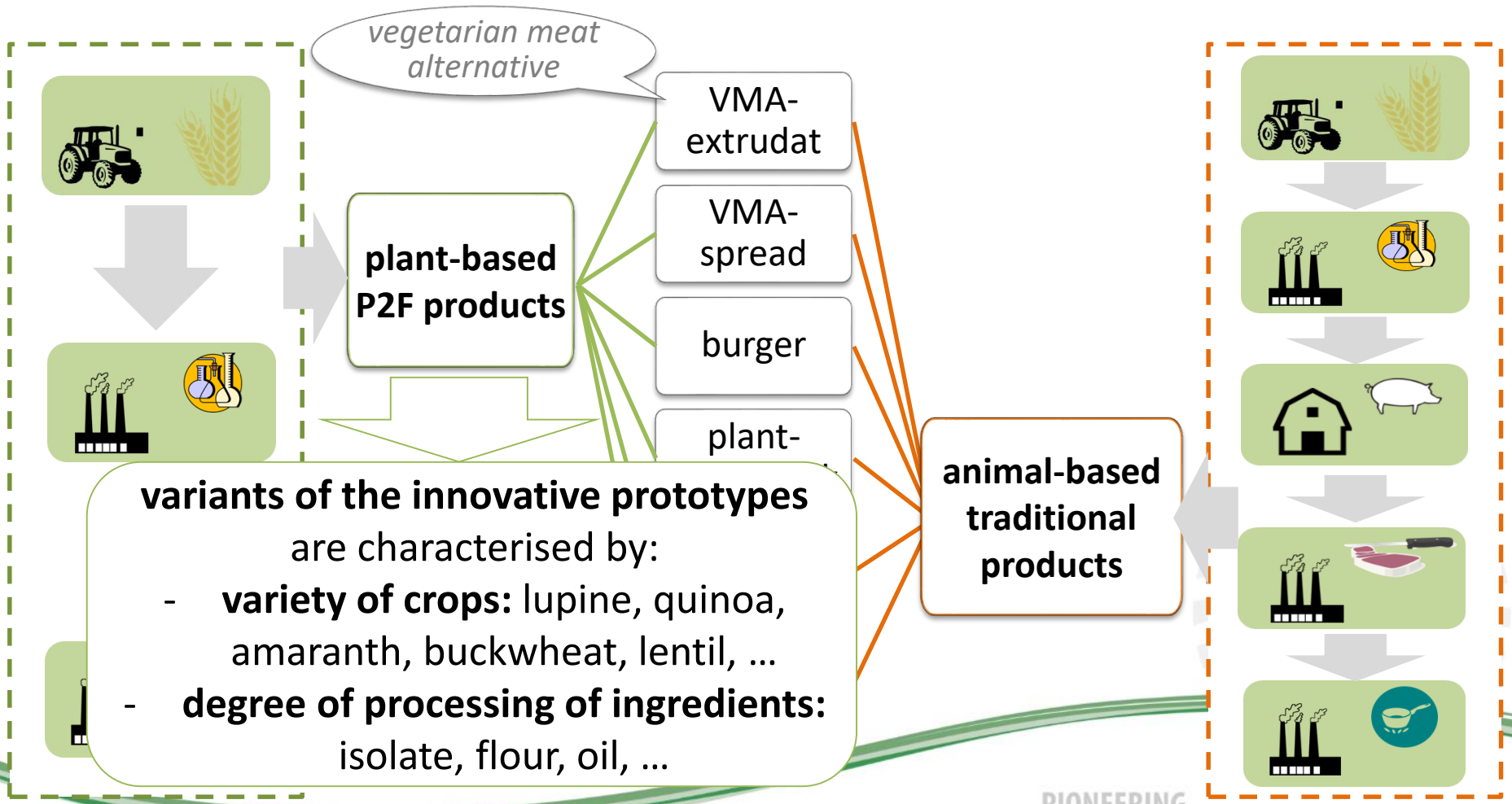
PROTEIN 2FOOD

Environmental footprint



