Jornada
INTA - ArgenTrigo

Alternativas de aprovechamiento de subproductos y residuos de la industrialización del trigo

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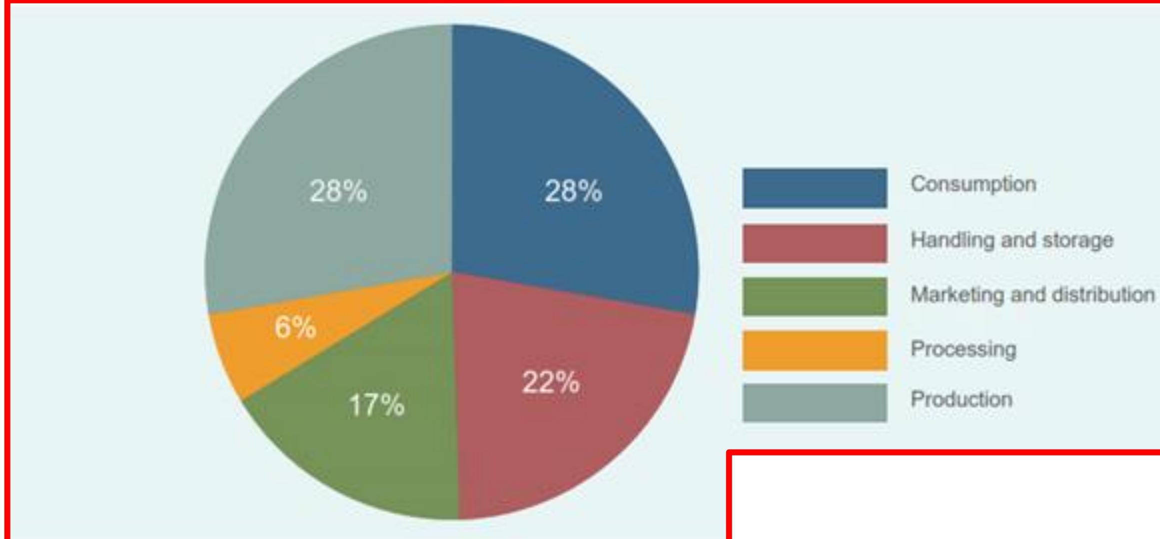
Centro Nacional de Investigaciones Agropecuarias - 1 de Octubre de 2018 -

INTA Secretaría de Agroindustria
Ministerio de Producción y Trabajo
Presidencia de la Nación

