Which dietary changes to move towards nutritionally adequate diets without increasing their impact on biodiversity, water and land-use?

Marlène Perignon, Jalila El Ati, Carole Sinfort, Sophie Drogue, Nicole Darmon, Marie Josephe Amiot-Carlin, . Medina Study Group

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Which dietary changes to move towards nutritionally adequate diets without increasing their impact on biodiversity, water and land-use? The case of Tunisia

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Food security in the Mediterranean region & Tunisia

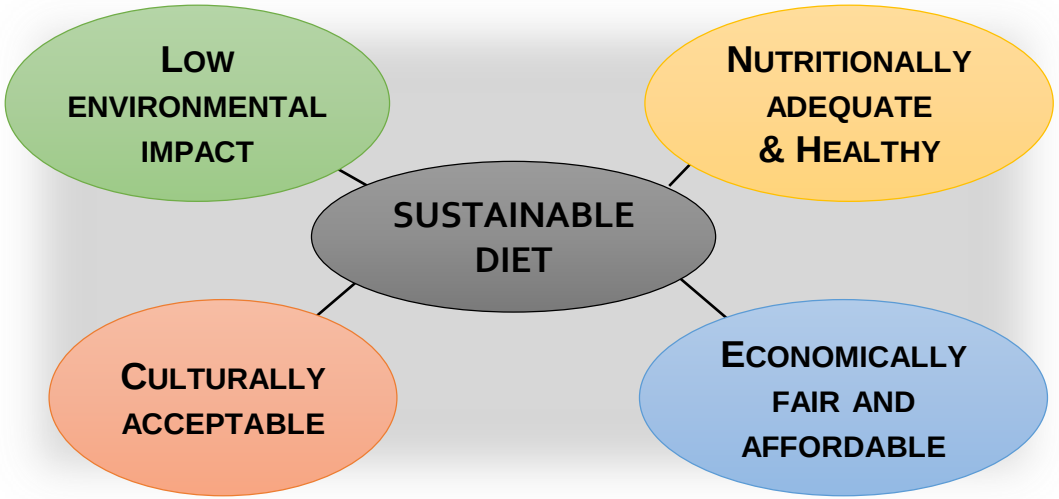
- **Epidemiological and nutritional transition**
  - ➡ increase in overweight, obesity and co-morbidities
  - ➡ burden of obesity especially high among women (~1/3 in Tunisia)

- **Environmental issues**
  - ➡ Water scarcity, soil erosion and biodiversity loss
  - ➡ Food system is responsible for a considerable proportion of environmental footprint (15-28% to overall GHGE)

Moving towards more sustainable diets

- **Changes in both food consumption and food production** are needed

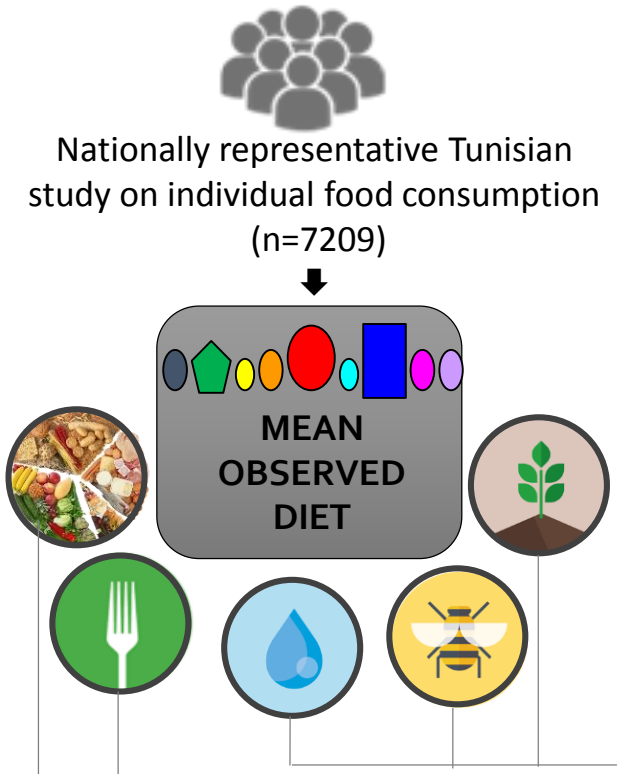
- *"**Sustainable Diets** are those diets with **low environmental impacts** which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, **culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy**; while optimizing natural and human resources."*
  (FAO, 2010)



Objective:

To identify dietary changes allowing to move towards healthy and culturally acceptable diets in Tunisia without increasing their environmental impact

Methodology : Diet optimization by linear programming



Environmental impact : 7 indicators
- → Water deprivation
- → Biodiversity
- → Land use and quality:
  - Surface
  - Erosion resistance
  - Mechanical filtration
  - Groundwater replenishment
  - Biotic production

Nutritional content : macronutrients, vitamins, minerals

Food content: food items, groups, subgroups

Methodology : Diet optimization by linear programming

Nationally representative Tunisian study on individual food consumption (n=7209)

DIET OPTIMIZATION

UNDER A SET OF CONSTRAINTS

MODEL ①

Nutritional constraints:
Fullfil the Recommanded Nutrient Intake (for 29 nutrients)