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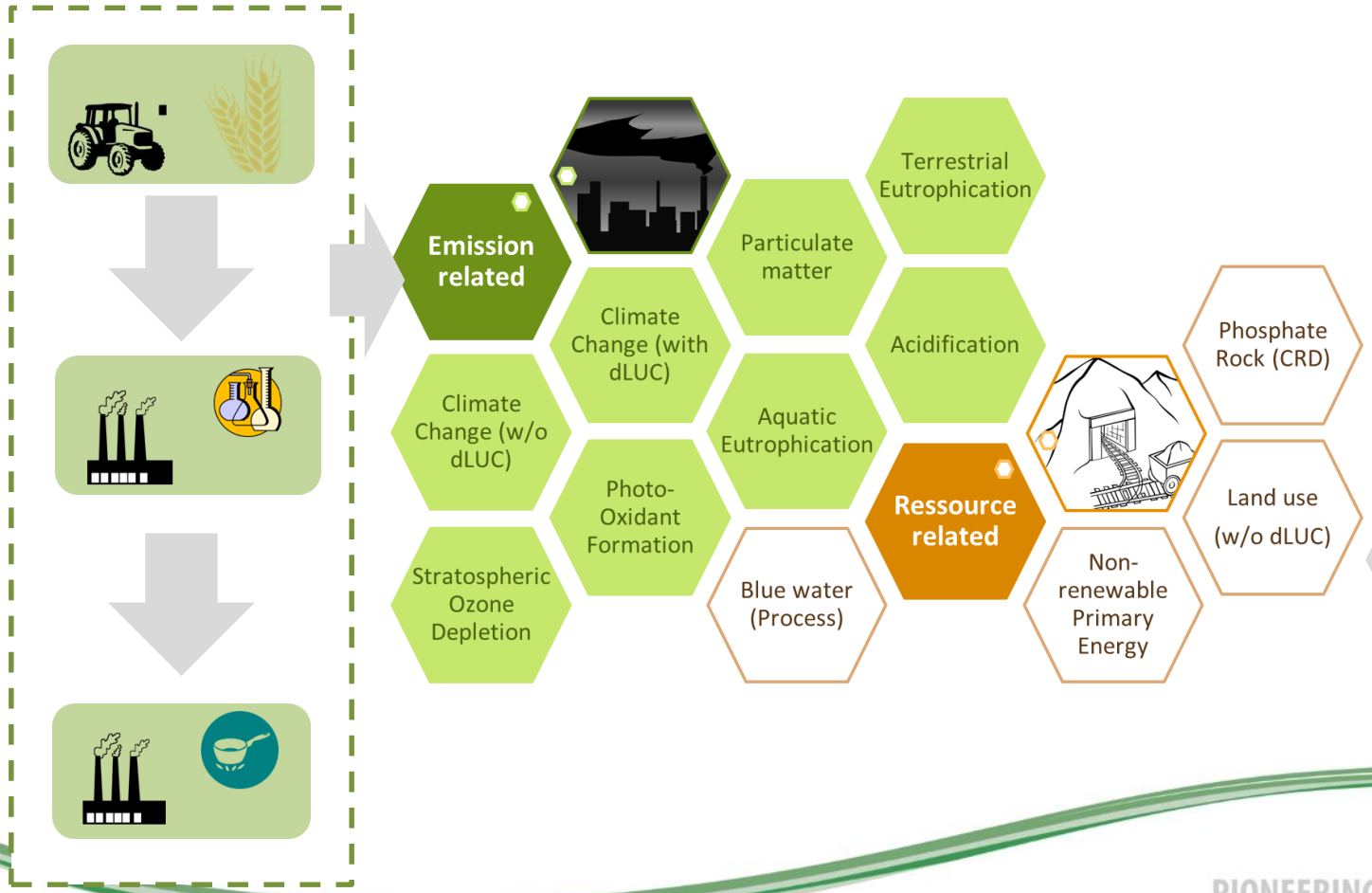

