

FIRDI 2017 ANNUAL REPORT

Food Industry Research and Development Institute





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In 2017, the output value of Taiwan's food industry (excluding tobacco manufacturing industry) was NT\$ 612.8 billion, increasing by 1.08% from the previous year and accounting for 4.7% of the total manufacturing output value (ranked the 7th). Taiwan's food industry is in a relatively mature state. It has solid and flexible technology and management capabilities, sensitive market observation abilities, and extremely efficient integration and division of labor in the upstream and downstream sectors. All of these factors have contributed to building up an important feature and foundation for Taiwan's food industry to deepen its industrial value chain and extend itself to the global market.

Food Industry Research and Development Institute (FIRDI), which was set up to assist the development of Taiwan's food industry, has been serving the industry for 50 years since its Hsinchu Research Building operated in 1967. To assist and guide the development of the industry, FIRDI has been continuing to deepen and expand its five major business functions, namely R&D, counseling, inspection, training and certification. In terms of organization, FIRDI established the Certification Service Center in 2017, following the launch of the FIRDI Academy in 2015. Meanwhile, it focuses its research strategies on three major axes, namely food innovation, food safety, and food biotechnology in a hope that FIRDI will build up the best professional service team to continue leading the food industry towards new era.

FIRDI, which has been energetically revealing the global trend in food clean-labeling for years, has also actively embodied this concept into structuring and designing its own key food technologies and has thus launched a number of innovative products in Taiwan, such as phosphate-free meatballs, 100% all-natural seasonings, and innovative non-fried instant rice produced by patented technology, all of which are important examples for achieving "industrial mass production with clean-labeling and designed quality". In other cases, FIRDI has also successfully broken technological and mass production bottleneck for such products as high-quality multi-structured noodles using multi-grains materials, meat analogs with anisotropic plant protein structure, and bio-modified bean and wheat ingredients that can be used to improve the taste and expansibility of bakery products. FIRDI will soon promote and apply them to the industry in the near future. Moreover, in response to the population-aging trend, FIRDI has been also investing in elder-friendly food research, building soft food texture grading systems and food texture analysis technologies, and collaborating with retail channel providers to jointly promote the elderly food industry.

In line with government policies, FIRDI has stationed a branch at the Southern Taiwan Innovation Park which is responsible for not only the promotion and integration of food machinery and process innovation and research services but also the operation and management of the Chiayi Industry Innovation and Research Center (CIIC) of the Ministry of Economic Affairs. Moreover, FIRDI has built up platforms for aseptic processing of health-care functional beverages and commercialization of elderly foods. In recent years, FIRDI has set up smart testing platforms for cooking systems, among which a food machinery hygiene design platform has been set up in accordance with the testing methods stipulated by the European Hygienic Engineering & Design Group (EHEDG). The platform passed the TAF ISO17025 certification in 2015 and again passed the EHEDG evaluation in 2017 to become one of the eight EHEDG-authorized testing laboratories in the world. FIRDI vows to actively assist our food machinery industry to design and make machines that meet the international hygiene standards.

Set up for more than 30 years, the Bioresource Collection and Research Center (BCRC) of FIRDI has all its bio-resources management systems certified by the International Organization for Standardization (ISO). BCRC has not only become an important foundation for the development of Taiwan's bio-industry but has also been developed into an internationally renowned bio-resources center with comprehensive functions. Becoming an official member of the Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM) in 2016, BCRC successfully hosted the ACM'S 14th annual meeting in Taiwan in 2017, actively communicating with international culture collection centers through this link. Actively incorporating the traditional and pioneering identification technologies

in recent years, BCRC has become the only team in Taiwan that is dedicated to microbial identification and provides professional services in addressing such issues as publication of new species, safety assessment, inspection of health foods, certification of export products, and environmental monitoring of pharmaceutical plants for all sectors. Services offered by BCRC affected an output value of more than NT\$10 billion.

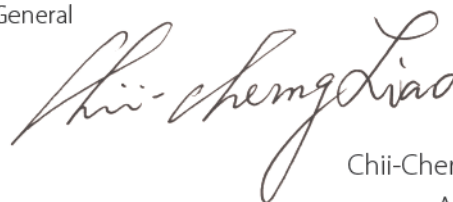
To continuously improve inspection quality and credibility, FIRDI passed the evaluation to become an inspection body for medicals and cosmetics accredited by the Ministry of Health and Welfare in 2017. FIRDI has actively expanded its service to more customers and become a contract laboratory of the industry. It has also strived to be an international accredited testing laboratory registered in multi-nations, now approved in Japan, the European Union, Brazil, Indonesia, and Singapore, aiming to assist Taiwanese companies in exporting their products smoothly.

To match the domestic certification systems with international standards, all the certification services provided by FIRDI meet the requirements of ISO accreditation. FIRDI formally became an international SQF certification body in 2017, moving FIRDI a big step forward in approaching the international certification market, and we vow to gain even more certification programs so as to provide a more professional and fair certification service for the food industry in the future. In response to international trends for food safety, FIRDI has already designed the first output tool for e-food protection program with expert-like functions in Taiwan to assist food factories in establishing and implementing food defense plans with four aspects, including food safety, food defense, food fraud, and food quality, to help the food industry overcome export obstacles and win orders from foreign countries.

Since its inception 50 years ago, FIRDI has been engaged in the coaching and training services for the canning industry and has become the largest food industry professional training organization in Taiwan. In order to improve the quality of professional training services, the FIRDI Academy introduced the Talent Quality-management System (TTQS) in 2015, which was upgraded and won silver-medal for TTQS Training Organization Version in 2017 and later became the international SQF training center to host the first international courses for the introduction of SQF system in Taiwan. FIRDI has also created some digital mini-learning courses to assist the professional in training of mini-enterprise personnel in outlying islands and rural areas.

Over the past 50 years, thanks to the full support from all walks of life and the dedication of our colleagues, FIRDI has become the most comprehensive food research institute, the most credible professional food inspection, certification and training organization, the best research partner in the food industry, and the most important foundation for the development of biotechnology industry in Taiwan. It is always our sincere hope that you will continue to encourage and support FIRDI, so that FIRDI can further advance Taiwan's food and biotech industry for the next 50 years!