Source: Food and Agriculture Organization 2011

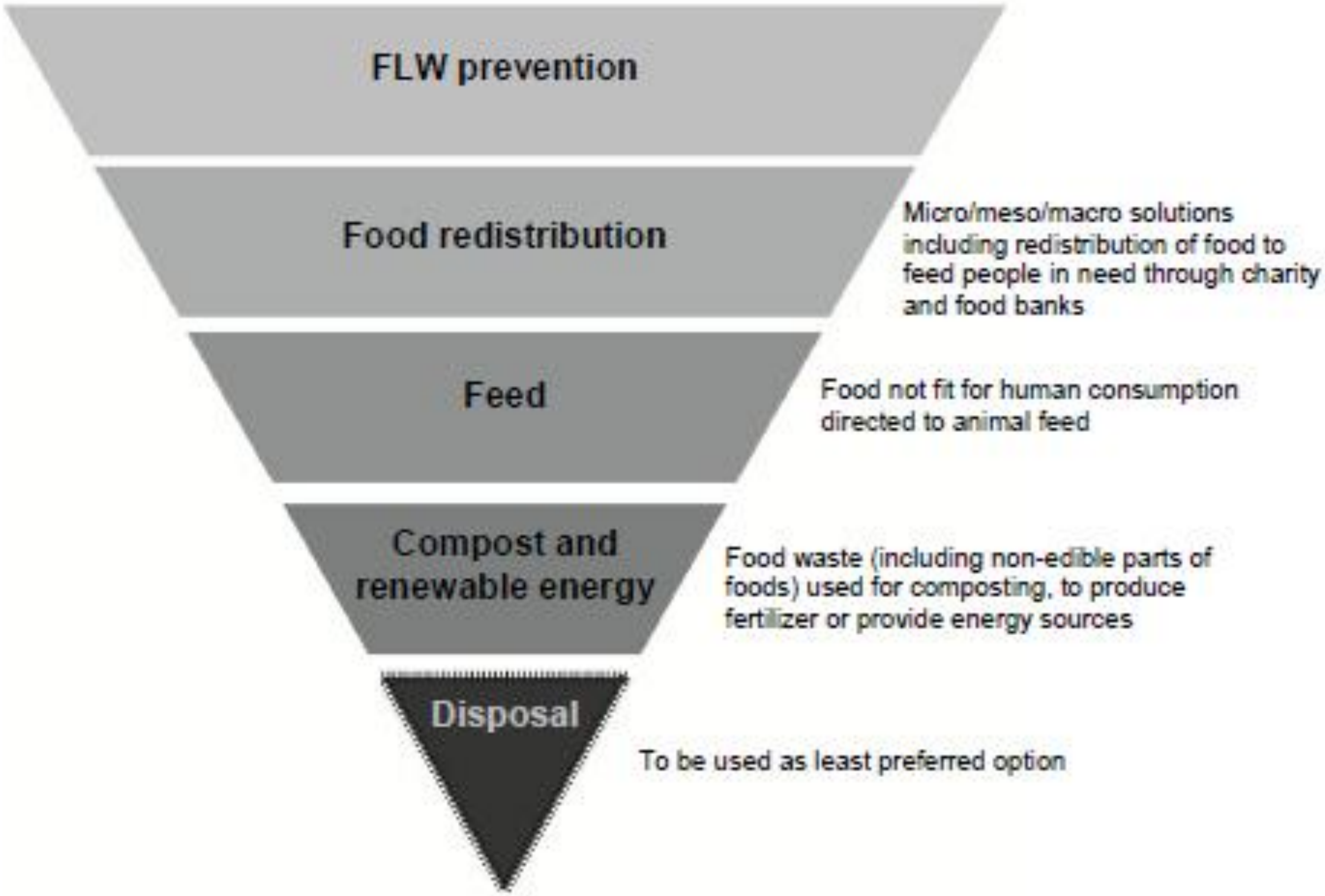


Source: FAO based on World Bank data (2014).

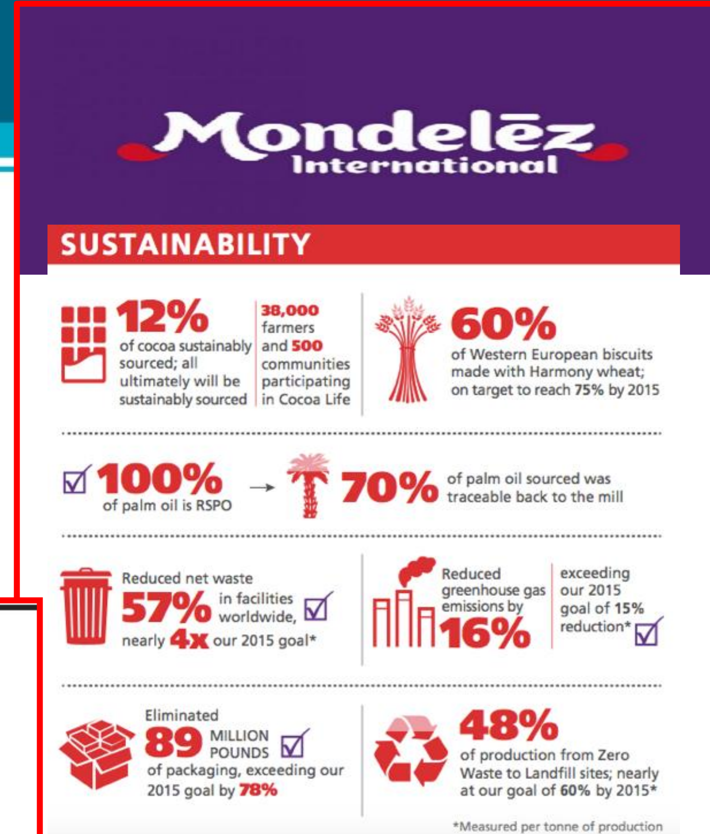
Impacto

- ❑ **Disminución de la disponibilidad local de alimentos**
- ❑ **Pérdida de ingresos para los productores**
- ❑ **Aumento de precios para los consumidores**
- ❑ **Importante pérdida de recursos y de energía**
- ❑ **Aumento en la emisión de gases de efecto invernadero**

