BactoAlarm®
BioSensor

White Paper.
BactoCoin

Manuel Fernandez
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Mission
and Objectives

The mission of BactoAlarm® Bio Sensor is to ensure the safety, quality, intelligence and sustainable packaging of food and drugs for producers, consumers and governments.

Objectives

1. Reduce food safety risks associated with bacteria outbreaks or, in other words, prevent people from being poisoned by contaminated food.
2. Provide consumers with greater knowledge of what they eat and increase aware ness of competent retailers.
3. Bring change to the obsolete food analyzing system, with a smart, simple, easy and cost-effective method of identification.
4. Provide a useful means of overcoming the problems of global food waste and food poisoning.
5. Become the number one criteria for certification bodies, in order to ensure food safety for everyone.

Executive Summary

BactoAlarm® Bio Sensor acts as an indicator of the real condition of food products, for instance their degradation or contamination.

The Bio Sensor is the high-end solution for the food and packaging industry. It detects microbiological contamination, potentially increases shelf life of foods, decreases the risk of diseases and distribution of infected food, and therefore increases profits of food and food related companies, as well as those companies' social responsibility.

Key features underlying the importance of BactoAlarm®

1. Food quality problems are increasing all over the world. A modern customer re quires reliable and trustful food.
2. Globally, the waste of food is tremendous, and the biosensor as part of smart packaging assists to protect the environment.
3. The growing market of smart packaging signifies the interest in new developments.
4. Intellectual packaging helps to improve the supply chain management and therefore increases a company's profits and social responsibility.
5. BactoAlarm® gives an additional marketing advantage to food producers, increases the health security of consumers, helps retailers to detect contamination and ensures traceability in the whole value chain.

Current technological advances that are available on the market are insufficient to meet the target for food waste reduction. However, BactoAlarm® has been developed by iPak AG to become technically usable. It is worth mentioning that the reduction of food waste by only 1% in Europe and USA only will save $3 billion. BactoAlarm® Bio sensor, in the managing hands of iPak AG, is being developed by a great team of innovative scientists. iPak AG has already been contacted by well-known brands, such as Sealed Air and Nutreco N.V., and industrial tests are on the way in order to release the sensor to the market.

Partnership with Nutreco N.V. will allow the company to immediately cover at least 25% of the Spanish chicken market, without modifying any production facilities or big marketing campaigns.

With further research and development, iPak AG is planning to adjust BactoAlarm® to most of the packed food that is available on the market today, including ready meals and sandwiches. In the future, the company also intends to develop Bio Sensor for pharmaceuticals and cosmetics.

Currently, there are no products in direct competition, so BactoAlarm® should be able to establish its place within the food industry.

To date, the founder invested significant resources in R&D, prototype development, marketing and development of production design and documentation. Therefore, everything needed for mass production and sales has been prepared. Successful negotiations with potential clients signify that customers are looking forward to the product launch. That is why the product will be a success.

1.

BactoAlarm® BioSensor Insights

BactoAlarm® is an invention within the food, chemical-pharmaceutical and cosmetic fields. Specifically, it represents a label or line that is placed on the inner side of the modified atmosphere food packaging, to monitor the presence and development of microorganisms by changing the initial color from green to black, with no need in direct contact with the food.

A special formula made from substances accepted as food additives and food contact is incorporated into the substrate label. The change of colour occurs when metabolites released by microorganisms arrive at the sensor formula. The sensitivity of the colour change and the change of colour are good enough to be distinguished by the consumers or retailers.

BactoAlarm® Bio Sensor can be manufactured in two basic forms

1. In the form of a 1 or 2cm label, of any shape including round and triangular

Key characteristics:
— Relatively cheaper production compared to the second type;
— Economies of scale on material used;
— Small transportation load;
— Adds an extra step to the packing facilities (automated arm). Such an extra step might cause a slowdown in an existing manufacturing process of the producer;
— Extra cost for the automated arm (though once installed, it contributes to economy in the future);
— Approximate cost would be $0.0005–0.0001.

2. In the form of a continuous line, with 0.5–1.0cm width and length depending on a container's length

Key characteristics:
— No additional cost to modify existing machinery and equipment;
— No reduction to packing speed;
— Heavier loadings as a sensor is already integrated into plastic bobbins;

— Slows down production process, as more operations are required;
— Necessity in production facilities, at least on every continent, to overcome high logistic costs;
— Approximate cost would be $0.005-0.0005.

Areas of application

After successfully launching BactoAlarm® Bio Sensor for chicken, the company will follow up with turkey, beef, fish and then salads, sandwiches, fruit and vegetables and ready meals.

Further planning will extend the development outside the sphere of food products and include pharmaceuticals and cosmetic products.

BactoAlarm® Bio Sensor users include food producers, packaging manufacturers, retailers, governments, as well as consumers and consumer organizations.

1.1 Background information: History of creation

The innovative research by Prof. Dr. Cristina Nerin and her team at the University of Zaragosa – regarding a biosensor that detects microbial metabolism to identify microbiological contamination of foods, for the purpose of intelligent packaging, healthy food and decreased waste of food – has immediately received the attention of Mr. Manuel Fernandez.

