Efficient removal of *fusarium* infested kernels by industrial single kernel sorting

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Food and Health - Risks and Benefits

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WHY ARE WE CONCERNED?
BLENDING IS NOT THE SOLUTION

Embryonic loss and abortion

Decreased milk production and milk contamination

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NIR-SPECTROSCOPY GENERATIONS

FIRST GENERATION 1973 – (First NIR Analytical tool)

- Quantitative Analysis of chemical components in grain by calibration to assigned wavelengths by MLR-statistics (Norris)
  - *limit for detection of DON by assigned wavelengths: > 60 ppm*

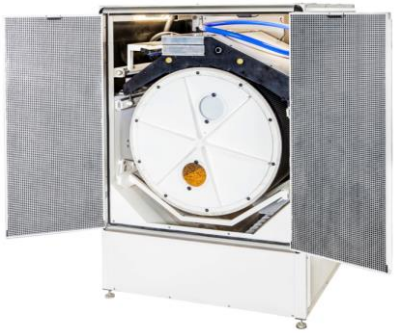
Karl Norris

SECOND GENERATION 1985 – (Improved NIR Analytical tool)

- Integrated Quantitative and Qualitative Analysis of physical structure and chemical components using whole spectra for prediction (PLS) and for classification for quality (PCA) by chemometrics (Martens)

THIRD GENERATION 2000 – (Industrial NIT Sorting tool)

- Industrial sorting of single kernels using NIT-spectra to represent the whole physical and chemical fingerprint  of the kernel as related to the degree of *fusarium* infection
  - *limit for detection of DON by raw spectra: > 0,2 ppm*



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WHY USE NIT – NEAR INFRARED TRANSMISSION?

CAN YOU TELL THE DIFFERENCE?

Image

NIT

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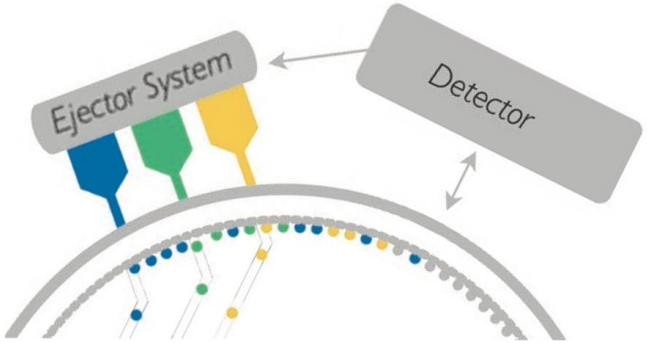
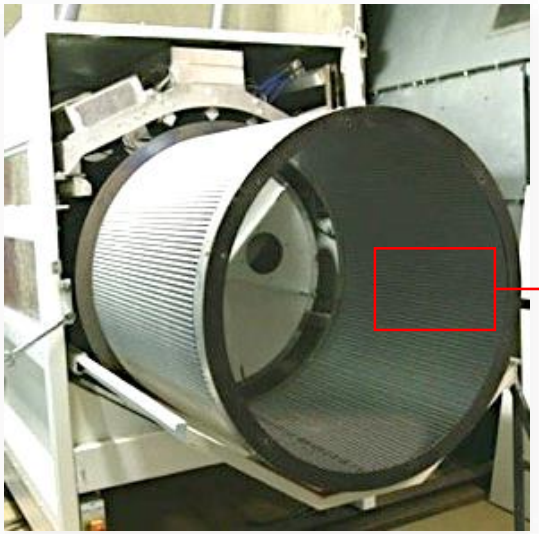
SINGULATION – NIT DETECTION – EJECTION

- Cylinder with 96 channels
- 260 pockets in each channel
- Total capacity 24,000 kernels/second
- Capacity 3 metric ton/h (TKW 45g)





Cylinder taken out of a TriQ.

