



CARIBOU

Exploratory project  
2022



© INRAE

### Coordinator

Tiphany Lucas (UR OPAALE)  
[tiphany.lucas@inrae.fr](mailto:tiphany.lucas@inrae.fr)

### Key words

Bread waste  
Bread  
Losses  
Valorisation  
Flows  
Conflict of uses  
Bioeconomy

### INRAE divisions

ACT  
MICA  
TRANSFORM

## Circularity of the bakery production



Supporting the development of circularity in the bread-making industry from the socio-economic, organisational and technological points of view, using bakery waste and unsold bread

### Context and challenges

Food losses and waste have been estimated at 20-30% of production in France. These losses occur all along the food chain, from production to consumption, with 35% cumulating at the processing and distribution stages for all types of food products combined. The 2016 Garot Law introduced a two-fold obligation: to gradually reduce the quantity of bread waste and to recover it according to a hierarchy that gives priority to food for humans (preventing waste, donating to charities, reuse for the manufacture of food products, on- or off-site), followed by feed for animals, and lastly composting and energy production. The "food first" priority is stressed, and often justified as another way to minimise the environmental footprint of products.

### Goals

CARIBOU combines skills from the social and human sciences, and from environmental assessment and technology to help develop these recovery sectors. The overall goal is to carry out the research needed to create a circular breadmaking sector from a socio-economic, organisational and technological standpoint, and that also sheds light on - and even calls into question - the legislative hierarchy which determines the uses of bread waste. It aims first to better characterise the flows of bread waste and particularly their regional specificity. This stage is crucial to define the most relevant topics for future research and action. CARIBOU will reflect on the most appropriate economic model to allow for several uses to co-exist, especially those with a strong social function (donations to charities, local synergies that forge ties in at regional scale). Finally, CARIBOU questions the hierarchy of uses laid down in current legislation, and calls for the contextualisation of uses before redefining a hierarchy. As such, the project proposes to explore new recoveries currently considered as medium term priorities in the legislative hierarchy. The goal is to test the first feasibility conditions in preparation for a follow-up project.

Three research goals have been defined by the CARIBOU project:

- Estimate available bread waste deposits and identify their determining factors to improve their management in the future
- Explore the feasibility of innovative recovery routes.
- Prepare future organisational plans for potential recovery of bread waste by other sectors while respecting, and even facilitating, the social function (donations, local synergies) and responding to the needs of the regions where bread waste is produced.

## Project members

INRAE division	Units	Expertise and contributions
ACT	UMR SADAPT	Territorial ecology, estimates of flows from surveys and database analysis, interdisciplinary analysis of <u>territorial</u> metabolism
MICA	UMR BBF	Microbial enzymology applied to recovering agro-industrial waste
TRANSFORM	UR OPAALE	Process engineering, environmental assessment, life cycle analysis