Mr. Manuel Fernandez, founder of NETCO AG as well as a veteran of the food and retail business, knows the market needs and expectations, and he has immediately started to form a team of experienced people and entrepreneurs to produce and commercialize the biosensor. Mr. Fernandez has decided to incorporate iPak AG in Baar, Switzerland with the preliminary aim to implement the Bio Sensor project in cooperation with the University of Zaragoza.

Having agreed upon the formula for the Bactoalarm® Bio Sensor, the formula was passed to UNIZAR for the production of a small amount of a trial powder. Samtack S.L., iPak AG's creator, then mixed it with different fractions of custom-designed adhesive mixtures. Samples were then tested in the laboratory prior to conducting further tests in an industrial testing. Prototypes of label-type sensors were made for Nutreco N.V. (Spain). Discovery Flexibles in Scotland integrated a continuous line of sensor into a standard bobbin of plastic film, which is ready to use with the food producer's packaging machinery.

1.2   What has been done

As of today, Bactoalarm® Bio sensor represents a fully functioning prototype that is almost ready for mass production and commercialization on the market.

iPak AG owns the exclusive license for production, selling, managing and patenting the BactoAlarm® Bio Sensor, playing its role in operating and managing three separate entities that all operate under common agreement. The production chain includes the University of Zaragoza, Samtrack S.L and Discovery Flexibles Ltd.

iPak is a holder of Internationally Registered trademark 'BactoAlarm'.

Patents in most of the countries around the world were obtained, including: Argentina, Chile, Colombia, Peru, Uruguay, Mexico, USA, Japan, India, South Korea, Taiwan, Vietnam, Indonesia, Malaysia, Thailand, Singapore, New Zealand, Israel, Ireland, Greece, UK, France, Finland, Spain, Belgium, Austria, China, Canada, Brazil, Australia, South Africa, Ukraine, Turkey, Sweden, Portugal, Poland, Denmark, Norway, Netherlands, Luxembourg and Italy.

iPak AG already holds a certificate of compliance with European regulations.

BactoAlarm® Bio Sensor has been tested on raw chicken, beef, turkey and fish, and positive results were obtained in the presence of:

— MOULDS Aspergillus flavus (Spanish Type Culture Collection, CECT, 2687), Penicillium roqueforti (Culture Collection of Fungi, IBT, 21319), Eurotium repens (IBT 1800), Penicillium islandicum (CECT 2762), Penicillium ammune (IBT 21314), Penicillium expansum, Penicillium nalgiovensis.

— YEASTS Candida albicans (American Type Culture Collection, ATCC, 64550), Debaryomyces hansenii (CECT 10353), Zygosaccharomyces rouxii (CECT 11928), Botrytis cinerea.

— BACTERIA: Enterococcus faecalis (ATCC 29212), Listeria monocytogenes (ATTCC 7644), Bacillus cereus (CECT 495), Staphylococcus aureus (ATCC 29213), Salmo nella choleraesuis (CECT 4000), Yersinia enterocolitica (CECT 4315), Escherichia coli (ATCC 29252), Pseudomonas aeruginosa (ATCC 27853).

Today, without modifying any facilities at iPak AG's value chain, 1bn sensors of the first type can be produced in less than one week; this number of sensors is equal to the number of all packaged chicken parts in the UK for one year, and can be loaded in a 20-ton truck. Partners that have developed laboratory equipment for the

company also undertake, if necessary, increased production capacity at their own expense.

The potential customer is NUTRECO AG with more than $5bn turnover.

The license for the production and sale of the sensor in Europe, issued by independent universities of the Euro Union, was obtained in 2013.

1.3 Trials

The latest conducted industrial test has been very positive, as the BactoAlarm® Bio Sensor has proven its effectiveness.

Test overview

For testing, 48 packs of chicken legs were sealed in a modified atmosphere, with biosensors in place. The guaranteed safe time for consumption, according to the producer, is 10 days from slaughter and 8 days after packaging.

Half of the packages (24) were transported to the laboratory of the University and the rest remained at the packing company. All of the chicken at the packing company remained safe for consumption during the whole testing period (8 days). The test conducted at the University produced the following results:
— 1 pack had been sealed badly, and BactoAlarm® changed its colour (to black) in just four days;
— 12 packs turned black in 8 days;
— 1 pack turned black in 12 days;
— Another 2 packages turned black in 13 days.

The remaining 12 containers were turned upside down during transportation, damaging the biosensors due to excess humidity. This issue has now been remedied and a new industrial test is planned for the near future.

Having been assured that the humidity issue has been overcome, NUTRECO AG is now ready to launch BactoAlarm® in their supermarkets to assess consumer approval.

2. Market overview

2.1. Present concerns within the food industry

Food management has changed a lot recently, since fewer people are growing their own fruit and vegetables or hunting for their own meat. There was no need to be concerned about genetically-modified organisms, pesticides or outbreaks of bacterial infection. People were concerned about preserving food so that it could last longer. The technology has changed; people learned about economies of scale and generally became more productive, due to the increasing world population. Global markets mean that family food management has turned into one of the biggest industries in the world. However, this new global industry raises concerns regarding the provenance of food: where and how it is raised, what chemicals are used in its production and how can safety be assured? Everyone involved in the food industry, whether university departments of research and development, insurance companies, distribution logistics companies or standardization bodies are constantly seeking to improve global consumer safety. Among the greatest concerns in the food industry today are food waste and food poisoning.