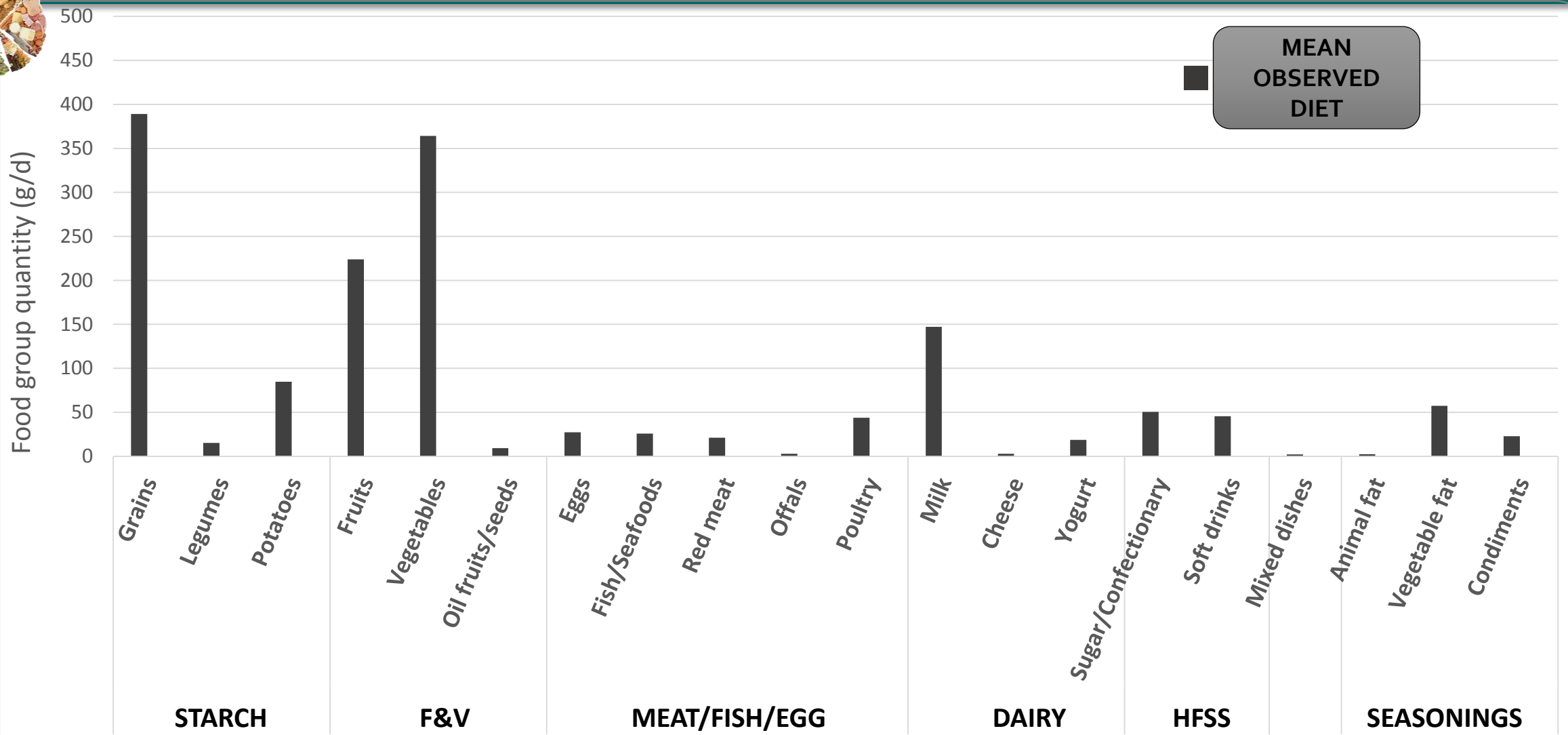
➡ **NUTRITIONAL ADEQUACY**

Minimization of departure from observed diet (for each food)

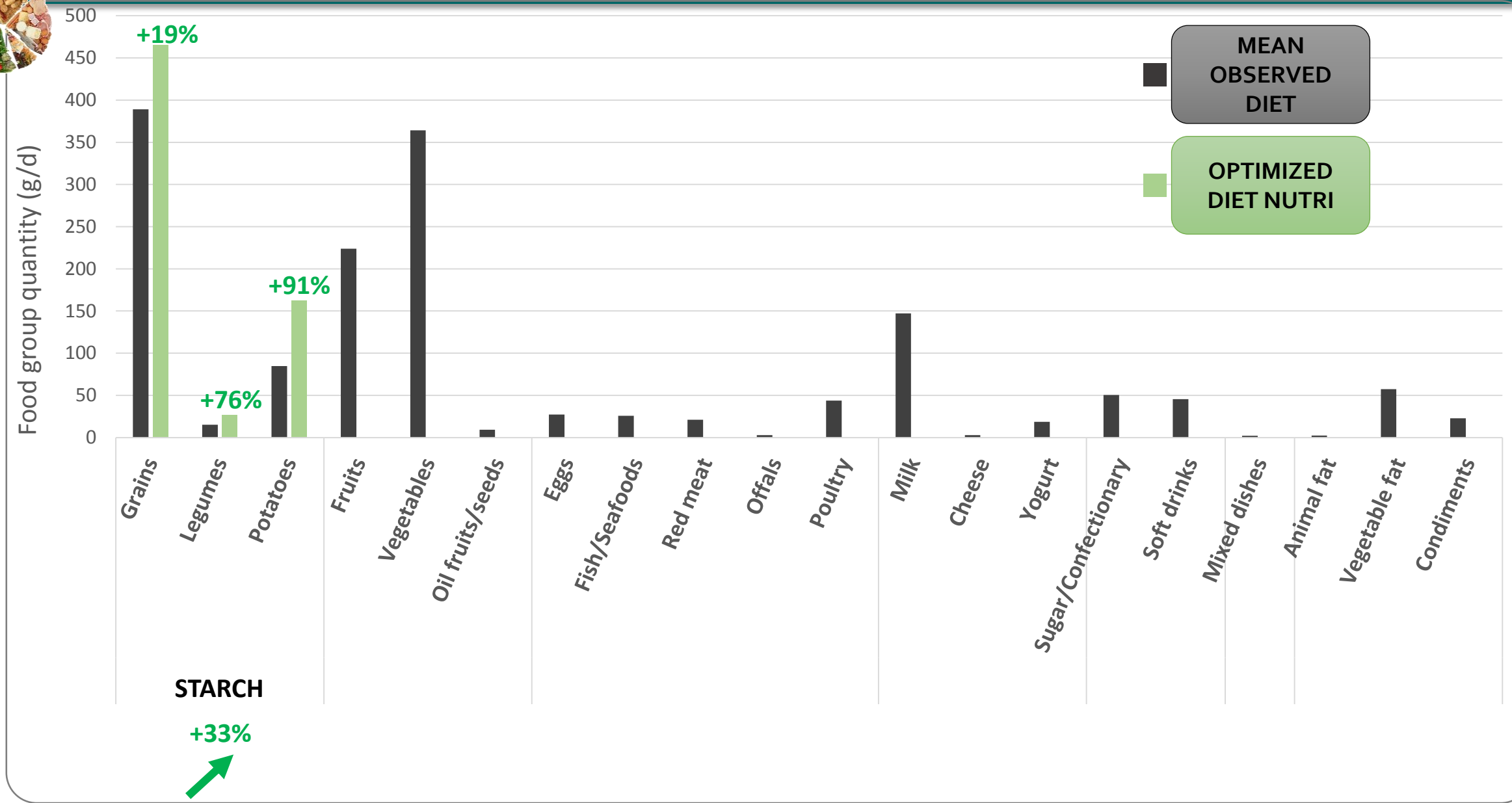
➡ **ACCEPTABILITY**

Which dietary changes?
What environmental impact?