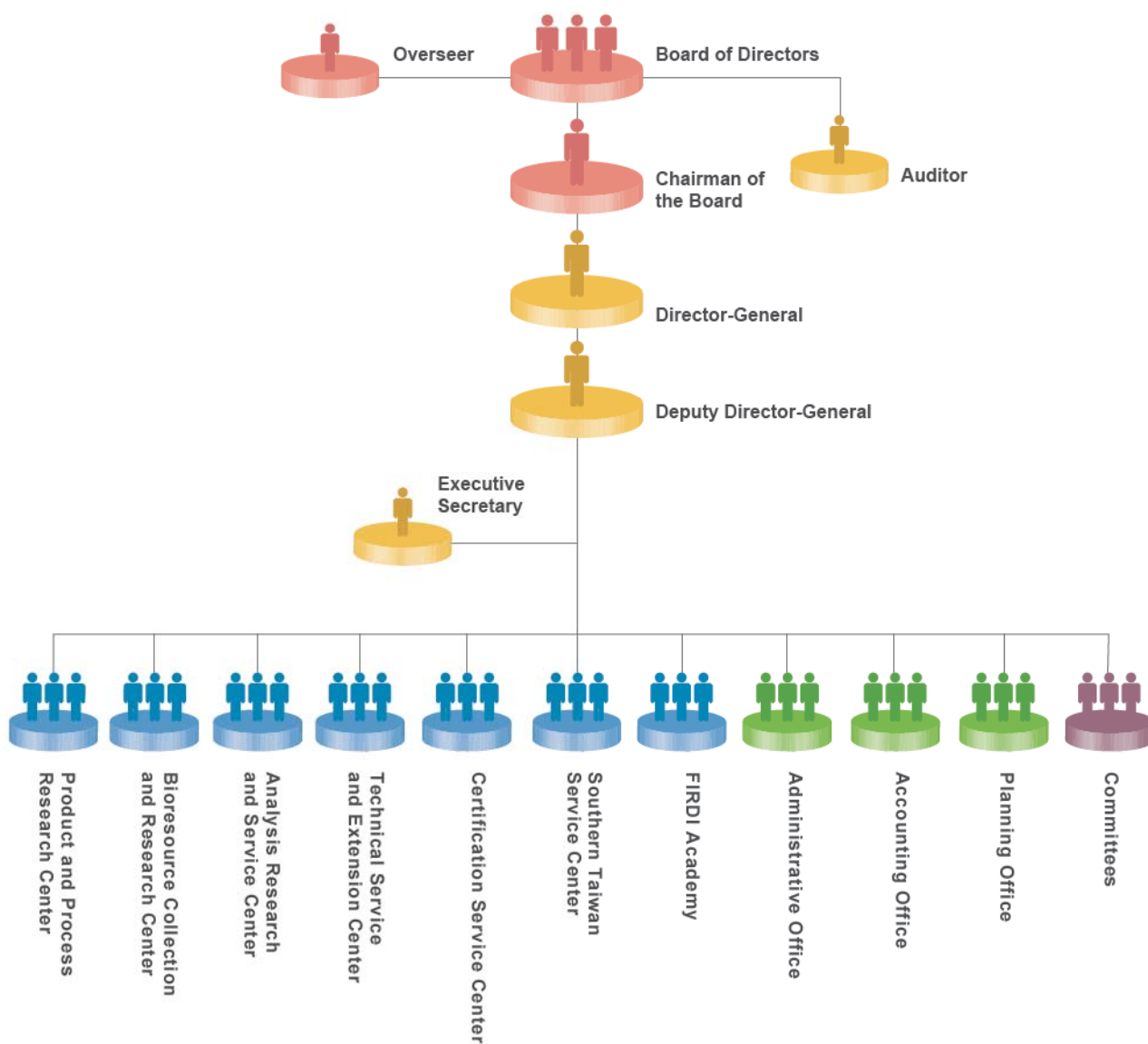
Director-General



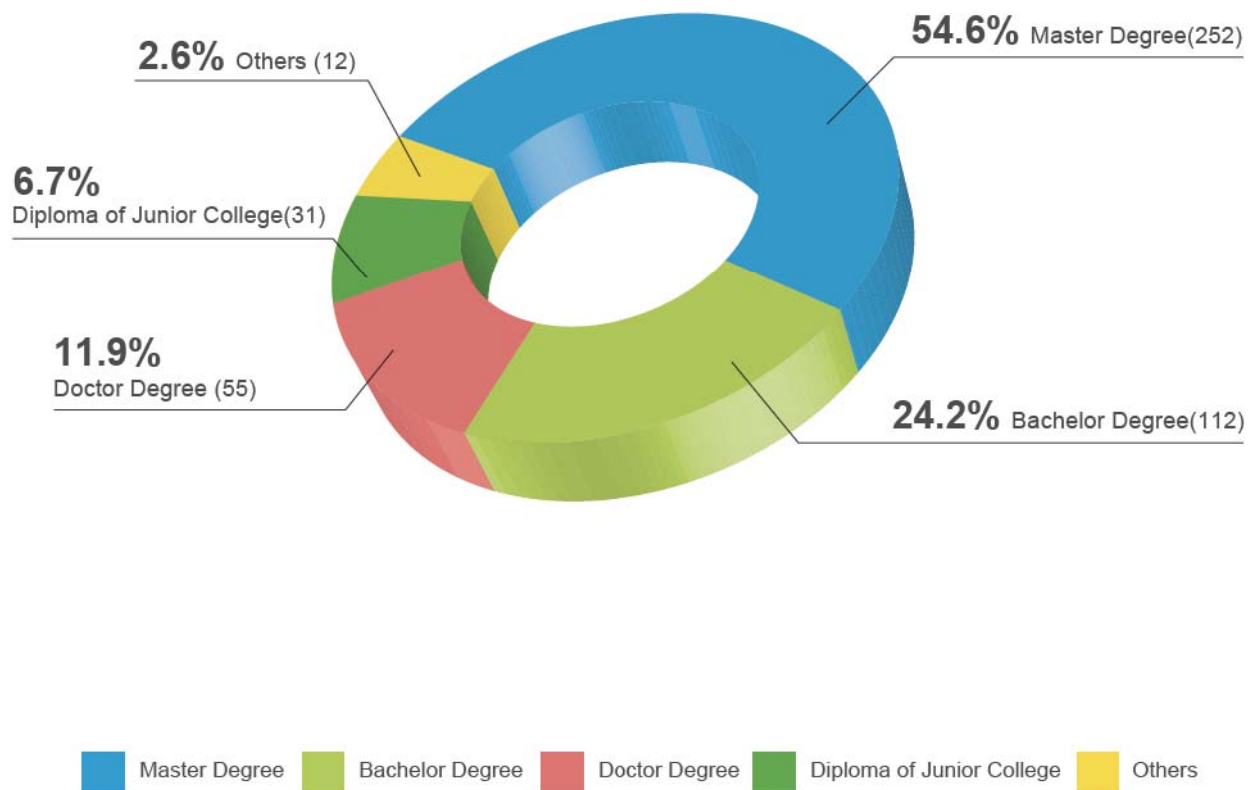
Chii-Cherng Liao
 April 2018



Organization



Human Resources



Number of employees : 462 (Dec.2017)



At the 50th Anniversary Ceremony of FIRDI, Director-General Chii-Cherng Liao revealed FIRDI's future direction on November 1, 2017.

