The role of outer membrane proteins and lipopolysaccharides for the sensitivity of Escherichia coli to antimicrobial peptides

Bacterial resistance to classical antibiotics is emerging worldwide. The number of infections caused by multidrug resistant bacteria is increasing and becoming a serious threat for human health globally. In particular, Gram-negative pathogens including multidrug resistant Escherichia coli are of serious concern being resistant to the currently available antibiotics. All Gram-negative bacteria are enclosed by an outer membrane which acts as an additional protection barrier preventing the entry of toxic compounds including antibiotics and antimicrobial peptides (AMPs). In this study we report that the outer membrane component lipopolysaccharide (LPS) plays a crucial role for the antimicrobial susceptibility of E. coli BW25113 against the cationic AMPs Cap18, Cap11, Cap11-1-18m2, melittin, indolicidin, cecropin P1, cecropin B, and the polypeptide antibiotic colistin, whereas the outer membrane protease OmpT and the lipoprotein Lpp only play a minor role for the susceptibility against cationic AMPs. Increased susceptibility toward cationic AMPs was found for LPS deficient mutants of E. coli BW25113 harboring deletions in any of the genes required for the inner part of core-oligosaccharide of the LPS, waaC, waaE, waaF, yaaG, and gmhA. In addition, our study demonstrates that the antimicrobial activity of Cap18, Cap11, Cap11-1-18m2, cecropin B, and cecropin P1 is not only dependent on the inner part of the core oligosaccharide, but also on the outer part and its sugar composition. Finally, we demonstrated that the antimicrobial activity of selected Cap18 derivatives harboring amino acid substitutions in the hydrophobic interface, are non-active against wild-type E. coli ATCC29522. By deleting waaC, waaE, waaF, or waaG the antimicrobial activity of the non-active derivatives can be partially or fully restored, suggesting a very close interplay between the LPS core oligosaccharide and the specific Cap18 derivative. Summarizing, this study implicates that the nature of the outer membrane component LPS has a big impact on the antimicrobial activity of cationic AMPs against E. coli. In particular, the inner as well as the outer part of the core oligosaccharide are important elements determining the antimicrobial susceptibility of E. coli against cationic AMPs.
Dissection of the antimicrobial and hemolytic activity of Cap18: Generation of Cap18 derivatives with enhanced specificity

Due to the rapid emergence of resistance to classical antibiotics, novel antimicrobial compounds are needed. It is desirable to selectively kill pathogenic bacteria without targeting other beneficial bacteria in order to prevent the negative clinical consequences caused by many broad-spectrum antibiotics as well as reducing the development of antibiotic resistance. Antimicrobial peptides (AMPs) represent an alternative to classical antibiotics and it has been previously demonstrated that Cap18 has high antimicrobial activity against a broad range of bacterial species. In this study we report the design of a positional scanning library consisting of 696 Cap18 derivatives and the subsequent screening for antimicrobial activity against Y. ruckeri, A. salmonicida, S. Typhimurium and L. lactis as well as for hemolytic activity measuring the hemoglobin release of horse erythrocytes. We show that the hydrophobic face of Cap18, in particular I13, L17 and I24, is essential for its antimicrobial activity against S. Typhimurium, Y. ruckeri, A. salmonicida, E. coli, P. aeruginosa, L. lactis, L. monocytogenes and E. faecalis. In particular, Cap18 derivatives harboring a I13D, L17D, L17P, I24D or I24N substitution lost their antimicrobial activity against any of the tested bacterial strains. In addition, we were able to generate species-specific Cap18 derivatives by particular amino acid substitutions either in the hydrophobic face at positions L6, L17, I20, and I27, or in the hydrophilic face at positions K16 and K23. Finally, our data showed the proline residue at position 29 to be essential for the inherent low hemolytic activity of Cap18 and that substitution of the residues K16, K23, or G21 by any hydrophobic residues enhances the hemolytic activity. This study demonstrates the potential of generating species-specific AMPs for the selective elimination of bacterial pathogens.

General information
State: Published
Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Research Group for Genomic Epidemiology, University of Copenhagen, Aalborg University
Comparison of the acidification activities of commercial starter cultures in camel and bovine milk

Camel milk has been reported to be difficult to ferment due to anti-microbial properties. The present study tested eight commercial starter cultures for their ability to grow in camel milk. All investigated cultures were able to acidify camel milk and reached a final pH at a level similar to what was achieved in bovine milk, but the speed of acidification was generally lower in camel milk. This could be due to inhibitory substances in camel milk or due to reduced availability of nutrients. Experiments using mixtures of camel and bovine milk or supplementation with casein hydrolysates allowed us to distinguish between these possibilities. High acidification rates were obtained in camel milk mixed with bovine milk or supplemented with casein hydrolysate. This demonstrates that the cultures are not inhibited by camel milk and we conclude that the growth rates of these cultures in pure camel milk are limited by the rate of proteolysis.

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- Web of Science (2017): Indexed yes
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- Web of Science (2016): Impact factor 3.239
- Web of Science (2016): Indexed yes
- Scopus rating (2015): CiteScore 3.11
- Web of Science (2015): Impact factor 2.711
- Web of Science (2015): Indexed yes
- Scopus rating (2014): CiteScore 3.12
- Web of Science (2014): Impact factor 2.416
- Web of Science (2014): Indexed yes
- Scopus rating (2013): CiteScore 3.11
- Web of Science (2013): Impact factor 2.468
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- Scopus rating (2012): CiteScore 3.12
- Web of Science (2012): Impact factor 2.546
- ISI indexed (2012): ISI indexed no
- Scopus rating (2011): CiteScore 3.18
- Web of Science (2011): Impact factor 2.545
- ISI indexed (2011): ISI indexed no
- Web of Science (2011): Indexed yes
- Web of Science (2010): Impact factor 2.292
- Web of Science (2008): Indexed yes
- Web of Science (2005): Indexed yes
- Web of Science (2004): Indexed yes
- Web of Science (2003): Indexed yes
Immunogenicity and allergenicity of camel and cow's milk: a comparative study in brown Norway rats