Food group content



Food group content



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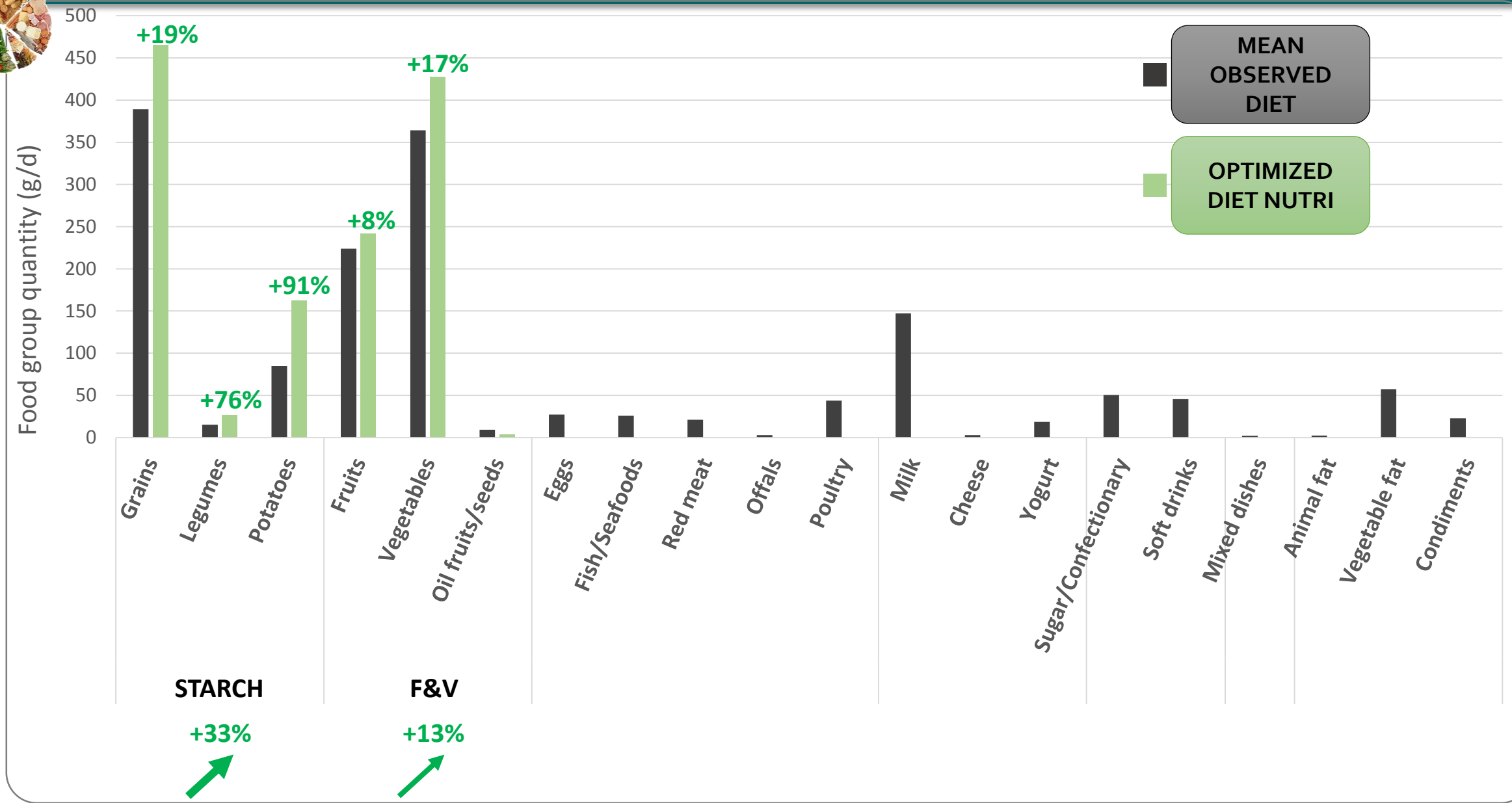

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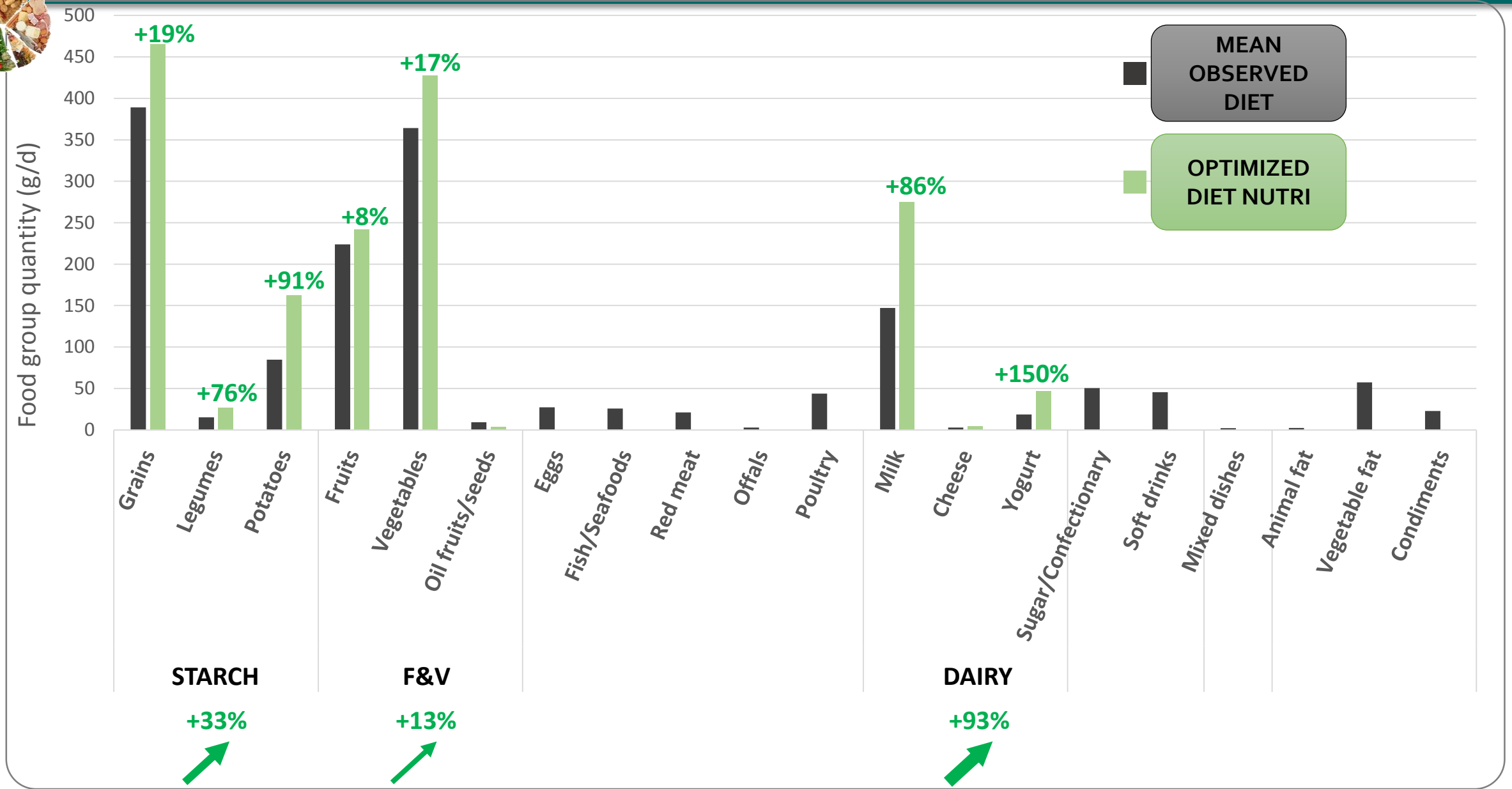

