

### **WORKSHOP ARGENTINA-JAPAN**

"Bioscience and Biotechnology for the Promotion of Agriculture and Food Production"

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# TECHNOLOGIES FOR THE PRODUCTION OF FUNCTIONAL FOODS, HEALTHY FOODS, FOODS FOR SPECIAL DIETS AND THEIR INGREDIENTS, FROM WHOLE GRAINS

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INTI-Cereals and Oilseeds



## NATIONAL INSTITUTE OF INDUSTRIAL TECHNOLOGY

### **OUR MISSION**

INTI is a public service for the generation, development and transfer of industrial technology



### **OUR ROLES**

### **FIRST ROLE**

Technical referent for the implementation of product identity and quality regulations in industry and commerce.



### **OUR ROLES**

### **SECOND ROLE**

Technologically responsible for people's integration into the productive system.



### **OUR ROLES**

### THIRD ROLE

Public assistant for furthering industrial competitiveness.



### MAIN SERVICES CURRENTLY DELIVERED















Innovation and development **Technology transfer** Technical Assistance, Analyses and **Tests Calibrations** Voluntary and mandatory certifications Interlaboratory tests **Audits Extension Training** Personnel qualification



### RESEARCH and DEVELOPMENT CENTRES

- Cellulose and Paper
- Cereals and Oilseed Products
- Chemistry
- Constructions
- Dairy Products
- Electronics and Informatics
- Energy
- Environment
- Soft Technologies and Development
- Fruits and Vegetables

- Leather
- Meat
- Mechanics
- National Security Regulations for Civil
- Constructions
- Packaging
- Physics and Metrology
- Plastics
- Rubber
- Superficial Processes
- Technologies for Health
   Care and the Handicapped
- Textiles
- Wood and Furniture



### INTI – RESEARCH AND DEVELOPMENT CENTRES RELATED TO FOODS

Formosa Chaco Catamarca Tucuman Santiago del Estero Corrientes Santa Fe La Rioja San Juan Cordoba Mendoza San **Buenos Aires** La Pampa Neuquen Rio Negro Chubut Santa Cruz

FRUITS AND VEGETABLES
(MENDOZA)

MILK (RAFAELA)

CEREALS AND OILSEEDS (9 DE JULIO)

MILK-MEAT-CEREALS AND OILSEEDS
(MIGUELETE)

FISH (MAR DEL PLATA)

HEAD OFFICE9 de JulioBuenos Airesprovince









MIGUELETE SITE











### **AREAS**

- OILSEEDS, OILS, FATS, BY-PRODUCTS AND RELATED PRODUCTS
- CEREALS AND MEALS, BY-PRODUCTS AND RELATED PRODUCTS
- JUICES, HONEY, SUGAR PRODUCTS, BEVERAGES AND RELATED PRODUCS
- NUTRITION
- PROCESSING TECHNOLOGIES
- FOOD LEGISLATION
- MICROBIOLOGY
- TOXICOLOGY
- QUALITY MANAGEMENT
- ENVIRONMENT



- Oilseeds
- Vegetable and animal oils and fats
- Cocoa butter and chocolate
- Oilseed industry by-products
- Enriched foods
- Feeds and pet foods
- Soybean food products



### CEREALS AND MEALS, BY-PRODUCTS AND RELATED PRODUCTS

- Wheat, oats, sorghum, rice, amaranth and other cereals
- Milling, meals and related products
- Wheat, mandioca, potato and rice starches
- Bakery products
- Crackers
- Pasta
- Snacks and breakfast cereals
- Dough conditioners



- Vitamins
- Functional foods
- Bioactive Compounds
- Foods for special dietary uses
- Dietary Supplements



- Oilseeds and oilseed meals
- Cereals, cereal meals and related products
- Honey, sugar products and fruit juices
- Vegetables
- Animal oils and fats
- Food additives



### **MICROBIOLOGY**

- Cereals, oilseeds and related products
- Bakery products
- Oils and fats
- Feeds and pet foods
- Salad deressings and margarine
- Sugar, honey, marmalades, jellys, corn syrup, juices, nectars, carbonated and non carbonated non alcohlic beverages
- Coffee, tea, mate, herbs, species
- fhytotherapeuticals
- Water, mineral water, soda water
- Catering

# TECHNOLOGIES FOR THE PRODUCTION OF FUNCTIONAL FOODS, HEALTHY FOODS, FOODS FOR SPECIAL DIETS AND THEIR INGREDIENTS, FROM WHOLE GRAINS

# FAO/WHO GLOBAL STRATEGY FOR DIET, PHYSICAL ACTIVITY AND HEALTH MAY 2004

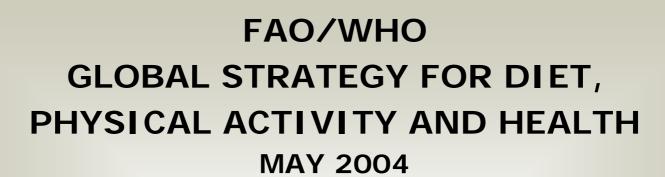
A few major risk factors account for much of the morbidity and mortality



# FAO/WHO GLOBAL STRATEGY FOR DIET, PHYSICAL ACTIVITY AND HEALTH MAY 2004

For non communicable diseases, the most important risks include:

- high blood pressure
- high concentrations of cholesterol in blood
- inadequate intake of fruit and vegetables
- overweight and obesity
- physical inactivity
- tobacco



Factors that increase the risks of these diseases include:

- Elevated consumption of energy-dense, nutrient-poor foods that are high in fat, sugar and salt
- Reduced levels of physical activity
- Tobacco