2.1.1.   Food Wastage

The Food and Agriculture Organisation of the United Nations (FAO) estimates that each year, one-third of all food produced for human consumption in the world (around 1.3bn tons) is lost or wasted. This includes 45% of all fruit and vegetables, 35% of fish and seafood, 30% of cereals, 20% of dairy products and 20% of meat.

According to FAO, of the 263mn tons of meat produced globally, over 20% is lost or wasted. This is equivalent to 75mn cows.
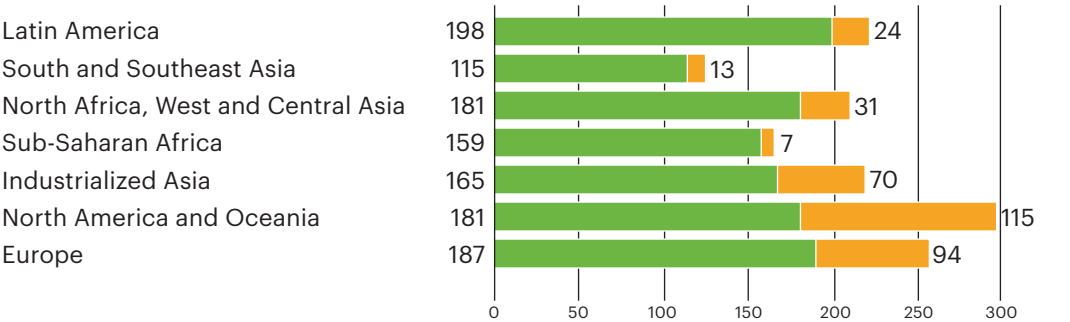
In developing countries, there are high levels of what is known as "food loss", which is unintentional wastage, often due to poor equipment, transportation and infrastructure. In wealthy countries, there are low levels of unintentional losses but high levels of "food waste", which involves food being thrown away by consumers because they have purchased too much, or retailers who reject food because of exacting aesthetic standards (The Guardian, 2015).

According to European experts, the EU is guilty of throwing away about 88mn tons of food; equivalent to 228.5 biggest container ships in the world, or 143bn euros. The USA alone accounts for about 165bn dollars (The Atlantic, 2016), or 60mn tons (Gunders, 2012).

— Every year, consumers in rich countries waste almost as much food (222mn tons) as the entire net food production of sub-Saharan Africa (230mn tons).
— Per capita, waste by consumers is between 95-115 kg a year in Europe and North America, while consumers in sub-Saharan Africa, south and south-eastern Asia, each throw away only 6-11 kg a year.
— The food currently lost or wasted in Latin America could feed 300mn people.
— The food currently wasted in Europe could feed 200mn people.
— The food currently lost in Africa could feed 300mn people (FAO).

Per capita food losses and waste, kg   Figure 1

	Green	Orange
Latin America	198	24
South and Southeast Asia	115	13
North Africa, West and Central Asia	181	31
Sub-Saharan Africa	159	7
Industrialized Asia	165	70
North America and Oceania	181	115
Europe	187	94

One study shows a detailed breakdown of this wastage: 53% households, 30% production and processing, 12% food service and 5% wholesale and retailers (Stenmarck et al., 2016).

Wasting food is not only an ethical and economic issue, but it also depletes the environment of natural resources. All actors in the food chain have a role to play in preventing and reducing food waste, from those who produce and process foods (farmers, food manufacturers and processors) to those who make foods available for consumption (hospitality sector, retailers) and ultimately consumers themselves (EU Commission).

The EU and Member States are committed to meeting the Sustainable Development Goals (SDG), adopted in September 2015, including a target to halve per capita food waste at the retail and consumer level by 2030, and reduce food losses along the food production and supply chains. The EU has also announced its "Horizon 2020" framework program for research and innovation; in this program, an 80mn euro is to be shared among 58 innovative companies (HORIZON 2020, 2016).

The US administration and the UN have pledged to halve avoidable food waste by 2030. Food producers, retail chains and campaign groups, such as the Natural Resources Defense Council, have also vowed to reduce food loss in the ReFED initiative.

Retailers have also introduced similar programs. For example, Carrefour has called on innovative firms to pitch ideas for reducing food waste (Michail, 2016). Most recently, European Structural & Investment Funds (ESIF) invested 5.5bn euros into a project for waste management (Gore-Langton, 2016). Despite a great deal of effort, little success has been achieved in reducing food waste.

2.1.2.   Food poisoning

The burden of foodborne diseases is a global health concern. WTO states that each year as many as 600mn, or almost 1 in 10 people in the world, fall ill after consuming contaminated food. Of these, 420,000 people die, including 125,000 children under the age of 5 years (WTO 2015).