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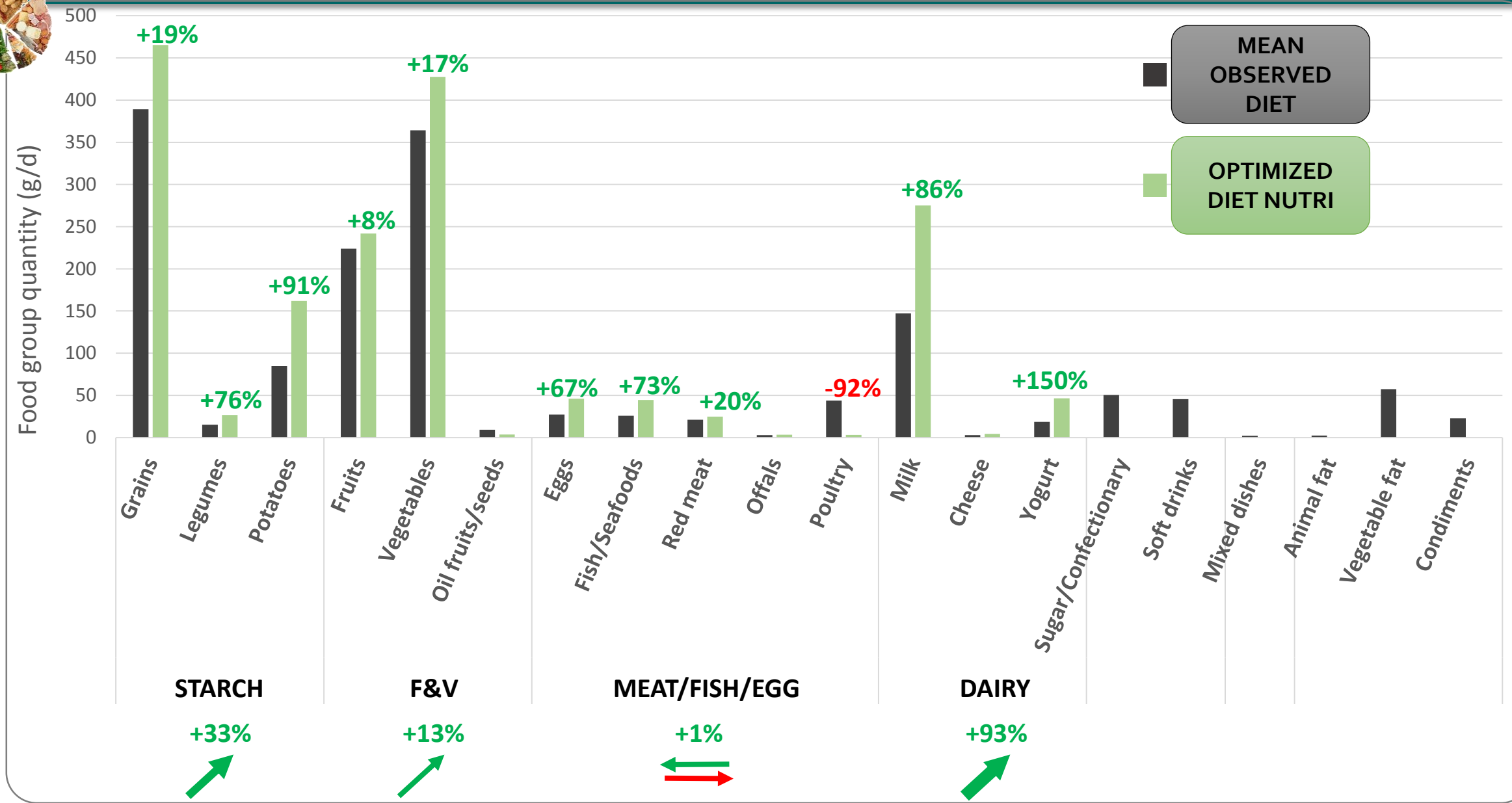
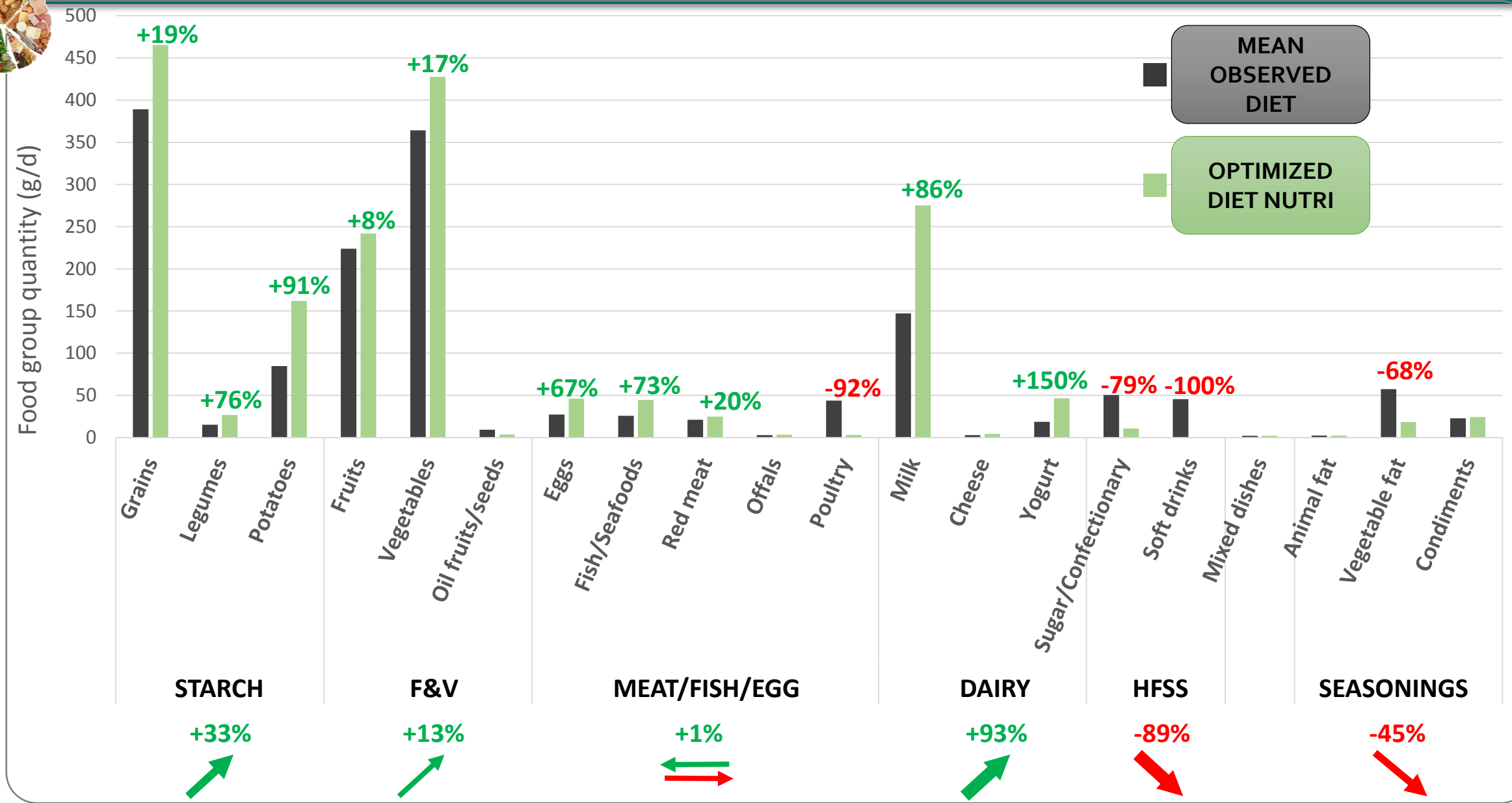
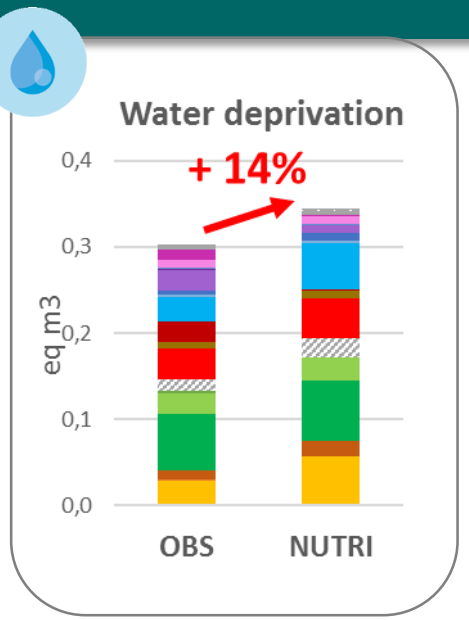
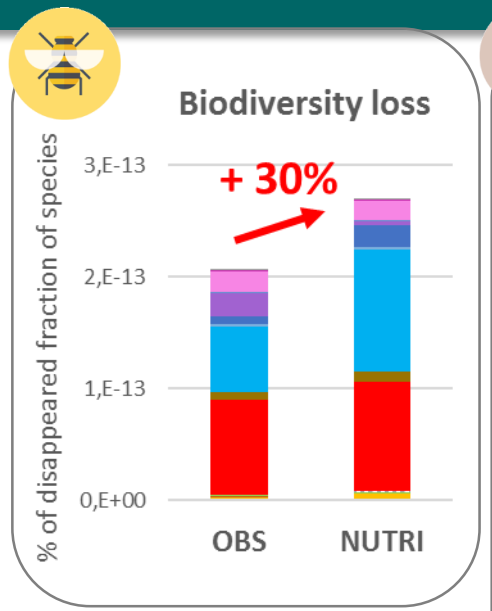


