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Smoked and marinated seafood: From high risk to low risk products - a review of more than 15 years of collaboration between research and the industry

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Since the late 2000s, Royal Greenland Seafood A/S (RGS) has been using predictive models for *Listeria monocytogenes* in development of RTE seafood with a high degree of safety and in compliance with the EU-regulation. These models have been developed and validated through several national research projects in close collaboration between DTU Food and RGS, and is based on a solid knowledge of product characteristics (pH, salt, preservation etc.) and growth of *L. monocytogenes* in RTE seafood. To make the predictive models valuable for the whole seafood sector they have been included in the Food Spoilage and Safety Predictor software (http://fssp.food.dtu.dk/).

The pathogenic bacteria *L. monocytogenes* is considered the main risk in many ready-to-eat (RTE) products. During the last couple of decades, several outbreaks of listeriosis with fatal outcomes have been linked to consumption of RTE smoked and marinated seafood. Prevention of growth for *L. monocytogenes* to concentrations no higher than the critical EU-limit of 100 cfu/g is an effective way to prevent and reduce cases of listeriosis.

In 2010, RGS started to produce smoked and marinated fish products (salmon, Greenland halibut and cod) with addition of acetic and/or lactic acids to change their status from high risk to low risk products. Appropriate concentrations of organic acids, preventing growth of *L. monocytogenes*, were determined using predictive models, and validated through regular risk assessments of the products. These risk assessment reports have been used proactively for documentation of food safety towards authorities and customers. The use of predictive models have made the product development process at RGS more effective by reducing time and costs from idea to finished product significantly. Most recently, new predictive models have been developed e.g. for psychrotolerant *Clostridium botulinum* that makes it possible to reduce the content of salt (sodium-chloride) in RTE seafood without compromising the food safety.