

# Biosensor system (lactate biosensor) that ensures quality and efficiency in the fruit juice industry

Campden BRI Hungary

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<b>Dissemination Level</b>		
<b>PU</b>	<b>Public</b>	
<b>PP</b>	<b>Restricted to other programme participants</b>	
<b>RE</b>	<b>Restricted to a group specified by the consortium</b>	
<b>CO</b>	<b>Confidential, only for members of the consortium</b>	

**1. Title of the case description**

Biosensor system (lactate biosensor) that ensures quality and efficiency in the fruit juice industry

**2. Indicate your role in the Smart Food Supply Chain:**

- individual member of the chain:
- chain operator:
- network operator:
- association:
- technical, scientific, or management expert:
- advisor:
- policy maker:
- other: .....

**3. Indicate the region (if applicable):** world-wide applicable

**4. WP2 Cross-reference table**

**Please indicate with an X in the relevant box of the matrix for which needs and the steps / functions of the supply chain the described innovative solution is applicable**

		Individual steps of the SFSC							Short food supply chain as whole						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Needs of the consumers (citizens)</b>	food safety														
	food quality														
	trust														
	ethical aspects														
	accessibility														
<b>Needs of the chain actors</b>	fair price														
	increased negotiating power														
	shared use of available resources														
	product development support														
	access to markets and consumers														
	access to infrastructure														

- 1: Farming**
- 2: Primary production**
- 3: Transport**
- 4: Processing and packaging**
- 5: Storage**
- 6: Logistics**
- 7: Sale**
- 8: Product integrity, authenticity, transparency**
- 9: Marketing concepts**
- 10: Food chain management and networking for enhancing cooperation among chain actors**
- 11: Business modelling**
- 12: Policy environment**
- 13: Legal requirements**
- 14: Labelling**

## 5. Short description of the innovative solution

- **Describe the specific need or problem being addressed by the case and please explain what is the novelty of this innovative solution**

Biosensor system (lactate biosensor) is an efficient sensitive early warning system, which indicates a critical undesired bacterial spoilage during fruit juice production. The methodology was developed under the QUALI JUICE project.

- **Describe the enabling function(s) and the practical benefit(s)-(e.g. for which types of problems and opportunities is used and can it be used, and how)**

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The commercial lactate biosensors can be used to measure lactate concentration in juices during production of juice concentrate and in juices.

- **Describe the method/procedure/technology/solution implemented. (Please explain, whether the innovative method is a product / service / process / marketing or organisational / management innovation) After completing the description, please indicate, whether this innovation is a technological or non-technological one.**

The good practice of the case is highlighted by the fact, that this type of biosensors are usually introduced when there is a risk of spoilage. The sensor helps to identify the need of a repeated pasteurization. The requirements and considerations for safe and hygienic production, handling and processing of fruit and vegetables into semi-industrial products destined for further processing and packaging are very high. Biosensors contribute to the fact that food sources are managed in a way that ensures that contaminants are not present in the food and/or food ingredients to levels which would render end products potentially harmful to human health or unsuitable for human consumption

technological

non-technological

- **Describe the business, which implemented the innovated solution (size, country, region, location, type of food)**
- **Describe the distribution channels of the product(s)**
- **Describe what makes the innovation work.**

The biosensor system technology enables the manufacturers to detect quality deterioration.

- **Describe the specific prerequisites for the business related to the implementation of the method and/or related to the location, method, procedure, solution**
  - a: **List the relevant necessary resources (including the estimated cost) for the specific innovation.**  
**Please list the relevant ones only (list is annexed)**
  - b: **List the relevant necessary capabilities for the specific innovation.**  
**Please list the relevant ones only (list is annexed)**

**6. Describe the results, achievements and typical failures**

**7. Summarize what makes the case to a good practice for the members of the SFSCs (e.g. lessons learned)**

If producers are made aware of contamination at an earlier stage, manufacturers can pasteurize the juice and then send it to market. Since this measure consumes energy - thereby raises production costs - it should only be introduced when there is an acute risk of spoilage. In this way, quality assurance which can be offered at a fair price to the customer is guaranteed since efficient production with minimum waste means optimized costs for the manufacturer.

Implementation of biosensors contributes to sector's goal to provide to the consumers a high-quality, convenient and tasty product.

The results of QUALI\_JUICE project indicate that commercial biosensors for L-lactate can be used in juice production industry to control the production process and quality of final product. The final choice of the device (biosensor) by the future user (juice producing company) would be defined by its particular demands (simplicity of the measurements, possibility of usage at line) and economic impact (price of the device and consumables).

