

# FOOD LOSSES AND WASTE - INVENTORY AND MANAGEMENT AT EACH STAGE IN THE FOOD CHAIN

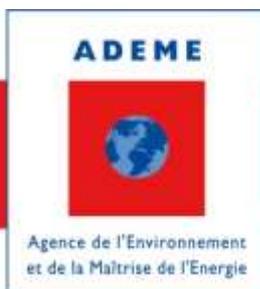
## EXECUTIVE SUMMARY

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by *INCOME consulting – AK2C*

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EXECUTIVE SUMMARY

## ACKNOWLEDGEMENT

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## 1. The choice of not differentiating food “losses” and food “waste”

If the purpose of the study is to evaluate food waste, defined as edible food products which have not been consumed directly by humans, the notion of “**food waste**” implies a **value judgment**.

That is why we chose to use in conjunction throughout this report the words “food losses and waste” to describe food products lost for human consumption.

The notion of “**losses**” relates to the **economic value** of the product and implies a need for action. This notion enables us to address the subject without using the moralizing tone that “*food waste*” could carry. The notion of “food waste” is nonetheless useful and complementary. It can lead to attitudes of denial that are counterproductive to behavioural change but it helps mobilizing based on the moral values attached to it. Behind our shared rejection of food waste, there is adhesion to respect for one another’s work, to caring for reducing environmental impacts, and also to offer solidarity to fellow citizens who are food insecure.

Finally, the border is thin between those two terms that raise the question of responsibility. Everyone can produce *food waste*, as a result of constraints inherent to his or her organization and/or because of the relatively low value associated with food. But she or he can also suffer from the losses or wastes generated at his level or, conversely, cause losses and waste from other actors. For example, products that do not match aesthetic and business standards can be discarded at the farm level because of contract specification from professional actors (processing or retailing) as well as consumer habits and expectations.

## 2. Goals of the study

Through a National Pact Against Food Waste, France committed to cutting food waste by half by 2025 and a law was adopted (Law n° 2016-138 of February 11, 2016) to set up a panel of measures to reduce and manage waste, especially at the retail stage. To better understand the situation in France, the objectives of the present study were:

- **Qualify and quantify** food losses and waste in the main food sectors and along all the stages from production to consumption
- Identify **initiatives** and ways to reduce food losses and waste
- Improve **knowledge and understanding** of mechanisms that generate losses and waste

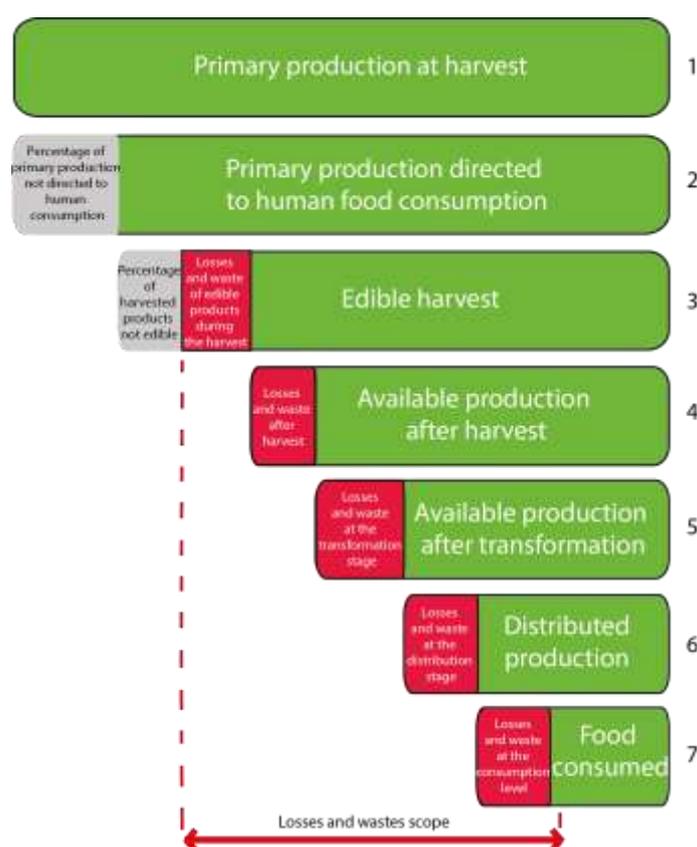
The goal is in any case to stigmatize the role of one or another actor but to bring pieces of understanding of the topic allowing each actor, individually and collectively (at the level of a sector, of a type of actor or again of the whole food chain whatever the territorial level), to question its areas of improvement to reduce food losses and waste.

## 3. Definition and scope

Exported products were excluded from the scope of the study, as long as they were outside the territory—indeed we cannot assess losses and waste on these products during stages of processing, retail and consumption outside our borders and we cannot intervene directly on the reduction of these losses and waste. Similarly, for imported products, losses and waste were taken into account as long as they entered the French circuit of production and distribution, but losses and waste generated beforehand were not included.

The definition is key for understanding the figures that are presented. We drew on and refined the definition of the National Pact, which is “all food directed to human consumption that, at one stage of the food chain, is lost, thrown away or degraded constitutes food waste.” The figure below (fig. 1) explains the scope of what was kept for the study.