Figure 7 A food-use-not-waste hierarchy to minimize FLW



Source: adapted from www.feeding5k.org




NOTICIAS 13-05-2016

Molinos presentó su 5° Informe de Sostenibilidad

Alineado con la G4, el documento repasa los logros del 2015 y se presenta como una antesala de sus Objetivos 2025. En esta mirada a largo plazo, se busca la sintonía con los ODS como clave.

Productos Alimenticios Intermediarios (PAI)

Ingredientes o productos complementarios que tienen funcionalidades específicas, y son agregados para mejorar el procesamiento y la calidad final de un alimento.

- PAI con valor nutricional
- PAI tecno-funcionales
- PAI nutracéuticos

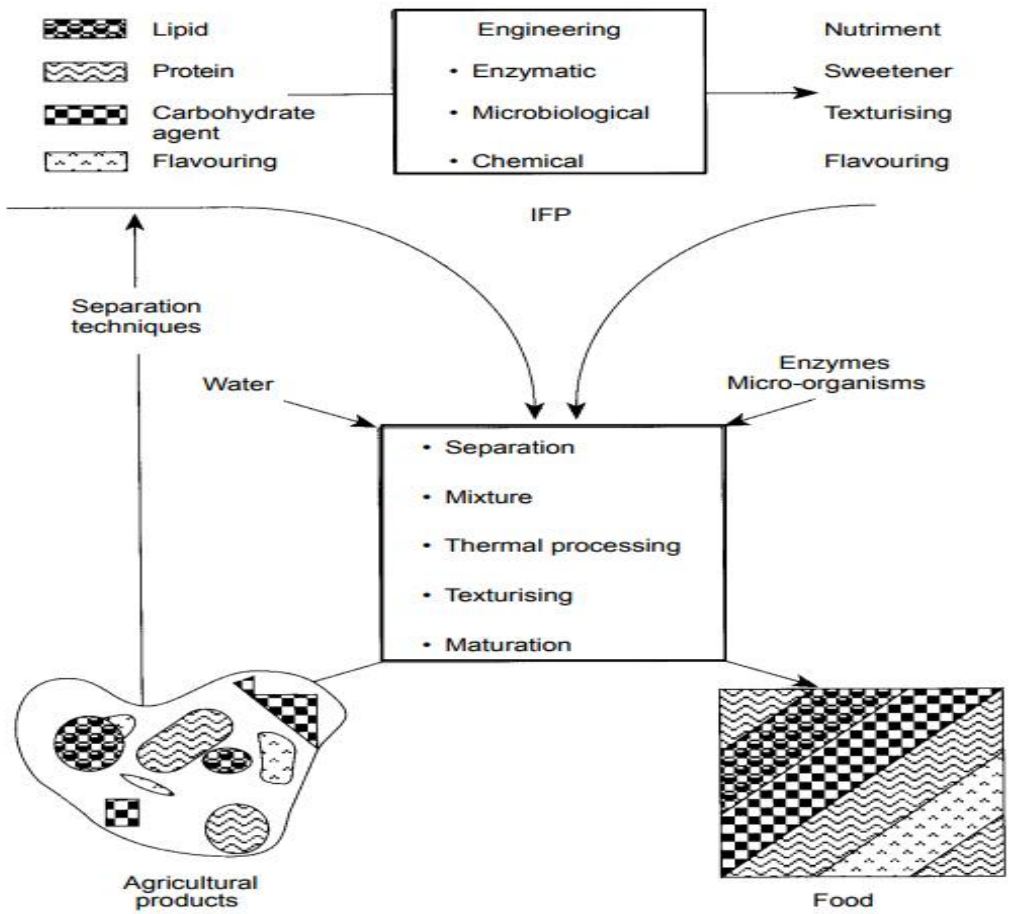


Fig. 1.1 General diagram showing the development of new food products.

