

[illegible]

# Agenda Topics

- **Introduction and Company Presentation**

Manfred Kerner

**10 min**

- **Mondelēz International Nut/Seed Supplier Quality Expectations**

Anett Winkler

**40 min**

- **Supplier Food Safety Assessment : most common issues**

Aude Martin

**20 min**

- **Questions**

**20 min**

OUR DREAM:  
CREATE  
DELICIOUS  
MOMENTS  
OF JOY








We offer many of the  
world's favorite  
brands



Mondelēz  
International

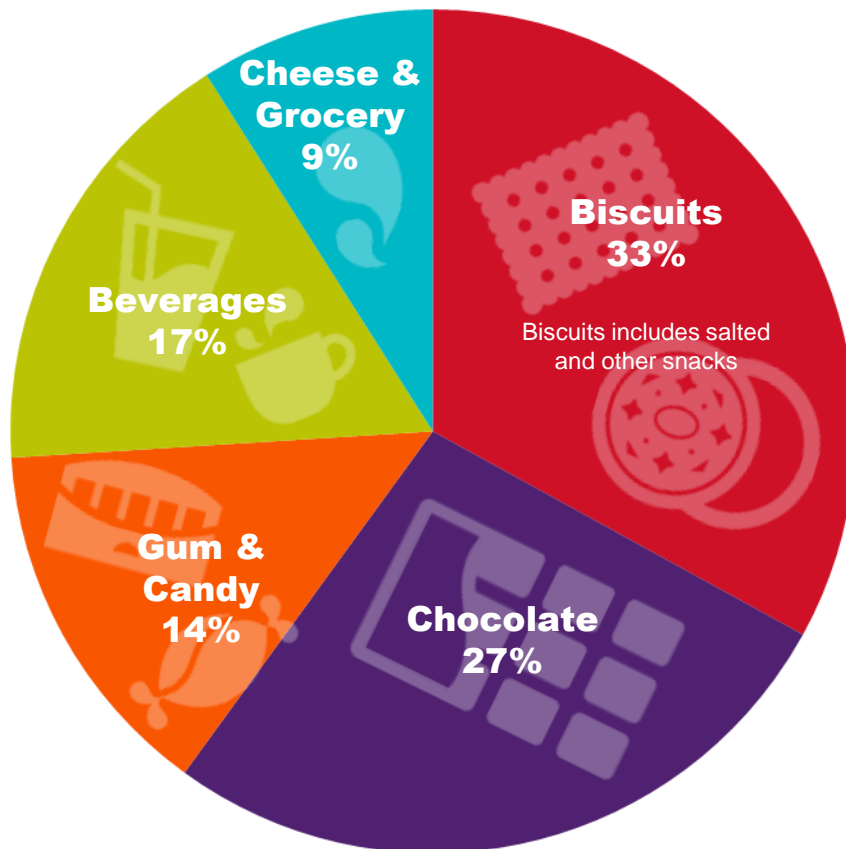
the power of big. and small.

# Fast Facts

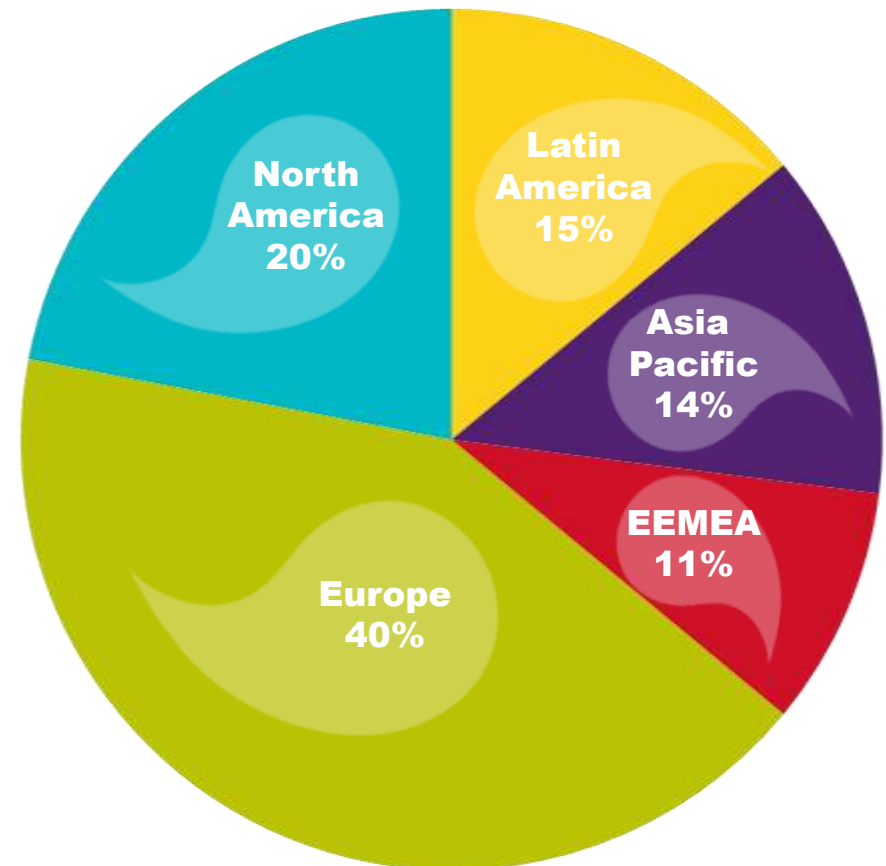
-  net revenues of \$35 billion in 2013
-  global snacks powerhouse
-  products marketed in 165 countries
-  #1 in biscuits, chocolate, candy & powdered beverages \*
-  #2 in gum & coffee \*
-  over 100,000 employees
-  donated more than one billion servings of food since 1997

