



BREAD WASTE – SUPPORT FOR DEVELOPMENT OF NEW TECHNOLOGIES

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Abstract: Food Waste is a subject gradually more effective and thoughtful, concerning the scientists on one side and for the population on the other side. The amount of waste resulted from food industry is exceeding often the maximum admitted levels.

The purpose of the current paper is to highlight a statement referring to food industry as a huge generator of food waste, marking out the impressive quantity of waste that in most of the cases could not be reused.

The studies conducted by the World Health Organisation revealed that half of the products bought from supermarket turn into waste due to a series of causes, generating annually huge amounts of waste.

Keywords: polycyclic aromatic hydrocarbons, pyrolysis, smoking, chromatography.

1. INTRODUCTION

Nowadays society enforces the humanity an alert rhythm of living, working, spending time with those who are close, but most important, feeding. In trying to do everything on time and as efficiently as possible, we forget to have a balanced diet and to consume responsibly. Running from one place to another and trying to do everything at the maximum level, we tend to go all out, buy too much, throw too much. Globally, about one third of food products are wasted.

This type of losses can be analyzed under two aspects: losses on the food chain in poorly developed countries where the charges are the lack of infrastructure, technical and managerial skills in the food field as well as the inability to process the raw material immediately after harvesting, facts that cause massive losses. On the opposite, there are the developed countries with a prosperous economy, where consumer incomes are well above the level of food prices, which determines the increase of the level of food waste for the consumer. At the same time, the influence of mass media, the desire for evolution, the technological mirage and the comfort offered by this environment will increase the degree of urbanization, which includes a distancing of future generations from the traditional way of growing raw materials for food that will generate a lack of responsibility, so consequently an increase in food losses, both concerning raw material and final product type.

Losses in this area occur throughout the entire food chain, with losses at harvest, after harvest or loss of finished products, but most studies show massive losses when the product reaches the consumer. They attract unnecessary economic costs as well as environmental degradation and call for urgent remedial measures. To this end, it is desired to decrease the degree of food production waste and to capitalize them in order to obtain new products. Over time, global research has been carried out to sum up the quantities of waste from the food industry, in order to achieve a correlation between global malnutrition and the level of food waste.

The intents to repair these type of losses take place since the moment of creating the Organization of United Nations for Food and Agriculture, in 1945, with the aim of eradicate hunger worldwide. [5]

Attempts to repair these types of losses have taken place since the establishment of the United Nations Food and Agriculture Organization, 1945, with the aim of eradicating global hunger. The results were observed at the first World Food Conference in 1974, when there was a 15% reduction in post-harvest losses, with the goal of reducing losses to about 50% by the early 1990s, thus the United Nations Food Organization and Agriculture (FAO) has developed the Special Action Program to prevent food loss. The insufficient level of reduction concerning the degree of loss of food led to the conclusion that the technical intervention approaches were not enough. It was necessary to approach sustainable and sustainable solutions.

In this context, a new industrial branch based on the recovery of waste from food industry has been developed, which represents a very important topic currently, and the current waste become more and more valuable taking into account the fact that they can be converted to be proper for human use. So, taking into account documented studies, we can observe the way how food waste can be converted and the various increments to harness the waste. [1]

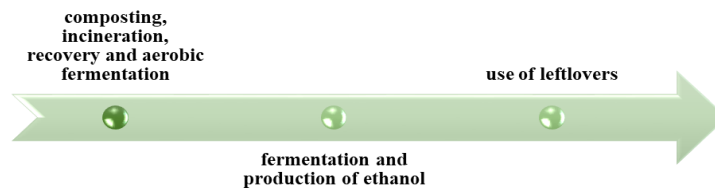


Figure 1: Methods of converting waste into useful products

Several methods of converting waste into sources of raw material:

- by composting, incineration, recovery and aerobic fermentation processes, the food industry waste can be used in agriculture and animal husbandry, as fertilizer or animal feed, also waste whose humidity exceeds 50% can be used to obtain methane and biogas;
- use of the residues in the bakery for the fermentation and production of ethanol;
- use of leftovers from tomato processing in order to obtain functional foods.