(Linden & Lorient; 1999)

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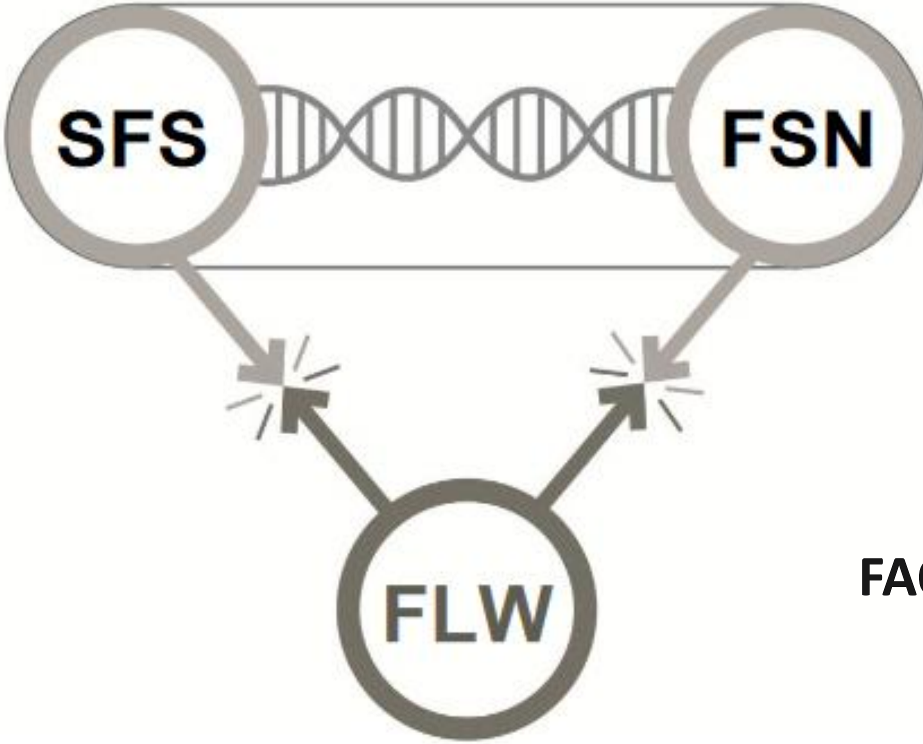
Figure 4 Schematic representation of the conceptual links between sustainable food systems, food security and nutrition, and food losses and waste

Sistemas Alimenticios Sostenibles

Seguridad Alimentaria y Nutrición



FAO (2014)