\* Source: Euromonitor market share

# A Global Snacks Powerhouse with Net Revenues of \$35 billion in 2013

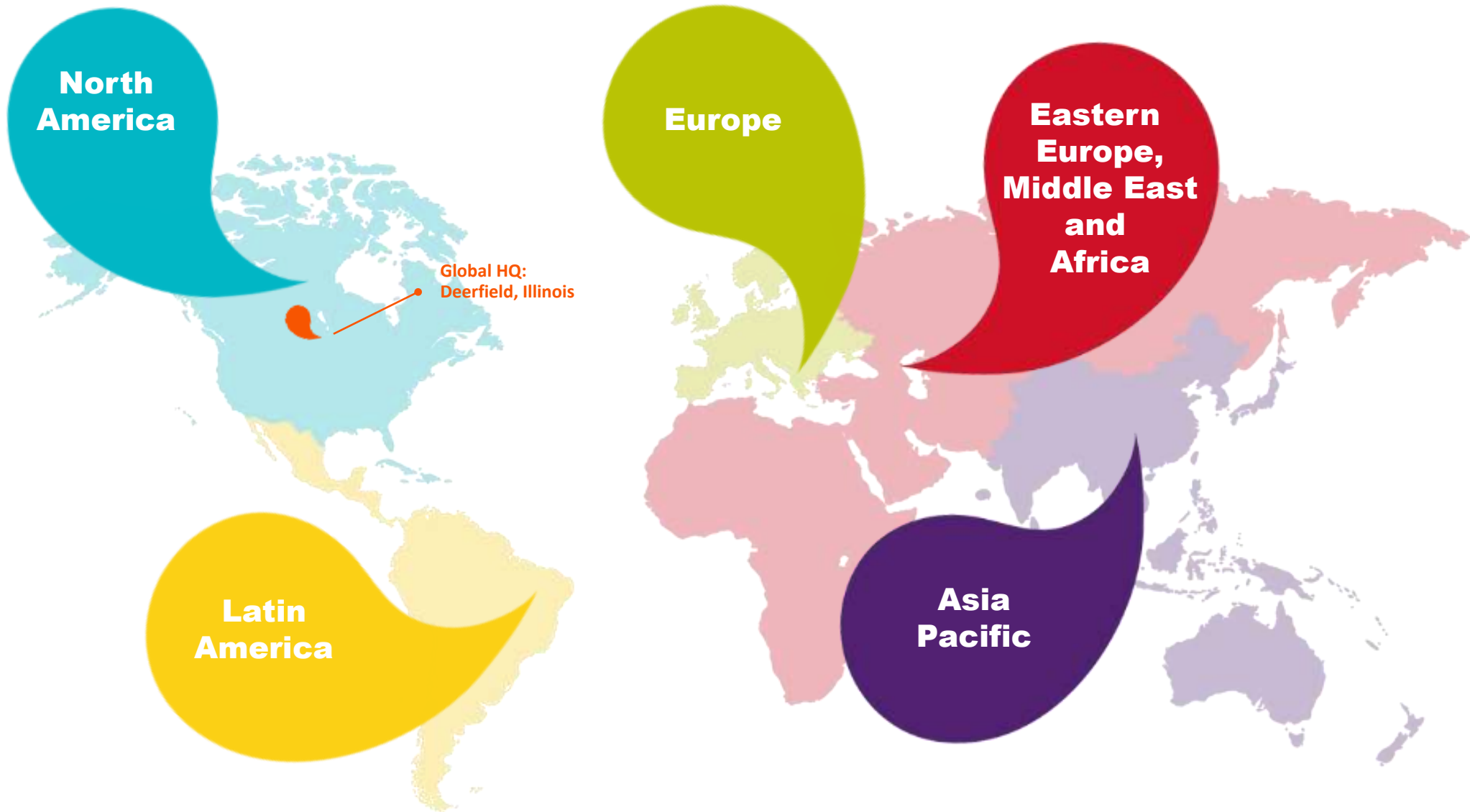


Nearly 75% of revenues in  
fast-growing snacks categories



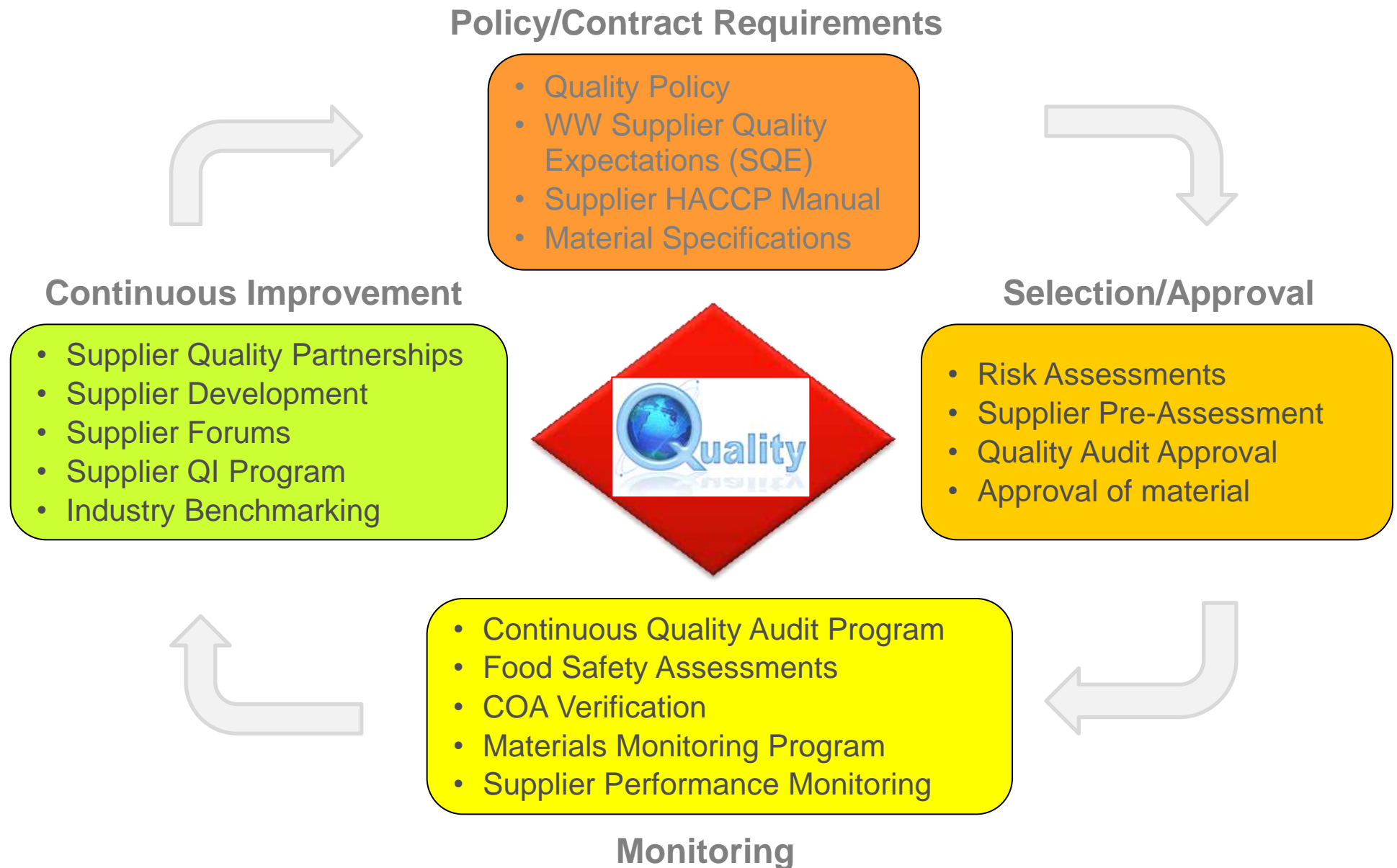
80% of revenues come from outside  
North America

# Our Regions



# Supplier Quality Management at Mondelēz International

*A comprehensive approach to managing supplier quality*





# Supplier Quality Management at Mondelēz International

*A comprehensive approach to managing supplier quality*

## Quality Audit (Re-) Approval Today

Tier	Initial approval	Periodic re-approval
1	Mdlz audit	Mdlz audit 1.5 years
<b>2</b> Nut Suppliers	<b>Mdlz audit</b>	<b>GFSI + SFSA</b> <b>2 years</b>
4	GFSI	GFSI 3 years
5	BU assmnt	BU assmnt



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*A comprehensive approach to managing supplier quality*

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### SFSA = Supplier Food Safety Assessment

- conducted by our Micro experts
- frequency to be determined by Micro
- target interval 2 years
- Focus on key Food Safety programs:
  - Zoning (separation between raw and RTE)
  - Pathogen Environmental Monitoring
  - HACCP
  - Validation of the kill step (CCP)
    - review of the technical data
    - review of production records
  - Supplier Quality Program
  - Environmental Monitoring (non-pathogen)
    - sanitation indicators
    - air handling
  - Lab proficiency (if internal lab)

# Tree Nut / Peanut / Seed Processing Expectations

## Introduction to the Tree nut / peanut / Seed Processing expectations:

Why do we have such expectations?