According to the CDC, there are more than 250 different foodborne diseases, which are caused by bacteria, viruses, and parasites. E. coli, for example, is a bacterium, while Hepatitis A is a virus, and Taenia solium is a tapeworm parasite found in pork. These are the most common foods responsible for transmitting of the major pathogens (The Atlantic, 2015):

E. Coli
— Beef: 46"%
— Vegetable row crops: 36"%

Salmonella
— Seeded vegetables: 18"%
— Fruit: 12"%
— Eggs: 12"%
— Chicken: 10"%
— Beef: 9"%
— Pork: 8"%
— Sprouts: 8"%

Campylobacter
— Dairy: 66"%
— Chicken: 8"%

Every year, in the USA alone, 48 million people are affected by foodborne diseases, of whom 128,000 are hospitalized, and over 3,000 die; mostly because of Salmonella (CDC, 2016). According to the Economic Research Center of the United States Department of Agriculture, the annual total direct and indirect costs of food poisoning in the USA are 15.6 billion dollars. These costs are based on detailed identification of specific disease outcome of foodborne infections caused by 15 major pathogens in the United States, associated outpatient and inpatient medical care expenditures, associated lost wages/productivity losses and cost of premature deaths (Marler, 2014).

The Food Standards Agency in the UK has revealed that 70% of chicken sold in UK supermarkets is contaminated with Campylobacter (BBC News, 2014). What is even more shocking is that 11-28% is contaminated highly.

In the USA, a Salmonella outbreak in 2011 resulted in the biggest recall of meat in US history, with Cargill recalling 18,000 tons of turkey that had caused the death of one person (BBC News, 2011). Recent studies have also shown milk, eggs and even bagged salads are at risk of contamination, and the CDC website is constantly being updated with new cases (Gallagher, 2016). Revolutionary new technology is essential to control this catastrophic situation.

2.2. Key points why Bactoalarm® is an innovative and preferred solution

Right timing

BactoAlarm® Bio Sensor can be used by many EU governments as one of the ways to solve the problem of food waste. For instance, the French government fines retailers who bin unsold food and do not give it to the nation's destitute people or to farms for animal food (Chrisafis, 2016). Another example would be an EU project that aims to slash food waste by 30% by 2025, while also supporting financially innovative companies (Gray, 2015). Recently, a new platform has been created where ESIF invested 5.5 billion euros in waste management (Goore-Langton, 2015).
While these startup companies are in their infancy, iPak AG has already collected a vast number of patents and a certificate of compliance with EU regulations and is giving the final tweaks to the BactoAlarm® Bio Sensor prior to its launch onto the market.

Great identifier

Stenmark et al. (2016) showed that over 50% of wasted food is attributable to household waste. Some believe that this level of waste is due to the retailer's effort to withdraw guilt of waste, increasing consumer purchasing through different types of "Buy One, Get One" deals (Michail, 2015). However, such deals provide invaluable assistance to some bigger families, and it would be unfair to blame retailers for potentially encouraging food wastage. Michail (2015) has shown that on average 15-23% of consumers in Europe are ready to avoid taking advantage of such special offers to reduce food waste. Retailers are not interested in abandoning successful marketing strategies to support some unproven assumptions, but according to Humboldt University in Berlin, one of the major causes of food waste in Germany is misunderstanding of "best-before" labeling. Along these lines, 34% of Germans said that clearer labeling would help to reduce the food waste, and these misunderstandings account for 43% of household food waste. On average, 24% of consumers in the EU throw away a pack of spaghetti that has reached its "best-before" date (Burrows, 2016).

Therefore, the BactoAlarm® Bio Sensor could be a revolutionary change in food labeling, as it identifies the condition of the food in real-time and thus informs both consumers and retailers whether it is consumable.

Consumer's choice

Food freshness and safety are of paramount importance to the food industry. Millions of people suffer food poisoning every year (Web MD, 2016). While the control of symptoms of food poisoning may be a valuable source of income for pharmaceutical companies, the direct and indirect costs to ordinary people in the USA total $15.6bn (Marler, 2014).

An average American throws away $640 worth of food every year (Malcolm, 2015). IOWA State University has found that consumers are willing to pay $0.36 more per pound of fresh meat that has been packed with carbon monoxide compared to conventionally packed fresh meat because these packages stay fresh for longer (Grebitus et al., 2013).

The BactoAlarm® Bio Sensor will not only identify whether a product is still safe to eat when it is near its "use-by" date, but also detect whether bacteria are growing in a package that has become contaminated. Therefore, a minimal increase in price may potentially save a consumer's life and preserve the retailer's reputation.

Suits current requirements

Issues surrounding food-labeling systems are generally raised with relevant government ministers who then decide on the approach to take. The German Minister of Agriculture realized that the systems in place were obsolete (AIPIA News, 2016) and 10mn Euro were made available to develop replacements (AIPIA News, 2016). While some companies like Parkside Flexible are trying to fight bacteria development with some expensive silver-based materials (AIPIA News, 2016), others are working towards some cold and hot ink-based sensors to check if the product is being stored properly (Freshpoint Quality Assurance Ltd., 2016). While useful and clever, neither of these technological developments are superior to the BactoAlarm® Bio sensor.