Figure 1 :



- 1. We include ripe/mature products and all the losses and waste that happen before--frozen sprouts, animal death rate at the breeding stage for example--are excluded
- 2. We exclude here the production for animal feed or energy that is not directed to human food consumption
- 3. We exclude products that are not edible for humans but “harvested”, such as milk that contains antibiotics. We include losses and waste after harvest, that is to say what is edible at the harvest but that is not harvested because the market is saturated, for example, or because the food was produced to ensure a security margin or was lost during the harvest)
- 4. We include losses and waste after harvest due to sorting and losses in stock, for instance.
- 5. We include all the losses and waste happening at the processing stage (transportation, sorting at reception, losses during processes, stock, client return) and we exclude co-products that are generated by human food productions that cannot be valued for human food consumption for cultural reasons of taste or appearance. We exclude losses and waste related to processing and preparation that are not edible (bones, for instance).
- 6. We include all the losses and waste happening at the distribution level - expired, damaged, unsold products - that are neither sold nor donated (donations are not food losses or waste). We exclude non edible food losses and waste related to food processing and preparation, such as bones.
- 7. We include all the losses and waste at home and in commercial or collective restaurants, related to products conservation, preparation (for edible parts of the products) and consumption (plate leftovers). We exclude non edible losses and wastes related to processing and preparation (bones, banana peels, etc.)

To sum up, we include as food losses and waste:

- Parts of products that are considered at some point of the food chain as edible by humans, even if this notion is inherently changing because it is related to cultural aspects and not necessarily generalized ;
- And that despite being edible are not consumed by humans because they are discarded (sorting, overproduction.), lost at harvest, processing, and transportation, or not consumed (expired, served but not consumed).

We do not include as food losses and waste :

- Losses and waste that are identified before harvesting or before the maturity of the products, in vegetal sectors as well as in animal ones, as well products, including edible ones, which are initially directed to animal feed or to energy production.
- Products that are harvested and directed to human consumption, but not edible.

We finally note that the loss in terms of value of the products is not shown. An apple that is transformed into apple sauce because it is rejected for aesthetic reasons is going to lose at least some of its commercial value. As opposed to other works, the present study does not address this aspect.<sup>1</sup>

**The hierarchy defined by the Law n°2016-138 of February 11, 2016, on the fight against food waste** specifies what relates to prevention of food losses and wastes and what relates to their management. It defines the actions to be taken to fight against losses and wastes in the following order of priorities :

1° **Prevention** of food waste (ex: selling products that are usually rejected) ;

2° Use of unsold products suitable for human consumption, by **donation** or **processing** (ex: allow gleaning or processing fruits to make juices or sauce) ;

3° Make value through animal feed (ex: giving or selling products that are not consumed by humans to pigs or poultry farming) ;

4° Use for agricultural compost or to make energy, especially through anaerobic digestion (ex: giving its food waste to a subcontractor that is going to make energetic value with them).

Every choice to include or exclude elements from the definition is important. For instance, excluding food losses and wastes of products directed to animal feed or to energy production does not take into account large quantities of products. As an example, for common wheat, 4.4 million tonnes were consumed for animal feed and 16 million tonnes for bio fuels in 2014. The human food production is 5.1 million tonnes.<sup>2</sup> Of course, the characteristics of these food products do not make them easily edible for human consumption and require less production.

This choice was guided by the concern of remaining with the notion of food losses and wastes, while integrating products for animals feed opens the question of dietary regimes and more largely the question of natural resources use and the repartition of uses (food, energy, etc.).

These debates are incorporated within a larger framework of work on sustainable food on which the French agency dedicated to waste prevention ADEME<sup>3</sup> is largely engaged, proposing areas of improvement around 3 pillars:

- Environmentally sustainable design of food products<sup>4</sup>,
- The fight against food losses and waste,
- Food diet evolution.

## 4. Methods

Available data on food losses and wastes are scarce and diverging depending on the sources. First of all, this can be explained by the complexity of the process at stake. Thus the first objective of the study is to quantify food loss and waste by defining as precisely as possible the nature of each activity at each step of its process.

Another difficulty is that food losses and waste are often either poorly communicated or badly identified and measured by the actors. Manufacturers and distributors which have the best knowledge in this area are rarely ready to deliver data that they consider confidential (as it is capable of providing information on the competitiveness of the company or lead to "malicious communications").

The other actors upstream (farmers and ranchers) and downstream (including restaurants, caterers, distributors, households) generally only have a vague idea of what they are losing and wasting. Few of them have in fact established methods for evaluation of the losses and waste that they routinely incorporate in their production processes.

<sup>1</sup> See the report n°8 of the High Level Panel of Expert of Food Security – FAO - 2014

<sup>2</sup> Also note that 2.8 million tonnes of common wheat are used in the wheat processing industry including about one half for human food consumption but not included in the study (bakery, pastry, cookie, candy, prepared meals) and the other half in non-food uses (cardboard, paper, chemistry/pharmacy...)