Pérdidas y Desperdicios de Alimentos

Nueva Área del Conocimiento

Desarrollo de Tecnologías de Recuperación del Residuos Alimentarios

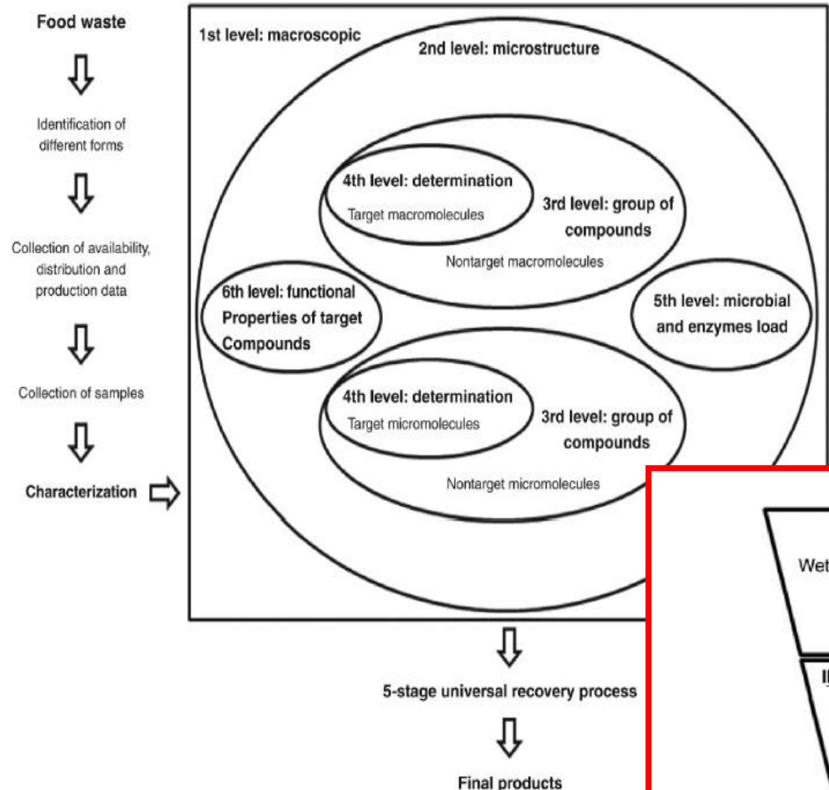


FIGURE 3.1 Development of the *Universal Recovery Strategy*

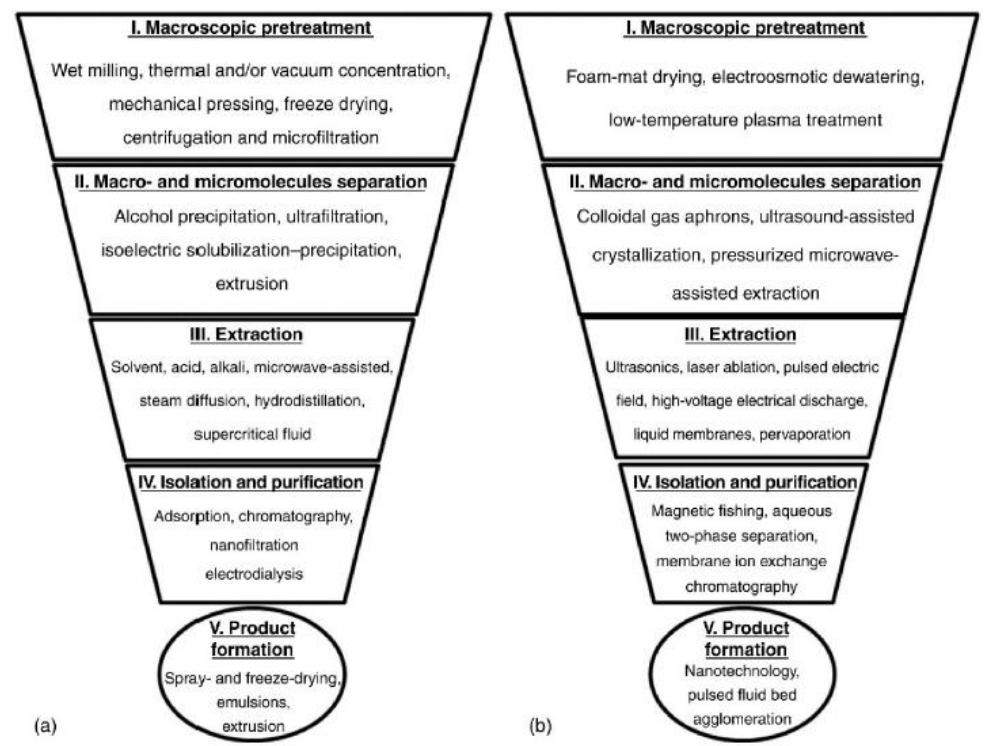


FIGURE 3.3 The 5-Stage Universal Recovery Process

(a) Conventional and (b) emerging technologies (Galanakis, 2012).

Desafíos

- **Maximizar el rendimiento de extracción**
- **Remover impurezas y compuestos tóxicos**
- **Prevenir la pérdida de funcionalidad durante el procesado**
- **Garantizar el grado alimenticio del producto**

Aspectos a integrar en el desarrollo de un nuevo producto con agregado de bioactivos

- **Seleccionar la fuente apropriada**
- **Detectar los compuestos bioactivos**
- **Desarrollar la tecnología de recuperación**
- **Realizar ensayos toxicológicos, de estabilidad, bioaccesibilidad, etc.**
- **Detectar nichos, percepciones y necesidades del consumidor**