General information
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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Research Group for Analytical Food Chemistry
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Scopus rating (2017): CiteScore 6.23 SJR 2.702 SNIP 2.332
Web of Science (2017): Impact factor 6.048
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 6.23 SJR 2.841 SNIP 2.521
Web of Science (2016): Impact factor 7.361
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 5.73 SJR 3.17 SNIP 2.17
Web of Science (2015): Impact factor 6.335
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 5.51 SJR 2.529 SNIP 2.161
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.91 SJR 2.218 SNIP 1.939
Web of Science (2013): Impact factor 5.995
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 4.81 SJR 2.126 SNIP 1.853
Web of Science (2012): Impact factor 5.883
ISI indexed (2012): ISI indexed yes
Redox reactions in food fermentations

Food fermentations are typically performed without actively supplying air. Except for possible surface microorganisms, oxygen will only be transiently available and the redox reactions during the fermentation need to be in balance. Production of ATP from fermentation of carbohydrates typically involves oxidative steps in the early part of the pathways whereas a multitude of different reactions are used as compensating reductions. Much of the diversity seen between food fermentations arise from the different routes and the different electron acceptors used by microorganisms to counterbalance the initial oxidative steps.

This review gives a short overview of the routes employed by microorganisms in food fermentations to find ultimate electron acceptors allowing them to balance their fermentative metabolism.

The diversity of acceptors used leads to diversity of metabolic end products and this contributes to the diversity in flavor, color, texture, and shelf life. The review concludes that these reactions are still only incompletely understood and that they represent an interesting area for fundamental research and also represent a fertile field for product development through a more conscious use of the redox properties of strains used to compose food cultures.

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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology
Contributors: Hansen, E. B.
Pages: 98-103
Publication date: 2018
Rheological and sensory properties and aroma compounds formed during ripening of soft brined cheese made from camel milk

Protein degradation, rheological properties, sensory properties and the aroma profile of soft brined cheese made from camel milk using two levels of coagulant (camel chymosin) [55 and 85 International Milk Clotting Units (IMCU) L−1] and two levels of brine (2% or 5% NaCl, w/w) were investigated over a ripening period of 60 d. Casein degradation in soft brined camel milk cheese significantly (p <0.05) increased during ripening and with increase of coagulant level. Young's modulus and stress at fracture significantly (p <0.05) increased with increasing level of salt in moisture in the cheese during ripening. However, cheese made with 85 IMCU L−1 coagulant resulted in softening of cheese texture and higher salt uptake. Using descriptive sensory analysis, the experimental cheeses were described as salty, sour and firm. The volatile aroma compounds formed in soft ripened camel milk cheese are affected by ripening time, and coagulant and NaCl levels.
Antimicrobial peptide CAP18 and its effect on Yersinia ruckeri infections in rainbow trout Oncorhynchus mykiss (Walbaum): comparing administration by injection and oral routes

The antimicrobial peptide CAP18 has been demonstrated to have a strong in vitro bactericidal effect on Yersinia ruckeri, but its activity in vivo has not been described. In this work, we investigated whether CAP18 protects rainbow trout Oncorhynchus mykiss (Walbaum) against enteric red mouth disease caused by this pathogen either following i.p. injection or by oral administration (in feed). It was found that injection of CAP18 into juvenile rainbow trout before exposure to Y. ruckeri was associated with lowered mortality compared to non-medicated fish although it was less effective than the conventional antibiotic oxolinic acid. Oral administration of CAP18 to trout did not prevent infection. The proteolytic effect of secretions on the peptide CAP18 in the fish gastrointestinal tract is suggested to account for the inferior effect of oral administration.

General information
State: Published
Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Research Group for Genomic Epidemiology, National Veterinary Institute, Section for Bacteriology, Pathology and Parasitology, University of Copenhagen, Aalborg University, BioMar A/S
Contributors: Chetri, J. K., Mehrdana, F., Hansen, E. B., Ebbensgaard, A. E., Overgaard, M. T., Lauritsen, A. H., Dalsgaard, I., Buchmann, K.
Characterisation of lactic acid bacteria in spontaneously fermented camel milk and selection of strains for fermentation of camel milk

The microbial communities in spontaneously fermented camel milk from Ethiopia were characterised through metagenomic 16S rRNA sequencing and lactic acid bacteria were isolated with the goal of selecting strains suitable as starter cultures. The fermented camel milk microbiota was dominated either by Lactobacillales or by Enterobacteriaceae, depending on incubation temperature and the provider of the milk. Strains of species with a potential use as starter cultures i.e., Lactococcus lactis, Lactobacillus plantarum, and Pediococcus acidilactici, were isolated. Fast acidifiers of camel milk have been isolated from the species of Lc. lactis, P. acidilactici, and Streptococcus infantarius. Gram-negative and potentially pathogenic microorganisms were frequent in spontaneously fermented camel milk, indicating the need for improved hygiene in Ethiopian camel farms. The profiled microbiota of spontaneously fermented camel milk and the isolated LAB strains will significantly contribute towards improving food safety and food security in dry regions that depend on camel milk production.

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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Haramaya University, Technical University of Denmark, University of Copenhagen
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  - Web of Science (2017): Impact factor 2.201
  - Web of Science (2017): Indexed yes
  - BFI (2016): BFI-level 2
  - Scopus rating (2016): CiteScore 2.34 SJR 1.124 SNIP 1.272
  - Web of Science (2016): Impact factor 2.067
  - Web of Science (2016): Indexed yes
  - BFI (2015): BFI-level 2
  - Scopus rating (2015): CiteScore 2.18 SJR 0.961 SNIP 1.15
  - Web of Science (2015): Impact factor 1.938
  - Web of Science (2015): Indexed yes
  - BFI (2014): BFI-level 2
  - Scopus rating (2014): CiteScore 2.24 SJR 1.06 SNIP 1.174
  - Web of Science (2014): Impact factor 2.008
  - BFI (2013): BFI-level 1
  - Scopus rating (2013): CiteScore 2.79 SJR 1.239 SNIP 1.394
Coagulants et cultures pour le lait de chamelle

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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, University of Copenhagen, Chr. Hansen AS, Haramaya University
Contributors: Hansen, E. B., Ipsen, R., Sørensen, K. I., Hailu, Y., Berhe, T., Eshetu, M.
Number of pages: 2
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Electronic versions:
Coagulants_et_cultures_pour_lait_de_chamelle.pdf
Research output: Research - peer-review; Journal article – Annual report year: 2017

Microbial Glycosidases for Nondigestible
There is much interest in the study and production of nondigestible oligosaccharides (NDOs), due to their bioactivities and beneficial effects to the human health. The main approach in the production of NDOs relies on the action of glycosidases performing hydrolysis or transglycosylation of polysaccharides and sugars. In this chapter, a description of the main
microbial glycosidases used for NDOs production, their sources, their principal properties, and a description of the production processes with the better results obtained are discussed.

