Value from food chains and waste reduction: complementary approaches for global sustainable food systems and bio-based economy

Session – Innovative tools and system approaches to reduce food loss and waste and its impact on water and energy use

Elisabetta Lupotto
Research Centre for Food and Nutrition - Rome
Council for Agricultural Research and Economics
Global Sustainable Development Goals 2016-2030

Three key characteristics of the SDGs

- **Universal**: global goals set for the “World We want”, applicable to developing and developed countries.
- **Indivisible**: cannot be positioned in a hierarchical or prioritization order. Denial of one invariably impedes enjoyment of other rights and basics needs;
- **Transformative**: Transforming current challenges into opportunities for the 5P (peace, people, planet, prosperity and partnership)
Food production and waste: a global problem

Food Waste

- Agriculture
- Industry
- Distribution
- Retail
- Consumer

In Europe, each year about 30,000 km² of agricultural land can be saved through reduction of food waste.

Food waste negatively affects food availability for others.

Food waste processing needs energy and money.

Vast amounts of food are wasted globally, through the loss of fresh produce and crops before they reach markets and through the food thrown away by consumers: a critical tool in the sustainable expansion of food availability is addressing **food loss and waste**
Food loss and waste: when

Food is lost or wasted along the entire value chain

- Production: During or immediately after harvesting on the farm
- Handling and Storage: After produce leaves the farm for handling, storage, and transport
- Processing and Packaging: During industrial or domestic processing and/or packaging
- Distribution and Market: During distribution to markets, including losses at wholesale and retail markets
- Consumption: Losses in the home or business of the consumer, including restaurants and caterers
Food loss and waste: where

Developing regions

Developed countries

NEAR THE FARM

NEAR THE FORK
Food waste is a powerful source of bioactive molecules which represent an interesting additional income source for bio-based industry. The transition to sustainable food systems is also a huge economic opportunity.

case studies presented:
Research at CREA: area of investigation

Waste collection from food production chains

- Undesirable compounds for end-users
- Pretreatments
- Green-extraction (enzyme-based)
- Desirable compounds for end-users
- Chemical profiling
  - Separation and purification of molecules for their functionality

Development of new high-value added products

- Industrial development
- Product design
- Nutraceutical
- Dietary products
- Cosmoceutical
- Pharmaceutical
The **olive oil industry** is one of the leading rural activities in Mediterranean countries with significant social and economic implications, and impacts on the agroecosystem.

More than 30 Mil m$^3$ of the olive mill wastes are generated in Mediterranean countries in a relatively short time period, representing several environmental risks for the high concentration of polluting substances.

The joint production of olive oil and new bio-based products is strategic for improving the sustainability of the farming systems based on this cultivation.
The case of viticulture is emblematic: grapevine is an exceptionally important culture for Mediterranean countries; about 80% is devoted to wine production which produces in Europe, an estimated amount of 14,5 Mil tons of waste.
Case study 3: Post-fermentation corn oil and thin stillage from bio-ethanol production

Industrial byproducts

POST-FERMENTATION CORN OIL

- Rich in bio-active molecules: carotenoids, phytosterols, squalene, tocopherols, omega-6 PUFA;
- Currently used for biodiesel production
- Impurities may be recovered and valorized

THIN STILLAGE

- Liquid sidestream generated by corn-to-ethanol conversion. It results from the centrifugation of heavy stillage
- Rich in N-compounds, free amino acids, soluble fibers, starch hydrolysates (dextrines), residual fermentation products (glycerol, organic acids).
- Currently used for DDSG (Dried Distiller’s Grain with Solubles) production
Project EXCornsEED - Separation, fractionation and isolation of biologically active natural substances from corn oil and other side streams

Coordination: La Sapienza, Rome; 7 participating countries with 13 partners
LINKING NUTRITIONAL AND PLANETARY HEALTH: Environmental sustainability, food waste and health and nutrition are inextricably linked

2016
**France** introduces legislation requiring supermarkets to distribute leftover food to charities serving poor communities

**Italy** Legge Gadda L.166/2016): a law designed to reduce hurdles to food donation

Following other countries, with legislation, but also:
Charities, Social enterprises . . . .
Examples: Banco Alimentare
Last Minute Market

**National observatory on food waste and recovery**

Ministry of agriculture, food and forestry policies, Italy
CREA – Research Centre for Food and Nutrition, Rome
Policy: National Guidelines, Educational measures and dissemination initiatives for consumer awareness

Reduce waste and support transition through correct lifestyle and adoption of healthy diets

Italian actions within the European School Fruits, Vegetables and Milk Scheme
Promoted and coordinated by: Ministry of Agriculture Food and Forestry policies
Research and innovation, policy intervention and educational measures are essential for meeting the five pillars of the SDGs:

Thank you for your attention!