<sup>3</sup> <http://www.ademe.fr/alleger-lempreinte-environnementale-consommation-francais-2030>

[http://www.ademe.fr/sites/default/files/assets/documents/85536\\_vision\\_2030-2050\\_document\\_technique.pdf](http://www.ademe.fr/sites/default/files/assets/documents/85536_vision_2030-2050_document_technique.pdf)

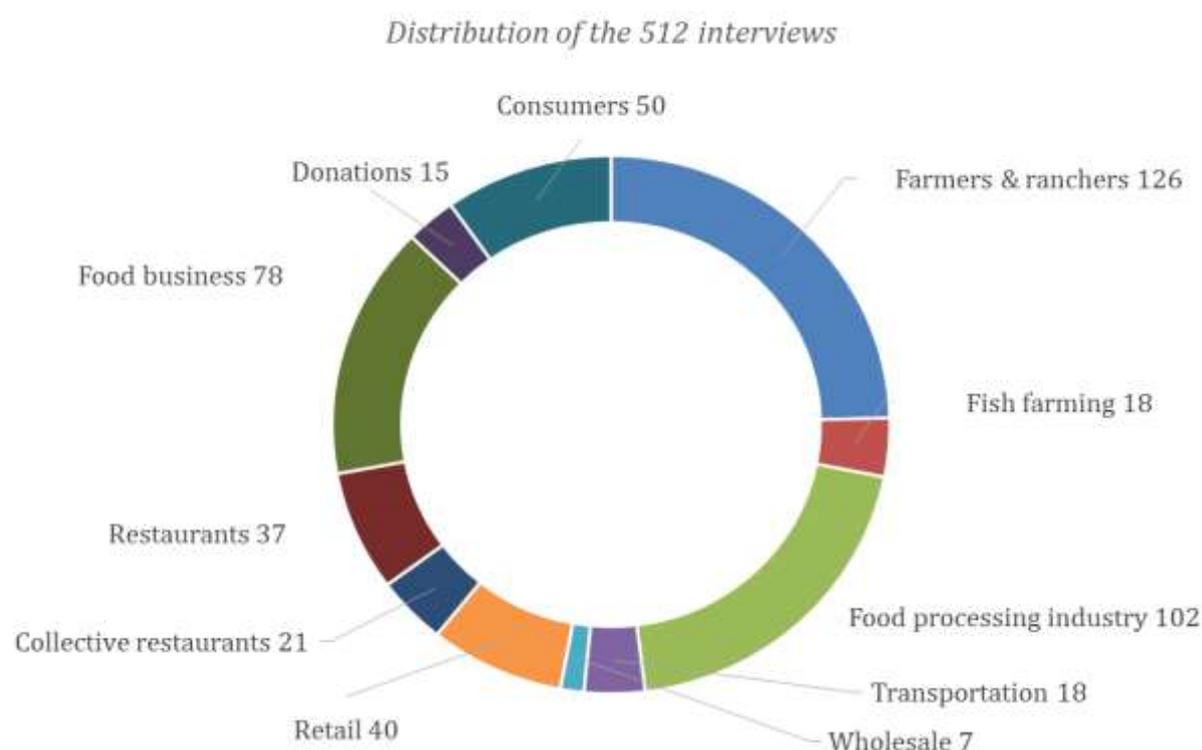
<sup>4</sup> That is to say, taking into account the total environmental impact all along the lifecycle of the product in order to identify ways to achieve an overall improvement.

The quantification of losses and waste requires labelling them and having information on the nature and origin of the data collected, even though the actors do not always have knowledge and / or awareness of what they represent. Furthermore, the moralistic nature of the subject can induce denial.

For these reasons, the study consisted of combining different methods to consolidate data (fig. 2):

- **Collection of data** from actors in food and consumption
- 512 quali-quantitative interviews (see diagram for distribution) and 70 qualitative interviews
- **Preferred measured data sources** (including 50 households and 30 sellers)
- **Literature review** and cross-analysis with data collected
- **Collaborative process** in preparing the report (experts and stakeholders)

Figure 2



## Lessons from the study

### 5. Central issues

Among all food sectors and all food chains actors (Fig. 3) food losses and waste represent in mass **10 million tonnes of lost and wasted products for human food**. A portion is reused in animal feed (less than 2 million tonnes, or less than 20% of losses and waste).

To make this study comparable with results of the French National Institute for Agricultural Research (INRA)<sup>5</sup> or the European program dedicated to social innovation on food waste FUSIONS<sup>6</sup>, these products should be removed from food losses and waste estimates.

<sup>5</sup><http://www6.inra.fr/ciag/CIAG-Alimentation/Reduire-les-pertes-agricoles-et-alimentaires>

<sup>6</sup><http://www.eu-fusions.org/>

The market value of losses and waste is estimated at 16 billion euros, 36% of the budget for the payment of interest on the French national debt<sup>7</sup>. This value is the selling price of the goods lost and wasted at every stage and does not take into account the gains that can be realized in animal feed, energy (biogas) or compost. This value is theoretical insofar as reducing losses and waste might require actions that have a direct cost (investment, human time to implement reduction measures, communication) or indirect costs (loss of activity for a market sector, for example, in the case of a trader which would reduce its offer to cut its losses and waste) that have not been studied.

In addition, lost or wasted products would not necessarily have been reused to this extent due to "market" effect or supply and demand at the time of production. ADEME will soon initiate work on the economic consequences in terms of employment of halving food waste by 2025.

The carbon impact of losses and waste is estimated at 15.3 million tonnes CO<sub>2</sub> equivalent, or 3% of all emissions from national activity<sup>8</sup>, or 5 times as high as the emissions from domestic air traffic. The impact is calculated by considering the need to produce more (equivalent to what is lost and wasted) to meet consumption needs at the same level. The carbon impact (or gain) of the management of these losses and waste, including animal feed, is not taken into account.

Figure 3



Each of us, as a consumer and / or professional, is involved in this food chain and has the power to influence how this system functions.