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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Universidade Estadual Paulista, Sao Paulo State University
Contributors: Bezerra, T., Montibra, R., Hansen, E. B., Contiero, J.
Pages: 181-206
Publication date: 2017

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10.5772/65935
Source: PublicationPreSubmission
Source-ID: 130851654
Research output: Research - peer-review › Book chapter – Annual report year: 2017

**Processing Challenges and Opportunities of Camel Dairy Products**
A review on the challenges and opportunities of processing camel milk into dairy products is provided with an objective of exploring the challenges of processing and assessing the opportunities for developing functional products from camel milk. The gross composition of camel milk is similar to bovine milk. Nonetheless, the relative composition, distribution, and the molecular structure of the milk components are reported to be different. Consequently, manufacturing of camel dairy products such as cheese, yoghurt, or butter using the same technology as for dairy products from bovine milk can result in processing difficulties and products of inferior quality. However, scientific evidence points to the possibility of transforming camel milk into products by optimization of the processing parameters. Additionally, camel milk has traditionally been used for its medicinal values and recent scientific studies confirm that it is a rich source of bioactive, antimicrobial, and antioxidant substances. The current literature concerning product design and functional potential of camel milk is fragmented in terms of time, place, and depth of the research. Therefore, it is essential to understand the fundamental features of camel milk and initiate detailed multidisciplinary research to fully explore and utilize its functional and technological properties.

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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, University of Copenhagen, University of Botswana, Haramaya University
Contributors: Berhe, T., Seifu, E., Ipsen, R., Kurtu, M. Y., Hansen, E. B.
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Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 1.89
Web of Science (2016): Impact factor 1.64
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.67
Web of Science (2015): Impact factor 1.504
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.65
Web of Science (2014): Impact factor 1.384
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.65
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ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
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Scopus rating (2012): CiteScore 1.47
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Scopus rating (2011): CiteScore 1.51
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ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
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Web of Science (2010): Impact factor 1.223
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Web of Science (2007): Indexed yes
Web of Science (2001): Indexed yes
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Source: FindIt
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Research output: Research - peer-review > Review – Annual report year: 2017

PROVIDE a project aiming at protein valorization through informatics, hydrolysis, and separation

General information
State: Published
Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Research Group for Bioactives – Analysis and Application, Department of Bio and Health Informatics, ImmunoInformatics and Machine Learning, Technical University of Denmark
Contributors: Hansen, E. B., Jacobsen, C., Lund, O., Marcatili, P., Garcia Moreno, P. J.
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Characterization of lactic acid bacteria in spontaneously fermented camel milk and selection of strains for fermentation of camel milk

General information
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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Technical University of Denmark, Haramaya University, University of Copenhagen
Pages: 36-36
Publication date: 2016

Factors influencing the gelation and rennetability of camel milk using camel chymosin
The effects of temperature, pH, concentration of camel chymosin and addition of CaCl2 on the hydrolysis of κ-casein (κ-CN) and the coagulation kinetics of camel milk were investigated. The rate of κ-CN hydrolysis was higher at 40 °C than at 30 °C and with increasing addition of chymosin and decreasing pH. For all samples gelation was initiated at levels of camel milk κ-CN hydrolysis >95%. The gelation time (Tg) of camel milk was significantly reduced (from 717 to 526 s) at 30 °C when the concentration of chymosin was increased, but was independent of chymosin concentration at 40 °C. Reducing pH also reduced Tg. The gel firmness increased at 40 °C (58 Pa) compared with 30 °C (44 Pa) and effect of CaCl2 addition on the gelation properties of camel milk was found to be dependent on pH; a significant improvement was only found at pH 6.3.

General information
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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, University of Copenhagen, University of Botswana, Haramaya University
Contributors: Hailu, Y., Hansen, E. B., Seifu, E., Eshetu, M., Ipsen, R.
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  Web of Science (2018): Indexed yes
  BFI (2017): BFI-level 2
  Scopus rating (2017): CiteScore 2.21 SJR 1.051 SNIP 1.031
  Web of Science (2017): Impact factor 2.201
  Web of Science (2017): Indexed yes
  BFI (2016): BFI-level 2
  Scopus rating (2016): CiteScore 2.34 SJR 1.124 SNIP 1.272
  Web of Science (2016): Impact factor 2.067
This review summarises current knowledge on camel milk proteins, with focus on significant peculiarities in protein composition and molecular properties. Camel milk is traditionally consumed as a fresh or naturally fermented product. Within the last couple of years, an increasing quantity is being processed in dairy plants, and a number of consumer products have been marketed. A better understanding of the technological and functional properties, as required for product improvement, has been gained in the past years. Absence of the whey protein β-LG and a low proportion of κ-casein cause differences in relation to dairy processing. In addition to the technological properties, there are also implications for human nutrition and camel milk proteins are of interest for applications in infant foods, for food preservation and in functional foods. Proposed health benefits include inhibition of the angiotensin converting enzyme, antimicrobial and antioxidant properties as well as an antidiabetogenic effect. Detailed investigations on foaming, gelation...
and solubility as well as technological consequences of processing should be investigated further for the improvement of camel milk utilisation in the near future.