After half a century of hard work, FIRDI has developed into the most comprehensive and professional food research institute in Taiwan. Its main businesses cover R&D, counseling, inspection, certification, and training. Facing the global industrial change and development trends, FIRDI will integrate and centralize its professional capacities and focus on the following three businesses in the future:

Food Innovation

By keeping abreast of the industrial and consumer trends, FIRDI aims at food innovation towards health and texture and targeting "Designed quality" and "Clean-labeling".

Specific R&D strategies and practices include: utilization and optimization of the natural characteristics of foodstuffs for their total utilization to enhance the natural ingredients in agro-derived raw materials and develop value-added healthy products; introduction of novel food processing

technologies to perfect the process conditions to strengthen and upgrading healthy feature, quality, and safety of prepared foods, and to create business opportunities for personalized manufacturing and services; strengthening food engineering and food packaging technologies to provide cross-sector process integration technologies that are deficient in and urgently needed by the industry to optimize the application of adequate packaging materials and foodstuffs; promotion of hygiene design of food machinery to meet international standards; extending the R&D service platform for pilot production and commercialization to help food innovation and start-up; assisting the food industry in adopting the concept of intelligent manufacturing to integrate raw materials management, online automatic quality assurance, information convergence of mechanical equipment and process parameters, optimization of energy management, and big data analysis for production management.

Food Biotechnology

BCRC of FIRDI has become an indispensable core facility for supporting the development of bio-industry in Taiwan. Based on the bio-resources bank and one-stop service program, we will continue to provide Taiwan's bio-industry with the best solution to the utilization of bio-resources in the future.

To enhance core energy, new technologies such as panomics will be introduced and applied to product safety testing and risk assessment. By integrating multiphase identification technology and using DNA barcodes and protein fingerprinting, we will strengthen the molecular typing identification of commercial microbial products to assist industrial research and development, ensure product quality, and expand export advantages. We will deepen the development platform for specialty microbes, focusing on specific microbes with industrial needs to explore and analyze their individual characteristics to enhance their differentiation value. We will also integrate bio-resources industrialization technologies, including bio-resources, strain screening, biotransformation,

animal study, mass production standards, product strategies, patent laws and other technical fields, to help customized service designed with formulation and process so as to create application value for our indigenous featured bio-resources and promote their international competitiveness.

Food Safety

In recent years, FIRDI driven by risk prevention and control has developed a more complete food defense system. We have introduced to Taiwan well-known international certification systems such as SQF, FSSC and BRC, and become their approved executing agency in Taiwan. We have also constructed food defense technological tools and platforms to assist enterprises in introducing risk concepts into their factory management. By integrating FIRDI's five major business capacities of R&D, counseling, inspection, certification, and training, we are able to promote the integration of domestic food management with international regulations, ensuring food safety and quality and strengthen export competitiveness.



FIRDI will focus on three major R&D axes: food safety, food innovation, food biotechnology.



Director-General Chii-Cherng Liao (left 2) attended a new product launch event for all natural seasoning on January 4, 2018.

Research and Development on Products and Process

Commercialization and Value-addition of Agricultural Raw Materials

Turmeric powder: Heat pump drying technology has been introduced for fruit and vegetable processing. Compared with hot air drying, heat pump drying of turmeric produced better products with about 14% increase in total curcuminoids content while saving about 50% of drying time. High quality turmeric powder products could be



Turmeric powder products



High pressure processed pesto chicken

developed using this technology, which can assist the industry in establishing processing procedures and product specification to develop products with health claims.

High-pressure-processed prepared products:

High-pressure processing (HPP) was introduced to induce endogenous enzyme activities of meat and reduce shear force on meat texture while inhibiting microbial growth, which in turn helps to tenderizing meat and extending shelf life. We have developed recipes and processing procedures for HPP chicken and duck prepared products, which are transferable-ready for interested parties.

Room temperature stable Lu Wei: High-temperature sterilization and vacuum packaging technologies were used to process chicken wings and claws for room temperature circulation. The technologies can assist the industry in establishing product formulation, processing procedures, and product specification while analyzing product quality and advanced glycosylation end products to develop safe and delicious processed livestock and poultry

products for room temperature circulation.

Sweet corn beverage: The combination of micronization processing and enzyme treatment was used to develop nutritional balanced beverages containing corn and soybean with good palatability and no precipitation after sterilization. This technology could improve the processing usability of corn and increase the value of local grains.

Novel Drying Technology

Radio frequency (RF) drying technology is the thermal process that has rapid and volumetric heating. Advantages of RF drying include shortening the drying time, energy saving and reduction of quality degradation. It is suitable for drying processing of a variety of foods. We constructed batch and continuous RF drying equipment in 2017. Application of RF drying on microbial fermentation products of *Cordyceps militaris* could save up to 40% of drying time and reduce energy

consumption. RF drying could also be used in drying process of agricultural products to improve product quality. The technology is of help to improve the drying technology level of the food industry.

Extraction and Evaluation of Functional Ingredients

Functional characteristics evaluation and extraction technology was used to produce functional fibers from agricultural processing by-products such as corn, rice and wheat bran. The fibers showed high water-holding capacity, oil-holding capacity, emulsification and adhesion properties, and their production costs have been reduced through process optimization. The functional fiber ingredients have been applied to emulsified meat products such as hot dogs and meatballs to replace artificial additives such as phosphates, improve product texture and taste, and develop foods conformed to the clean label.



- | | |
|---|---|
| 1 | 1.Aseptic packaged Lu Wei of chicken wings and claws for room temperature circulation |
| 2 | 2.Sweet corn beverage |
| 3 | 3.Functional fiber made from corn bran |
| 4 | 4.Continues conveying type of radio frequency drying equipment |

Developing Prepared Products with Low Artificial Additives

FIRDI has developed the natural substitute technology of phosphate-free and artificial nitrite-free for meat products. With functional ingredients extracted from natural foods and through formula designs, modification of food texture, enzymatic hydrolysis/conversion combining optimization of food processing, we improved the problems of texture, flavor, color, and preservation of food products resulting from reduced use of additives. This technology has successfully assisted industry in developing novel phosphate-free emulsified meat products (e.g. meat balls and hot dogs), dried meat products (e.g. thick-sliced meat jerkies), and low artificial nitrite-free Chinese sausages that meet clean concept.

All Natural Seasoning

Based on powder modification and application evaluation platform technology and with strict selection of natural ingredients and the application of extrusion granulation technology, the easy-hygroscopic powder was transformed into particles to improve product quality and convenience for consumers to use. This technology has been transferred to the industry to produce 100% natural seasoning without artificial additives and can replace traditional table salt and MSG. The product is simple, delicious, and easy to use that meets the requirements of food clean labeling.