## 6. Inconspicuous but concerning every actor

For a company, as for an individual, these losses and waste are the loss of a production or purchase and therefore, a financial loss. The product was purchased, and often stored, transformed and transported. They often even generate a cost associated with disposal as waste. Everyone may make an effort to avoid these losses. Moreover, given the weight of products purchased and / or sold, the share of lost and wasted products is low. It varies between 3.3% (for distribution) and 7.3% for consumption<sup>9</sup> (Fig. 4).

<sup>7</sup> In the Financial Law of 2016 (regarding the national budget), the burden of the debt amounts to 44.5 billion euros.

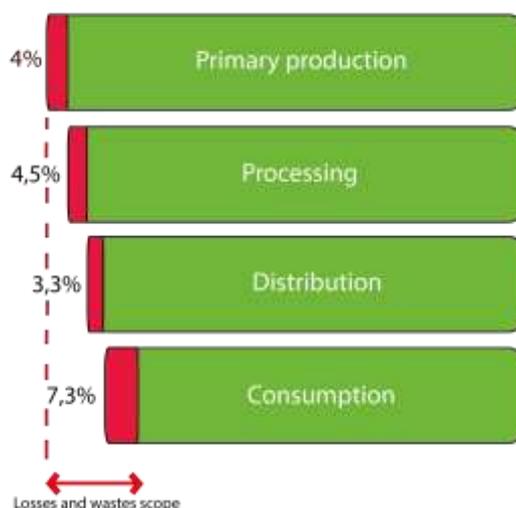
<sup>8</sup> The French emissions are 491 billion tonnes in CO<sub>2</sub> equivalent, inventory CITEPA, 2013 data.

<sup>9</sup> Note that the "consumption" stage corresponds to food consumption inside and outside the house—that is to say in restaurants or collective restaurants—at least until Figure 6 where these two sites of consumption are subject to a separate analysis.

Daily, the weight of food loss and waste, scattered in multiple stages of production or consumption for each of the players, is often minimal<sup>10</sup>. For the consumer at home for example, losses and waste are 20 to 30 kg / person / year (26 kg / person / year in this study), which corresponds to about 30g / meal / diner, taking into account the preparation, leftovers of meals and what is thrown, including liquids between meals. This finding also applies to a distributor or a farmer.

Figure 4

Percentage of losses and waste per type of actors

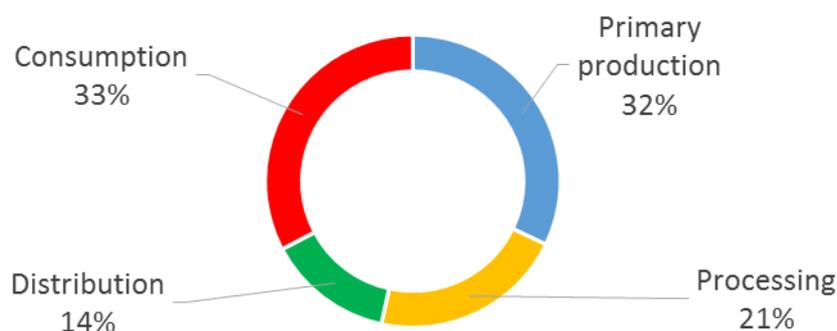


Yet all the stakeholders are also responsible. They generate, at their level, a share of food losses and waste that is significant and which also relativizes the claim that losses and waste are concentrated at the consumption phase (the latter includes a third of losses and waste that is to say 45 kg per person per year - fig. 5).

The graph below shows that losses by weight are relatively higher for producers than for others: this is explained by the fact that the associated weights are more important upstream (raw products that often require transformations even if the product is edible and intended for human consumption, ex. wheat grain) than downstream (processed products, "ready to eat"). It is therefore preferable to take into account the proportion of losses and waste, rather than the weight, in order to reflect the interdependent responsibilities of the actors.

Figure 5

Distribution of losses and waste by weight

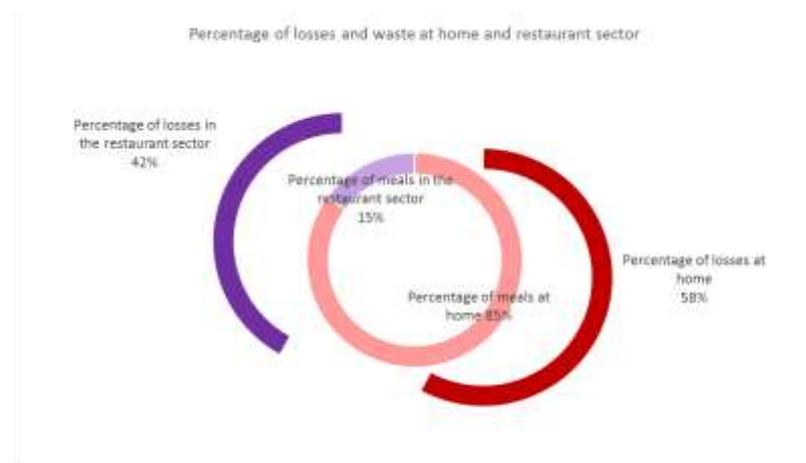


<sup>10</sup> Or when it is not, the weight can be significant but it often relates to accidents (ordering mistakes, unforeseeable change in demand, failed or forgotten dishes) that people themselves do not consider as "waste" because of the accidental cause.

We also have to note that products that are lost and wasted at the production level are often difficult to recover (agricultural areas being remote and far from places where most consumers live) and that the recycling and recovery sector—agricultural donations, gleaning—is still marginal. Their market value is also lower than the value of goods that are lost and wasted at stages down the chain, which may explain why they are more significant in terms of weight rather than economic value.