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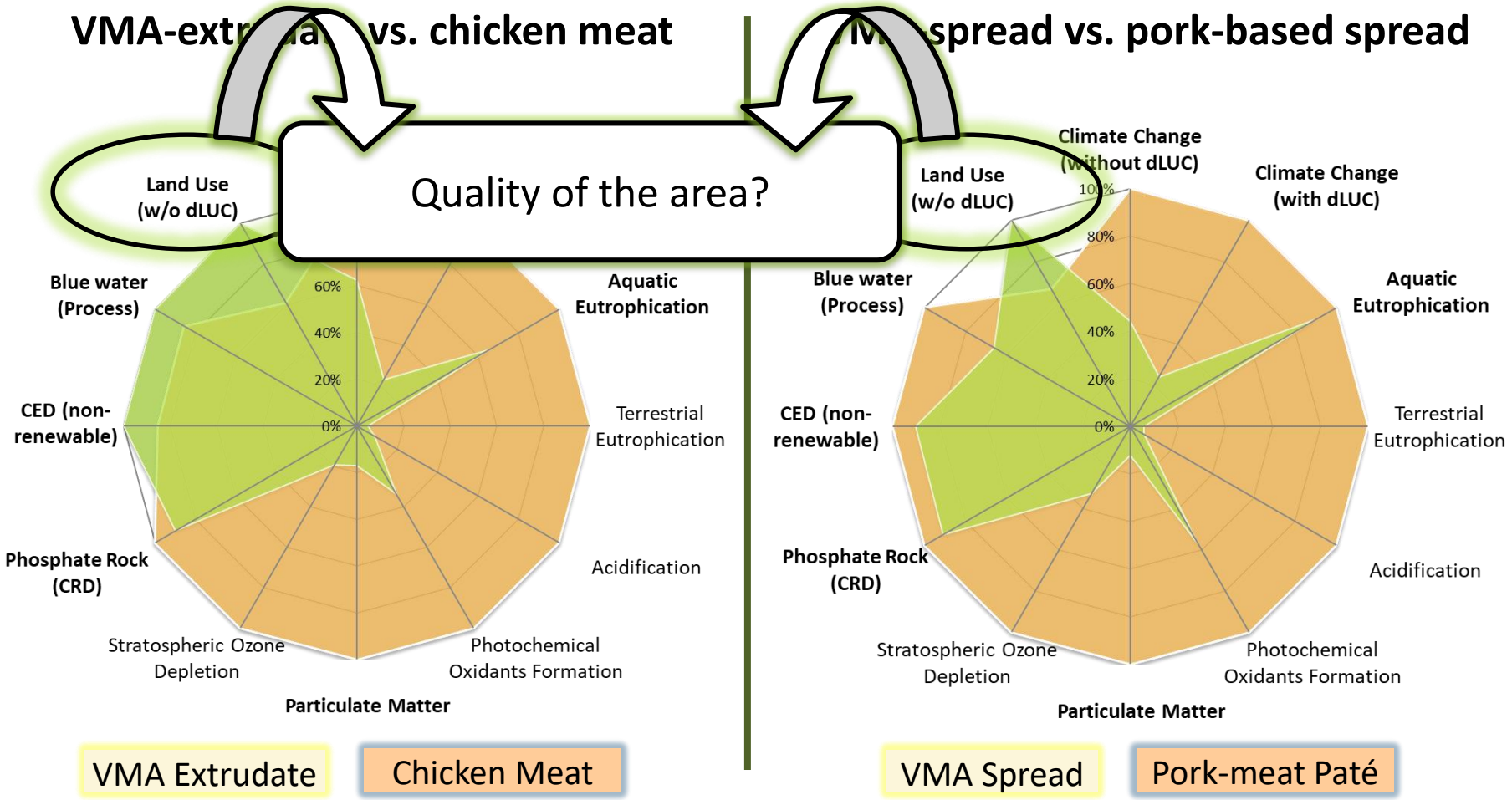

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CROPS FOR FUTURE GENERATIONS

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Biodiversity assessment …

… within the P2F project

- is performed at generic - rather than site-specific – level
- should highlight differences in crop species

→**crop-specific differences are not yet represented in available methodology approaches**

Development of a biodiversity assessment method with focus on the cultivation stage

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1) Identification of influencing factors

Factors targeting the improvement of benefits and mitigation of **agricultural pressures on biodiversity** based on Agri-Environmental Schemes (FAO 2016)

Pressure category	Influencing factor
(1) N-/P-related pollution	A) Partial replacement of N-fertilizer input by including legumes in crop rotation B) Nutrient leaching to ground and surface water:
(2) Pesticides and other pollution	C) Reduction of pesticide treatments D) Reduction of stratospheric ozone depletion E) Reduction of photochemical ozone formation
(3) Water balance	F) Reduction of water demand
(4) Soil degradation	G) Reduced soil compaction due to mechanical field work H) Increase of soil organic matter
(5) Landscape structure	I) Diversifying crop rotations

FAO (2016). Teillard, F., Anton, A., Dumont, B., Finn, J.A., Henry, B., Souza, D.M., Manzano P., Milà i Canals, L., Phelps, C., Said, M., Vijn, S., White, S. 2016. A review of indicators and methods to assess biodiversity – Application to livestock production at global scale. Livestock Environmental Assessment and Performance (LEAP) Partnership. FAO, Rome, Italy.