Ready-to-eat Food Texture Design

Development of process technology for instant rice: High temperature and short time drying technology was used to develop patented equipment (ROC patent No. M548447) to make rice with porous structure. Non-fried instant rice and other products developed using this technology are convenient to carry, stable at room temperature, and easy to cook. The cracked grain substrate can be a composite functional ingredient to enhance the nutritional value of rice and echo consumer's demand for health.

Formulation design and processing technology for multi-ingredient noodles: Through the study on the processing parameters for dough structure modification, non-wheat materials such as rice, barley, and black bean mixed with flour could be directly extruded to generate multi-ingredient noodles using the commercial dough filling equipment without sheeting and cutting process. No phosphate and modified starch were needed to enhance taste in the formulation. The multi-ingredient noodles conform to clean labeling and have a cooking loss less than 5 g/100 g. The optimized formulation of multi-ingredient noodles could incorporate up to 40% non-wheat materials. This technology expands the diversity of food ingredients and endows multi-application value to local specialty food raw materials, enabling the development of novel, nutritious, and delicious extruded noodle products.



- 1 2 3 4
1. Series of meat products for clean labeling concept: phosphate-free meat ball, phosphate-free dried meat, phosphate-free hot dog, celery sausage
 2. All natural seasoning
 3. Instant rice
 4. Multi-ingredient noodles containing rice, barley, and black bean without additives



Application of texture analyzer on texture grading assessment of rice

Sensory preference evaluation and relevance analysis of food texture:

The technology provides validated food texture information and performs relevance analysis with sensory preference evaluation. It is an effective tool for designing new product texture in food research and development. The technology has been applied to perform oral chewing simulation of commercial cake products in bakery industry. Furthermore, it can be combined with the grading system for soft texture foods to help food industry develop chewing safe foods and expand the elderly and chewing-care food market.

Development of Elder-friendly Food

Food textural analysis and development of food texture grading system:

The elder-friendly food team of FIRDI is devoted to develop grading guidelines for texture-modified food in Taiwan based on IDDSI (International Dysphagia Diet Standardisation Initiative), UDF (universal design food, from the Japan Care Food Conference) and Smile Care Foods (from Japanese Ministry of Agriculture, Forestry and Fisheries). Meanwhile it refers to meeting Taiwanese diet characteristics from domestic industry and establishing pre-process of texture analysis on solid food for texture evaluation systems. In 2017, the texture levels of solid food have been divided into three parts, "easy-to-chew",

"crushable-with-gums", and "crushable-with-tongue". The texture analysis of 8 types of 56 foods has been finished, such as livestock and poultry prepared foods, rice, noodles, vegetables, eggs, and bean products. The results could serve as reference for building food texture grading system in Taiwan. In addition, analytical and technical services are also provided for helping the industry to assess and develop soft texture foods.

Commercialization technology of the elder-friendly food:

Enzyme processing, pressure cooking and/or food colloids shaping technology was applied to modify the food texture. The process parameters for types of food ingredients have been established to produce different hardness of soften protein food. Moreover, nutritional formula design model was combined to the processing to develop nutrition-enhanced soften food. The texture properties and sensory quality specification of products were established to be the quality assurance indicator. The technology could be used to develop commercial or semi-finished products of the elder-friendly food sold at retail access or applied to nursing-care agencies, hospitals, and central kitchens. That would simplify protein soften processing for the elder-friendly food service providers and achieve hygiene requirement to satisfy the need of the elder food industrial chain.



Application display of the soften protein foods as commercial/semi-finished products for the elderly

Appraise and elect of elder-friendly food: In order to implement the Council of Agriculture's project, FIRDI held "The Second Elder-friendly Food Appraise and Elect Event" with 16 elder-friendly foods awarded. They were then presented at a press conference held in the Council of Agriculture's main event hall on October 12, 2017. The awarded foods all use superior locally-produced specialty agricultural ingredients of Taiwan, with additional processing and value addition to transform the product forms. In terms of nutrition, taste/mouth-feel, meeting functional needs, and ease of consumption, these foods are superbly friendly to elders' dietary and nutritional needs. At the same time, in partnership with the government-industry research program, RT-Mart, Family Mart convenience stores, and ez66.com.tw, FIRDI held an industrial chain cooperation, promotion and initiation ceremony to join hands and create a new era for food. In the follow-up from this, FIRDI worked with partner channel operators in holding experiential promotional activities for the awarded foods, aiming at helping all parts of society pay better attention to elderly nutrition.



On October 12, 2017, FIRDI held an "Activation Ceremony for Cooperation and Promotion of Industrial Chain" to join hands and create a new era in elder-friendly foods in the Council of Agriculture.

Integrating Process equipment Rapid Commercialization Technology Service Platform

Formulation and process quantification technology for high protein supplement drinks: The stable formula of high protein supplement drinks were investigated by screening different sources of proteins and addition of proper minerals. Combining the quality assessment model for physicochemical properties of formula ingredients and process scaling up technology, we have helped food manufacturers develop high protein supplement drinks. The model not only enhances the quality and stability of products but also shortens time for product development. Additionally, customized process design and product storage stability assessment according to the manufacturing equipment of the industry were developed. It would be helpful for increasing the diversity of protein supplement drinks and enhancing industrial competitiveness.

The optimization of the integration for liquid food production equipment and process: The technology for clean-in place efficiency analysis and management platform for food factories has been established. According to cleaning process setting parameters of different food residues, this platform could long time capture and record the amount of steam, detergent, and water used as the basis in analyzing the cleaning efficiency data of each unit in food factory to achieve the purpose of standardization of the cleaning process and energy-saving.

Intelligent Cooking System and Quality Prediction for Prepared Foods

Integration of intelligent cooking system and reheating process: An intelligent cooking system testing platform was established. Through introduction of the intelligent information technology, such as bar code identification of food, into the hybrid heating

cooking machine, the machine operates cooking procedures automatically via machine-exported product history and reheating parameters. Besides, the crisp taste of pre-fried prepared foods could be restored by optimizing reheating parameters of hybrid energy (microwave, IR, and hot air). With the aid of color and texture analysis, the database of re-heating quality could be established to improve product quality and uniformity.

Development of functional packaging and validation of quality prediction: The shelf life of foods that are perishable and sensitive to moisture or oxygen could be extended through a combination of antimicrobial, oxygen scavenging and moisture barrier packaging. Besides, the Temperature-Time-Quality Indicator was developed to solve the quality deterioration problems of refrigerated prepared foods due to temperature abuse during circulation and sale. Relevant achievements will promote the development of intelligent packaging industry in Taiwan.