**8. Aspects, methods for transfer of methods for other SFSC members**

**9. Recommendations for members of other SFSCs for further applications**

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**10. More information is available at (web), if it is relevant**

I-CON Interreg Central Europe : Handbook tool, Good practice cases

## **Annex**

### **1. Checklist for necessary resources (tangible and non-tangible):**

- materials (access to: raw materials/ ingredients - including volume, land – including size, packaging materials)
- human: labour force: size, knowledge & skills (production, technical, marketing, managerial, ICT, financial, etc.)
- technology: patents, know-how, trademarks, copyrights, trade secrets
- infrastructure, equipment, facilities, - size, minimum volume of production/sales, IT infrastructure
- information, reputation, brand, trust
- financial\*

\*: estimated cost:

0 - 10 000 Eur  
10 001 - 50 000 Eur  
50 001 - 100 000 Eur  
100 001 - 300 000 Eur  
300 001 – 1 000 000 Eur  
1 000 000 Eur above –

- other specific necessary resources for the application of the specific innovation



## 2. Checklist for the necessary capabilities

- **food safety:**
  - basic skills to comply with the EU food safety regulations
  - ability to understand what makes the product safe (the key controls, which ensure the safety of the product – biological, chemical and physical hazards, providing the safety shelf life of perishable products)
  - food safety culture (motivation, responsibility for food safety) and basic skills for the implementation of HACCP
  
- **food quality:**
  - ability to define the target segments of consumers for SFSCs
  - ability to define the product characteristics which are (tacit) basic requirements for the target segment(s) of consumers;
  - ability to define which product attributes/levels and augmented services represent an added value for the target segments of consumers;
  - food quality culture (motivation, responsibility for food quality);
  - production experiences which help to provide the expected quality reliably, uniformly;
  - ability to provide distinguishable quality which meets the needs of the targeted consumer segment;
  - meeting (local) legal requirements, application of the labelling rules;
  - ability to access the consumer willingness to pay for specific products of SFSCs.
  
- **trust:**
  - ability to ensure product integrity, authenticity and transparent information for the consumers (including systems, tools);
  - ability to access external trust enhancers (third party certification, internal certification system, participatory guarantee systems);
  - application of the labelling rules and branding (mandatory and voluntary);
  - ability to meet third party certification requirements
  
- **ethical aspects**
  - ability to understand consumer needs for ethical behaviour related to the specific product(s) of the SFSCs;
  - culture for ethical food production and supply;
  - ability to implement necessary measures to ensure ethical food production and supply;
  - ability to access the consumer willingness to pay for products meeting ethical aspects
  
- **accessibility to consumers:**
  - ability to organize logistics efficiently and to exploit innovative solutions and distribution channels;
  - efficient, innovative sales methods;

- ability to develop and implement new business models for ensuring access of consumers to products and augmented services;
- **fair price:**
  - collecting marketing information;
  - ability to enhance and maintain cooperation among chain actors including the combined use of available complementary resources, capabilities, competences of SFSCs actors, networking, understanding the principles of food value chain management;
  - ability to define, develop or maintain unique quality of products and augmented services;
  - ability to develop and implement new business models;
  - ability to access the consumer willingness to pay for fair price
- **increased negotiation power:**
  - collecting marketing information;
  - ability to enhance and maintain cooperation among chain actors including the combined use of available complementary resources, capabilities, competences of SFSCs actors, networking, understanding the principles of food value chain management, cooperation culture;
  - ability to define, develop or maintain unique quality of products and augmented services;
  - ability to develop and implement new business models;
- **shared use of available resources:**
  - ability to enhance and maintain cooperation among chain actors including the shared and combined use of available complementary resources, capabilities, competences of SFSCs actors, networking, understanding the principles of food value chain management, cooperation culture;
  - the level of value chain management culture;
  - ability to access the consumer willingness to pay for food with reduced environmental impacts

- **input for R+D:**
  - ability to monitor, research, evaluate, and understand the needs and wants of customers and consumers;
  - ability to develop new products, processes, packaging, preservation techniques, systems and access to new markets, including in other categories;
  - access to innovative technologies; distribution and marketing solutions and methods. management systems;
  - access to local input for R+D covered by other aspects
  
- **access to markets: and market success**
  - effective promotion, customer service, efficient and innovative sales methods;
  - ability to understand consumer's needs;
  - ability to organise logistics efficiently and to exploit innovative solutions and distribution channels,
  - unique value propositions;
  - ability to develop and implement new business models for ensuring access of consumers to products and augmented services, develop the market accessibility for the suppliers.
  - stock control;
  - ability to access to required raw materials within a restricted geographical area
  
- **access to infrastructure:**
  - ability to use existing own infrastructure in a focused way to serve consumer needs or to combine it with complementary infrastructures of other SFSC actors, cooperation culture;
  
- **management:**
  - to implement management systems for vision, planning, implementing), coordinating, controlling, monitoring, continuously;
  - improving; ability to motivate, authorize staff;
  
- **production, processing:**
  - management system, production experience, specific controlling, monitoring, continuously;
  - willingness to consider and ability to evaluate the adoption of TECI and NTI in the current production processes;
  - any additional specific resources necessary for the application of the specific innovation.