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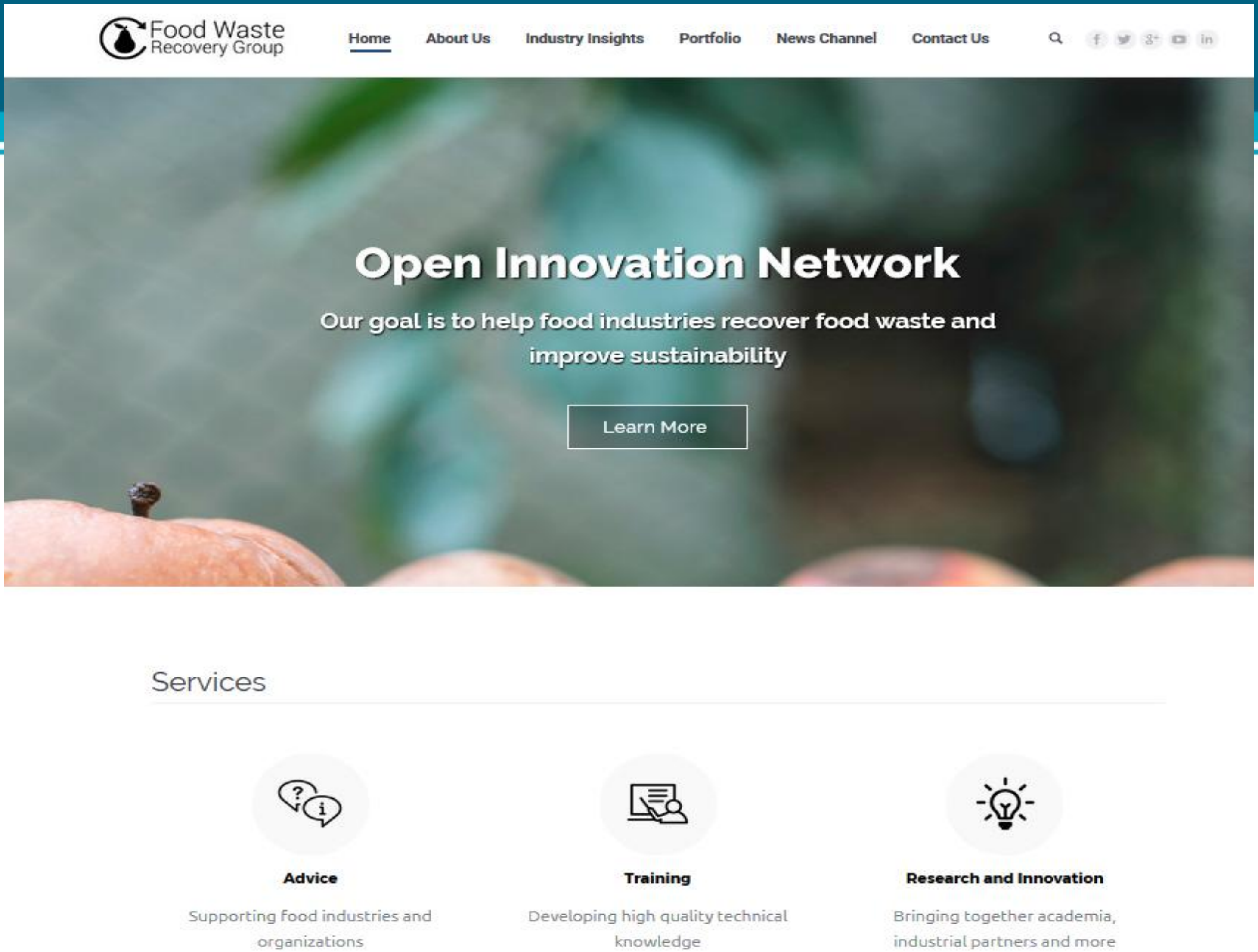
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Developing high quality technical knowledge
Research and Innovation
Bringing together academia, industrial partners and more