What is the content of that document?

Biological CCP's

Other programs to consider

# History

Historically, nut and seed processing was aiming to achieve a certain **product quality** (to remove the skin and/or develop color and/or flavor in the finished product), but was not meant to ensure microbiological safety of the final products.



# History

## Outbreaks with nuts, seeds, legumes

- ☹ Almonds (2000-01, 2003-04, 2006)
- ☹ Peanut Butter (1996, 2007, 2009)
- ☹ Dried Coconut (1999)
- ☹ Peanuts (1994-95, 2001, 2009)
- ☹ Sesame Seed – Halva (2001), Tahini (2002, 2003)

# History

## 2007 (peanut butter - USA)

- 425 illnesses from *Salmonella Tennessee*
- Total cost to the business approximately \$50 - 60 Million
- Source: moisture inadvertently entering the production process allowing for growth of *Salmonella* organisms present at low levels in the product

## 2008-9 (peanut products - USA)

- ca. 700 illnesses and at least 9 deaths related to *Salmonella Typhimurium*
- Total cost to the business not defined, but business filed for bankruptcy liquidation, additional fine \$14.6 Million
- Source: gaps in CCP controls & zoning issues identified (roof leaks, faulty sprinkler systems), as well as shipping of products that had been tested positive for *Salmonella*

# History

1. Extremely low level contamination with *Salmonella* can cause illness in dry & high fatty foods!

Examples:    3 cfu/g in peanut butter (1996 – Australia)  
                  2 cfu/g in chocolate (1983 – Italy)  
                  0.3 cfu/ 10g in chocolate (2006 - UK)

2. Heat resistance of *Salmonella* depends on water activity / moisture of the materials to be heat-treated.

Examples:

*Salmonella* Senftenberg in raw milk    D-value at 67.5° C: 0.046min  
*Salmonella* Senftenberg in chocolate D-value at 70° C: min. 440 min

# History

- ↳ Nuts, seeds and products thereof are used in the confectionary, cereal, and other businesses with **no further lethal processing steps**.
- ↳ Any potential *Salmonella* present in the product are able to **survive in the finished product**.
- ↳ Raw material and finished product **testing for *Salmonella* is not adequate** to detect low level, spot contamination.



# Potential Contamination Routes

Nuts and seeds are grown and are harvested from the natural environment, e.g. by

- shaking nuts from the trees (with machines or manually) onto the floor of the orchard,
- digging up from the ground and drying in the sun at the field (peanuts)
- collecting them in the forest (Brazil nuts)

☹ As a result of this, the outside (shells) is occasionally contaminated with low levels of *Salmonella* and other bacteria from animal/fowl feces and/or soil.

☺ The cleaning (and shelling) operation removes the majority of the microbial contamination, but subsequent storage and transportation creates opportunities for re-contamination with microorganisms from soil, dust, insects, birds, and rodents.

# Control Options

**Commonly used processing steps which can be used to control microbiological hazards:**

**Roasting:** Oil or  
Dry (continuous or batch process)

Vacuum/Steam Pasteurization Units

Blanching (hot water), e.g. almonds

PPO (Gas) treatment (only allowed in USA & Mexico)

Marzipan Cooking

# Key Changes in Processing Expectations

## 1.0 OBJECTIVE

.....for Mondelez International shall have effective processing conditions in place. **Additional processing conditions as outlined in Supplier Quality Expectations or External Manufacturers Quality Expectations that shall be in place but are not covered within this document include:** Good Manufacturing Practices (GMPs), Hazard Analysis and Critical Control Points (HACCP), process validation(s), cross-contamination prevention, Pathogen Environmental Monitoring (PEM), calibration, and allergen management.

## 3.0 SCOPE

....**This document is based on current knowledge with respect to ensuring food safety by processing and handling. It will be amended as necessary when new data are available.** In the meantime, this document shall be used to provide examples of processes that would ensure safe products for consumer use.

# Key Changes in Processing Expectations

## 5.1 Critical Control Points (CCP)

CCP ID: Minimum time and temperature processing requirements necessary to produce a 2 log reduction of *Salmonella* on all seed/nut products. (a 4 log reduction for almonds – USA delivery only.) **Dry roasting is the least preferred option to be used as biological control step.**

...

Note: Moisture of the nut product must be within the spec for the product. When nut products are pre-dried to lower moisture prior to roasting, Mondelez International Corporate Quality shall be contacted.

...

**For seed/nut products processed in the USA**, is for almonds bound for delivery within the United States of America: processing conditions must be sufficient to deliver a minimum four log reduction of *Salmonella*. **The exception is for products produced in the USA or to be exported to the USA guidance can be obtained by contacting Mondelēz International Corporate Quality.**

# Key Changes in Processing Expectations

## 5.1- B. Dry Roasting; Continuous and Drum [HACCP Model 38]

### 5.1 – B.1 CONTINUOUS BELT ROASTING

Critical Limit: Time/Temperature conditions are listed below. Equivalent Time/Temperature parameters can be calculated using z –values listed.