Cereals have been a basic field in the food industry which has been and will continue to be highly exploited for the production of various products and by-products, both from cereals and from the residues left over from their processing. Over time, through cereal processing, there have been discovered several areas, such as the confectionery industry through the production of chocolates, the bakery industry, the beverage and vinegar industry, animal feeds, fibers, proteins, oils and through refining and extraction were obtained. Obtained biofuels, biodegradable chemicals, antioxidant oils as well as polysaccharides. The development and improvement trends in this area involve the collection of cereal-based waste from factories processing cereals, both in the field of bakery and from factories that use cereals for the purpose of making beverages, from restaurants, from bakeries and households for the purpose. Capitalization and transformation of these residues into other types of products for various industries such as: the chemical industry through the production of succinic acid, the oil industry through the production of biofuels or for the food industry through the production of beverages. [2], [3]

2. THE CURRENT STATE OF THE TECHNOLOGIES AND THE MODALITIES OF RECOVERY AND REDUCTION OF WASTE IN THE FOOD INDUSTRY

2.1. Waste

Currently, waste of any kind is one of the biggest problems that the population faces. In this sense, studies and researches are carried out in order to reduce the quantity of waste but also in order to recover them. Regarding the definition of waste, we find a set of definitions according to their origin, harmfulness, degree of degradation and a multitude of other criteria.

According to the European Commission's Waste Framework Directive EU, 75/442/ EEC, the legal definition of waste states that: "waste" means any object or substance [...] that its owner discards or intends to dispose of or are required to be disposed of by the provisions of national law".

2.2. Ways of reusing waste in the food industry

Any industrial sector packs a considerable amount of waste in addition to its benefits, similar the agri-food industry generates besides the variety of products that satisfy our needs and a huge quantity of waste both solid and liquid, biodegradable of organic composition coming from from the processing of raw materials.

It is estimated that about 26% of the waste from the food industry belongs to the beverage industry, near which it is located. dairy industry with a percentage of 21% residues, processing of fruits and vegetables generates 14.8%, cereals processing 12.9%, processing and preserving meat products 8%, processing and preserving fishery products 0.4%, the vegetable and animal oil industry 3.9% and 12.7% being wastes from other processes.

Wastes from the food industry are characterized by a high moisture content, being largely organic compounds have a high biological instability and the lack of intervention on them will result in intense microbial activity. Improper disposal or disposal practices will have serious environmental consequences, such as water pollution and degradation of marine life, air and soil pollution or phytotoxicity. These reasons have led to the creation of a global legislative framework on waste handling and disposal.

It is well known that prevention is simpler than dealing with it, but this is difficult to do and involves a long-term consumer education strategy to make them aware of the seriousness of the situation. The hierarchy of waste management within the European Union provides as a solution the reuse and recycling of waste from the food industry in order to transform and recover them. [4]

The reuse of food residues in order to transform them into commercial products and energy is known as the concept of bio-refinery, this concept is rapidly becoming integrated in the scientific community, being regarded as an opportunity for sustainable and sustainable development. Through the technologies specific to the concept of bio-refinery the wastes from the food industry are transformed into products such as: biofuels, biocatalysts, biomass and secondary chemicals. The aforementioned products are obtained by the biotechnological transformation of food waste through technologies that involve aerobic fermentation, anaerobic fermentation and composting.

Conceptually bio-refining has an extended applicability, successfully managing the conversion of certain agri-food residues into efficient bio-adsorbents that have been used in the bioremediation of different types of pollutants from wastewater. Through this concept, the recovery of valuable components and their reuse as food or therapeutic additives has also been successful, the valuable components are selectively extracted from the matrix of food residues and transformed into products with added value.

The bakery industry, like the other industries, generates waste throughout the product circuit, from producer to consumer and even after that. A study in Sweden concluded that losses in the bakery industry occur at factories, bakeries, supermarkets and chains of small shops, restaurants, schools and households (Fig. 2)