Note in the chart below (Fig. 6) the relatively large share of losses and waste in the restaurant sector. We waste four times as much in collective catering and commercial restaurants than at home (130g / guest / meal instead of 32g for households). Another way to say this is that these losses and waste in restaurant consumption represent 42% of the total at the consumption stage, even though we eat less than 15% of meals at restaurants. This finding may suggest that when the consumer can choose portions, the nature of the meals, and store their leftovers—all more often possible at home—there is less waste. Therefore, the structure of restaurants' offer greatly influences consumer behaviour.

**Figure 6**

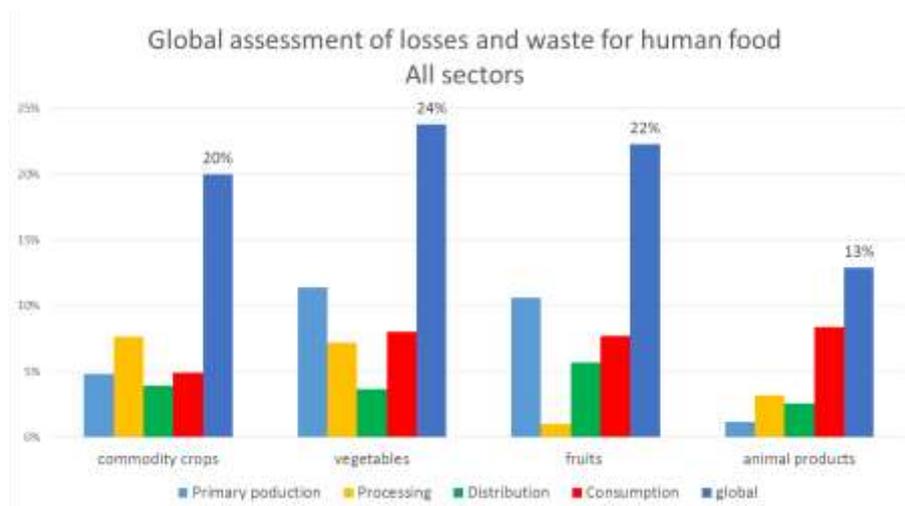


## 7. Depending on the products, losses and waste are not the same and take place at different stages

Losses and waste in terms of transformed mass, by main families of products and actors, are a useful indicator of where losses and waste happen. All the actors are involved in losses and waste, but in different proportions depending on the nature of products and various sectors. Thus, “perishable” products are more likely to be lost or wasted at the consumer level; “seasonal” products show large losses and waste at the production level because markets have difficulties adapting to production uncertainties; products that require a transformation process reveal slightly more losses and waste during upstream phases that make the product “edible” for the final consumer. Finally, methodological choices (scope) can induce bias and accounting gaps depending on the sectors (especially with by-products).<sup>11</sup>

The main families of products, presented below (fig. 7) as a whole, hide significant disparities within these families. They are described in the final report.

<sup>11</sup>Agro food industries use the term “by-product” for a related product that is not directly intended to be produced, but that can be economically valued. This term is not defined in the French regulation.

Figure 7<sup>12</sup>

## 8. But food losses and waste do not have the same value at each stage of the food chain

More than 40% of the market value of food losses and waste corresponds to the stage of consumption,<sup>13</sup> which is easily explained by the increase in product value along the chain (cost of transportation, processing, marketing, including advertising). Yet the populations involved are not comparable.

Examined at the individual level, the data show that **food losses and waste that are generated at the consumption stage amount to about €108 per person**, per year. They amount to **€240 per person, per year, if we include all the food losses and waste generated all along the chain in relation with the French population**. This is based on the products' price at the stage where they are lost or wasted and not eaten. It does not include the price of associated services.<sup>14</sup>

The economic impacts for actors that are presented below are based on the market value of lost or wasted products at the stage where each actor works, divided by the number of independent or employed workers in each of the sectors.

Food losses and waste have a market value every year of:

- €2,630 per person (farmers, family supports, employees) at the production stage
- €4,970 per person (food industry workers) at the processing stage
- €6,260 per person (employees or independent workers in the retail sector) at the distribution stage

