



**HAL**  
open science

## The Possibility of Immediate Meat Intake Reduction in pathways toward a healthy diet

Elie Perraud, Juhui Wang, Alison Dussiot, H el ene Fouillet, Fran ois Mariotti

### ► To cite this version:

Elie Perraud, Juhui Wang, Alison Dussiot, H el ene Fouillet, Fran ois Mariotti. The Possibility of Immediate Meat Intake Reduction in pathways toward a healthy diet. NUTRITION 2023, Jul 2023, Boston (MA), United States. hal-04186262

**HAL Id: hal-04186262**

**<https://hal.inrae.fr/hal-04186262>**

Submitted on 23 Aug 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destin ee au d ep ot et  a la diffusion de documents scientifiques de niveau recherche, publi es ou non,  emanant des  tablissements d'enseignement et de recherche fran ais ou  trangers, des laboratoires publics ou priv es.



Distributed under a Creative Commons Attribution - NonCommercial | 4.0 International License

## Reduction in pathways toward a healthy diet

### Background:

- In Western countries, **reducing total red meat (red and processed meats)** consumption is becoming more **popular**.
- The importance of **meat** has been pointed out for **nutritional** adequacy.

**Objective:** Understand if there is a **risk** with the direct **diminution of total red meat** and what steps should be introduced to make this diminution possible.

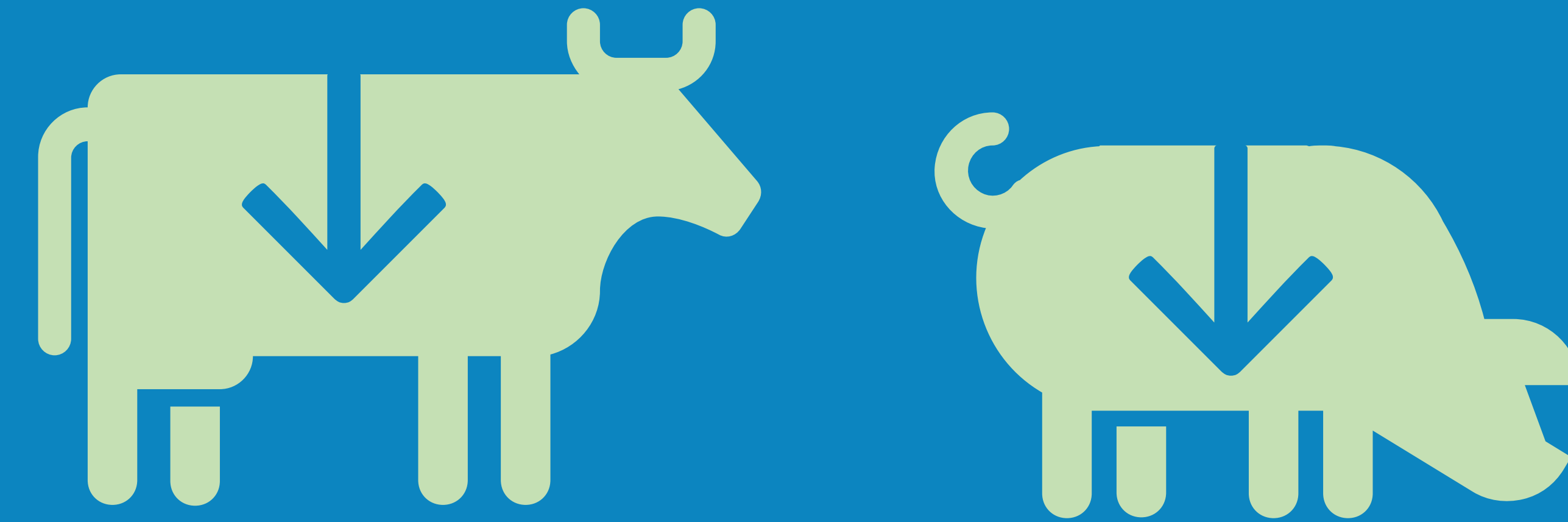
### Methods:

- A **new method** developed using **graph theory**
- Pathways all avoiding the risk of nutrient deficiency
- Identified and characterized the trajectory that **reduces total red meat** consumption as **quickly** as possible.
- The best pathways were found using the **Dijkstra algorithm**.