Nut Type	Reference Parameters			Time for log-reduction (minutes)	
	Product Temperature	D-value (minutes)	z-value	2-log	
Pecan/Walnut	248°F /120.0°C	19.5	54.9°F /30.5°C	39.0	
	265°F /129.4°C	9.5		19.0	
	280°F /137.8°C	5.1		10.2	
Peanut	265°F /129.4°C	6.4	49.8°F / 27.8°C	12.8	
	280°F /137.8°C	3.2		6.4	
	295°F /146.1°C	1.6		3.2	
Hazelnut/soy nut/Macadamia*	230°F /110.0°C	19.5	62.5°F /34.8°C	39.0	
	248°F /120.0°C	10.1		20.2	
	265°F /129.4°C	5.4		10.8	
	280°F /137.8°C	3.1		6.2	
Sunflower Kernel/other seeds*	248°F /120.0°C	10.3	52.1°F /29.0°C	20.6	
	265°F /129.4°C	4.9		9.8	
	280°F /137.8°C	2.5		5.0	
Pistachio kernel /Cashew	248°F /120.0°C	9.3	46.3°F /25.8°C	18.6	
	265°F /129.4°C	3.9		7.8	
	280°F /137.8°C	1.9		3.8	
Almonds	266°F /130°C	7.4	65.4°F/36.4°C	14.8	
	280°F /137.8°C	4.55		9.1	

- \* for similar nut products

# Key Changes in Processing Expectations

## 5.1 – B.2 CONTINUOUS CONVECTIVE HEAT TRANSFER; mainly **FLUIDIZED BED**

Note: Some seeds (linseed / Flax, poppy seeds) are generally not subjected to dry roasting for quality reasons. For those seeds either other treatments have to be validated or contact Corporate Microbiology / Food Safety for further guidance.

Critical Limit: Time/Temperature conditions are listed below. Equivalent Time/Temperature parameters can be calculated using z -value of 14.37°C (40.16°F)

Minimum Temperature	Minimum Time for 2 log reduction	Z value °C/°F
110°C (230°F)	39.0 min.	14.37°C/40.16°F
115°C (239°F)	17.5 min.	
120°C (248°F)	7.86 min.	

The lowest applicable temperature is 110°C/230°F.

# Key Changes in Processing Expectations

## 5.1 – B.3 DRUM mainly CONDUCTIVE HEAT TRANSFER

Critical Limit: Nut/Peanut products: Time/Temperature conditions are listed below. Equivalent Time/Temperature parameters can be calculated using z-value of 54.°C (129.3°F).

Minimum Temperature	Minimum Time for 2 log reduction	Z value°C/°F
90°C (194°F)	30.5 min.	54.°C / 129.3°F
100°C (212°F)	19.9 min.	
110°C (230°F)	13.0 min	
120°C (248°F)	8.5 min	

The lowest applicable temperature is 90°C/194°F

## 5.1 – B.4 DRUM mainly CONDUCTIVE HEAT TRANSFER

Critical Limit: **Seed Products:** Time/Temperature conditions are listed below. Equivalent Time/Temperature parameters can be calculated using z-value of 13.27°C (23.87°F).

Minimum Temperature	Minimum Time for 2 log reduction	Z value°C/°F
100°C (212°F)	28.3 min.	13.27°C / 23.87°F
105°C (221°F)	11.9 min.	
110°C (230°F)	5.0 min	



# Key Changes in Processing Expectations

## 5.1- C. Brining & dry roasting (drum) Seeds only [HACCP Model 38]

Note: After brining superfluous liquid is drained off by a sieve, before the seeds are subjected to the roast. However, the seeds have not been significantly dried before roasting.

Critical Limit: Time/Temperature conditions are listed below. Equivalent Time/Temperature parameters can be calculated using z-value of 18.52°C (33.33°F).

Minimum Temperature	Minimum Time for 2 log reduction	Z value°C/°F
95°C (203°F)	1.2min	18.52°C /33.33°F

The lowest applicable temperature is 95°C (203°F).

## 5.1 – D. Vacuum/Steam Pasteurization [HACCP Model 40]

Critical Limit: Time/Temperature conditions for large chamber vacuum/steam pasteurization units are listed below: These parameters must be validated at the cold spot in the chamber.

Controllable conditions required to ensure the steam chamber pressure > 5 psi for the prescribed time for a > 4 log kill of *Salmonella*, 2 log reduction log kill of salmonella needs to be validated. The chosen parameters must be validated.

