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WAGENINGEN UR

Food traceability: traceability systems and species identification

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Background

Accurate and truthful labelling of the source of raw materials is required for buyers and consumers with specific diet wishes (e.g. due to allergy, religion, vegetarian diet), demands for sustainable products, or to detect fraud.

> Ingredients: water, free-range eggs, wheat, 12% spinach, 11% blue cheese (milk, butter, rennet, preservatives), flavourings, mealworm paste, modified starch, salt, yeast, maltodextrin, mustard.

Food traceability is regulated by law. Food and feed products should be able to be traced from farm to the fork and track it back from plate to its source according to Regulation (EC) No. 178/2002.
Specific traceability systems have to be developed to assure food traceability, and the composition of products has to be verified by audits and robust laboratory analysis methods that can identify and discriminate between the sources derived from different species.

RIKILT and food traceability

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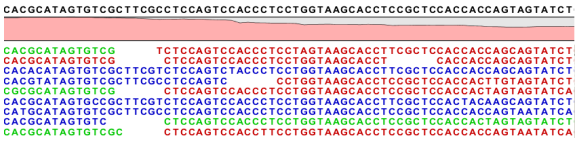
- develops documentary traceability systems;
- develops cost-effective identification methods for species and specialty products;
- identifies various animal, plant, and fish species in food and feed samples;
- applies advanced Next Generation Sequencing (NGS) approaches to develop multimethods for complex samples.



Traceability systems

RIKILT develops documentary traceability systems using diverse information systems, databases, and optical identification methods for labelling (for example GS1 System, 2-dimensional bar codes).
RIKILT established a system of food traceability in Indonesia, especially for fish products exported to EU countries. The system is a mixed paper-based/electronic-based traceability system suitable for aquaculture shrimp production for grow-out farms, suppliers and processors.

Species identification methods

RIKILT develops and applies novel methods to identify the species of ingredients in food and feed products. Advantages of these methods are their multiplicity, a short time of analysis, and cost-effectiveness. Examples of novel species identification methods include: TaqMan PCR methods, NGS, DNA barcoding using BOLD and GenBank database.

Table 1. Examples of species identified by laboratory methods and the application

Category	Examples of species	Application
Animal species	Ruminants, cow, pig, goat, sheep, chicken, turkey, duck	Halal food, manure, meat /bone meal in feed
Plant species	Maize, soy, rapeseed, rice, potato, sugar beet, cotton, wheat, oat, rye, barley, basmati rice	Feed composition
Fish species	Herring, mackerel, catfish, cod, plaice, turbot, sole, sea bass, salmon, hake, pangasius, tilapia, trout, tuna, anchovies, sardine	Sustainable fish

Sustainable fish

Knowledge on fish species in food products is relevant with respect to sustainable fishing. Identification of the origin of fish in the supply chain can guarantee sustainability of fish products and can reduce mixing and exchange of fish species.
RIKILT develops molecular methods to identify fish species, and identifies critical points of potential mixing and exchange of fish species in the supply chain.

Halal food

A halal food product has to be produced according to Islamic law. Examples of non-halal food are pork and derived products.
RIKILT develops methods to identify the (source of) ingredients of halal food products as a verification of halal assurance. Preliminary studies have been performed on pork species in snack products and on pork gelatine in yoghurt and quark products.

Conclusion

RIKILT develops advanced food traceability methods for a broad range of topics. Combining documentary traceability systems and analytical species identification methods has an added value to assure the authenticity of food and feed products.

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