BactoAlarm® is 100% accurate, and it shows immediate results and uses live ingredients, so even if the product was stored correctly, microscopic bacterial growth is detectable. In addition, while the bio-ingredients (which are widely available) are permissible in direct contact with food, there is no need for direct contact. All in all, this means better, more accurate results.

Multifunctional

Global cooperation is an ethical imperative to solve the issues of food waste and food poisoning. That is why so many non-for-profit organisations start to organize events and forums for like-minded people with a common goal. Reducing loss and waste throughout the entire food system is a crucial step towards the improvement of global food security (Bond et al., 2013). Assuring food safety along the whole supply chain is one of the biggest concerns of food providers (Blaha, 2001). Despite the fact that quality assurance is very high during every stage of the supply chain, dangerous contamination can still occur (Blaha, 2001).

For example, according to the BBC, 70% of chicken sold in supermarkets is contaminated with Campylobacter (BBC News, 2014). Contamination of a small sample from a large consignment of food can lead to the whole load going to waste. Similarly, detection of a disease such as bird flu in a supplier's flock could lead to a ban on imports. In a recent case, for example, Mexico prohibited the import of chicken from the USA after bird flu was detected (Reuters, 2015).

BactoAlarm® Bio sensor is a multipurpose tool that can control food safety throughout the value-added chain. After placing BactoAlarm® into package, monitoring of bacterial growth becomes very easy, and saves unnecessary testing before and after product transportation. The exporter and retailer are both assured of the quality of the product prior to sale and have proof that 99.9% of their chicken is in good condition. However, should the buyer store the meat inappropriately, the sensor will detect that it has gone bad and any danger of food poisoning is averted.
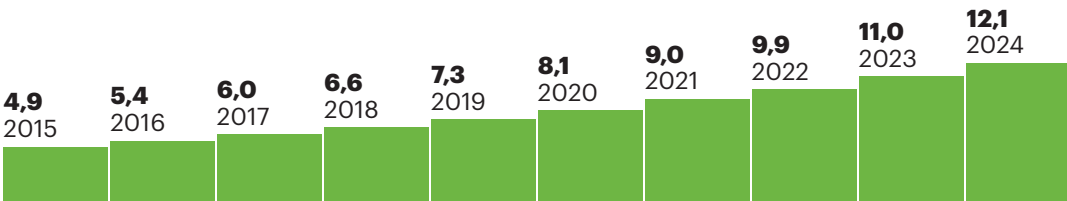
2.3.   Smart packaging market overview

The food chain is complex with each participant having a specific place in the chain. Rapid growth in the food industry leads to increasing need for methods to sustain food safety and freshness. While technology has been advancing rapidly in areas such as communication and renewable energy, sustainability of the food chain has been neglected until recently. However, the role of smart packaging in current and future strategies for food sustainability is becoming more apparent (Lamanna Alliance, 2016). In today's market, active and intelligent packaging is of paramount importance. Therefore, industry values these kinds of technologies, and governments are making funding available for these developments so that consumers need not worry about food safety.

The global smart packaging market size was USD 10.8 billion in 2015, according to different research institutions. Rising usage of smart packaging products in the food & beverage industry for is expected to drive the market growth in 2013-2024. Furthermore, the rising need for high quality and ready-to-eat food products, coupled with changing consumer preferences globally, is expected to drive the industry. Increased demand for packaged food products, which can provide nutritional enrichment and functional benefits, is expected to drive the demand in the food & beverage industry over the next eight years (Grand View Research 2016).

The global smart packaging industry is expected to reach $26.7 billion by 2024, recording a CAGR of 10.6% from 2016 to 2024.

The food & beverage sector is currently the largest application segment and accounted for a share of over 45%, or ca. $4.9bn. Taking into account the projected CAGR for the market, the food & beverages sector can potentially reach $12bn by 2024.

Projected growth of smart packaging within food & beverages sector, $bn   Figure 2

| 4,9 2015 | 5,4 2016 | 6,0 2017 | 6,6 2018 | 7,3 2019 | 8,1 2020 | 9,0 2021 | 9,9 2022 | 11,0 2023 | 12,1 2024 |

North America emerged as the largest market, accounting for almost half of the global market in 2015. Rapid growth in industries like food & beverage is expected to drive the demand over the next few years. The rising spending capability of consumers, coupled with growing concerns on improving the general health in the region, is expected to drive the smart packaging industry over the forecast period.

Europe is expected to witness a significant share of demand on account of rising emphasis by the government to reduce the toxic content in packaging material. Rising R&D activities in the pharmaceutical industry for improving the compliance to stringent legislations is expected to fuel the industry growth (Grand View Research).

All of the above confirms that smart packaging is a modern and developing industry, which is receiving increasing attention from consumers, producers and governments of many countries.

2.4.   Niche value calculation

Although Bactoalarm® Bio Sensor can be considered part of the smart packaging market; it has no analogues in the world, meaning that Bactoalarm® Bio Sensor has created a relatively independent niche within the market.

For example, the total potential Bactoalarm® Bio Sensor market for poultry in the 30 most prosperous countries is around $1bn. These calculations take into account only the poultry market, since the first Bactoalarm® Bio Sensor will be launched for this market. Given the plans of the company for further advancements, the total niche value can be several times higher.