Services and Value Addition of Bio-resources

Bio-resources Bank and International Cooperation

Implementing the risk management to strengthen the sustainable operation of BCRC: In response to the international management consensus,

BCRC has established the systematic management of laboratory biosafety. We adopted Plan-Do-Check-Act (PDCA) cycle for continual improvement to carry out risk analysis approach for achieving the goal of self-management. We are processing the integration of the criteria for biological risk management into the ISO 9001:2015 quality management system and the revision of new ISO/IEC 17025 system to improve specifically our quality system. In 2017, the laboratory for preservation and identification of bacteria and yeast and the bio-resources preservation banks in BCRC have successfully passed the CDC fieldwork examination on biosafety level 2 microbiology laboratories with up to 99% of average achieving rate.

Promotion of clinical cell services: In line with the current development of regenerative medicine in the biomedical industry, BCRC has been committed to expanding the services for clinical cells in recent years. Apart from the abundant cell and stem cell resources for medical research, BCRC also provides GTP (Good Tissue Practice) compliant laboratories and joins specialized management systems to support services from cell manufacture to product deposit. In addition, with a number of ISO 17025 certified safety testing (including sterility test, mycoplasma test, and endotoxin analysis) and one-stop service from process to quality assurance, BCRC has assisted domestic and foreign innovative companies for therapeutic cell clinical studies in the incubation phase with its rich capacities.



Security management system of bio-resources preservation banks



Bio-resources preservation bank

Expanding Bio-resources and Upgrading Technology

Development of a platform for the cultivation, preservation, and detection of obligate anaerobes: In 2017, we introduced type strains of *Akkermansia muciniphila* and *Faecalibacterium prausnitzii* and established the technique for cultivation and preservation of these two obligate anaerobes which can be used as microbial indicators of gut health. At the same time, we also established the qualitative and quantitative methodology for detecting *Bacteroides fragilis* from fecal samples. The platform for the cultivation, preservation, and detection of obligate anaerobes can provide contract services such as distribution of type strains of key anaerobic indicators, personnel training on the operation of obligate anaerobes, isolation of fecal microbes, and detection of indicator bacteria in stool samples, which can effectively promote the research and product development of the industry and academia on gut microbiome.

Expansion of *Cordyceps* bio-resources: Over 30 species and 400 strains of insect-parasitic fungi have been collected by BCRC. In addition to *Beauveria bassiana*, *Metarhizium anisopliae*, *Nomuraea rileyi* and others that could be used as bio-pesticide, the bio-resources also consisted of *Cordyceps sinensis*, *C. militaris*, *C. sorbolifera*, *C. formosana* and others with potential medicinal usage. In 2017, the cultivation techniques for *C. militaris* and *Isaria cicadae* were established and the

healthcare potential from *Cordyceps* spp. was screened and explored. The results from these *Cordyceps* studies will accelerate the R&D timeline of the industry.

Platform for identifying microbial pathogenicity and genome-wide analysis: Microbial virulence factors including virulence genes and antibiotic resistance genes could be rapidly and effectively identified according to microbial whole genome sequence alone. The transmissibility of antibiotic resistance genes and the genetic modification of microorganisms could be evaluated by using genome-wide analysis. Currently, the platform has helped two well-known domestic manufacturers analyze the safety of their production strains and provided supporting reports as import and export review documents.

Development and Application of Bio-resources

Exploration and application of microbiome: We developed key platforms for exploring the microbiome and its applications by integrating the technologies of microbial cultivation and preservation, bioreactor control, bioinformatics and others. The platforms consist of microbiome analysis platform, cultivation and preservation platform for anaerobic bacteria, and cultivation and screening platform for gut microbiota. It can assist academia and the industry to invest in product development in the microbiome field.



Anaerobic manipulation system



Cultivation of Cicadae flower (*Cordyceps cicadae*) for fruiting body



Lobby of BCRC

Processing and application technology of edible mushroom: Expanded introduction of important commercial mushroom strains, such as *Morchella*, and *Tremella fuciformis* etc., were carried out to enrich the edible mushroom resources in BCRC. In addition, fermentation, formulation, and processing technology were led in to assist the industry develop polysaccharide production strain of *Flammulina velutipes* and liquid spawn making of *Pleurotus eryngii*, as well as novel fermented drinks from mushroom with lactobacillus and jelly products of mushroom with probiotics complex. All these techniques could effectively expand the scope of the mushroom processing industry. On the other hands, for connecting the mushroom industrial chain, we established the alliance platform of the mushroom industry to strengthen the processing and application of mushroom raw materials and expand the international market.

Value-added application of microbial healthy ingredients: Based on the abundant bio-resources of BCRC, we have developed a series of functional food products through development of healthy ingredients and process integration, formula design, and strategic service for product commercialization. We have now developed liquid nutritional products by combination of water soluble cellulose and emulsion practice. Moreover, water insoluble astaxanthin was used to develop a soluble high suspension product through the introduction of formula design, thus expanding its application scope. In addition, we developed high quality probiotic products by optimization of the drying process and microencapsulation to produce probiotic bacteria powder with high viable cell counts. The technical specifications is higher than the industry level



Dr. Chii-Cherng Liao (left), Director-General of FIRD and Mr. Markus Boehm (right), CMO of SIG Combibloc on agreement signing ceremony of technology cooperation on January 4, 2017.

Operating Chiayi Industry Innovation and Research Center (CIIC), MOEA

The Ministry of Economic Affairs (MOEA) has assigned FIRD to operate the administration and research functions of the CIIC since 2011. We expect to promote CIIC as the benchmark for innovation and as a health-oriented technology transfer and application center by integrating resources of industries, government, academia and research institutes in Southern Taiwan.

Test-Filling Platform for Development of Innovative Aseptic Drinks with Perceptible Particulate Content

In March of 2017, FIRD signed an agreement to cooperate on aseptic filling technique with SIG

Combibloc and setup "Test-filling platform for development of innovative aseptic drinks with perceptible particulate content." Therefore, a SIG Combibloc aseptic filling machine was installed at the pilot plant of FIRD in Chiayi Industry Innovation and Research Center. Combined with FIRD's production line and process integrating and optimizing technologies, we could provide short-run test fillings of innovative beverages with perceptible particulate content and customized service to shorten R&D timelines of the industry with integrated resources. Also, "2017 Symposium of Aseptic Processing and Packaging" was held, and abroad experts were invited to share years of experience and broad expertise in developing new aseptic processing of particulate foods and the success stories of product commercialization, expecting to drive more investment from aseptic beverage manufacturers and improve the technology level.

Integrating Service Capacity to Assist Local Industry in Innovative Research

"Counseling seminars of governmental programs to encourage firms' innovative researches" and "Plan-writing gifted classes" were executed to enhance firms' understanding of government firm-guiding resources. Moreover, we assisted the firms counseled by the Chiayi specialists of academia and research institutes to apply for government research grants. We also actively visited local firms in Chiayi, Yunlin and Tainan. In 2017, we had visited 180 firms 365 times. Besides, 46 conferences and training courses were held, providing 1,583 attendees with professional knowledge. Furthermore, the Food Safety Inspection Center established in 2011 has served 243 firms, providing a more convenient and faster food testing service for the local food industry. Additionally, the nine research communities formed by the research institutes stationed in CIIC have held 20 forums on specific subjects, expecting to stimulate innovative ideas and cooperative opportunities through interacting with each other within these knowledge-sharing platforms.