For steam pressure chambers critical limits are given below:

Nut Temperature	= 71°C (160°F) minimum
Time	= minimum 20 minutes, depending on
Chamber pressure	the nut type

# Key Changes in Processing Expectations

## 5.1 – E. **Blanching by using hot water**

Critical Limit for tree nuts and peanuts: Time/Temperature conditions are listed below. Equivalent Time/Temperature parameters can be calculated using z -value of 29°C (84°F). (Based on almond studies of Uesugi and Harris, 2005)

Temp °C/°F	Time exposure (sec)	Log reduction Salm PT30 30 sec exposure	D value (min)	Minimum Time for 2 log reduction	Z value
70°C (158°F)	30	1.7	1.0	2.0	29°C (84°F)
80°C (176°F)	30	3.0	0.6	1.2	
88°C (190.4°F)	30	4.6	0.3	0.6	

Non Almond nuts shall be validated on the equipment used for blanching.  
The lowest applicable temperature is 70°C/158°F

# Key Changes in Processing Expectations

## Temperature

...If the temperature between the nuts cannot be measured (e.g. in certain drum roasters) a **correlation must be established, through roaster validation, between the temperature between the nuts and the point where the temperature is monitored to ensure minimum temperature requirements of the nuts are achieved.** ...Corporate Microbiology shall be contacted in case such validations are performed.

Temperature - Batch systems: ..is recorded to a **permanent record** such as a temperature chart or a digital recording device.

Temperature readings **can be manually recorded** as long as the system is alarmed at the critical limit, the start and end times of the holding period are noted, and a correction to the hold time is made in case the temperature drops below the critical limit.

Temperature – continuous systems: ..**permanent record**, such as a temperature chart or a digital recording device.

(The recording frequency depends on the speed at which the process variable changes, the monitoring frequency, and the robustness of the control system particularly if there are automatic alarms and reactions to alarms.)

# Key Changes in Processing Expectations

## Alarm

An audible or visible alarm must be in place to notify technician of deviations in the critical limits (e.g. temperature/time settings, belt speed). The **alarm events shall be recorded**.

## Time

If time is not directly measured, but expressed as flow rate or belt speed a **verified correlation shall be available to correlate time** to that measurement (e.g. minutes to Hz).

Flow rate or belt speed setting shall be recorded and checked at the **beginning of the process run, once per shift after start-up, after adjustments and at the end of the run to the belt speed/product changeover**.

# Key Changes in Processing Expectations

**Other critical parameters as defined during the validation study shall be adequately monitored to ensure control of the process. Some examples are listed below:**

## Initial temperature

**If** initial temperature is determined during the validation as being a critical parameter than it shall be recorded to a **permanent record** to assure product safety is not compromised.

## Belt roaster – bed depth

The product bed depth as validated and documented in the validation study shall be verified via measurement and recorded the setting for bed depth. **If this parameter is fixed, locked, or sealed, then records shall be available to demonstrate control.**

# Key Changes in Processing Expectations

Examples of HACCP Plan Verification Activities include:

- A designated plant employee review of records **daily or prior to release of product to Mondelez International.**
- Alarm operation must be verified at a frequency sufficient to demonstrate control.
- Verification of bed depth setting systems shall be conducted daily.
- Verification of belt speed/ residence time readout devices shall be conducted daily.
- Verification of the diversion system shall be done daily.
- All measuring devices used to monitor critical control parameters shall be calibrated at a frequency sufficient to demonstrate control, as outlined in SQE.
- The correlation flow rate/holding time for the fastest particle must be documented and filed with the HACCP plan, and documented at least once per shift and after speed changes

# Key Changes in Processing Expectations

1<sup>st</sup> Requirement for all biological CCP's used in Nut processing

**A validation report shall be available to prove that the equipment and process fulfills Mondelēz requirements respective the lethality required!**

**Validation reports can be issued by Mondelēz Food Safety representatives or supplier. In the latter case the validity of the report should be confirmed preferably by Mondelēz or a recognized external expert.**



# Key Changes in Processing Expectations

Defined Validation frequency was removed & requirements added which trigger a re-validation:

For processes where the CCP Model is under development or where monitored parameters cannot be adequately validated as reflecting the actual process, **adequate alternative studies e.g., inoculation studies, (in consultation with Mondelez International Corporate FSM) shall be substituted.** The decision, **what is a significant change (in equipment, hardware, software settings) triggering a new validation, needs to be taken by technical experts...**

...Cumulative lethality can be calculated from the temperature data. The validation studies are conducted **as a minimum in triplicate** (e.g. the temperature sensor or surrogate-inoculated seeds/nuts has to run three times through the equipment)...

# Key Changes in Processing Expectations

## Appendix A - Specific Productions

### Caramelization

Caramelization of nuts can be done in one of two ways:

1. Roasting together with caramelization

This step can be validated as CCP using the dry roast model 5.1.B.

2. Caramelization of processed nuts

This step is commonly performed in open pans / drums thereby not allowing for adequate temperature controls to be validated as CCP. Therefore, nuts being caramelized that way shall have received an adequate lethal step (see 5.1 A-E) before caramelization.

Note: If the temperature in open pans would be measured constantly, e.g. by infrared thermometer, and time / temperature combination would by far exceed our requirements, this step can be agreed to be handled as control step PP.