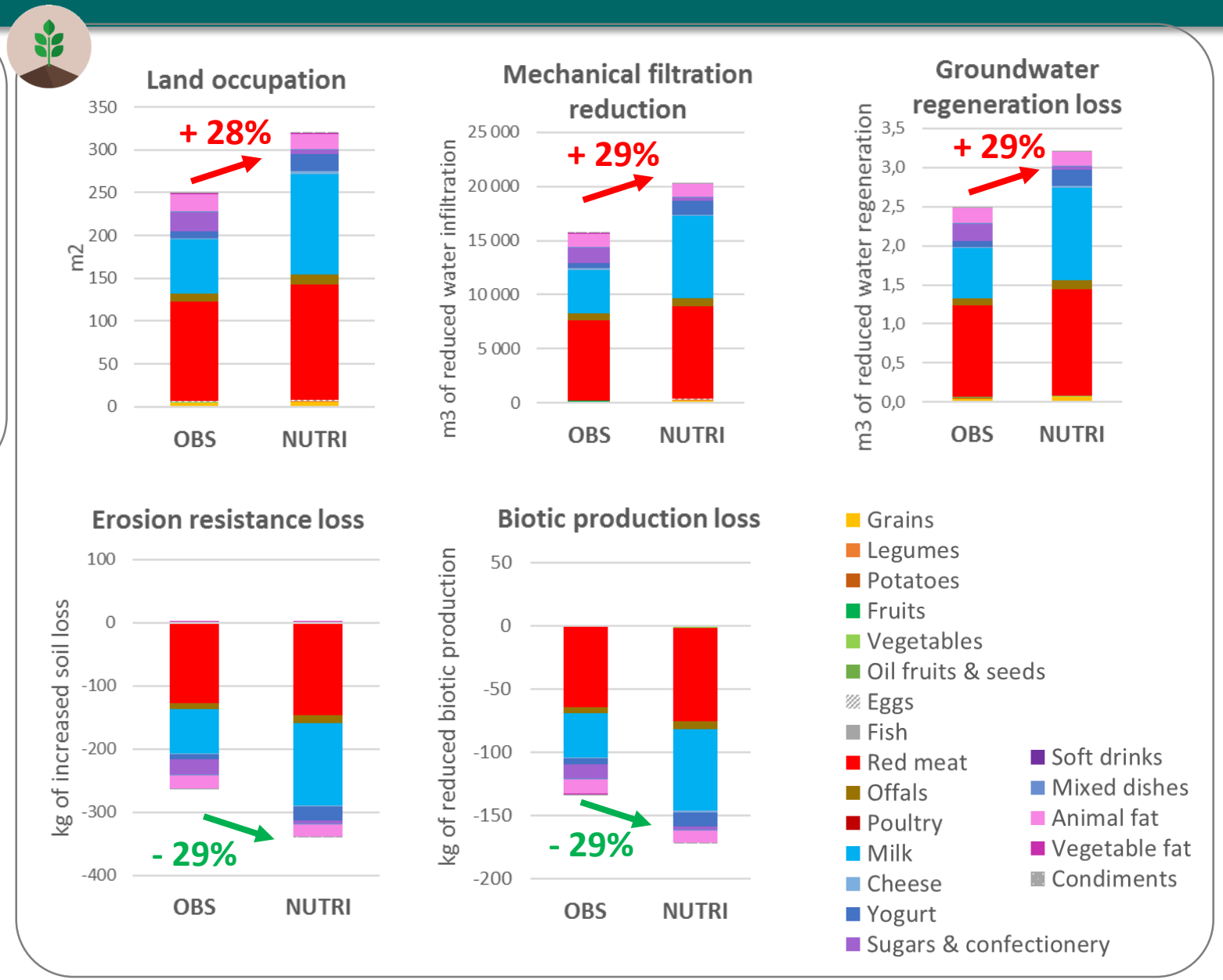
Food group content



Environmental impact



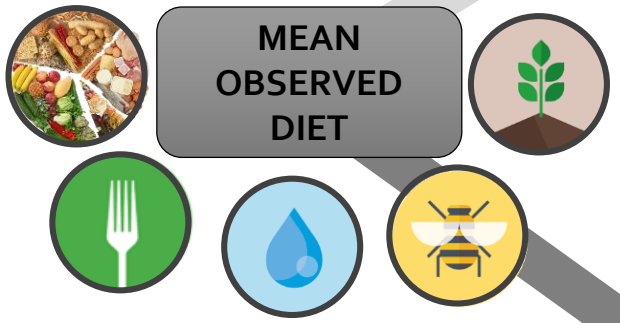




- Dietary changes to reach nutritional adequacy ↗ **the impact** on water, biodiversity and 3 indicators of landuse