2) Definition of appropriate metrics per influencing factor

A) Metrics directly connected to LCA results

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2) Definition of appropriate metrics per influencing factor

A) Metrics dire

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(5) Landscape structure	

Acidification potential (g SO2-e/fu)

Aquatic and terrestrial eutrophication potential (g PO4-e/fu)

Ozone depletion potential (g CFC-11-e/fu)

Photochemical ozone formation potential (g O3-e/fu)

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2) Definition of appropriate metrics per influencing factor

B) Metrics directly connected to the cultivation models

Pressure category	Influencing factor
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B) Metrics dire

Area cultivated with legumes (m^2 *a/area used per fu)

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Area cultivated with legumes (m² *a/area used per fu)

Use of pesticides (g/fu)

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Diesel consumption of agricultural machines (l/area used per fu)

→ the more diesel is consumed, the heavier machines are used or the higher is the frequency of the field work

Assessment and Performance (LEAP) Partnership. FAO, Rome, Italy.

2) Definition of appropriate metrics per influencing factor

C) Metrics subject to additional data

Pressure category	Influencing factor
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Humus equivalents (kg C/area used per fu)

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2) Definition of appropriate metrics per influencing factor

(5) Landscape structure: I) Diversifying crop rotation

Metric: Area cultivated with minor crops where the share of cropped area declined throughout Europe (m^2 *a/area used/fu)

Considered data:

- Share of cropped area: cultivation area of crops based on EuroStat (years 2014-2016)
- Crop area decline or increase: evaluation of crop area time series with figures from 1961 to 2016 published by FAOSTAT

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2) Definition of appropriate metrics per influencing factor

(5) Landscape structure: I) Diversifying crop rotation

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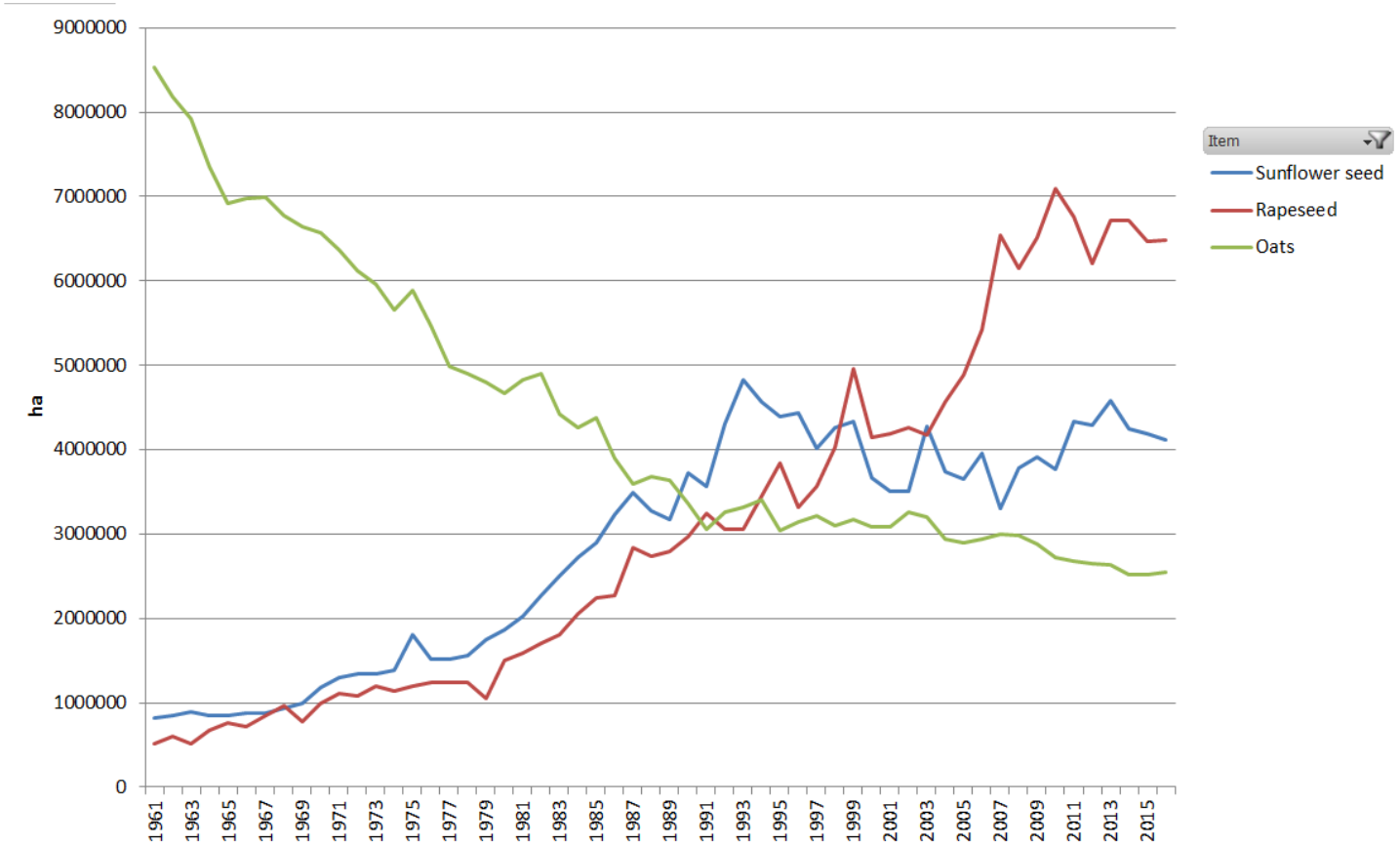