### Results:

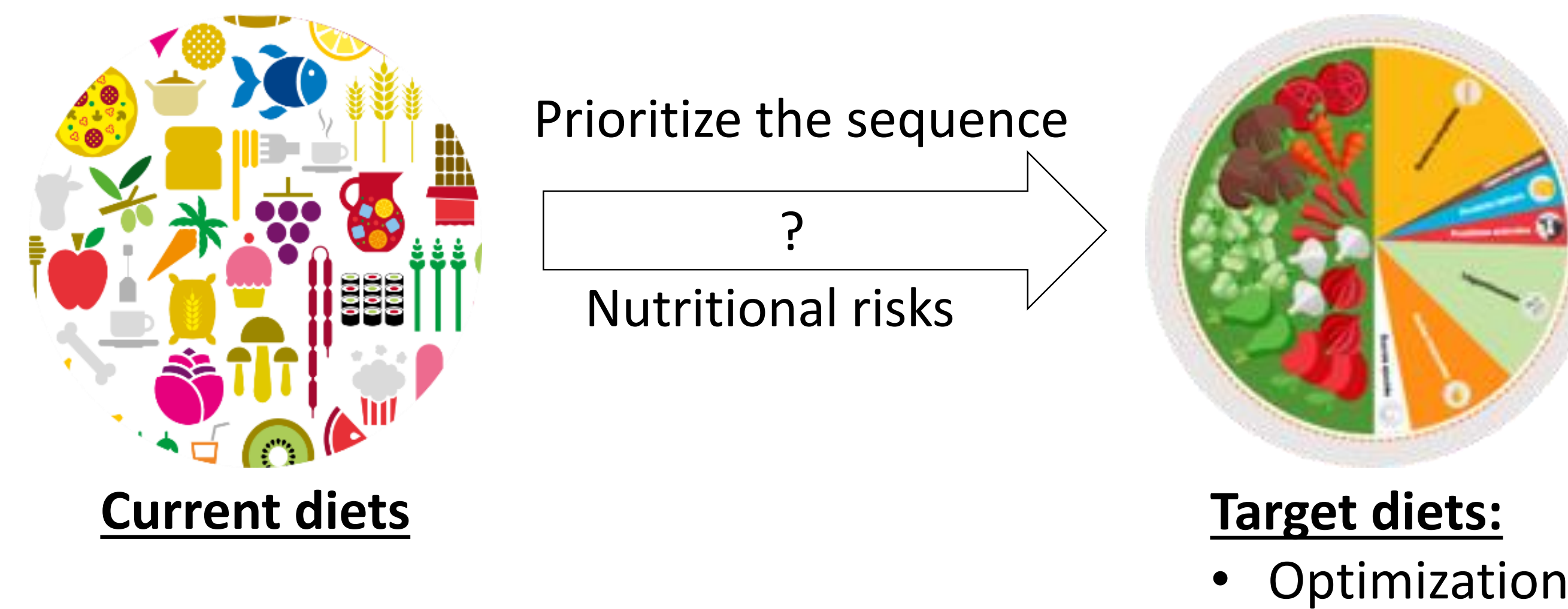
- The number of **total red meat portions** consumed is **0, 3, and 3** for **males'** observed diets (low-meat, mean, high-meat) and **0, 2, and 3** for **females'** observed diets (low-meat, mean, high-meat).
- For each graph having an observed diet with red meat intake, the first step was the diminution of this consumption.
- Conclusions:**
- Total red meat** can be **decreased** with specific increases, especially fruit, vegetable, and fish.
- Bioavailable iron** adequacy is a **major limit** in total red meat reduction for women.