Biosensor market value (poultry) = number of poultry packs per capita ×
× number of urban citizens × Bio Sensor cost.

USA market = 63.46 × 268,046,237 × $0.03 = $510,306,426
Other 29 markets = 36 × 515,372,168 × $0.03 = $556,601,941
Total market = $1,066,908,367

Rationale and detailed calculations

Any calculation of market size is reliant upon knowing the number of people who want to make a purchase. Food is a fundamental necessity, and the numbers are often counted in billions. With current estimates of world population being about 7.5 billion, food is a highly lucrative business. No single product could cover the entire population from one source, so the calculations were based on a list of the 30 most prosperous countries, where people are educated and sufficiently wealthy to spend an extra 2-10 cents per package of raw meat, to ensure that what they eat is safe. These countries were ranked as the 30 most prosperous nations in 2014, according to LEGATUM PROSPERITY INDEX (Macias, 2014).

Nº	Country	Total Population	Yearly Change (%)	Urban citizens (%)	Poultry Consumption per capita (kg)
1	U.S.A.	324,118.787	0.73%	82.7%	47.6
2	Japan	126,323.715	-0.2%	94.1%	13.6
3	Germany	80,682.351	-0.01%	77.2%	20
4	U.K.	65,111.143	0.61%	81.7%	28.3
5	France	64,668.129	0.42%	80.5%	26
6	South Korea	50,503.933	0.42%	81.7%	14.2
7	Spain	46,064.604	-0.12%	82%	31
8	Canada	36,286.378	0.96%	81.9%	34.2
9	Australia	24,309.330	1.42%	89.2%	42
10	Taiwan	23,395.600	0.06%	77.5%	32.2
11	Netherland	16,979,729	0.32%	90.5%	22
12	Belgium	11,371.928	0.64%	96.6%	20.9
13	Czech Republic	10,548.058	0.05%	74.8%	22.5
14	Portugal	10,304.434	-0.44%	65.9%	39
15	Sweden	9,851.852	0.74%	85.2%	11
16	U.A.E.	9,266,971	1.2%	90.3%	37.9
17	Austria	8,569.633	0.29%	66.2%	20
18	Switzerland	8,379.477	0.97%	73.5%	11.3
19	H.K.	7,346.248	0.8%	N.A.	45
20	Singapore	5,696.506	1.66%	N.A.	41
21	Denmark	5,690.750	0.38%	87.7%	24
22	Finland	5,523.904	0.37%	83.7%	18
23	Norway	5,271.958	1.17%	79.6%	19
24	Ireland	4,713.993	0.54%	64.4%	30
25	New Zealand	4,565.185	0.81%	87.8%	37.8
26	Uruguay	3,444.071	0.36%	95.4%	13.6
27	Slovenia	2,069.362	0.09%	49.9%	20
28	Luxemburg	576.243	1.61%	86.3%	34
29	Malta	419.615	0.23%	98.4%	N.A.
30	Iceland	331.778	0.71%	96.7%	27
	Total	**972,385.665**	**Av. 0.57%**	**Av. 79.5%**	**Av. 27kg**

USA market calculation

An average® American consumes 47.6 kg of poultry in one year, while an average pack size is 300 grams and the retail price is $3.26 per kg.

However, only 55% of total consumption is purchased at retailers or groceries, and only 40% of this is purchased as chicken portions. Therefore, 47.6 kg x 0.4 = 19.04 kg purchased for home cooking purposes. In this format, the price per kg doubles on average and accounts for $6.52 per kilo.

In terms of potential market for BactoAlarm® Bio Sensor is:

1. 19.04 kg × 1000 grams / 300 = 63.46 packages per person in one year;
2. 324,118,787 people × 0.827 = 268,046,237 USA urban population;
3. 63.46 × 268,046,237 × $0.03 = $510,306,426 USA BactoAlarm® market.

If BactoAlarm ® Bio Sensor is going to be sold at $0.03 per sensor; the market in the USA will be equal to $510,306,426 in revenue, only for poultry.

Adding the other 29 countries

1. 972,385,665 people of 30 countries – 324,118,787 population of USA = 648,266,878 people;
2. 648,266,878 people × 0.795 urban citizens = 515,372,168 urban population in other 29 countries;
3. 27 kg × 0.4 = 10.8 kg per capita purchased in cut-up/parts;
4. 10.8 × 1000 / 300 = 36 packs per capita in one year;
5. 36 × 515,372,168 × $0.03 r = $556,601,941 total revenue from the other 29 countries.

Total Potential market for poultry in the 30 most prosperous countries is $510,306,426 + $556,601,941 = $1,066,908,367

2.5.   Competition analysis

Most of the competitors are in the TTI area, which means Temperature, Time Indicators. They only change the color on changes of temperature. Compared to the BactoAlarm® Bio sensor, they do not assure safety and do not show the micro-bacterial changes of the packaged food. These features make the BactoAlaarm® Bio sensor unique, and therefore, it is a premium tool to add on packaged food. The main competitors that produce the closest analogues to BactoAlarm® include Onvu (Switzerland), FreshCheck (New Jersey, USA), Cryolog (France). One of the investors of Cryolog is Life Ventures by Nestlé.