- Incompatibility of the nutrition vs. environmental dimensions

Methodology : Diet optimization by linear programming



MEAN OBSERVED DIET

MODEL 1

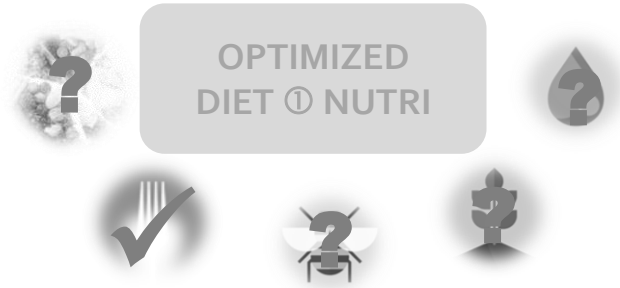
Minimization of departure from observed diet

➡ ACCEPTABILITY

Nutritional constraints:

Fullfil the Recommanded Nutrient Intake for 29 nutrients

➡ NUTRITIONAL ADEQUACY



OPTIMIZED DIET ① NUTRI

MODEL ②

Minimization of departure from observed diet

➡ ACCEPTABILITY

Nutritional constraints:

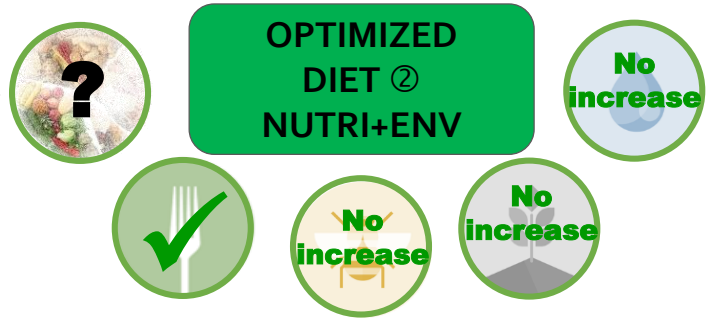
Fullfil the Recommanded Nutrient Intake for 29 nutrients

➡ NUTRITIONAL ADEQUACY

Environmental constraints:

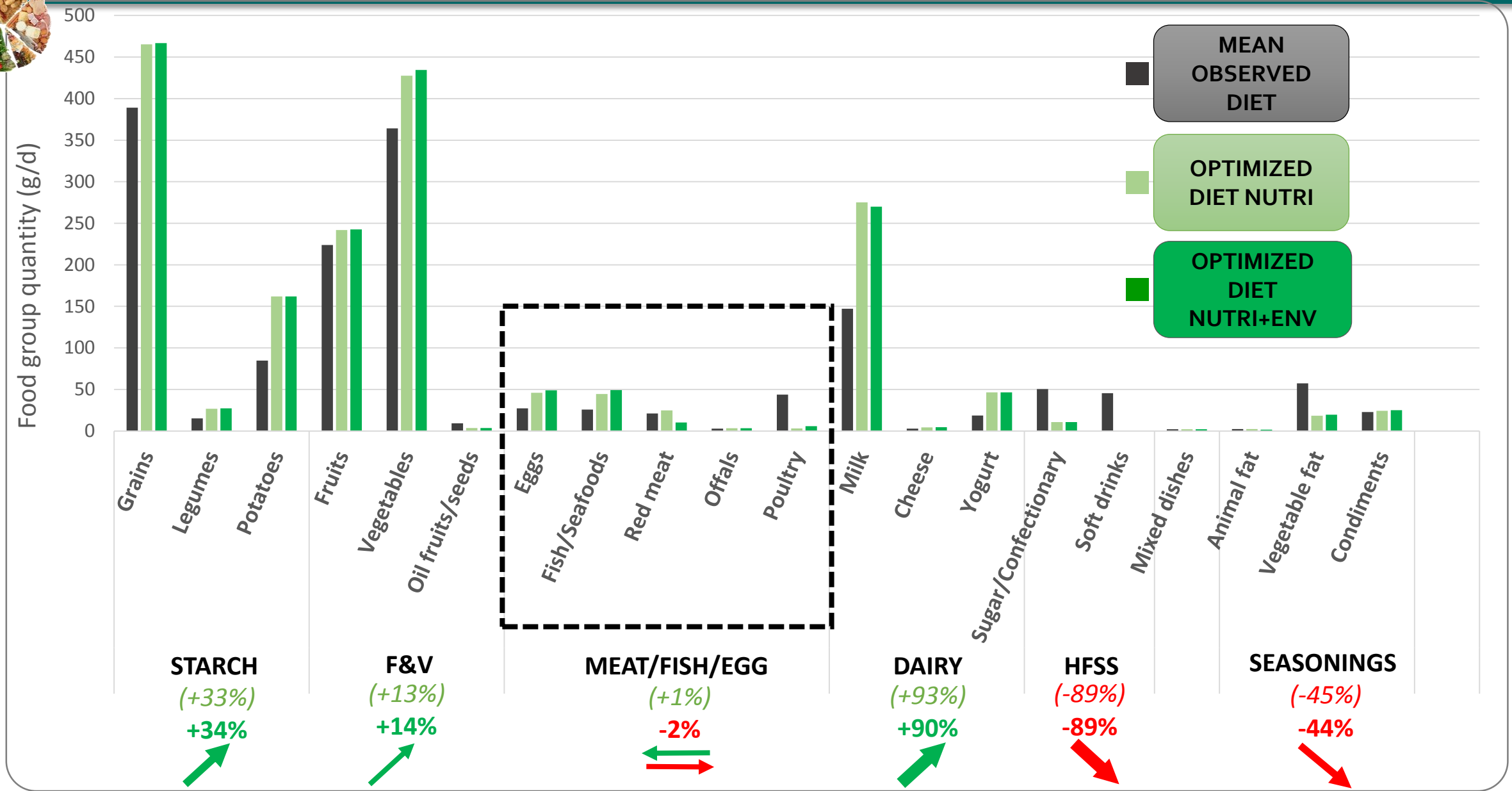
No increase from observed level for the 7 indicators