**General information**

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*Organisations:* National Food Institute, Research Group for Gut Microbiology and Immunology, University of Copenhagen, University of Botswana, Haramaya University, M+W Central Europe GmbH  
*Contributors:* Hailu, Y., Hansen, E. B., Seifu, E., Eshetu, M., Ipsen, R., Kappeler, S.  
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BFI (2017): BFI-level 1  
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Web of Science (2017): Impact factor 1.17  
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BFI (2016): BFI-level 1  
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Web of Science (2016): Impact factor 1.409  
Web of Science (2016): Indexed yes  
BFI (2015): BFI-level 1  
Scopus rating (2015): CiteScore 1.54 SJR 0.694 SNIP 0.888  
Web of Science (2015): Impact factor 1.5  
Web of Science (2015): Indexed yes  
BFI (2014): BFI-level 1  
Scopus rating (2014): CiteScore 1.79 SJR 0.732 SNIP 0.954  
Web of Science (2014): Impact factor 1.598  
BFI (2013): BFI-level 1  
Scopus rating (2013): CiteScore 1.49 SJR 0.625 SNIP 0.828  
Web of Science (2013): Impact factor 1.394  
ISI indexed (2013): ISI indexed yes  
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Scopus rating (2012): CiteScore 1.54 SJR 0.67 SNIP 0.937  
Web of Science (2012): Impact factor 1.373  
ISI indexed (2012): ISI indexed yes  
Web of Science (2012): Indexed yes  
BFI (2011): BFI-level 1  
Scopus rating (2011): CiteScore 1.61 SJR 0.775 SNIP 1.016  
Web of Science (2011): Impact factor 1.566  
ISI indexed (2011): ISI indexed yes  
BFI (2010): BFI-level 1  
Scopus rating (2010): SJR 0.804 SNIP 0.94  
Web of Science (2010): Impact factor 1.807  
BFI (2009): BFI-level 1  
Scopus rating (2009): SJR 0.684 SNIP 0.879  
BFI (2008): BFI-level 2  
Scopus rating (2008): SJR 0.818 SNIP 0.928  
Scopus rating (2007): SJR 0.819 SNIP 1.218
Proteolysis of camel milk by lactic acid bacteria

General information
State: Published
Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, University of Copenhagen
Contributors: Witt, S. P., Lametsch, R., Hansen, E. B.
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Host publication information
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Place of publication: Copenhagen
Publisher: American Society for Microbiology
Article number: P10
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Programme & Abstracts book
Research output: Research - peer-review › Conference abstract in proceedings – Annual report year: 2016

Viden er den vigtigste ingrediens

General information
State: Published
Organisations: Office for Innovation & Sector Services, National Food Institute, Office for Research and Relations, Department of Chemical and Biochemical Engineering, Center for BioProcess Engineering, Research Group for Gut Microbiology and Immunology, Landbrug og Fødevarer, DI Fødevarer, manjourn.dk
Number of pages: 27
Publication date: 2016

Publication information
Publisher: Technical University of Denmark (DTU)
Original language: Danish
Electronic versions:
Sektorudviklingsrapport_1_.pdf
Research output: Commissioned › Report – Annual report year: 2016
Comparative Evaluation of the Antimicrobial Activity of Different Antimicrobial Peptides against a Range of Pathogenic Bacteria

The rapid emergence of resistance to classical antibiotics has increased the interest in novel antimicrobial compounds. Antimicrobial peptides (AMPs) represent an attractive alternative to classical antibiotics and a number of different studies have reported antimicrobial activity data of various AMPs, but there is only limited comparative data available. The mode of action for many AMPs is largely unknown even though several models have suggested that the lipopolysaccharides (LPS) play a crucial role in the attraction and attachment of the AMP to the bacterial membrane in Gram-negative bacteria. We compared the potency of Cap18, Cap11, Cap11-1-18m2, Cecropin P1, Cecropin B, Bac2A, Bac2A-NH2, Sub5-NH2, Indolicidin, Melitin, Myxindin, Myxindin-NH2, Pyrrhocoricin, Apidaecin and Metalnikowin I towards Staphylococcus aureus, Enterococcus faecalis, Pseudomonas aeruginosa, Escherichia coli, Aeromonas salmonicida, Listeria monocytogenes, Campylobacter jejuni, Flavobacterium psychrophilum, Salmonella typhimurium and Yersinia ruckeri by minimal inhibitory concentration (MIC) determinations. Additional characteristics such as cytotoxicity, thermo and protease stability were measured and compared among the different peptides. Further, the antimicrobial activity of a selection of cationic AMPs was investigated in various E. coli LPS mutants.

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Organisations: Department of Systems Biology, National Food Institute, Research Group for Genomic Epidemiology, Research Group for Gut Microbiology and Immunology, Aalborg University
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.11 SJR 1.236 SNIP 1.101
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.32 SJR 1.427 SNIP 1.136
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.54 SJR 1.559 SNIP 1.148
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.94 SJR 1.772 SNIP 1.153
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 4.15 SJR 1.982 SNIP 1.156
Web of Science (2012): Impact factor 3.73
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 4.58 SJR 2.425 SNIP 1.233
Web of Science (2011): Impact factor 4.092
Comparison of the Acidification Activities of Commercial Starter Cultures on Camel and Cow Milk

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Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Haramaya University, Botswana College of Agriculture, University of Copenhagen
Number of pages: 1
Publication date: 2015
Peer-reviewed: Yes
Event: Poster session presented at 9th NIZO Dairy Conference, Papendal, Netherlands.
Electronic versions:
Tes_Nizo_poster.pdf
Source: PublicationPreSubmission
Source-ID: 118982032
Research output: Research - peer-review › Poster – Annual report year: 2015

Development of Starter Cultures

**General information**
State: Published
Organisations: National Food Institute, Division of Food Microbiology
Contributors: Hansen, E. B.
Pages: 432-438
Publication date: 2015

**Host publication information**
Title of host publication: Handbook of Indigenous Foods Involving Alkaline Fermentation
Publisher: Taylor & Francis
Editors: Sarkar, P. K., Nout, M. J. R.
ISBN (Print): 978-1-4665-6529-6
Source: PublicationPreSubmission
Source-ID: 98272660
Research output: Research - peer-review › Book chapter – Annual report year: 2014
Factors Influencing Gelation and Rennetability of Camel Milk using Camel Chymosin