Inside cylinder, pockets filled with kernels

Inside cylinder, with detecting and blow opening

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TriQ – SORTING PLANT – 18 MTON/H

- Industrial scale technology available today
- Installations in Italy, US, Canada and Austria
- Reference plant – Molino Casillo, Italy

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PROFITABILITY IN FOOD SECURITY AND SAFETY

Producer in Canada:
- 5 000 metric tons, CWAD
- Salvage Quality
- Value of batch, € 0

Production parameters:
- 24 hours/day
- 5 days/week
- 3 metric ton/h

Investment parameters:
- TriQ, installation and running cost
- All auxillary equipment
- No hidden cost

Result

- 16 weeks to sort with one TriQ
- Upgraded 57,6% of the grain to Grade 1
- Price for Grade 1 = CAD 422
- All prices in CAD

Value of unsorted batch	0
Value after TriQ- Fraction 1	756 864
Value after TriQ- Fraction 2	0
Value after TriQ- Fraction 3	0
Cleaned kernels returned to batch after TriQ sorting	0
Total value after TriQ	756 864
Other Cost Savings	0
Investment	-511 884
Return of Investment for this batch	244 980

Ref: Business case Dec. 2014 Canada

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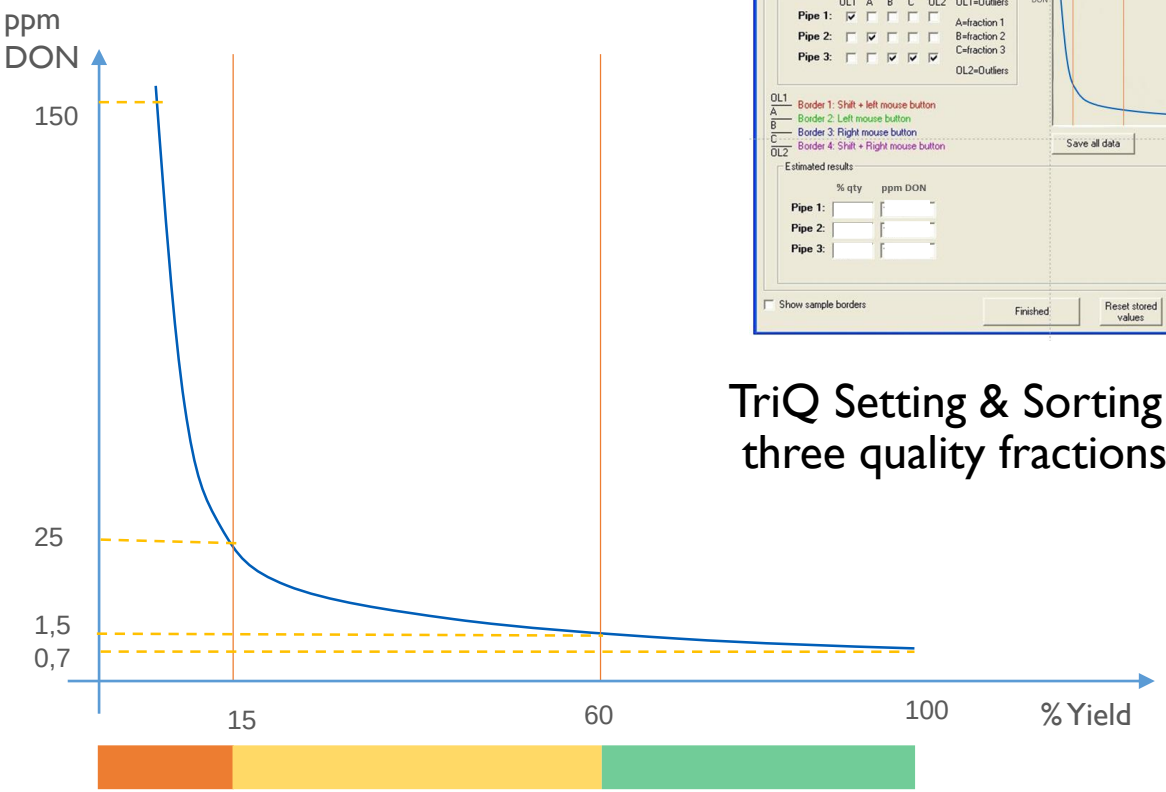
FRACTION SETTING BASED ON DON LEVEL IN UNSORTED RAW MATERIAL