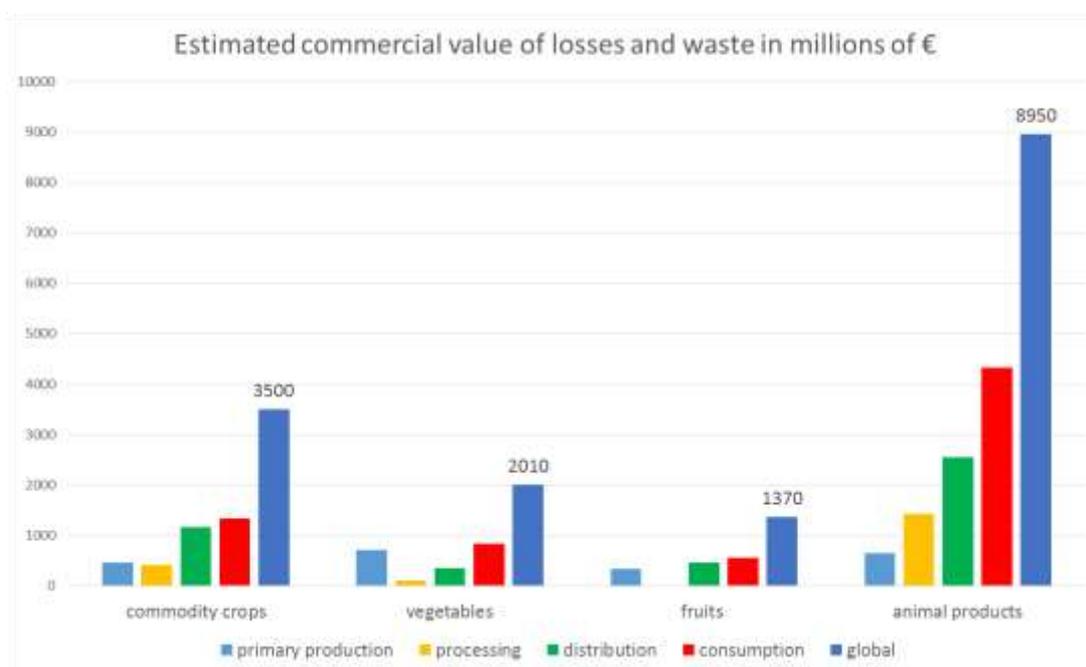
According to our study, more than half (54%) of the market value of food losses and waste in France corresponds to animal products (fig. 8) while by weight, food losses and waste of animal products are only 42%. Their contribution to the balance of greenhouse gas emissions of food losses and waste is also particularly high (82%), because animal products add impacts from farming and feed production. Yet it is at the stage of consumption that the rate of food losses and waste of animal products is the most significant (8% as opposed to less than 3.5% for the other stages of the food chain). It is also at this stage that these animal products have the highest commercial value. See the following graph.

<sup>12</sup>28 sectors were studied, which represent more than 90% of French food production.

<sup>13</sup> Inside and outside the house (restaurants and collective restaurants)

<sup>14</sup> The study of 20 households by ADEME in 2014 was able to show that products lost by only the households had a cost amounting to €159/person/y if we included transportation, storage and energy cost related to preparing the products and managing waste.

Figure 8



The specificities of food losses and waste of animal products show how important it is not to accept weight as the only criterion for the choice of priority sectors. This sector shows that if all the actors contribute to **food losses and waste, the least visible ones at the consumer level take a significant toll at the economic and environmental level.**

## 9. Initiatives to fight food losses and waste

A supermarket cut its losses and waste by half in one year and saved €300,000/year that way.<sup>15</sup> The 20 households studied by ADEME in 2014 reduced their food losses and waste by half based on relatively simple actions during three weeks<sup>16</sup> and they saved about €60/person/year.

A departmental [French administrative division] council managed to reduce by a third food losses and waste within its 96 middle schools. They estimate a reduction in purchases of **one million euros every year**, which they could re-invest in products of better quality.<sup>17</sup>

Today, all actors can reduce their food losses and waste in a significant way, which would improve their image and save money, and which could be reinvested to benefit the quality of the products. **By improving the value of food, food is better respected and less is thrown away.** A virtuous circle is thus begun.

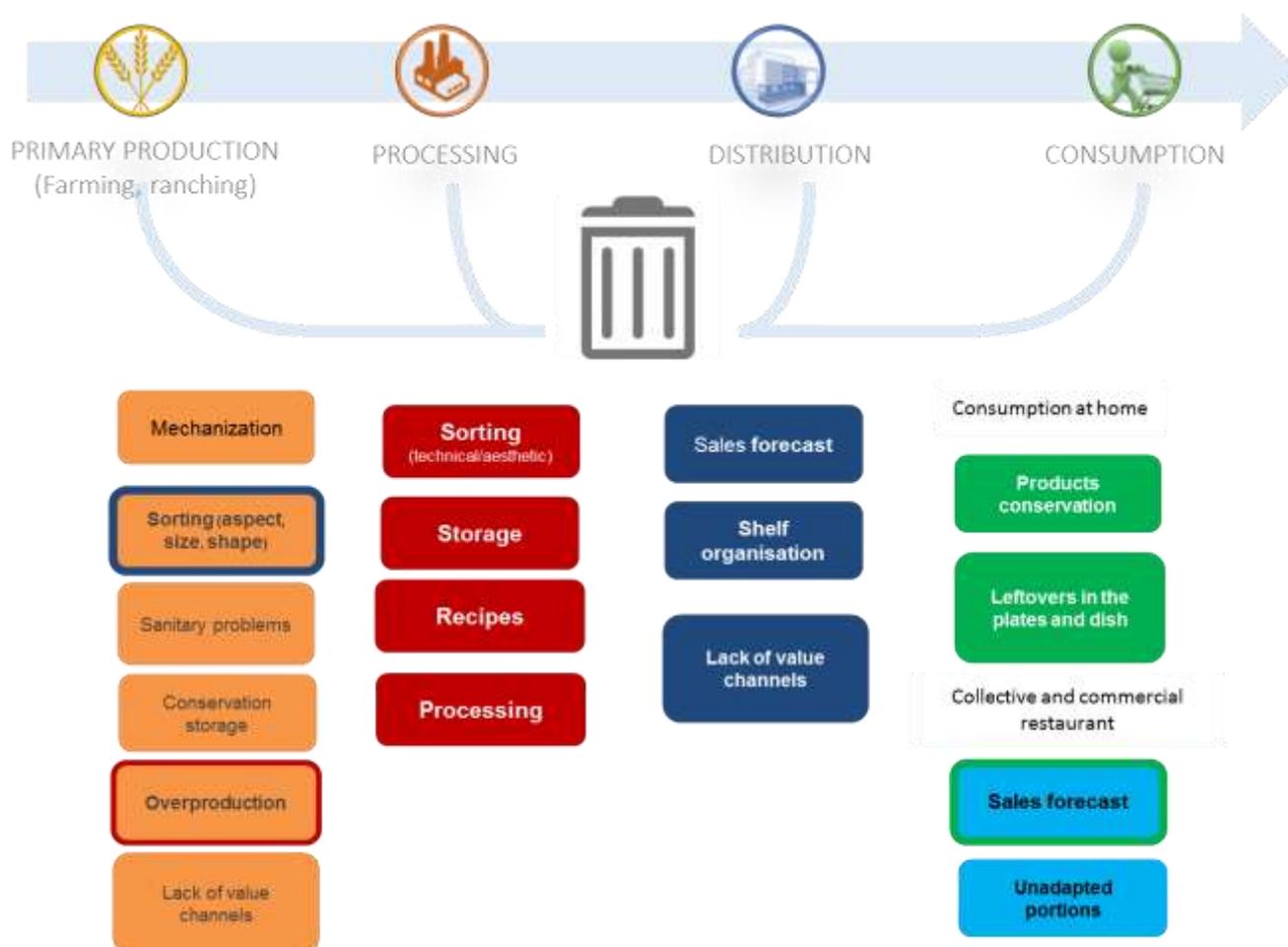
**The main mechanisms that generate** losses and waste are grouped and summarized in the chart below (fig. 9). The blocs circled by another colour indicate the influence of the actor of this specific colour on this action.