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2) Definition of appropriate metrics per influencing factor

(5) Landscape structure: I) Diversifying crop rotation

→ Crops are categorised into three classes

- A = decrease in cropped area and < 5 % of European cultivation area
- B = decrease in cropped area and > 5 % of European cultivation area or cropped area remained unchanged and 5-20 % of European cultivation area
- C = increase in cropped area and > 5 % of European cultivation area

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2) Definition of appropriate metrics per influencing factor

(5) Landscape structure: I) Diversifying crop rotation

Crop/Fruit	Decrease (A) or increase (C) since	Current share of cropped area	Classification
Buckwheat	B	0,2%	**B**
Fababean	A	1,6%	**A**
Lentil	A	1,6%	**A**
Lupin	A	1,6%	**A**
Soybean food	B	0,6%	**B**
Amaranth	C	0,2%	**B**
Oat	A	7,0%	**B**
Rapeseed	C	5,3%	**C**
Sunflower	C	3,4%	**B**
Wheat	C	21,8%	**C**
Maize	C	12,4%	**C**
Sugar beet	A	2,7%	**A**

Multiplication of area needed per fu with 1 (class A), 0.5 (class B) and 0 (class C)

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3) Comparison of food products

Pressure category	Influencing factor	
N-/P-related pollution	A) Inclusion of legumes in crop rotation	
	B) N-/P-leaching to ground/ surface water	Acidification
		Aquatic Eutrophication
		Terrestrial Eutrophication
Pesticides and other pollution	C) Reduction of pesticide treatments	
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Landscape structure	I) Diversifying crop rotations	

1. differences ≤ 20% are considered as insignificant

1. Calculation of the metrics for all examined food products per functional unit
2. Relative comparison of innovative products with the traditional food products
3. Classification into more or less favourable compared to the competing ones per influencing factor

Results: biodiversity assessment

Pressure category	Influencing factor		Vegetable burger vs. beef burger	VMA-fibre vs. chicken meat (medium intensive)	VMA-spread vs. pork-based spread (medium intensive)	Plant milk vs. cow milk (medium intensive)
			P2F prototypes are more (green) or less (red) favourable than the traditional products			
N-/P-related pollution	A) Inclusion of legumes in crop rotation					
	B) N-/P-leaching to ground/ surface water	Acidification				
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te, S.

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Landscape structure	I) Diversifying crop rotations					

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innovative food products would potentially reduce the pressure of agriculture on biodiversity

te, S.

To sum up …

→ Development of an semi-quantitative approach that allows

- initial assessment of potential pressure on biodiversity
- benchmarking of innovative protein rich products against animal based products on a non-site specific scale

→Results show that the innovative products would reduce the pressure of agriculture on biodiversity

→ An increased **plant-based protein supply** with innovative protein-rich foods bears **potential to sustain the environment**

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