Nutrition 2023 – July 22-25 – Boston – P14-074-23



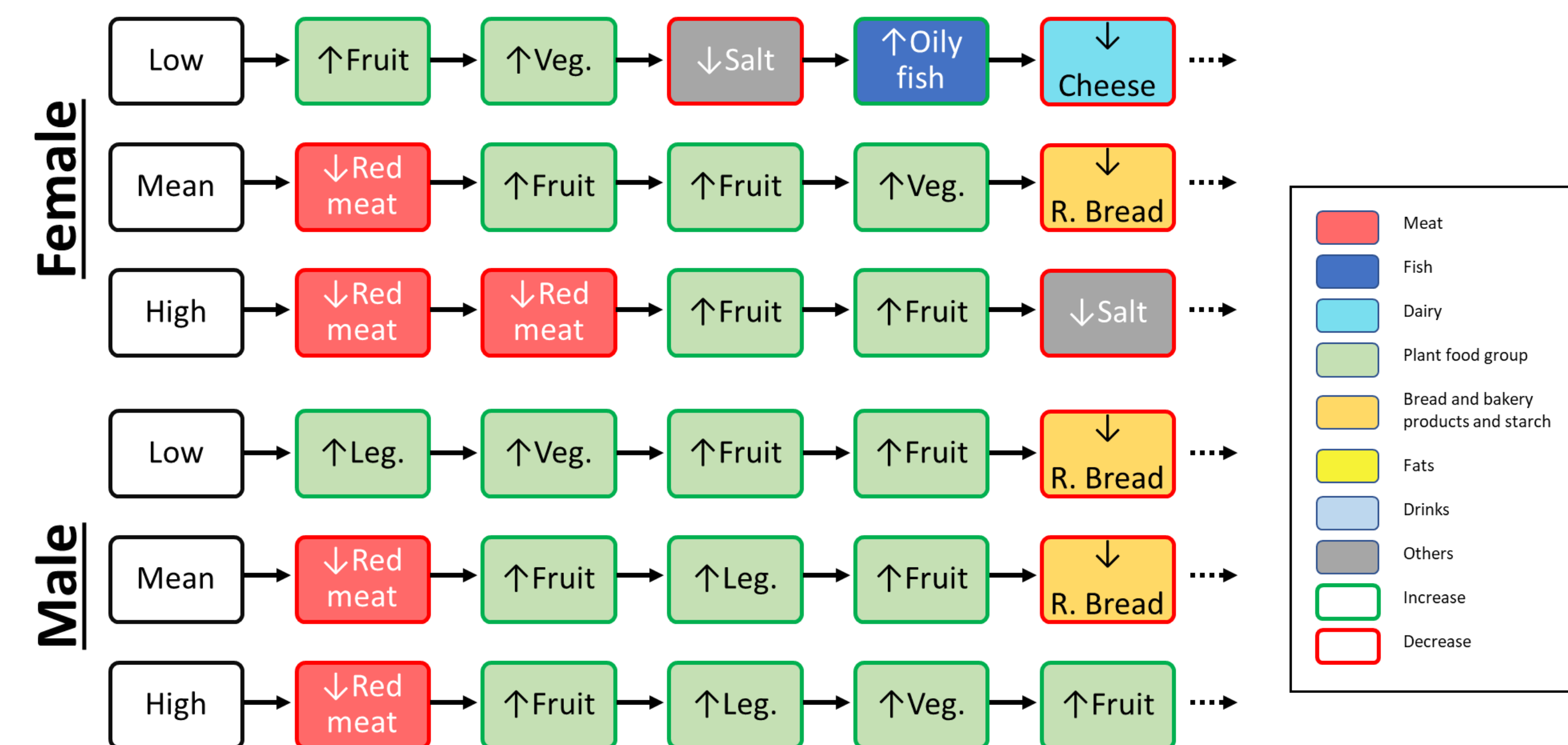
### Introduction

- In Western countries, **reducing total red meat (red and processed meats)** consumption is becoming more **popular**.
- The importance of **meat** has been pointed out for **nutritional** adequacy.

