Creating Novel Approaches to Mitigate Aflatoxin Risk in Food and Feed with Dairy Derived Proteins and Lactic Acid Bacteria

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Introduction

Aflatoxins possess significant health risks in staple foods and feeds in tropical climates. The climate change can worsen the production of safe food by promoting the Aspergillus fungi growth and the aflatoxin production in food and feed. Lactic acid bacteria (LAB) and dairy proteins provide a potential novel approach to mitigate the mould growth and aflatoxin production in maize during storage and after food consumption.

This research is done as part of FoodAfrica programme, which is a research and development programme and the main funding agency being Finnish Ministry for Foreign Affairs. The research is partnering with MTT Agrifood Research Finland and ILRI International Livestock Research Institute.

Research Plan

- There are two different approaches to the aflatoxin mitigation in this research
  - The mould growth inhibition
  - The aflatoxin binding - Both with LAB and proteins
- LAB will be isolated and identified from fermented products made in households in different areas of Kenya
- Both LAB strains and proteins inhibiting mould growth and binding aflatoxins will be analyzed in laboratory conditions and in selected food materials
- Near Infrared (NIR) will be used for the aflatoxin level analyses

Background for the research

- Especially Lactobacillus rhamnosus strains GG and LC-705 are well studied
- Both strains provide a great potential to be used in novel biological aflatoxin binding method
- Aflatoxin M1 is found in milk and aflatoxin B1 in maize
- Aflatoxin M1 is not bound to most studied LAB strains as well as aflatoxin B1

\[ 	ext{Aflatoxin B1 binding} \]

\[ 	ext{Aflatoxin M1 binding} \]

Dairy proteins and peptides have the potential to bind aflatoxins

- Milk proteins and peptides are an important source of energy and nutrients but they are known to also have antifungal and toxin neutralizing properties
- For example in blood aflatoxins form adducts with albumins and thus there is the potential to use proteins for specific aflatoxin binding

Key message

- LAB provide a potential novel biological method to bind aflatoxins
- This research aims to develop a safe method of reducing aflatoxin absorption in human gastrointestinal tract after ingesting fermented maize or dairy products, which are contaminated with aflatoxins
- This research aims to find LAB which can inhibit the mould growth and aflatoxin production during the maize storage