



The role of food processing in food safety and food security

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■ Disclaimer

- The opinions expressed in this presentation belong to the author and do not necessarily reflect the opinion of the institutions that organize this meeting.

■ Conflict of interest

- The author is an independent consultant and works with Food ingredient and additive suppliers, processing companies and law firms around the world providing food safety, toxicology and regulatory services.
- The author is member of scientific advisory boards of different food and pharmaceutical companies.
- The author worked as member of The Challenge of Change Task Force: Harnessing University Engagement, Learning, and Discovery to Achieve Food and Nutrition Security (Association of Public Land-grant Universities)
- The author has worked as a consultant for FAO mycotoxin technical cooperation projects
- No organization had influence on the information herein contained.

Outline

- Introduction
- Global food security challenge
- Importance of the food processing industry
- Food safety challenges and grain processing
- Conclusions

Introduction

- ▶ Food processing is an essential tool to ensure access to food.
- ▶ Processing is an intrinsic part of cereal science as cereal grains are mostly consumed processed
- ▶ Although access to proper information regarding food (mainly through labeling) is consumer's legal right, information must be based on sound science to enable proper choice. Developing unnecessary "consumer fear of processing" does not improve access to safe food and does not help address the upcoming food production challenges.

Introduction

- Food security, as defined by the United Nations' Committee on World Food Security, is:
 - “The condition in which all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.
- Over the coming decades, a changing climate, growing global population, rising food prices, and environmental stressors will have significant yet highly uncertain impacts on food security.”