General information
State: Published
Organisations: National Food Institute, Research Group for Gut Microbiology and Immunology, Haramaya University, University of Copenhagen, Botswana College of Agriculture
Contributors: Hailu, Y., Ipsen, R., Hansen, E. B., Seifu, E., Eshetu, M.
Number of pages: 1
Publication date: 2015
Peer-reviewed: Yes
Event: Poster session presented at 9th NIZO Dairy Conference, Papendal, Netherlands.
Electronic versions:
Yonas_Final_Poster.pdf
Source: PublicationPreSubmission
Source-ID: 118981977
Research output: Research - peer-review › Poster – Annual report year: 2015

Starter Cultures: Uses in the Food Industry.
Starter cultures are preparations of microorganisms serving as inoculants for the production of fermented foods. The production of cheese, yogurt, fermented milk, wine, sauerkraut, hams, and sausages occurs through the use of starter cultures that are consistent, predictable, and safe. The cultures provide the food products with a multitude of properties. Acidification of the food matrix is a primary property in a large number of food fermentations. Acidification activity often will be used to define packaging size and the unit of activity, whereas other characteristics differentiate a culture from the range of other available starter cultures. Starter cultures are commercially available in liquid, frozen, or lyophilized form from several companies serving regional or global markets.

Erratum to "Food fermentations: microorganisms with technological beneficial use" [International Journal of Food Microbiology 154 (2012) 87-97]

General information
State: Published
Organisations: Center for Microbial Biotechnology, Department of Systems Biology, Danone Research Centre for Specialised Nutrition, INRA Institut National de La Recherche Agronomique, CNIEL, Cargill Texturizing Solutions, University of Hohenheim, Fonterra Co-operative Group Ltd., Ghent University, European Food and Feed Cultures Association, Danisco AS, Dairy Innovation Australia Ltd., Anand Agricultural University, Megmilk Snow Brand Co., Ltd., Laboratory & Quality Services Friesland, CSK Food Enrichment B.V., University of Antwerp, Groupe Lactalis, International Dairy Federation
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: International Journal of Food Microbiology
Volume: 156
Issue number: 301
ISSN (Print): 0168-1605

Ratings:

BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.76 SJR 1.366 SNIP 1.436
Web of Science (2017): Impact factor 3.451
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.97 SJR 1.481 SNIP 1.553
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.02 SJR 1.614 SNIP 1.683
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.62 SJR 1.493 SNIP 1.695
Web of Science (2014): Impact factor 3.082
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 3.8 SJR 1.612 SNIP 1.841
Web of Science (2013): Impact factor 3.155
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 3.7 SJR 1.603 SNIP 1.705
Web of Science (2012): Impact factor 3.425
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 3.63 SJR 1.607 SNIP 1.713
Web of Science (2011): Impact factor 3.327
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.61 SNIP 1.666
Web of Science (2010): Impact factor 3.143
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.475 SNIP 1.539
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.442 SNIP 1.509
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.349 SNIP 1.692
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.541 SNIP 1.788
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.511 SNIP 1.834
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.502 SNIP 1.638
Web of Science (2004): Indexed yes
Food fermentations: Microorganisms with technological beneficial use

Microbial food cultures have directly or indirectly come under various regulatory frameworks in the course of the last decades. Several of those regulatory frameworks put emphasis on “the history of use”, “traditional food”, or “general recognition of safety”. Authoritative lists of microorganisms with a documented use in food have therefore come into high demand. One such list was published in 2002 as a result of a joint project between the International Dairy Federation (IDF) and the European Food and Feed Cultures Association (EFFCA). The “2002 IDF inventory” has become a de facto reference for food cultures in practical use. However, as the focus mainly was on commercially available dairy cultures, there was an unmet need for a list with a wider scope. We present an updated inventory of microorganisms used in food fermentations covering a wide range of food matrices (dairy, meat, fish, vegetables, legumes, cereals, beverages, and vinegar). We have also reviewed and updated the taxonomy of the microorganisms used in food fermentations in order to bring the taxonomy in agreement with the current standing in nomenclature.

General information
State: Published
Organisations: Center for Microbial Biotechnology, Department of Systems Biology, Danone Research Centre for Specialised Nutrition, INRA Institut National de La Recherche Agronomique, CNIEL, Cargill Texturizing Solutions, University of Hohenheim, Fonterra Co-operative Group Ltd., Ghent University, European Food and Feed Cultures Association, Danisco AS, Dairy Innovation Australia Ltd., Anand Agricultural University, Megmilk Snow Brand Co., Ltd., Laboratory & Quality Services Friesland, CSK Food Enrichment B.V., University of Antwerp, Groupe Lactalis, International Dairy Federation
Pages: 87-97
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: International Journal of Food Microbiology
Volume: 154
Issue number: 3
ISSN (Print): 0168-1605
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.76 SJR 1.366 SNIP 1.436
Web of Science (2017): Impact factor 3.451
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.97 SJR 1.481 SNIP 1.553
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.02 SJR 1.614 SNIP 1.683
Analysis of the human intestinal epithelial cell transcriptional response to Lactobacillus acidophilus, Lactobacillus salivarius, Bifidobacterium lactis and Escherichia coli

The complex microbial population residing in the human gastrointestinal tract consists of commensal, potential pathogenic and beneficial species, which are probably perceived differently by the host and consequently could be expected to trigger specific transcriptional responses. In this study, a comparative analysis of the global in vitro transcriptional response of human intestinal epithelial cells to Lactobacillus acidophilus NCFMTM, L. salivarius Ls-33, Bifidobacterium animalis subsp. lactis 420 and enterohaemorrhagic Escherichia coli O157:H7 (EHEC) was conducted. Of particular note, L. salivarius Ls-33 DCE-induced changes were overall more similar to those of B. lactis 420 than to L. acidophilus NCFMTM, which was consistent with previously observed in vivo immunomodulation properties. In gene ontology and pathway analyses, both specific and unspecific changes were observed. Common to all was the regulation of apoptosis and adipogenesis, and lipid metabolism related regulation by the probiotics. Specific changes, such as regulation of cell-cell adhesion by B. lactis 420, superoxide metabolism by L. salivarius Ls-33 and regulation of MAPK pathway by L. acidophilus NCFMTM, were noted. Furthermore, fundamental differences were observed between the pathogenic and probiotic treatments in the Toll-like receptor pathway, especially for adapter molecules with a lowered level of transcriptional activation of MyD88, TRIF, IRAK1 and TRAF6 by probiotics compared to EHEC. Results provided insights into the relationship between probiotics and human intestinal epithelial cells, notably with regard to strain-specific responses, and highlighted the differences between transcriptional responses to pathogenic and probiotic bacteria.