Integrating Institute Resources to Promote Innovation of Industrial Technology

To promote the "Demand-planning of Local Specialty Industries", we have integrated the capacities of the four research institutes stationed in CIIC and constructed cross-cooperation model on the basis of "Health Food Commercialization R&D Service Platform". Different from other innovative centers, with the pilot plants and real-life experience field, CIIC provides technology service model for the implementation of pilot production, real-life experience, and the commercialization to assist technology upgrading of local industry. In 2017, there were 17 firms working with research institutes in CIIC as business tenants. We also assisted 11 cases of local firms to obtain central/local government R&D subsidies in 2017 with 6 cases applying local SBIR of Chiayi County/City and Yunlin County.

Promoting Cooperation of Academia and Research Institutes to Serve Local Industry

We have constructed and operated the Research Resource Integration and Service Network (RRISN) website by integrating resources of the academia and research institutes in Chiayi/Yunlin. To this day, CIIC's 4 research institutes and 8 colleges in Chiayi/Yunlin already uploaded their service information and R&D outcomes to this website. To promote page view count and communicate information, the registered members of RRISN platform would receive updated information by weekly newsletter. There are 87,000 views accumulated since the website started working in 2013. Moreover, in March, 2017, CIIC signed the "Cooperative Strategic Alliance Agreement of Douliu Industrial Park" with Douliu Industrial Park Service Center, MOEAIDB, Business Association of Douliu Industrial Park, National Formosa University, National Yunlin University of Science and Technology, and TransWorld University, looking forward to help local industries become more prosperous with a firming interaction and training cooperation.



Pei-Hui Tsai (right), member of the Legislative Yuan visited FIRDI's pilot plant in CIIC on January 4, 2017.

■ Upgrading and Innovation for Outlying Island Food Industry

To provide resources and assistance nearby to outlying island food industry, we have worked with the teams from the central government, research institutes, and private corporations to set up the "Food Industry Development Advisory Service Platform" in Kinmen, Matsu, and Penghu, respectively, and its joint counseling office in 2017. Through those offices, we made 41 factory visits to explore their problems and needs regarding hygiene management and offered technical diagnosis and advice for 41 times.

In addition, we have completed 20 counseling cases, concerning the functional assessment of specialty raw materials of outlying islands, the improvement of key process technologies, the development of new products and others. These 20 cases included the semi-automatic production process for Jinmen Gong sugar, the value-added application of beef-cooking liquid; the semi-automatic production process for Penghu's dried squid, cactus chocolate, oyster crisp, and cactus popcorn ball; and Matsu's red fermented chicken cuisine package, old-wine chicken soup, red koji pastry, wakame sauce, and so on.

Moreover, we held 6 regulatory advocacy seminars or food manufacturing workshops, 3 forums for local manufacturers and associations in the outlying islands, and assisting the promotion of 4 specialty

product exhibitions. In addition, we have completed 15 counseling services on industrial land projects for specialty industry through the Land Professional Team.

■ Guidance on Upgrading of Food Industry

Through common problems of the prepared food industrial chain at all stages, we introduced value-addition technologies into the key industrial process, such as safety control of raw materials and products, process optimization, and product innovation and development to establish core technology platform for technology/product innovation and value-addition of the prepared food industry, guiding its upgrading and transformation.

We analyzed and evaluated plant environment and production stages to improve process hygiene and safety. Well-done thermal processing technology was established, novel high efficiency thermal processing technology was introduced, thermal sterilization process was optimized, and non-thermal processing technology was applied to develop high quality chilled prepared foods and fruit juice beverage, shelf-stable aseptic packaged "Lu wei", and healthy snack foods. Finally, we assisted the industry in setting relevant quality specifications for new products, and so on.

In 2017, we have assisted the industry in developing new products, improving process quality, and applying



The inauguration ceremony of "Joint Counseling Office for Matsu Industries" was held in Matsu on October 28, 2017.



Drunken chicken leg prepared with aged Matsu Anka wine

suitable packaging materials. Products such as pumpkin cake, almond-brown rice cake, koji-drinks, cupped low acidity drinks for room temperature circulation, grain nut snacks and others were developed.



Koji fermented/formulated rice yoghurt beverage

● Counseling on Good Hygiene Practice for Food Factories

In 2017, we conducted guidance on raw material supply chain, technical consulting and diagnosis, and traceability guidance 449 times for 360 food factories, helping the upgrading and transformation of 41 factories. The counseling included raw material supply chain management, process rationalization, mechanization and labor-saving, product problem solving and suggestion for prevention, hygiene of local specialty products, increasing added value and yield rate, and reducing annual loss, and so on.

In response to the internationalization and promotion of food industry export, we held 19 classes of food factory operating practices related technical training to assist the food industry to establish and implement good hygiene practice and process management, improving its quality assurance capacity.

● Food Quality Assurance Services

Establishing Food Protection Systems for Food Factories

To strengthen and expand food industry's export capability and connect with the international market,

FIRDI developed "Food Protection System" which is funded by the Industrial Development Bureau. This System is based on risk prevention and incorporates aspects of Food Safety (FS), Food Defense (FD), Food Fraud (FF) and Food Quality (FQ). In 2017 the FIRDI provided assistance service to 50 factories to implement Food Protection Plan by using Food Protection Plan Builder, the first user-friendly computer platform integrated with technical information including potential hazards of ingredients/materials and risk-based analysis. An expert on Preventive Controls for Human Food was also invited to perform mock audit and shared insights of FSMA regulations.

Regarding the common export issues, five guidance documents including United States food labeling, reduce food recall, voluntary incidental trace allergen labelling (VITAL), *Listeria monocytogenes* control and validation, and United States import alert system were composed to optimise business management environment.



U.S. Experts visited food factories for mock audit on food protection

Guidance on Quality Assurance

Hygiene management and counseling for canned foods:

In the project of hygiene and safety management of thermal processed foods packaged in hermetically sealed containers consigned by the Ministry of Health and Welfare, 67 food safety regulatory systems were set up under the guidance of the "Guidelines for Food Safety Control Systems" to guide canned food manufacturers to establish a food safety control system; and counseling 13 low-water activity container sauce manufacturers. At the same time, briefing sessions on US export regulations and manufacturers of thermally processed foods packaged in hermetically sealed containers and seed training courses of canned food hygiene unit staff for inspectors were held.