Key industry participants of the smart packaging market include the following: 3M (U.S.), TempTime Corporation (U.S.), PakSense (U.S.), American Thermal Instruments (U.S.), Avery Dennison (U.S.), R.R. Donnelly Sons & Company (U.S.), BASF SE (Germany), International Paper (U.S.), Stora Enso (Finland), Thin Film Electronics ASA (Norway), Huhtamaki Group (Finland), and Smartrac N.V. (The Netherlands), among others.

With that being said, Bactoalarm® Bio Sensor has no analogues on the market, which gives the product a huge competitive advantage. New developments are being conducted by such conglomerates as Unilever or Nestlé, but only iPak AG has a fully developed product ready for a market launch. Any new competitors with similar developments will have to catch up at least several years of R&D and industrial tests, meaning that in the near future, Bactoalarm® will not have in engage in severe competition.

2.6.   SWOT-analysis

Strength
— Patents in 41 counries;
— Almost insignificant cost;
— Professionals and good working team;
— No analogues in the world;
— Strong product philosophy;
— Sound know-how and experise of the food industry;
— Soundrelationships to the food industry;
— Already heaving a great interest from the industry as form food producer, retailers and packaging producers;
— Full production chain;
— Multipurpose usefulness;
— Absence of direct competitors.

Weaknesses
— Low recognition;
— Infrastructure will grow with the turnover.

Opportunities
— Large target audience;
— The development can become an indispensable element of the quality standard;
— Reduce food waste, influence health;
— Reduce food poisoning;
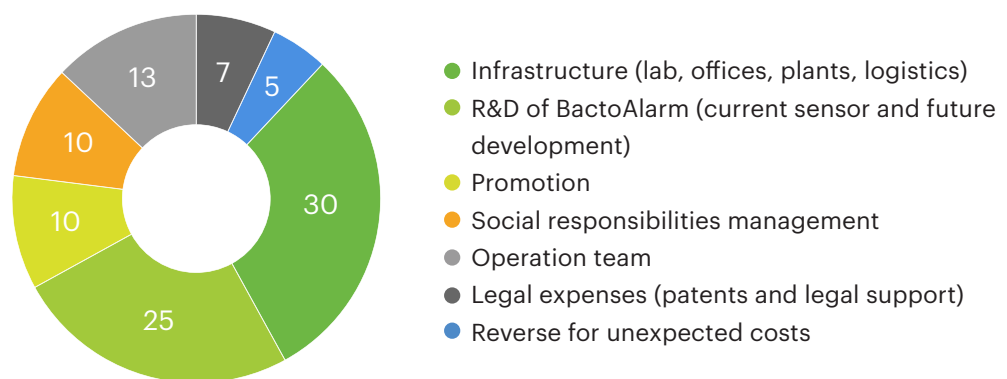— The ability to conduct social activities in third world countries.

Treats
— Delay in the development of sensor;
— New competitors;
— The refusal by the main bodies to standardize the product;
— Unjustified expectations.

3.   BactoCoin (token concept)

The BactoAlarm® project plans to attract investments in the amount of 100.000.000 Swiss francs through the issuance of 4.000.000 BactoCoins at the price of 25 CHF/BTNN. The *value of BTNN will grow accordingly to 25% of the company's profit from the sale of its sensors.

Distribution structure of funds raised, %   Figure 3


- Infrastructure (lab, offices, plants, logistics)
- R&D of BactoAlarm (current sensor and future development)
- Promotion
- Social responsibilities management
- Operation team
- Legal expenses (patents and legal support)
- Reverse for unexpected costs

BactoCoins will be redeemed by the company from the moment the company starts generating profit, for the *value of the 25% profit accumulated at that time.
—
*Value = 25% of the profit from sales / 4.000.000 BTNN.

The company claims to become a multi-billion dollar business in relatively short time.

BactoCoin price change, CHF   Figure 4
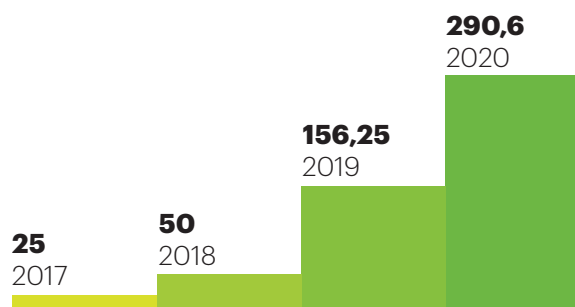
Example

Year 1
Company sells sensors for a sum of CHF 1bn, from which CHF200mn is an operation cost. As a result, the profit afterwards is CHF 800mn, 25% from which the company has promised to pay out to their investors (community friends). Therefore, 25% = CHF 200mn, which is distributed in accordance with the amount of tokens hold by investors (partners, or community friends), in the form of token's initial price increase.

CHF200mn/4mn of tokens = CHF50 price increase; therefore, the price of a digital asset is now CHF50.

Year 2
Company's revenues amounts to CHF 2bn, from which CHF 300mn is an operational cost, so the profit left this year is CHF 1.7bn.