<sup>15</sup><http://www.optigede.ademe.fr/fiche/reduction-du-gaspillage-alimentaire-dans-les-supermarches-e-leclerc-de-templeuve-wattrelos-et->

<sup>16</sup><http://www.optigede.ademe.fr/impacts-financiers-et-environnementaux-gaspillage-alimentaire>

<sup>17</sup><http://www.presse.ademe.fr/2014/12/reduction-du-gaspillage-alimentaire-collectivites-entreprises-et-acteurs-de-la-restauration-partagent-leur-experience.html>

Figure 9



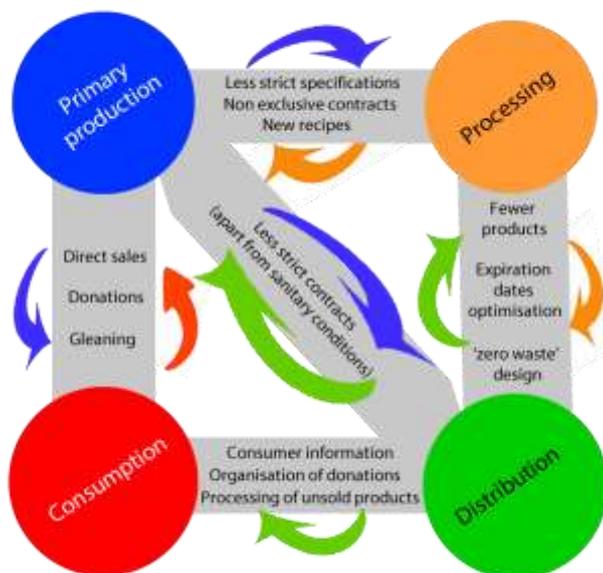
When the actions of one can reduce the food losses and waste of others, the actions become particularly interesting because the entire food chain is structurally modified. In this respect, we can quote actions that aim to **market products that were not sold previously for aesthetic reasons**. The products that used to be left in the field or, in the best case, used as animal feed can now be sold to the consumer. Besides reducing losses, the type of actions often supported by communication campaigns contributes to raising awareness on the agricultural context among consumers, and therefore modify retailers' offer.

In the same vein of ideas, the **Networks to Avoid Food Waste** (REGAL, in French) allow for gathering, on a given territory, all the actors of the food chain, in order to work together on the fight against food waste.<sup>18</sup>

The chart below (fig. 10) traces a **few axes structuring relationships between actors in the reduction of food losses and waste**.

<sup>18</sup> <http://regal-normandie.fr/> and <http://www.reseau-regal-aquitaine.org/>

Figure 10



In short, every firm, actor or sector can carry out **individual actions**. Yet we need to distinguish:<sup>19</sup>

- The easy and interesting actions, in terms of efforts required in relation with the results that can be obtained;
- The difficult ones demanding investment or heavy organizational involvement, but which are interesting in terms of reduction of losses and waste;
- The not interesting ones, which have overall negative economic or environmental impacts.

Every firm, actor or sector can also engage in dialog with others to transform their own sector or the food chain on their own territory, with the goal of **collectively** reducing food losses and waste:

- Develop responsible marketing that does not encourage overconsumption or over-purchasing
- Reduce excessive market expectations, such as endless introductions of new products that generate losses, or the search for “zero defects”;
- Improve contracts and agreements to minimise losses and waste and stabilise relationships with actors over time
- Optimise and develop the logistics and organization of food donations within a given a territory in order to increase food security and the quality of food rescue while controlling the cost and environmental impact (transportation)

In order **to start with an action**, whatever its scope, it is important to:

- Measure losses and waste in order to assess the resources and their potential;
- Question the role and importance of food within its organization or sector or territory;
- Mobilize as many people as possible to define and set up daily actions to reduce food losses and waste.