### DIETARY RECOMMENDATIONS FOR POPULATIONS AND INDIVIDUALS

- Achieve energy balance and a healthy weight
- Limit energy intake from total fats and shift fat consumption away from saturated fats to unsaturated fats and towards the elimination of *trans*-fatty acids
- Increase consumption of fruits and vegetables, legumes, whole grains and nuts
- Limit the intake of free sugars
- Limit salt (sodium) consumption



- Saturated fat
- Trans fat
- Sodium

### **GOOD NUTRIENTS**

- Unsaturated fat
- Polyunsaturated fat
- Dietary fiber
- Protein
- Vitamins and minerals



### **NATURALLY HEALTHY FOODS**

Foods that naturally have a health promoting or disease-preventing property beyond the basic and traditional function of supplying nutrients



### **FUNCTIONAL FOODS**

Foods that are designed to have a health promoting or disease-preventing property beyond the basic and traditional function of supplying nutrients



## AT PRESENT, WHAT DO CONSUMERS LOOK FOR?

- Healthy, nutritious and easy to prepare foods
  - Functional and natural foods
- Foods with a minimum of processing and less quantities of synthetic ingredients
  - Safe and low-priced foods



### FROM A GLOBAL POINT OF VIEW

- Very competitive market
- Great pressure upon costs
- Requires innovation and new technologies



### AIMS

To give an answer to these challenges

 To achieve an effective impact on society's health and life quality



# DEVELOPMENT, PRODUCTION AND TECHNOLOGICAL TRANSFERENCE OF:

- Functional and Healthy Foods
- Foods for Special Dietary uses
- Foods for Special Feeding Programs

### FROM CEREALS AND OILSEEDS

Low cost and highly available raw materials

# PROJECTS THAT ARE BEING CARRIED OUT



High temperature/short time process

May affect the non-nutritive factors

 Constitutes a valuable tool to improve the nutritional quality of foods



Innovative

High performance

Low cost

 Production of high added value products



### FIRST PRESS OILS

- Soybean
- Sunflower
- High oleic sunflower
- Linseed
- Canola

# ANUGA Food and Beverage Trade Fair





### **SEMI-DEFATTED FLOURS**

- Soybean
  - Linseed











#### **FULL FAT FLOURS**

- Oats
- Rye
- Barley
- Wheat
- Forage bean
- Multigrain

(linseed, forage bean -Pisum sativum L. var. laguna-, soybean, wheat bran, wheat germ)



- The extrusion processes caused a reduction in β-galactoside content and a sharp drop or total removal of trypsin inhibitor activity of bean flour.
- Although the thiamine content decreased very deeply after these processes, slight changes were observed in the other nutritive compounds.
- Then, extruded bean could be considered as a novel product with high nutritive value.



#### FOODS FOR SPECIAL DIETS

Cereal Bars

- Meals for old people
- Meals for people with diabetes
- Meals for people with celiac disease
- Meals for people with phenylketonuria
- Healthy snacks



## DEVELOPMENT OF ESPECIAL MEALS

- Composite meals for feeding programs
- Composite meals for emergency situations

### Prepared meals with higher nutritional value

- Semi-defatted soy meal
- Whole corn meal



#### **CEREAL BARS**

#### **NUTRITIONAL BARS FOR SCHOOL CHILDREN**

- · Corn, oats, rice
- Ovoalbumin as source of high BV protein
- First press soybean oil as source of polyunsat. fatty acids
- Honey

The cereals used are whole grain and texturized

### Sensory evaluation was made with 120 school children between 9 and 11 years old







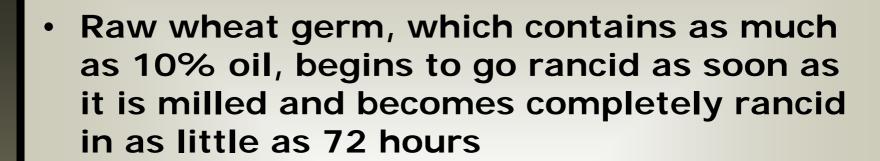


## INDUSTRIALIZATION OF BY-PRODUCTOS FROM GRAIN PROCESSING



#### PRODUCTS DEVELOPED

- Stabilized wheat bran and germ
- Stabilized corn bran and germ
- Brewery spent malt
- By-products from wet corn and wheat milling



 The process can inactivate the enzymes without significant damage to nutrients, including vitamins and minerals

 The resulting product has a longer shelf life at room temperature

## DEVELOPMENT OF MEALS AND DERIVATIVES (FLAKES, EXPANDED PRODUCTS) FROM NO TRADITIONAL GRAINS



#### GRAINS THAT JUST IN THE PAST FEW YEARS HAVE BEEN REDISCOVERED. THEY WERE A STAPLE FOOD IN THE DIET OF THE ANCIENT INCA AND AZTEC CULTURES IN AMERICA

Chia



Amaranth



Quinoa





# POLYPHENOLS FROM BY-PRODUCTS OF GRAINS INDUSTRIALIZATION AND THEIR USE IN FUNCTIONAL DRINKS



## DEVELOPMENTS CARRIED OUT ON SOY

## PRODUCTION OF SOY PROTEIN ISOLATES WITH DIFFERENT TECHNOLOGICAL PROPERTIES



- Effect of slurry preparation methods on the rheological and gelling behavior of soy protein
  - Effect of solutes on the hydration characteristics of soy protein isolate
  - Denaturation of soybean proteins related to functionality and performance in meat systems



## DEVELOPMENTS CARRIED OUT ON SOY

 Functional properties of soy proteins as affected by heat treatment during isoelectric precipitation

Obtention of Soybean isolates: Influence of termal treatment after neutralization on their Functional Properties

# THANK YOU VERY MUCH!!