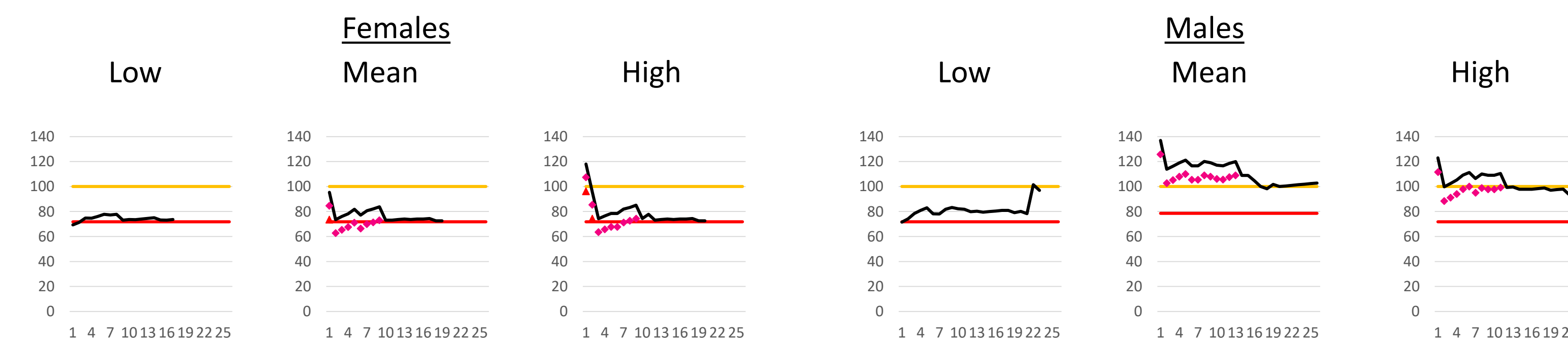


### Results

#### First five steps of the pathways identified based on the optimization criteria



#### Intake of bioavailable iron (as a percentage of the reference value)

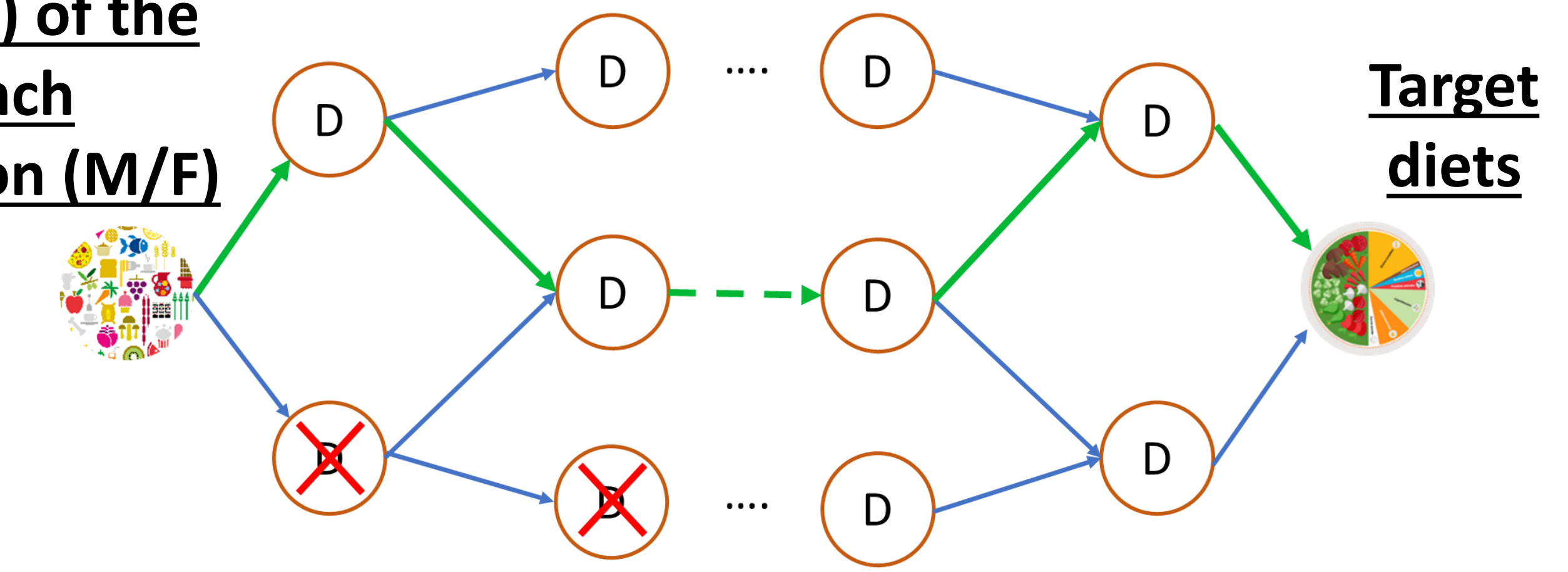


Step of the trajectory

### Methods

**Optimization criteria:**  
**Meat quantity (MQ),**  
 Health score (HR): TMREL, DALYs  
**Score = MQ(100-1e-8) + HR(1e-8)**

**Q1 (low), Mean, Q5 (high) of the French population (M/F)**



→ **Optimal pathway: Dijkstra algorithm**      ✗ **Constraint application: Risk of nutrient deficiency**

**Graph theory**  
 (D) Diet: vector of 33 food groups  
 (→) Dietary change: 1 portion step

### Conclusion

- ➔ Red meat can be decreased in the first steps of the pathways.
- ➔ Total red meat can be minimized in the first 13 steps of the pathways.
- ➔ Fish, fruit, and vegetable are the most efficient substitutions in the pathways to reduce meat consumption.
- ➔ Bioavailable iron is an important limitation toward meat reduction for females.