## 10. While source reduction is a priority, increasing donations and improving waste management are also possible areas of improvement

A recent study led by an organization dedicated to waste prevention and sustainable energy (AMORCE) for ADEME showed that food donations could increase substantially.

<sup>19</sup>These elements are judged by each actor depending on numerous and various criteria that are assessed in a subjective manner.

In Grenoble Alpes Metropole [a municipality in central France], for example, less than 10% of available resources were being used by food assistance organizations. This constituted only 24% of available resources from large and medium retailers, 8% of food industries and 0.1% of farmers.<sup>20</sup>

Besides, the management of losses and waste could also be improved. In France, only 37% of organic waste is used in composting or anaerobic digestion, while this rate is more than 70% in Sweden, Germany or Wallonia (Belgium).

This study shows, for example, that retailers donate only 20% of dairy products. As another example, for apples at the production stage, 133,000 tonnes are simply left on trees, on the ground, or, in more rare cases, composted.

## 11. Integrating food losses and waste reduction in a broader work for "sustainable food"

The reduction of food losses and waste represents a major area of improvement for a more sustainable food system. While simple actions can allow for quick results for each actor, interrelations between actors require a substantive debate in order to change practices in a way that the behaviour of some actors does not lead to losses and waste by others, or does not increase other impacts, such as through packaging waste or energy consumption. As such, the evolution of our food system should be analysed in terms of a multiplicity of issues and impacts.

Besides, we imperatively must tie the issue of losses and waste to a broader approach that would include the improvement of production systems broadly speaking, including all firms, and the evolution of eating practices, such as diets, product processing, and places and times of consumption. The system as a whole needs to improve with respect to all these issues. If the fight against food losses and waste is an important issue, it is nonetheless fundamental to include it in an environmental approach based on multiple criteria<sup>21</sup>, given the multiple issues related to food. One issue surrounding food is pleasure: what is better to prevent waste than to better appreciate food?

## 12. Annexe : an original methodology and research to be continued

This study allows for a significant improvement in knowledge about food losses and waste, but it presents a few limitations:

Despite consistency with existing bibliographies, uncertainties are high—around 10% to 20%—because of limited access to data that is not measured, confidential, or disparate, because of the diversity of situations and actors as the panel cannot pretend to national representativeness, and because of the methodology that was employed, even if it was a good way to go on with a limited budget on this type of topics. Note as an example that for certain stages of the chain in certain sectors (ex: strawberry losses at the processing stage), no reliable data could be obtained. In this case we used a 1% loss rate but it may be underestimated, especially with regards to other products of similar nature for which there were data.

Following up on the short to medium term with this type of methods would consequently not be justified.<sup>22</sup>

This is also the reason why it is important that each actor, sector, and territory should be able to engage its own work of identifying, quantifying and understanding their own losses and waste in order to identify the most efficient paths for action.

<sup>20</sup><http://www.presse.ademe.fr/2016/02/etude-invendus-alimentaires-et-dons-aux-associations.html>

<sup>21</sup> The National Pact Against Food Waste, signed in 2013, made the companies that were subject to Corporate Social Responsibility (CSR) responsible for mentioning in their CSR reports the measures dedicated to waste prevention, especially the ones regarding food waste.

<sup>22</sup> Also note that this study does not take into account imports and exports, which introduces a bias in numbers especially at the agricultural stage as long as we applied losses rates without taking into account these parameters. Besides, economic, social and environmental impacts in other countries were not studied either.

The steering committee for this study chose the definition based on debates and the context at the moment of the study and with a view to being in concordance with the definition usually used. The modification of this definition would lead to different results and incidentally raise different questions. The definition we adopted tends to focus on products downstream on the chain.

For example, if the definition aimed to observe losses and waste in terms of calories or resources used, then the results would show higher losses and waste upstream. To realize the link between the numbers and the definition, we can draw on the case of the basic food product: water. Each actor uses this resource daily, in much higher proportions than the 10 million tonnes of food losses and waste that the study identified. Its low financial value, however, explains why no one considers these uses as “food losses and waste” even if it is indeed a product that was not consumed by humans. In this study, we did not include water in order to stay within the relative consensus to study water waste separated from food losses and waste.

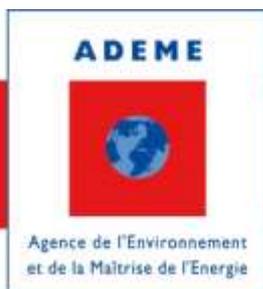
There are also “grey” areas that relate to the definition and uncertainties issues. There are products that we sometimes quality as “potentially edible,” such as fruit and vegetable peels. In the case of data on households, they were not included in terms of weight. Yet they were included in terms of economic value and GHG impacts because of the databases we used. But for the surveyed companies, whether the producer, the processor or retailer, the peels were accounted for because it was difficult to make the distinction, especially with interlocutors who were already difficult to interview. We nonetheless estimate that this proportion of “potentially edible” products included in the figures is low, less than 10%.

The difficulties in stabilizing the definition and gathering data over the course of the study prevented us from spending more time on **identifying mechanisms** generating food losses and waste. While the report shows causes that are manifested at the individual level, their generalization is sensitive because of the complexity of interrelations between actors. That is also why it appeared more relevant to leave the task of providing further recommendations for other works on sustainable food.

## ADEME IN BRIEF

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