Guidelines for catering providers to implement food safety self-control system:

In 2017, we

conducted HACCP inspections on 105 hotels, schools, medical institutions, sales stores, central kitchens, and restaurants, and offered 2 audit consensus camps and 1 hygiene seminar. In addition, we also amend the application notices of HACCP inspections for general catering providers.

Promotion and Guidance Regarding the Food Traceability System

In 2017, we have aided 263 manufacturers of edible vinegar, soy products, and other foods with registered factories to establish their own traceability systems. Moreover, we held meetings with experts and scholars, offered consensus camps for health authorities, and hosted explanation sessions and tutorial classes of electronic upload operation (including practice) for the industry in a hope to help them establish their own food traceability systems.



Real-time practice on the electronic upload operation of food traceability systems

Food Industry Analysis and Knowledge Services

Analysis of Food Industry Trends

With the support of the projects of the Ministry of Economic Affairs, the Council of Agriculture, the Ministry of Health and Welfare, and the Board of Science and Technology of the Executive Yuan, several food industry development surveys and analyses were completed, and exchanges and services with external parties were implemented via various ways, mainly as follows:

Food Market News Update: Information was collected on policies and regulations that affect domestic and export sales of local food products, new products and technologies, as well as food product consumption and market development trends. News on market trends were updated monthly. The food industry knowledge database and the theme community's information on market development trends and analyses were continuously updated.

Publication of "2017 Food Industry Annual": This publication covers information on foreign food industries, global economic environment changes, as well as the overview, development trends, policy changes, and enterprise news of Taiwan's main food product industries. The food industry's clean labeling, smart manufacturing and other trends that are of interest to all industries were also analyzed.

Publication of "2017 Almanac of Food Consumption Survey in Taiwan": This publication covers basic information on consumers in the Taiwan region aged 15-80, overview of channel use, personal eating habits and needs, and consumption of various food products, providing information on the consumption characteristics and behaviors of various agricultural products and processed foods by current Taiwanese consumers.

Expansion of information services and sharing: All information was disseminated and shared to external parties via publications, online articles,

emails, seminars, sharing sessions, and conferences. The food industry knowledge database and theme community membership system, ITIS Intelligence Network continued to be promoted, to provide members or community members with first-hand information and trends.

Food Industry Surveys and Research

Taiwan's local industries, including the dairy market, pork supply chain, Hualien and Taitung's specialty agricultural products, promotions of processed fruits and vegetables etc., as well as Taiwanese elders' dietary needs and demands for convenient meals etc. were examined. In addition, prospective trend reports and cross-agency emerging research topics were published, including biodegradable materials, industrial robotic arms, circular economy, smart retail, the Southeast Asian food industry environment, and overviews of industry chain statuses etc. Fast and insightful observations on industry developments were provided through industry breaking news and industry appraisals, with a strong grasp of the global food industry market and regulatory developments.

Food Industry Knowledge Services

Customized market research was conducted to meet the needs of the industry, including market research on the ASEAN food industry etc. 5 market analysis and industry innovation seminars were held and 9 sessions of keynote addresses or consultancy services on relevant industry innovation trend analyses etc. for food associations and manufacturers were provided to assist the government and the industry to grasp relevant industry information in a timely manner. In addition, several information analyses, forums, industrial Collaboration Summits etc. on the food industry international export environment and business opportunities were completed. This is beneficial to the expansion of the collaboration space and business opportunities between Taiwan and ASEAN countries.



GC/MS/MS-for hazardous substance analysis – pesticide residues, veterinary drug residues and others



Contract Analysis and Service Window

Optimizing Service Scope

Dual Accreditation of the Analysis Research and Service Center

The Analysis Research and Service Center (ARSC) of FIRDI is an ISO 17025 accredited food testing laboratory that provides inspection services which complies with the requirements of international standards. ARSC has been granted 496 accredited testing items from the Taiwan Food and Drug Administration (TFDA) and 538 accreditations from the Taiwan Accreditation Foundation (TAF). The newly accredited items acquired in 2017 include nitrite and sweeteners (acesulfame potassium, dulcin) and others.

TFDA Accredited Testing Laboratory for Medicals and Cosmetics

To expand consignment services, ARCS passed the accreditation to become the TFDA testing laboratory for medicals and cosmetics in 2017. The accredited testing items include aerobic plate counts, *Escherichia coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* in cosmetics.

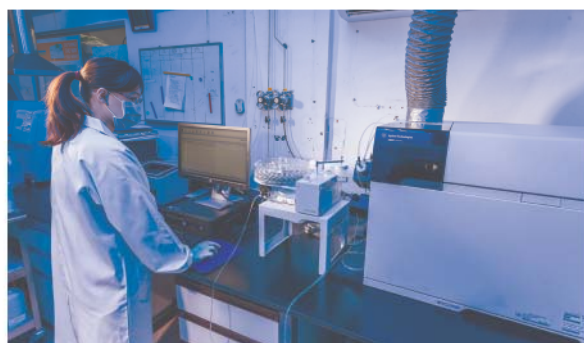
● Enhancing Professional Image

International Accredited and Registered Testing Laboratory

To enhance product export, FIRDI has actively strived to become an accredited testing laboratory registered in multi-nations. The Institute currently holds accreditations from various countries and regions: the Export Public Inspection System certificate for 492 items issued by Japan's Ministry of Health, Labour and Welfare; fishery product inspection certificate for 17 items issued by the European Union; drink, vinegar, and wine inspection certificate for 21 items issued by Brazil; fresh crop import (including fruits, vegetables, grains, nuts, and tea) inspection certificate for 184 items issued by the Indonesian Agency for Agriculture Research and Development; maleic acid (anhydride) inspection certificate issued by Singapore; and the National Treasury Agency certificate on plasticizers inspection in alcohol exports for 9 items.

Consultation on Laboratory Accreditation

To serve and assist the industry in adhering to the Act Governing Food Safety and Sanitation and the Three-tier Quality Assurance System for Food Safety, FIRDI provided consultation services such as hardware planning and personnel training for companies interested in establishing their self-management laboratories of the first-tier quality assurance that meet international standards. We assist companies hard and strive for becoming a contract laboratory of the industry.



Inductively coupled plasma mass spectrometry-trace elements analysis

● Deepening Inspection Capacity

New Testing Service Items

FIRDI continued to add new testing service items. In 2017, namely, pesticide residues in dairy foods (60 items), pesticide residues in muscle and internal organs of livestock and poultry and poultry products (122 items), glycerol in alcohol, theanine in foods, chlorogenic acid in green coffee, fipronil residues in chicken muscle and eggs, organophosphorous pesticides in sea foods, soluble peptide conversion rate in foods, stigmastadienes in oil, benzoyl peroxide in flour, antibacterial activity of food additives, event specific qualitative and quantitative detection of genetically modified foods. In addition, we also provided full testing service for additive specifications in accordance with the Act Governing Test Methods in Food Additives announced by TFDA. Moreover, in response to the policy "Measures for the Administration of the Registration of Formula Food for Special Medical Use" issued by China, the Institute has established a standard testing method conforming to the national food safety inspection requirements of China to facilitate the export of formula products intended for special medical use to China.