Keyword: Epithelial cells, Microarray, Probiotics, Escherichia coli, Cell line models

General information
State: Published
Organisations: Danisco Finland, Danisco USA Inc., DANISCO France SAS
Pages: 283-295
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Beneficial Microbes
Volume: 1
Issue number: 3
ISSN (Print): 1876-2883
Ratings:
Web of Science (2018): Indexed yes
Scopus rating (2017): CiteScore 2.63 SJR 0.962 SNIP 0.79
Web of Science (2017): Impact factor 2.31
Web of Science (2017): Indexed yes
Scopus rating (2016): CiteScore 2.72 SJR 0.95 SNIP 0.787
Web of Science (2016): Impact factor 2.923
Scopus rating (2015): CiteScore 2.94 SJR 1.028 SNIP 0.867
Web of Science (2015): Impact factor 3.301
Scopus rating (2014): CiteScore 2.05 SJR 0.837 SNIP 0.574
Web of Science (2014): Impact factor 2.614
Scopus rating (2013): CiteScore 1.71 SJR 0.763 SNIP 0.66
Web of Science (2013): Impact factor 1.5
ISI indexed (2013): ISI indexed yes
Scopus rating (2012): CiteScore 1 SJR 0.602 SNIP 0.523
Web of Science (2012): Impact factor 1.474
ISI indexed (2012): ISI indexed no
Scopus rating (2011): SJR 0.251 SNIP 0.346
ISI indexed (2011): ISI indexed no
Original language: English
DOIs: 10.3920/BM2010.0003
Source: orbit
Source-ID: 316716
Research output: Research - peer-review > Journal article – Annual report year: 2010
The production of fermented foods is one of the oldest food processing technologies known to man. Since the dawn of civilization, methods for the fermentation of milks, meats, fish and vegetables have been used to produce safe foods with distinctive organoleptic properties. Microbial food cultures (MFC) with a technological impact on food are called “starter cultures”. They may be present as natural microflora in the food, or as a result of the intentional addition of the microorganisms in an industrial food fermentation process. MFC that are used for their beneficial effect on consumers’ health are called probiotics. Probiotics are always intentionally added to the food as they have been carefully selected and studied to guarantee that they provide a proven beneficial effect to consumers. They may be used in both fermented and non-fermented foods such as food supplements. This paper aims to provide an overview of the European regulatory framework which governs the use and labelling of commercial microbial food cultures intentionally added in a food manufacturing process.

Engineering of Bacillus subtilis 168 for increased nisin resistance

Nisin is a natural bacteriocin produced commercially by Lactococcus lactis and widely used in the food industry as a preservative because of its broad host spectrum. Despite the low productivity and troublesome fermentation of L. lactis, no alternative cost-effective host has yet been found. Bacillus subtilis had been suggested as a potential host for the biosynthesis of nisin but was discarded due to its sensitivity to the lethal action of nisin. In this study, we have reevaluated the potential of B. subtilis as a host organism for the heterologous production of nisin. We applied transcriptome and proteome analyses of B. subtilis and identified eight genes upregulated in the presence of nisin. We demonstrated that the overexpression of some of these genes boosts the natural defenses of B. subtilis, which allows it to sustain higher levels of nisin in the medium. We also attempted to overcome the nisin sensitivity of B. subtilis by introducing the nisin resistance genes nisFEG and nisl from L. lactis under the control of a synthetic promoter library.

General information
Effect of four probiotic strains and Escherichia coli O157:H7 on tight junction integrity and cyclo-oxygenase expression

Controversy exists as to whether contact between a probiotic bacterial cell and an epithelial cell in the gut is needed to confer beneficial effects of probiotics, or whether metabolites from probiotics are sufficient to cause this effect. To address this question, Caco-2 cells were treated with cell-free supernatants of four probiotics, Bifidobacterium lactis 420, Bifidobacterium lactis HN019, Lactobacillus acidophilus NCFM™, Lactobacillus salivarius Ls-33, and by a cell-free supernatant of a pathogenic bacteria, Escherichia coli O157:H7 (EHEC). Tight junction integrity as well as expression of cyclo-oxygenases, which are prostaglandin-producing enzymes, were measured. Probiotic-specific as well as EHEC-specific effects on tight junction integrity and cyclo-oxygenase expression were evident, indicating that live bacterial cells were not necessary for the manifestation of the effects. B. lactis 420 cell-free supernatant increased tight junction integrity, while EHEC cell-free supernatant induced damage on tight junctions. In general, EHEC and probiotics had opposite effects upon cyclo-oxygenase expression. Furthermore, B. lactis 420 cell-free supernatant protected the tight junctions from EHEC-induced damage when administered prior to the cell-free supernatant of EHEC. These results indicate that probiotics produce bioactive metabolites, suggesting that consumption of specific probiotic bacteria might be beneficial in protecting intestinal epithelial cells from the deleterious effects of pathogenic bacteria.