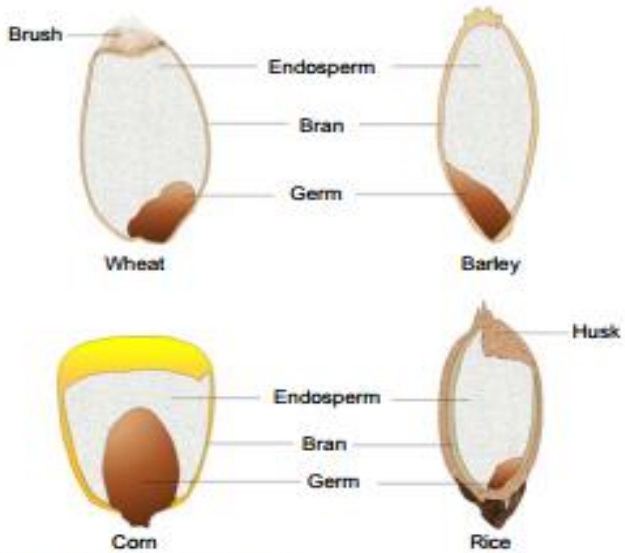
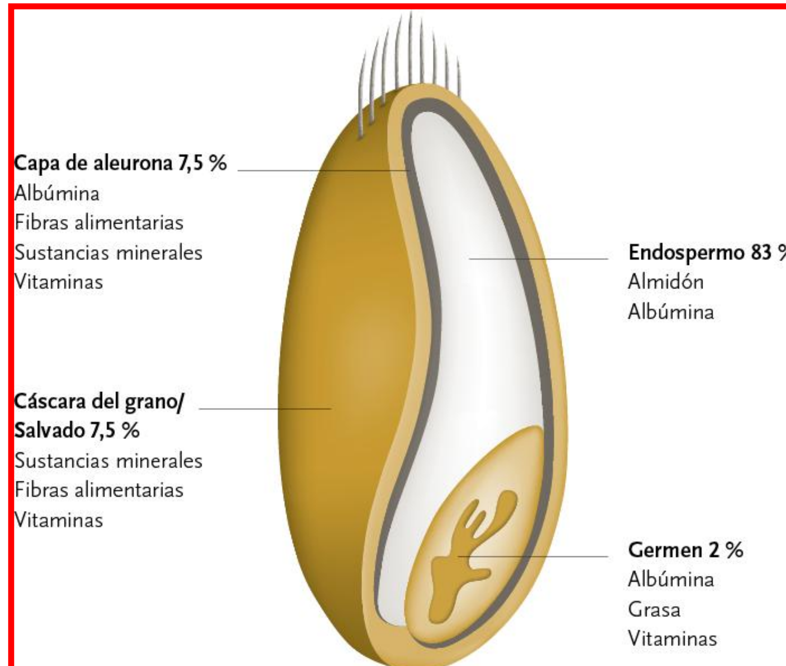


Figure 5.1 Anatomy of the four main cereals.

Table 5.3 **Typical proportions of the anatomical parts of the main cereal grains (g/100 g grain wt, in dry base)**

Cereal grain	Tissue			References
	Endosperm	Bran	Germ	
Corn	83	5	11	Gwirtz and Garcia-Casal (2014)
Rice (brown)	90.5	6.5	3	Juliano (2004)
Wheat	80	17	3	Pomeranz (1982)
Barley (excluding the hull, which is 13%)	87	8.8	3.4	Kent and Evers (1994) and cited by Evers and Millar (2002)



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Salvado	Germen de trigo
Polisac. no-amiláceos (38%) Almidón (19%), Proteínas (18%), Lignina (6%) Compuestos fenólicos Vitaminas.	Proteínas (26% a 35%) H de C (17%) Lípidos (10% a 15%) – triglicéridos, linoleico, palmítico, oleico Fibra (1,5% a 4,5%) Minerales (4%) – fósforo