# Key Changes in Processing Expectations

## Marzipan

Typically, Marzipan is made using blanched almonds. In that case there are two control options:

1. Blanching (using hot water)
2. Marzipan cook (that is commonly used in marzipan production)  
..An example of an adequate marzipan cook is  $93^{\circ}\text{C}$  for 10min,  $z=13^{\circ}\text{C}$ . If no corresponding time / temperature values can be achieved, the supplier has to do a validation study to prove that they achieve a 2log *Salmonella* reduction by their cooking.

# Key Changes in Processing Expectations

## Reference documents

- Up-dated the scientific references which include additional studies and scientific basis for CCP models, removed some non-applicable references

## Other Programs to consider

**Air filtration** sizes for the final filter in the processed nut areas, including nut roaster cooling zone, should be:

Minimum 80 – 85% efficient (**equivalent to F7**) at 1 micron  
10 air exchanges/hour

➤ Cooling air adequately filtered

↳ Air should not be sourced from areas where raw products are stored / handled

↳ minimum Filtration required F7

➤ Hot air roasting: How is air heated? Combustion gases in contact with product?

↳ Risk of chemical contamination assessed?

## Other Programs to consider

➤ adequate corrective actions defined & followed (Roaster failure, power shut down) including

↳ **Cleaning** after potential under-processing

Notes:

Cleaning has to include all parts after treatment, e.g. cooling equipment, conveyors, slicing, packing!

***Microbiological testing is not an adequate corrective action due to low contamination levels expected !***

➤ Are there light treatments not fulfilling Kraft requirements adequately separated (by cleaning)?

## Other Programs to consider

- separation (**Zoning**) between raw & processed areas adequate
  - ↳ Storage and handling of raw / under-processed products completely separated, which includes also **traffic controls** (forklifts, clothing, people, mobile container / bag usage, tools), **drainage systems**
  - ↳ **air flow** directed towards areas of raw products (negative pressure in “raw” areas)
  - ↳ **no usage of same equipment** – or, as a minimum, deep cleaning between both products, e.g. for chopping / caramelizing raw and processed products
  - ↳ **rework** areas assessed



# Other Programs to consider

➤ Is **pathogen environmental monitoring (PEM)** performed?

**Organism to be monitored** : *Salmonella*

Note: PEM is not a control measure but a verification of correct / adequate zoning!

WHY ?

- ⇒ Nuts are microbiologically sensitive products
- ⇒ The product is exposed to the environment during processing

Where ?

- ⇒ Not to be done in raw product areas
- ⇒ **in processed areas** where risk of contamination from environment exists esp. look for any wet areas / cracks / high traffic
- ⇒ Swabs shall be taken from **non-product contact surfaces** including floors, drains, wheels/legs of equipment, control panels, equipment exterior, etc.

# Other Programs to consider

- Was the risk of **allergen carry over** assessed? e.g.
  - ↳ floating particles (coating) in the oil from previous productions
  - ↳ usage of common equipment for different kind of nuts
  - ↳ usage of other allergenic materials in shared equipment (caramelization / coating)
  - ↳ Rework areas assessed ?
  
- Are there any **GMO issues** regarding the frying oil?

# Other Programs to consider

- Any **foreign material contamination** risks (exposed product)?
- Is the **metal detector** verified/which test piece/records and action plan available?
- **Operators trained** regularly?  
minimum 1 / year

# Other Programs to consider

## Principal risks associated with processing raw nuts & the major pre-requisite programs and controls that must be present

### Raw Material Quality

- Pesticides
- Dirt & pest control
- Segregated storage

### Extraneous Matter

(fragments of shell)

- Sieves/Filters
- X-ray units
- Magnets/Metal detectors
- Preventative Maintenance
- Disposal of contaminated shells

### Pathogen Environmental Monitoring

- Salmonella
- zoning verification

### Zoning

- Tools (trolleys, probes)
- Staff traffic flow
- Clothes
- line usage

### Sanitation

### Utilities: Water

- Water as ingredient
- Water as processing aid
- Recirculated water

### Utilities: Air

- Plant environmental air (F7)
- Cooling air (F7)
- Compressed air (filtered to 0.3microns)