Keyword: Probiotics, Cyclo-oxygenase, Caco-2, Tight junction, Lactobacilli, EHEC O157:H7, Bifidobacteria

General information

State: Published
Organisations: Danisco Finland, Danisco AS
Contributors: Putaala, H., Salusjärvi, T., Nordström, M., Saarinen, M., Ouwehand, A. C., Hansen, E. B., Rautonen, N.
Pages: 692-698
Publication date: 2008
Peer-reviewed: Yes

Publication information

Journal: Research in Microbiology
Volume: 159
Issue number: 9-10
ISSN (Print): 0923-2508
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.11 SJR 0.82 SNIP 0.848
Web of Science (2017): Impact factor 2.372
Characterization of recombinant camel chymosin reveals superior properties for the coagulation of bovine and camel milk

Enzymatic milk coagulation for cheese manufacturing involves the cleavage of the scissile bond in κ-casein by an aspartic acid protease. Bovine chymosin is the preferred enzyme, combining a strong clotting activity with a low general proteolytic...
activity. In the present study, we report expression and enzymatic properties of recombinant camel chymosin expressed in Aspergillus niger. Camel chymosin was shown to have different characteristics than bovine chymosin. Camel chymosin exhibits a 70% higher clotting activity for bovine milk and has only 20% of the unspecific protease activity for bovine chymosin. This results in a sevenfold higher ratio of clotting to general proteolytic activity. The enzyme is more thermostable than bovine chymosin. Kinetic analysis showed that half-saturation is achieved with less than 50% of the substrate required for bovine chymosin and turnover rates are lower. While raw camel milk cannot be clotted with bovine chymosin, a high clotting activity was found with camel chymosin.

Keyword: Camelus dromedarius, Milk clotting enzyme, Heterologous gene expression, Cheese, Camel chymosin, Aspergillus niger

General information
State: Published
Organisations: Swiss Federal Institute of Technology, Chr. Hansen AS
Pages: 647-654
Publication date: 2006
Peer-reviewed: Yes

Publication information
Journal: Biochemical and Biophysical Research Communications
Volume: 342
Issue number: 2
ISSN (Print): 0006-291X
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.62 SJR 1.087 SNIP 0.707
Web of Science (2017): Impact factor 2.559
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.51 SJR 1.133 SNIP 0.699
Web of Science (2016): Impact factor 2.466
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.43 SJR 1.18 SNIP 0.704
Web of Science (2015): Impact factor 2.371
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.37 SJR 1.179 SNIP 0.718
Web of Science (2014): Impact factor 2.297
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.62 SJR 1.282 SNIP 0.757
Web of Science (2013): Impact factor 2.281
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.65 SJR 1.282 SNIP 0.763
Web of Science (2012): Impact factor 2.406
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.65 SJR 1.343 SNIP 0.777
Web of Science (2011): Impact factor 2.484
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.397 SNIP 0.769
Web of Science (2010): Impact factor 2.595
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.436 SNIP 0.767
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.519 SNIP 0.809
Scopus rating (2007): SJR 1.564 SNIP 0.814
Scopus rating (2006): SJR 1.591 SNIP 0.817
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.58 SNIP 0.819
Scopus rating (2004): SJR 1.566 SNIP 0.8
Scopus rating (2003): SJR 1.525 SNIP 0.796
Scopus rating (2002): SJR 1.57 SNIP 0.808
Scopus rating (2001): SJR 1.631 SNIP 0.819
Scopus rating (2000): SJR 1.859 SNIP 0.829
Scopus rating (1999): SJR 1.842 SNIP 0.85
Original language: English
DOIs:
10.1016/j.bbrc.2006.02.014
Source: orbit
Source-ID: 316707
Research output: Research - peer-review › Journal article – Annual report year: 2006

Projects:

**Allergenicity of camel milk**
Maryniak, N. Z., PhD Student, National Food Institute
Bøgh, K. L., Main Supervisor, National Food Institute
Hansen, E. B., Supervisor, National Food Institute
Sancho Vega, A. I., Supervisor, National Food Institute
Samfinansierede - Virksomhed
01/05/2018 → 30/04/2021
Award relations: Allergenicity of camel milk
Project: PhD

**PROVIDE: PROVIDE - Protein valorization through informatics, hydrolysis, and separation**
PROVIDE is a project to develop bioinformatics technology for the discovery of protein based food ingredients. Five enterprises and two universities collaborate with the aim to create the technology and develop new high value food and feed ingredients from protein sources that are currently under-utilized. We will use bioinformatics to predict and identify embedded peptides that can be released from proteins through hydrolysis, fermentation and separation. The targeted functionalities are antimicrobials, antioxidants, gelation, emulsifying and flavoring properties. Functional assays will be established and synthetic peptides will be used for validation. Release of the active peptides from the protein matrix will be obtained by enzymatic hydrolysis and fermentation. The participating companies utilize specific protein sources, mainly plantbased, and are united in the desire to develop novel high value food and feed functional ingredients through the proposed technology.
Holdt, S. L., Project Participant, National Food Institute, Research Group for Bioactives – Analysis and Application
Jacobsen, C., Project Participant, National Food Institute, Research Group for Bioactives – Analysis and Application
Hansen, E. B., Project Participant, National Food Institute, Research Group for Gut Microbiology and Immunology
García Moreno, P. J., Project Participant, National Food Institute, Research Group for Bioactives – Analysis and Application
Lund, O., Project Participant, Department of Bio and Health Informatics
Bang-Berthelsen, I., Project Participant, National Food Institute
Marcatili, P., Project Participant, Department of Bio and Health Informatics
01/09/2017 → 31/08/2021
Keywords: peptides, by-products, bioinformatics, ingredients
Collaborators: KMC, Unibio A/S, AKV Langholt, Lihme Protein Solutions, Aalborg University, CP Kelco ApS
Project: Research

**NOBLE: NOBLE - Non digestible oligosaccharides (NDOs) from food processing residues**
The objective of the project is to use byproducts from the Brazilian food industry to develop non-digestible soluble fibers with specific health benefits for applications in food and feed. Non-digestible oligosaccharides (NDOs) have been
established as food and feed supplements due to their beneficial effect on microbiota of the intestinal tract. NDOs vary in composition and structure depending on the source, and different NDOs also differ in their effect on the intestinal microbiota. We will take advantage of the specific properties of side streams from the Brazilian food industry to develop novel types of NDOs. We will use enzyme technology developed at Sao Paulo State University to produce the novel NDOs. The biological activity of the NDOs will be characterized by technology established and developed at the Technical University of Denmark. The research will be conducted in close collaboration with industrial partners and the project is expected to result in commercial applications that will bring food and feed with improved nutritional value on the market. The project will generate new bioactive food and feed ingredients from residues not currently utilized by the Brazilian food industry. The processing technology will be based on membrane reactors with immobilized enzymes. The technology will minimize generation of waste and minimize consumption of water and other resources. The technology developed represents in itself a major result of the project. We expect several of the NDOs developed in this project to be significantly different from currently available NDOs due to the specific raw materials and due to our specific enzymes and process technology. The impact on human and animal health will be examined through state of the art microbiological and metagenomic analyses. In this aspect the project use nutrigenomics to analyze health aspects of novel ingredients. For the participating universities and industries an important outcome will be a close collaboration around development of technology and products. The industries are expected to implement the research results without unnecessary delay, and the universities intend to continue and expand the collaboration around research and training of young scientists.