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Material	Processing and technology	Products	Application	References
WB	Batch fermentation	Succinic acid	Acidulant, flavoring agent, or as preservative	Song and Lee (2006)
WB	Starch hydrolysis Hydrothermal pretreatment	Starch, HMF, acetic acid, lignin, and fenolic acids	Biofuel	Merali et al. (2015)
WB	Starch hydrolysis, pretreatment of hemicellulose, enzymatic liquefaction, and saccharification	Starch, lactic acid, succinic acid, ABE, furfural and HMF, xylitol, ferulic acid, vanillin, and amino acid	Food sector, cosmetic, fragrance, pharmaceutical, food and feed additives, antioxidant, and raw material for vanillin production	Apprich et al. (2014)
WB	Enzymatic hydrolysis (liquefaction and saccharification)	Bioethanol	Biofuel	Juodeikiene et al. (2011)
WB	Starch hydrolysis, acid hydrolysis, heat pretreatment, and enzymatic hydrolysis	Bioethanol, arabinose, xylose, and glucose	Converted sugar and biofuel	Palmarola-Adrados et al. (2005)
WB	Dry milling, starch hydrolysis, acid hydrolysis, enzymatic hydrolysis, liquefaction, and saccharification	Bioethanol, furfural, and HMF	Wheat milling industry	Chotěborská et al. (2004)
WB	Starch hydrolysis, microwave pretreatment, and enzymatic hydrolysis	Ethanol, DDGS, furfural, glucose, and HMF	Animal fodder and biofuel	Linde et al. (2008)
WB	Enzymatic hydrolysis, acid addition, milling, and heat treatment	Glucose, arabinose, xylose, and bioethanol	Biofuel	Favaro et al. (2012)
WB	Starch hydrolysis and alkaline hydrogen peroxide extraction	Arabinoxlyan and cellulose	Biofuel	Maes and Delcour (2001)

Continued

Table 5.6 Functional properties of protein concentrates obtained from millrun by wet alkaline extraction followed by heat or acid precipitation and subjected to drum, spray, or freeze drying

Treatment after wet alkaline extraction	Functional properties				
	Nitrogen dispersibility index at pH 7–7.2	Nitrogen solubility (%)	Foaming capacity/ stability (foam volume in cm^3/foam volume in cm^3 after 30 min)	Fat absorption capacity (% fat absorption)	Baking quality (specific loaf volume in cm^3/g) at 10% protein concentrate
Acid precipitate					
Drum dried	13.7	<30% at pH 2–10	n.r.	n.r.	5.26
Spray dried	18.9	<40% at pH 2–10	≈400/≈20	133	4.92
Freeze dried	21.3	≈60% at pH 2 ≥50% at pH 10	n.r.	152	4.56
Heat precipitate					
Drum dried	8.1	<30% at pH 2–10	n.r.	137	3.04
Spray dried	11	<30% at pH 2–10	≈300/0	137	4.41
Freeze dried	11.6	<30% at pH 2–10	n.r. (Soy protein isolate: 200/280)	179 (Soy protein isolate: 147)	5.17 (10% soy flour: 5.02) (Wheat flour: 5.63)

n.r., not reported.
From data of Saunders, R., Betschart, A., Edwards, R., Kohler, G., 1976. Nutritive assessment and potential food applications of protein concentrates prepared by alkaline extraction of wheat millfeeds. In: Proceedings of the 9th National Conference on Wheat Utilization Research, Seattle, WA, October 8–10, 1975, Agricultural Research Service: United States Department of Agriculture, 9–22.

Table 10.4 Various applications of wheat germ ingredients in wheat flour-based products

Wheat germ ingredient	Product	Amount	Purpose	References
Wheat germ flour	Chinese steamed bread	3%, 6%, 9%, 12%	Improving physicochemical properties and nutritional value	Sun et al. (2015)
Raw and microwaved wheat germ	Semolina-based pasta	15%	Increase of nutritional value	Pınarlı et al. (2004)
Wheat germ stabilized by toasting or by sourdough fermentation	Wheat flour bread	3%, 10%, 20%	Decrease in rancidity; higher stability during dough mixing and development	Marti et al. (2014)
Raw wheat germ or defatted wheat germ	Wheat-steamed bread	1%, 2%, 3%, 4%, 5%,7%, 9%, 11%	Enrichment with wheat germ	Ma et al. (2014)
Sourdough-fermented wheat germ bread	Typical Italian bread	4%	Antifungal activity; enzyme inactivation	Rizzello et al. (2011)
Defatted wheat germ	Wheat flour cookies	5%, 10%, 15%, 20%, 25%	Effect on functional and nutritional properties	Arshad et al. (2007)
Raw and extruded wheat germ	Bread	2.5%, 5%, 7.5%, 10%, 20%	Influence on rheological and quality characteristics	Gómez et al. (2012)
Microwave stabilization wheat germ	Turkish noodles	10%, 20%, 30%	Increased nutritional value	Aktaş et al. (2015)

Muchas gracias!!!

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