So, CHF 1.7-75% = CHF 425mn.
CHF 425mn/4mn of tokens = CHF106.25 + CHF50 (price from last year) = CHF156.25 is the price of a token in the end of 2nd operational year.

Year 3
Company's revenue amounts to CHF 2.5bn from which CHF 350mn is a cost.

So, CHF2.5bn – 350mn = CHF2.15bn.
CHF2.15bn – 75% = CHF537.5mn to split
CHF537.5mn/4mn of tokens = CHF134.38(increase) + CHF156.25 (price of 2nd year) = CHF290.6 new price

As can be seen from the example above, the price of CHF 25 is considered as some sort of investment in the company's future R&D activities and procedures, which will help to boost the BactoAlarm® Bio Sensor commercialization on the market. Therefore, the value of the token will grow only when the company starts to generate profit. Afterwards, the company will offer buyouts of its initial tokens, with the potential future resale. BactoCoins can be traded between holders straight after they have been issued. iPak AG will buy back the tokens at a price that will be formed after profit generations, and not at a free market price.

4.   Parties involved

iPak AG

iPak AG has the sole mission of making food safer through R&D and collaboration with highly experienced professionals. iPak AG is dedicated to four "E" practices: Effectiveness, Efficiency, Experience and Ease. The aim is to make a product that is 100% accurate without adding any extra cost to the original packaging. Therefore, iPak AG works only with trusted and easy available suppliers of raw materials that are finely adjusted to users' requirements. The company believes that the current developments are going to benefit all stakeholders, including consumers, government, producers and retailers. iPak AG plans to roll out its products worldwide within the next two years.

Unizar

The University of Zaragoza is the main center of technological innovation in the Ebro Valley and has great prestige among Spanish and European universities. It is the only public university in the region, with over 450 years of history. The University employs more than 3,000 highly experienced academic personnel and shares its knowledge with over 40,000 students in its 22 faculties.

The I3A operates mainly from the Campus Rio Ebro, next to the EINA, although there are several research groups working in other campuses. Most of our members are also engineering, physics or chemistry professors or lecturers at the EINA.

Samtack

Samtack uses environmentally friendly ingredients to make glues, adhesives, hot-melts and lacquers. The company has been in business since 1988 and is dedicated to conserving the environment and preserving the future of the planet. All its products have been developed under strict quality control and only natural and synthetic materials of the highest quality are used in their manufacturing.

Discovery Flexibles

Discovery Flexibles Ltd is based in Dundee and has been producing packaging for nearly 60 years. It is one of the biggest packaging companies in the UK, specializing in the conversion of films, paper, aluminum foil, and laminate structures. The company is committed to innovative product development and methodology and provides its customers with flexible packaging of the highest quality.

5.   Team

Manuel Fernandez
Board member and
project Coordinator
LinkedIn
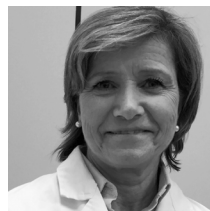
Prof. Dr. Cristina Nerin
Inventor and head of R&D
team
LinkedIn

Eudald Mas
Chief Technical Executor
LinkedIn

Jimmy Urquart
Packaging Expert
LinkedIn

Josef Felber
Patent Attorney
LinkedIn

Jacob Stossel
Finance Specialist
LinkedIn

Giuseppe Domeniconi
Advisor in Food
Promotion
LinkedIn

Bernhard Zwiker
PR Consultant with
technical reduction
LinkedIn

Alfredo Corujo
Food and Safety Expert
LinkedIn

6.   Roadmap

2009-2017

2009	Colour change observed; first lab tests conducted
2010	Spanish patent obtained by the University of Zaragoza
2010–2011	University looking for investors
2011	12 April: iPak AG founded
	30 November: Contract signed between the University of Zaragoza and iPak AG
2011–2012	In search for ingredients suppliers
2012	From mid: Contract signed between FELBER&PARTNERS AG and iPak AG
	Late: The base material for the sensor found; further tests
2013	Samtack (Spain) engaged in industrial development and testing
	Negotiations with potentially interested parties, including some major European retailers; NUTRECO (Netherlands) shows high interest in the sensor development
2014	Discovery Flexibles (Scotland) engaged in multi-layer sensor development
2015	Sensor greatly improved and changed from initial concept
2016	Mid: Industrial test with Nutreco, positive results were obtained
	Late: Working towards improvements of BactoAlarm®
2017	Mid: Solution for Improvements were found; lab tests underway before the next industrial test with Nutreco.
	To present: 41 patents obtained, certificate of compliance with EU markets, trade mark is registered, value adding chain is conducted, and potential buyer is waiting!

Short-term Plans in 2017 (Sept.–Dec.)

2017	September: Preparing ICO launch for BactoAlarm® Biosensor
	October/December: promoting the project; introducing the concept to prospective partners
	14–23 December: Token offering

Long-term Plans in 2018-20..

2018	Early: Test with Nutreco (Positive results will lead to final real life testing with customers)
2018–2019	Social education work
2019–2020	Product launch and mass production
2021*	Company starts to generate profit; cashing back of coins announce. (Applied if previous steps were undertaken on time)
2021–20..	Horizontal integration in the product line

2021* applied if previous steps were undertaken on time.

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