➡ ENVIRONMENTAL IMPACT

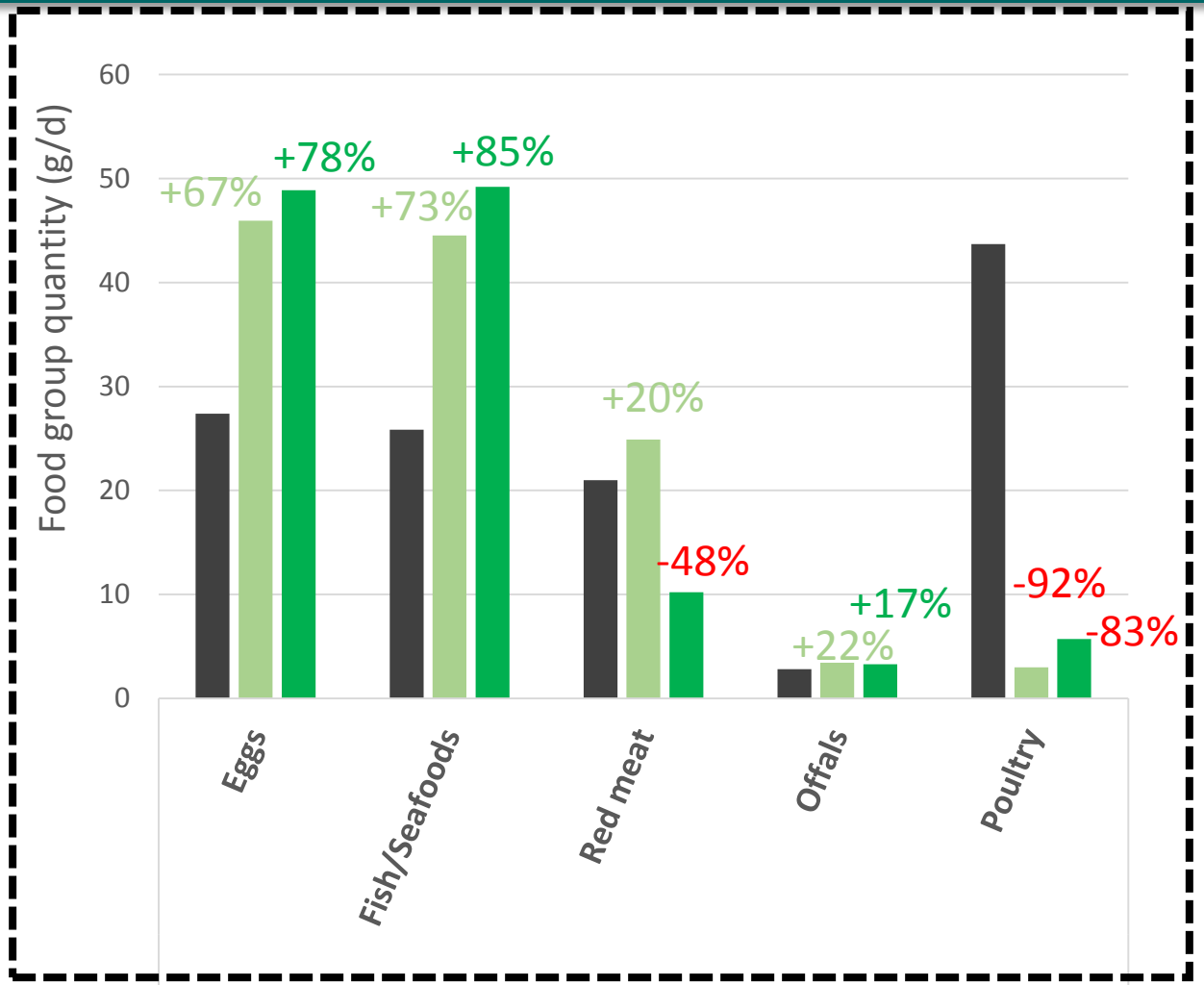


OPTIMIZED DIET ② NUTRI+ENV

Food group content



Food group content



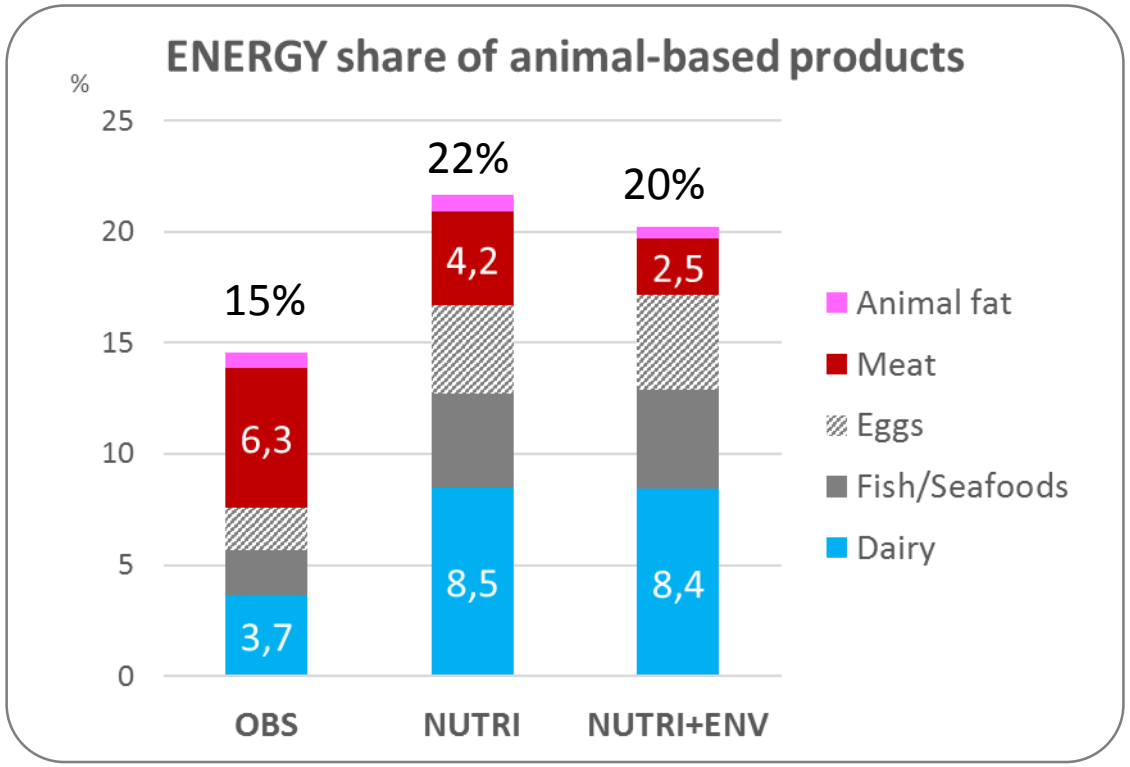
MEAN OBSERVED DIET

OPTIMIZED DIET NUTRI

OPTIMIZED DIET NUTRI+ENV

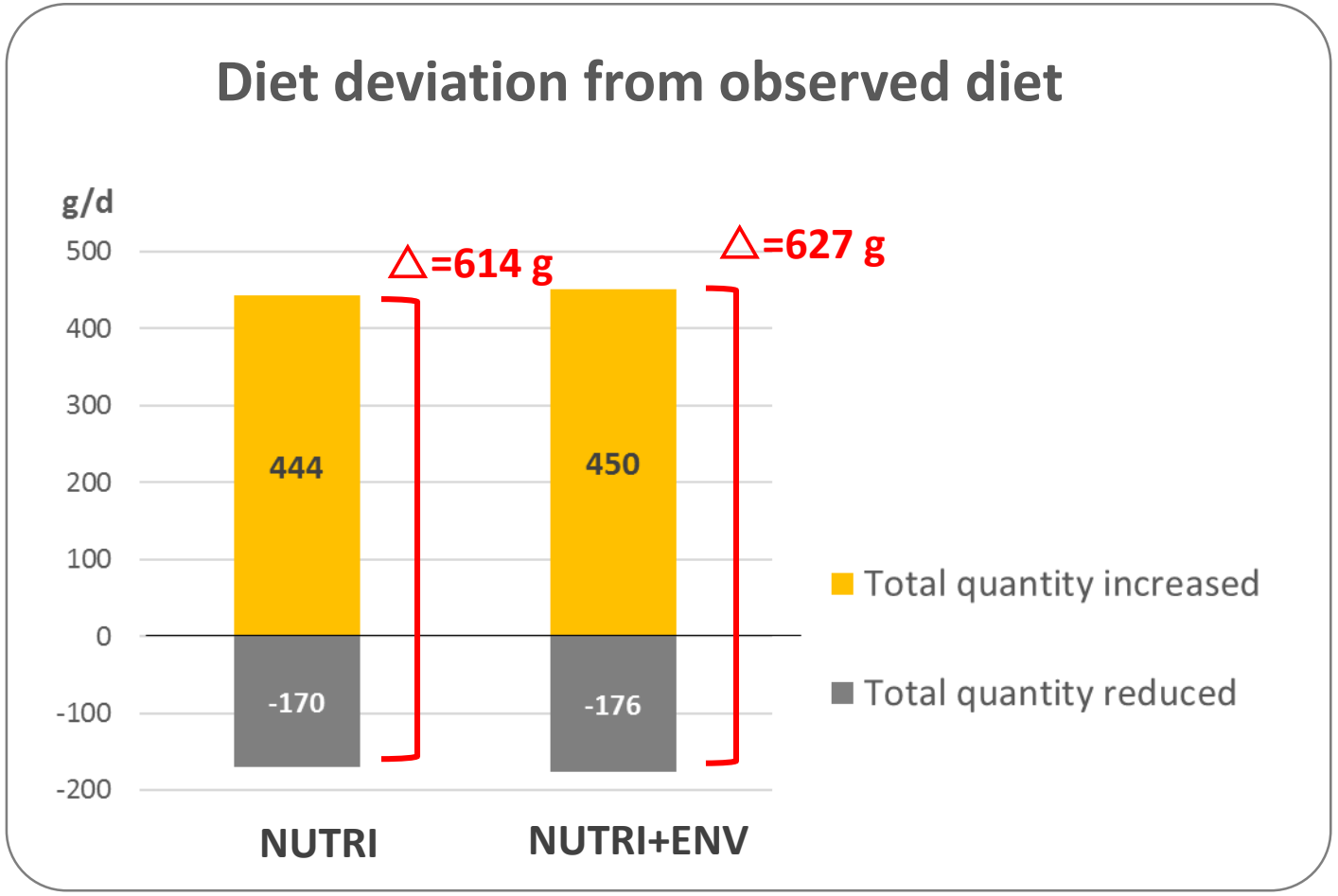
- **Addition of environmental constraints**
  ⇨ reduction of red meat by half

Share of animal-based products



- **Increase of total energy share** of animal-based products
- But **restructuration of contributions** within animal-based products:
  - ↗ Dairy, Fish, Egg
  - ↘ Meat

Deviation from actual diet



	Obs	NUTRI	NUTRI+ENV
Total diet weight (g/d)	1556	1829	1830

- **Reaching nutritional adequacy without increasing environmental impact** is possible but requires **higher diet deviation**
- but **small additional changes** vs. NUTRI

Conclusion

- **Compatibility of sustainable diet dimensions:**

  ➥ Dietary changes **improving nutritional quality may induce a higher environmental impact** of diet

  ⇨ Both **dimensions should be considered together** when designing guidelines for healthy & sustainable diet

  ➥ It is **possible to reach nutritional adequacy without increasing the environmental impact of diet**

  ⇨ it requires **higher deviation from observed diet** (but additional changes are small)

- **Main dietary changes identified to move towards more sustainable diet in Tunisia**:

↗
Dairy products
Fish/eggs
F&V

↘
Sweet products
Fats
Meat

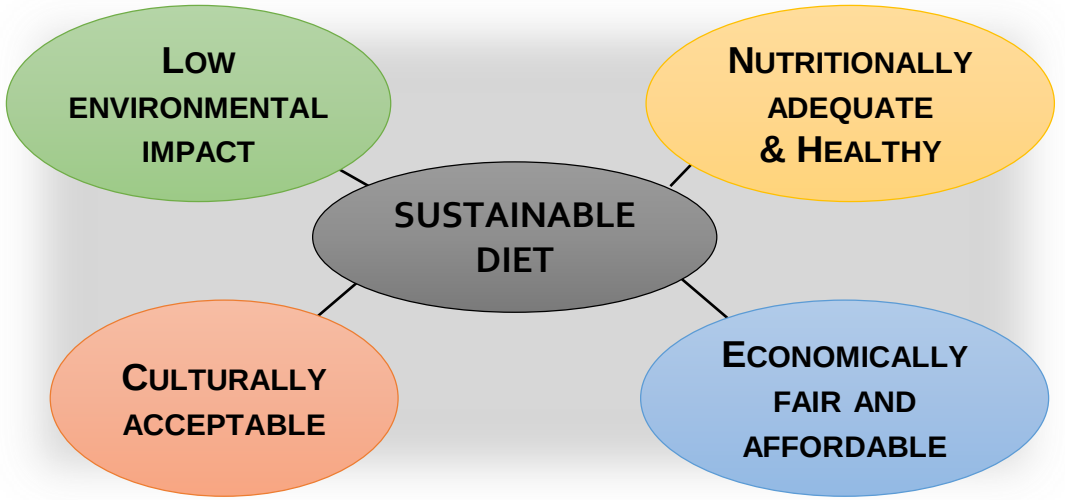
Animal-based products ~ 20% of total energy
(~ ¼ of total weight)

Translation into action proposals

DIETARY CHANGES	EXAMPLES OF ACTION PROPOSALS
Dairy	**Improve stability of supply/availability** : to expand the installation of small, mobile or industrial processing units to transform the surplus seasonal products into stabilized ingredients and food products for off-season use and consumption.
Fish & seafoods	**Improve access (physical)** : improve distribution channels to ensure regular access to fresh seafoods, and encourage the artisanal seafood processing sector (salting, drying, smoking and pickling techniques)
F&V	**Improve access (economic)**: Promote deployment of sales points "from producer to consumer". This action will be accompanied by a communication campaign to encourage the use of these local distribution channels
Fats	**Rebalance the utilization of vegetable oils:** remove the subsidy for imported vegetable oils (soybean) and transfer this subsidy in the form of vouchers for olive oil (reserved for people living below the poverty line)
Sodium / salt	**Improve formulation of main contributors:** set a maximum permitted level of salt in manufactured products that are highly contributors (bread, cheeses and processed meats). A quality label will be awarded to products complying with these standards
...	...

Perspectives

- **Evaluation of the actions proposals** by key stakeholders
- **Diet optimization** with **reduced environmental impact**
- **Models improvement**:
  - Marine biodiversity and GHGE
  - Iron bioavailability, quality of protein
  - Optimization at the individual level
  - Diet cost



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Thank you for your attention

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