Hansen, E. B., Project Coordinator, National Food Institute, Research Group for Gut Microbiology and Immunology
Bang-Berthelsen, I., Project Manager, National Food Institute

Project ID: 5133-00006B
InnvationsFonden: DKK1,657,830.00
01/01/2017 → 30/06/2019
Keywords: oligosaccharides, enzymes
Collaborators: University of São Paulo
Award relations: NOBLE - Non digestible oligosaccharides (NDOs) from food processing residues

Lactic Acid Bacteria as cell factories
Liu, J., PhD Student, National Food Institute
Solem, C., Main Supervisor, National Food Institute
Jensen, P. R., Supervisor, National Food Institute
Hansen, E. B., Examiner, National Food Institute
Kleerebezem, M., Examiner
Zeng, A., Examiner
Institut stipendie (DTU)
01/06/2014 → 30/09/2017
Award relations: Lactic Acid Bacteria as cell factories
Project: PhD

Brug af Bacillus Subtilis til Poduktion af et naturligt aromastof
Hansen, M., PhD Student, Department of Systems Biology
Jensen, P. R., Main Supervisor
Hansen, E. B., Supervisor
Mijakovic, I., Supervisor
Kilstrup, M., Examiner
Kuipers, O. P., Examiner
Mascher, T., Examiner
1/3 DTU-stip, 2/3 FUR/andet
01/02/2005 → 23/09/2009
Award relations: Brug af Bacillus Subtilis til Poduktion af et naturligt aromastof
Project: PhD

Haramaya Camel Dairy
Milk production is the primary purpose of camel husbandry. Secondary purposes are meat production and transportation. The number of camels in the world ammounts to about 24 million, of which 89% are one-humped (Camelus dromedarius) and the remaining 11% are two-humped (Camelus bactrianus) camels (FAOSTAT, 2010). Ethiopia is estimated to have the third largest camel herd in the world after Somalia and Sudan. The number of camels in Ethiopia is estimated to 2.4 million of the dromedary type (FAOSTAT, 2009). Although the total global production of camel milk equals half the Danish milk production it plays very little significance in the global economy, and the FAO statistics does not list any other camel dairy products than fresh whole milk. There is thus a great potential for initiating a significant value generation in countries struggling with poverty and droughts. As the primary production is already established, what is needed is to establish an infrastructure and to develop locally suitable dairy products in order to create a camel dairy industry. Dairy products based on camel milk can, however, not be developed just by technology transfer as camel milk differs more from bovine milk than milk from the four true ruminants (cows, buffaloes, sheep and goats) differ from each other. With this project we will conduct the research needed for product development and establish the necessary scientific capacity at Haramaya
University in eastern Ethiopia to support infrastructure and product development locally.

Hansen, E. B., Project Manager, National Food Institute, Research Group for Gut Microbiology and Immunology

Vquist, P. K. B., Project Participant

Ibsen, P. R., Project Participant, University of Copenhagen

Kæstel, A. P. P., Project Participant, University of Copenhagen

Guya, A. P. M. E., Project Participant, School of Animal and Range Sciences Haramaya University

Danish Development Fund, Danida: DKK8,500,000.00

01/12/2012 → 31/12/2017

Collaborators: School of Animal and Range Sciences Haramaya University, Chr. Hansen AS, University of Copenhagen, Haramaya University

Award relations: Haramaya Camel Dairy

Documents:

Letters of support in connection to CREATE proposal

Project: Research

Activities:

Coagulant et cultures pour le lait de chamelle

Period: 20 Nov 2017

Egon Bech Hansen (Guest lecturer)

National Food Institute

Research Group for Gut Microbiology and Immunology

Degree of recognition: International

Documents:

Coagulant et cultures pour lait de chamelle

Related event

3ème MGIB Workshop International : "Le lait: Production, Conservation et Valorisation"

20/11/2017 → 20/11/2017

Tlemchen, Algeria

Activity: Talks and presentations › Conference presentations

Press clippings:

DTU's ingredienssektorudviklingsrapport

Egon Bech Hansen

20/01/2017

National Food Institute, Research Group for Gut Microbiology and Immunology

Media contribution (1)

DTU's ingredienssektorudviklingsrapport

20/01/2017

Food Navigator, Web

Niamh Michail

Egon Bech Hansen

National Food Institute, Research Group for Gut Microbiology and Immunology

Press/Media: Press / Media

DTUs Sektorudviklingsrapport "Viden er den vigtigste ingrediens"

Egon Bech Hansen

12/12/2016

National Food Institute, Research Group for Gut Microbiology and Immunology

Media contribution (1)

DTUs Sektorudviklingsrapport "Viden er den vigtigste ingrediens"

12/12/2016

DR2 Dagen, Television
Fakta om GMO
Egon Bech Hansen
19/10/2016
National Food Institute, Research Group for Gut Microbiology and Immunology

Media contribution (1)

Kamelmælk
Egon Bech Hansen
07/06/2016
National Food Institute, Research Group for Gut Microbiology and Immunology

Media contribution (1)

Kamelmælk
06/06/2016
TV2, Television
Christian Sejer Rasmussen
Egon Bech Hansen
National Food Institute, Research Group for Gut Microbiology and Immunology

Media contribution (1)

Probiotika, prebiotika og mælkesyrebakterier
Egon Bech Hansen
19/05/2014
Department of Systems Biology, National Food Institute, Division of Food Microbiology

Media contribution (1)

Probiotika, prebiotika og mælkesyrebakterier
19/05/2014
Television
Hyun-Seog Jeong og Myung Jun Chung
Egon Bech Hansen
Department of Systems Biology, National Food Institute, Division of Food Microbiology