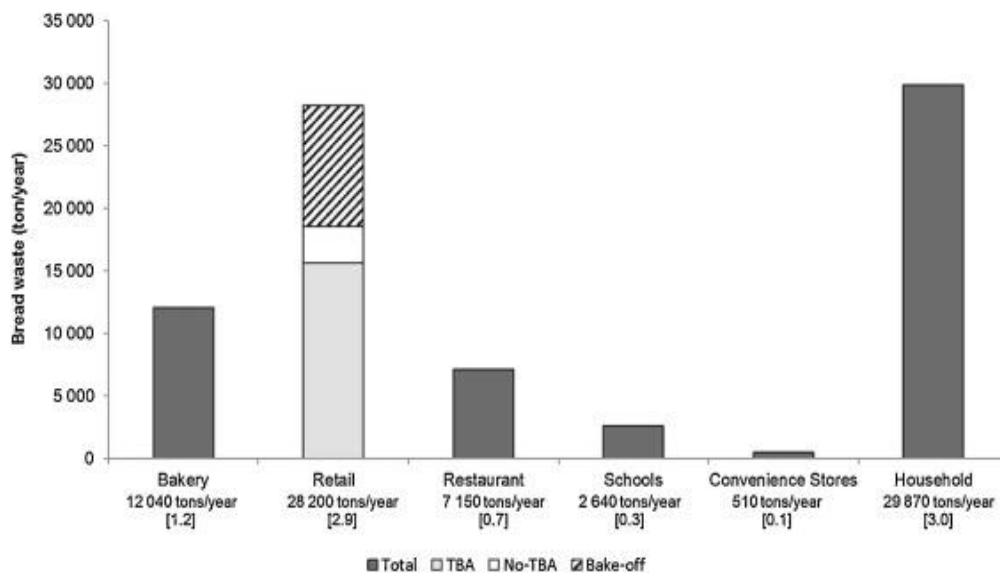


Figure 2: The amount of waste from bread industry throughout the circuit of products in Sweden [7]

In figure 2, the numbers in brackets represent the quantity of waste from the bakery industry, expressed in kg per year per consumer.

According to a research, losses incurred during production are estimated at 12,040 tones per year, which represents 15% of the total waste in the bakery industry, 55% equivalent to 28,220 tones being losses resulting from supermarkets and retailers, restaurants produce 9% of total waste, and schools 3% while waste from households reaches up to 13%.

The results are alarming and all types of waste come with energy losses and negative effects on the environment, as regards the residues in the bakery industry, their recovery is very efficient, and the resulting products can cover a wide range of areas and can satisfy different human needs. In this respect, certainties were developed and allowed the transformation of the residues from the bakery industry into ethanol through the fermentation process, into succinic as well as the production of bio-hydrogen from waste bread using anaerobic sludge also to reduce losses in the bread industry, the residues can be harnessed to obtain sugar syrup, which can successfully replace the sugar from the biscuits, while the bread remains can turn into dumplings or cakes.

These residues can be transformed by drying and shredding into crumbs, and also find their usefulness in a new extrusion cooking concept. Extrusion allows gelatinization of starch, protein denaturation and microbial loading reduction as well as color changes depending on extrusion conditions. This type of cooking is also responsible for changing the degree of molecular association between components, such as the amylose-lipid complex that can affect starch digestion in vacuum flour, anaerobic digestion. Through this process, the bread industry residues can be transformed into snacks or snacks as well as to form a crusty crust for foods prepared by frying, having superior physical and chemical properties compared to wheat flour.

2.3. Waste management

Waste management is part of the two crucial problems food industry is facing with. Together with energy management, the lack of waste management raises major problems for food industry, environment and humanity in general.

Waste generated in food industry can be divided in three main categories:

- waste resulted from production;
- food products;
- residue of solid food products and packages.

According to the UE regulations, the waste is defined as “any substance which the owner throws or intends to throw”.

Waste from bread industry are part of the category of that waste whose quantity cannot be modified, only by certain methods, which generate the modification of the quality of the product.

LCA Life Cycle Assessment is a modality of evaluation of the impact on the environment by a product, process or activity during its entire life. By using this method, the industry and those involved become able to evaluate and to improve the impact on the environment. The life cycle of a product represents time, mode of action of a product since it is produced to disappearing. [6]

3. CONCLUSIONS

Bread and bakery products are the category of products situated on the main positions concerning consumer's preferences, judging by their attribute of affordability, ease of consumption and nutritional properties. Due to the preference for fresh bread and bread products, the consumer is tempted in most of the cases to buy more than is consumed.

Bread and bread products are largely retailed in supermarkets, which sometimes face problems concerning the waste generated after production or retail. In order to face this problem, several solutions were identified: reusing waste in food production and creating new products with improved properties. Various management decisions concerning bakery waste can occur during every stage of the bakery production, most of them depending of the nature of the waste.

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