### Calibration

### Control of rework

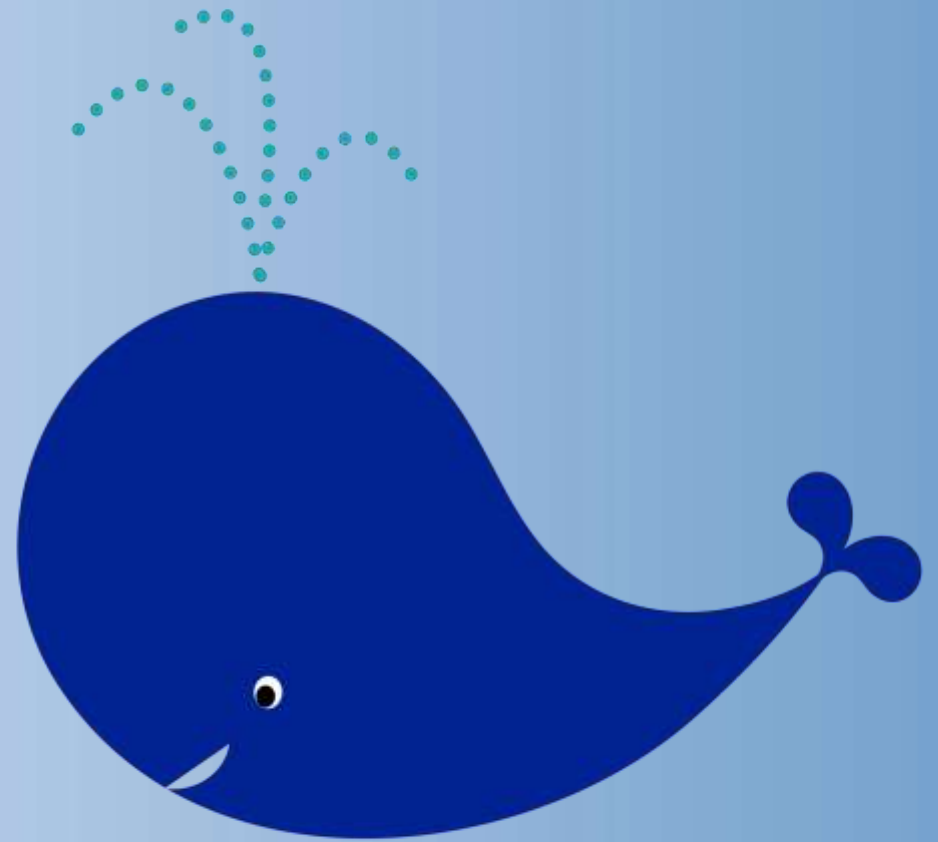
### Equipment Lubrication

### Allergen Management

- Storage areas
- Shared equipment (roasters, conveyors, oil in fryers)
- Recirculated utilities (oil)

# Supplier Food Safety Assessment

NUT suppliers: Common issues



# Heat treatment/validation:

- Validation not performed at the 'worst case scenario' conditions:
  - Incoming nuts temperature not taken into account
  - The bed height used for the validation lower than the maximum bed height used.
  - The validation not performed at the start-up of the roaster
  - Validation does not take to consideration alarm setting (ex: +/- 5°C)
  - The establishing of the coldest side of the roaster is not done.
- Recording/monitoring probe NOT located at the coldest spot
- Tolerance of the calibrated continuous monitoring probe is not taken into account for critical limit set up.
- The alarm is not verified and documented by the operator.

# Zoning:

- 'Washing area' located in raw material storage.
- Common entry for raw and processed area
- Passage by raw area to go into processed area without hygienic barrier.
- No dedicated forklifts for raw and controlled zones
- Handling of non sensitive materials ( ex: sugar) in same room as raw nuts.
- Hopper above the roaster that feeds raw nuts not completely enclosed
- Map of drains often not available

# PEM Issues

- Mobile equipment (e.g. forklifts, wheeled items) is not considered to include in PEM (only advisable when dedicated to defined areas)
- Drains often not included in PEM
- Direct product testing -> no hold and release procedure in place
- No sponges used for sampling big & smooth areas
- Samples taken the same day every week
- PEM procedure does not reflect that swabbing should be done 3-4 hours after production starts
- Time / storage conditions between taking PEM samples tested for *Salmonella* in the external laboratory and their processing is not established.
- Reporting of results and action limits for indicators are not clearly defined or meet our specific target limits.
- 3 negative sampling within 3 consecutive weeks not in the procedure as part of corrective actions
- Not meeting with minimum laboratory requirements if testing P.E.M especially testing pathogens.



# Utilities issues (Water and Air)

- Not all water circuits tested, volume/methods used is inadequate sometimes.
- Chlorine levels are not checked at the defined frequency
- Ingredients such as water not always considered in the process flow and therefore not always tested at our required frequencies
- Acceptable air limits not defined
- Air filtration specifications do not always meet with Mondelez requirements.
- Packing area, frequency of air checks inadequate in absence of air filtration
- Steam condensate quality is not routinely evaluated for turbidity, off flavours and particulates at the frequency to demonstrate control (every 6 months).

# Mondelēz International Supplier Quality Web Site

The Mondelēz International Supplier Quality web site is designed to facilitate the communication between Mondelēz International and our suppliers.

Here you will find all of the Quality Requirements and Guidelines for Suppliers to Mondelēz International, as well as the slides used in our Supplier Forums.

## The web site includes:

- Supplier Quality and Food Safety Contractual Requirements

- Supplier Forum presentations

- Quality Support Material

- Contact email address

- eLearning modules

## Browser Address:

<http://www.mondelezinternational.com/procurement/index.aspx>

**Thank you very much!**

## **Questions & Answers**