TriQ Setting & Sorting display in to three quality fractions

Unsorted raw material contains 8,6 ppm DON

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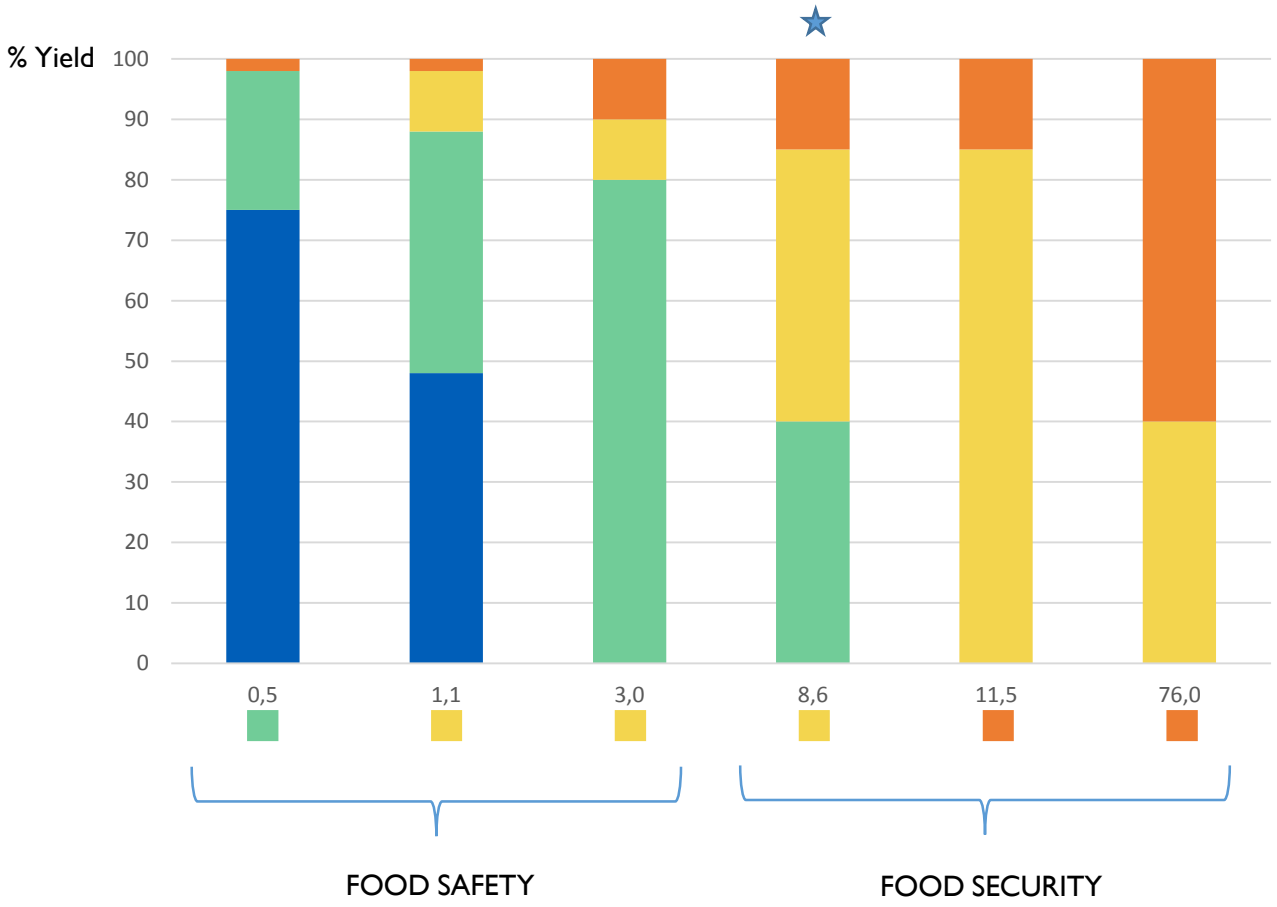
FOOD SAFETY - FOOD SECURITY



SALVAGE	> 10,0 ppm
FEED	< 5,0 ppm
FOOD	< 1,0 ppm
BABY FOOD	< 0,2 ppm

Canadian grading

Origin ppm DON unsorted grain

Reference: Canadian International Grain Institute Harvest 2014, Canada

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ADVANTAGES WITH THIRD GENERATION OF NIT

The commercial TriQ single kernel quality sorting technology will:

- Improve Food Safety by removal of mycotoxins, such as *fusarium,* from a grain lot
- Open up for improved food and feed safety regulations
- Promote production of optimal commercial qualities from any grade of raw material i.e. improve Food Security
- Offer a viable alternative to blending
- Add value to the grain business by being highly economic and competitive to standard technologies used today

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Adds more value to your grain

We will be at your disposal here in Porto during September 16 – 17

Karin Wehlin, CEO
Bo Löfqvist, Founder
Lars Munck, Prof.

Thank You!