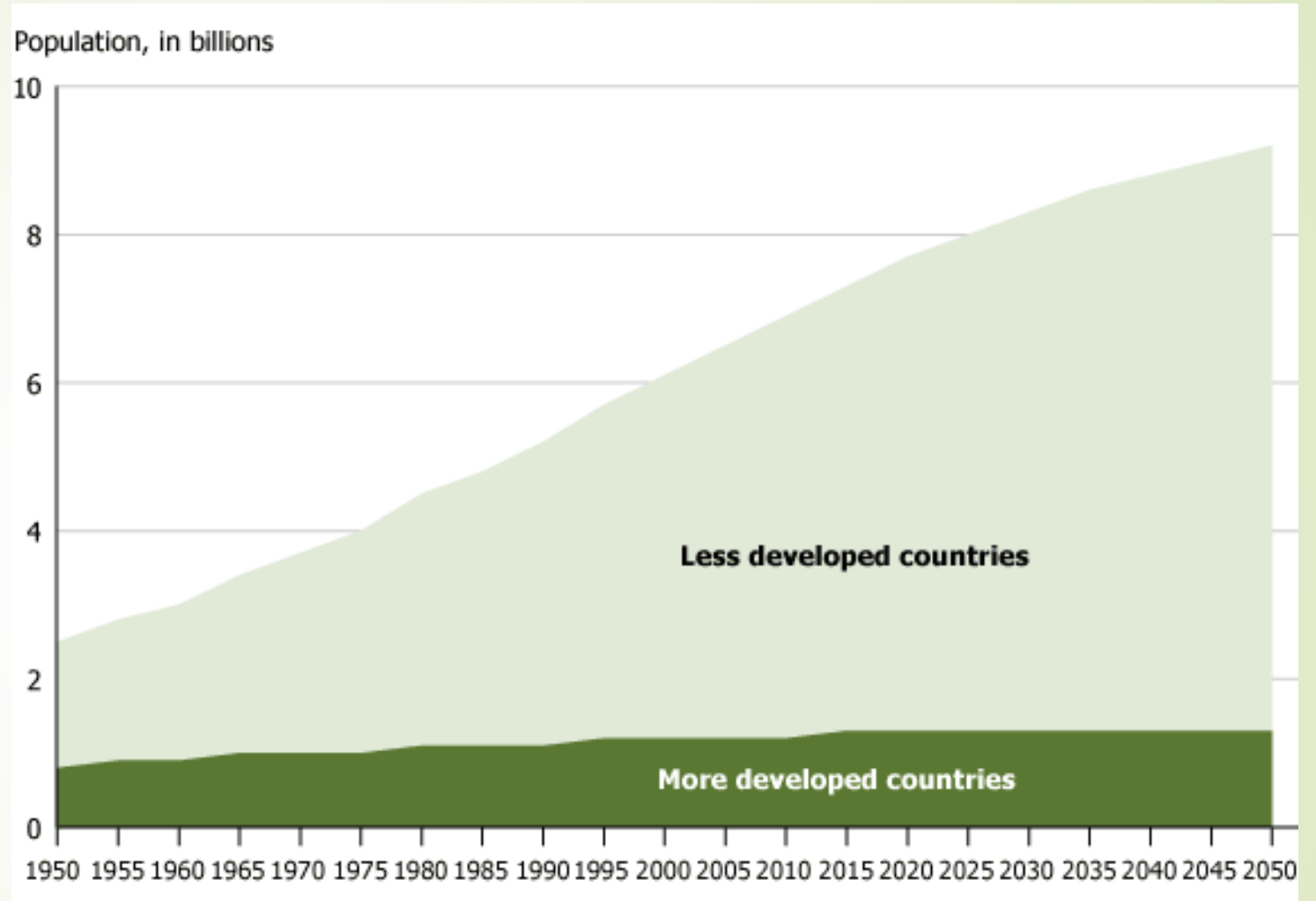
Global food security challenge

- By 2050:
 - World's population will reach 9.1 billion people
 - Nearly all increase will be in developing countries and urban areas
 - Humanity will need to sustainably increase food production by 70%
 - Annual cereal production increase by over 200 million tons

Sources:

APLU. The Challenge of Change: Harnessing University Engagement, Learning, and Discovery to Achieve Food and Nutrition Security. Washington DC. 2016.

Alexandratos, N. and J. Bruinsma. 2012. World agriculture towards 2030/2050: the 2012 revision. ESA Working paper No. 12-03. Rome, FAO.



Source: United Nations Population Division, *World Population Prospects, The 2008 Revision*.

The food gap and its implications



- In creating a sustainable food future, there are a menu of potential solutions that could sustainably close the food gap by 2050.
 1. Solutions that help to close the food gap by reducing growth in Food consumption in ways that advance or safeguard human well-being:
 - a. reduce obesity (6% reduction calorie gap);
 - b. reduce losses and waste (globally cutting losses and waste in half by 2050 would reduce the gap by 20%)
 - c. Reduce excessive consumption of animal products

The food gap and its implications

- In creating a sustainable food future, there are a menu of potential solutions that could sustainably close the food gap by 2050.
 2. solutions that help to close the food gap by increasing food production on existing agricultural land (without impact on tropical forests and with the or less amount of water); and
 3. solutions that do not necessarily produce more food but reduce the environmental impact of food production, particularly gas emissions



The role of food processing

- Processing foods is fundamental to prevention of losses following harvest and to bridge the gap between seasons
- Processing is crucial to maximizing utilization of the harvest, particularly during droughts and periods of food production
- Food processing industry is pivotal in supporting the availability of nutritional products and in the implementation of fortification to staple foods

Prevention of food loss and waste



- Proper, timely processing, storage and distribution
- Use of GMPs
- Use of technology: use of properly evaluated and approved food additives to extend the shelf life of products

Environmental impact

- While much of the attention to the relationship between the Food production system and the environment has been focused on farm production, in recent years the focus has widened to include resource use throughout the food value chain
 - New technologies continue to improve efficiencies and lower the energy use and waste emissions from Food processing.
 - Technologies continue to expand the utilization of byproducts and the ability for some processors to generate their own energy from by-products



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Economic contribution

- Contribution of the Food sector:
 - US economy about 5% of the GDP¹
 - Mexico economy: In 2014 the food processing industry represented 3.9% of the GDP²
- Taking into account farming, ranching, processing and distribution, the global food and beverage sector experienced annual sales in excess of \$15 trillion in 2014. Since the best estimates of global economic output were between \$75 trillion and \$90 trillion for 2014, **the food and beverage sector represents approximately 16.7% to 20% of the world economy.**

1. Committee for Economic Development of the Conference Board: Economic Contribution of the Food and Beverage industry.
2. Promexico. 2016. Alimentos procesados. Perfil del sector, información estatal y casos de éxito.
3. Investopedia. 2016.

Cereal grain production

Production



Distribution



Processing



Food
safety



**Food
security**

Food safety

➤ Major food safety concern: Mycotoxins

- Processing may not destroy, inactivate or eliminate mycotoxins
- Processing provides additional controls through integrated management systems
- Improve segregation and control
- Refined products may help in the removal of certain toxins, i.e., DON
- Processing allows availability of different foods to improve diet diversification that will help reduce the impact





Food safety

- Processing enables:
 - Mycotoxin control
 - Inactivation of antinutrient factors, i.e. lectins, glycosides, etc.
 - Activation or release of certain nutrients
 - Increase availability and reduce loss to increase diet diversification

Conclusions

- Food processing is an essential tool for using cereal grains as food.
- In order to face the 2050 food security challenge, all tools will be needed for food production. Production, distribution and processing of staple grains will become critical to ensure food security
- Processing of cereal grains helps prevent exposure to mycotoxins, through improved drying, storage and distribution conditions, control and segregation.
- Processing improves nutrition by releasing some key nutrients, inactivating antinutrients and improving availability to enable diet diversification
- Labeling and information are a legal right. However, labeling must not foster unreal fear of food, endanger food security and must be based on sound Science.
- Labeling must inform consumers but most importantly, labeling must help educate consumers.



“Hunger knows no friend but
its feeder”

Aristophanes

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