Establishing Adulteration Identification Techniques

Food adulteration identification and rice grade inspection services of FIRDI are unique in Taiwan, such as for fruit juice purity (juice percentage content) and rice grade, as well as rice noodle purity and rice flour purity (corn starch) tests that have been added. In 2017, we continue to accumulate our technical capacity in identifying food adulteration. By integrating equipment such as Elemental Analysis-Isotope Ratio Mass Spectrometry (EA-IRMS) and Gas Chromatography-Ion Mobility Spectrometer (GC-IMS), novel high-value food testing services regarding adulteration can be conducted by examining differences in spectral profiles regarding the ratios of stable isotopes and volatile components in food products. By combining the established databases of volatile flavor

compounds, inorganic elements, and free amino acids with multiple eigenvectors, we have constructed an adulteration detection model for dripped chicken essence products. This model can be used for the identification of commercial chicken essence products with substantial accuracy.

Evaluation on Product Quality and Specifications

This evaluation technique could monitor the quality specifications of specific products. By using the statistical analysis techniques, the main component database was established to identify the difference between products. In concert with data analysis, we could draw up indicators and their reasonable range suitable to be product specifications. The technique can help the industry rapidly assess variation trends of product quality.

Quality Assessment Technique during Storage

Gas chromatograph-ion mobility spectrometer (GC-IMS), chemical analysis techniques, and sensory evaluation were applied to establish the fingerprinting profile database of volatile flavor compounds. Manufacturers can identify the deterioration factors affecting products using the database as the basis for



Analyses of volatile compounds using GC-MS combined with Multifunction Injector

quality improvement during product development and help reduce production time and cost.

Expanding Technical Research

Developing and Maintaining the Food Nutrition Database and the Edible Oil Database in Taiwan

In 2017, the contents of the food composition database were continuously expanded and revised. We also assisted the Ministry of Health and Welfare in maintaining and revising the website databases and replying and dealing with public opinions. In accordance with the policy requirements for nutrition and food sanitation, the Institute also continued developing the edible oil database, which can serve as a reference for authorities in the implementation and amendment of legislation.

Compiling Food Adulteration Data and Establishing the Database

An information platform of food adulteration was created by systematically collecting data and compiling thousands of related researches, investigation reports, and media reports to assist authorities predict and solve problems associated with adulteration, thus reducing the occurrence of such cases. In addition, this database can serve as a reference for establishing food adulteration testing methods. In the future, this database will be released to the public to enable their understanding of the possible fraudulent situation of food, thus alerting the food manufacturers.

Food Additive Specifications Inspection Service

FIRDI is supporting the Ministry of Health and Welfare to develop and validate testing protocols for food additives; such protocols can serve as a reference for manufacturers and government inspectors in ensuring the safe use and management of food additives. Currently, 39 testing protocols have been developed and validated. Moreover, 38 inspection methods for specifications have been compiled and 30 have been

amended. We also provide the full testing services for food additive specifications. These services can help manufacturers in verifying the compliance of their food additives to established standards and in fulfilling self-inspection requirements.

Monitoring Anomalous Substances in Commercial Chinese Herbal Products

The Institute sampled Chinese herbal products and examined the concentrations of underlying anomalous substances such as heavy metals, sulfur dioxide, and aflatoxin. The compliance rate was assessed against current standards to determine abnormal amounts of residues in such products. The examination results can serve as a reference for future monitoring of the sanitation and safety of Chinese herbal products, in addition to serving as a reference for managing and supervising such products.

Monitoring and Early Warning of Pesticide and Heavy Metal Residues in School Lunch Meals and Commercial Food Products

To determine the amounts of pesticide and heavy metal residues in school lunch meals and in products sold on campus such as pork, chicken, eggs, and milk, the Institute monitored and analyzed pesticide and heavy metal (lead, cadmium, arsenic, and mercury)



The flagship real-time gene qualitative and quantitative detection system

residues in samples of fresh livestock and poultry materials collected from school lunch providers in various regions. The results can serve as a reference for authorities to promote the “Five Links of Food Safety” policy, aimed at constructing the monitoring and supply system for safe agricultural products, and control the quality and safety of school lunch meals.

Establishment of Quantitative and Qualitative Techniques for Verifying Adulteration of Fishery Materials

To address a lack of analytical method for cephalopods, the Institute has established quantitative and qualitative techniques for identifying fishery raw materials (e.g., fish, shrimp, cuttlefish, and squid). The techniques can be used in monitoring manufacturing processes and in certifying the quality of products by using marks of “honest label” and “quality agricultural products”. Additionally, the techniques have been used in inspecting fishery products sampled from factories or the market. Such inspections are useful for verifying the quality and identifying adulteration of fishery products, thus preventing the market circulation of products that intentionally substitute low-cost fishery materials for more expensive ones.

Managing New Generation Biotechnology Foods and Monitoring Transport Spillage of GM Grains

The “Management Principle of Biotechnology Foods Derived from Grafting” was drafted for the Ministry of Health and Welfare. The key components of the imported GM and local organic soybeans were also analyzed and compared to provide an objective assessment on the safety of GM soybeans and for post-market monitoring. Furthermore, we assisted the Council of Agriculture in investigating the GM grain spillage during transportation for GM feed management.



The inauguration ceremony of FIRDI as the eligible SQF certification body and training center was held on September 21, 2017.

Several types of certification services of FIRDI were accredited, including CAS accredited by the Council of Agriculture, GHP accredited by the Taiwan Food and Drug Administration, and others that meet the standards of ISO 17021, ISO 17065, and ISO 22003 and accredited by the Taiwan Accreditation Foundation (TAF). These accreditations have made the certification services of FIRDI more in line with international standards on the basis of localization to become an eligible certification body conformed to the ISO regulations. Meanwhile, in 2017 FIRDI has also become the accredited SQF certification body. In order to continue providing best services, we will actively attempt to fulfill qualifications on more certification schemes in the future to provide a more professional and impartial certification services to the food industry.

■ Promotion of Government Certification Programs

Certification for Taiwan Quality Agricultural Products of CAS

In 2017, with regard to assist the Council of Agriculture in promoting the certification system of agricultural products, we have conducted inspections on 89 factories with CAS

certification logo, 176 factory surveillance inspections, and sampled 86 products for testing. To strengthen the sampling of hazardous substances in raw materials (including animal drugs, pesticides, heavy metals, etc.), we have sampled 86 raw materials and assisted 4 factories to improve their product and manufacturing process. Furthermore, we have also conducted 3 on-site inspections, forming an on-site evaluation team to perform certification audit regarding cases of new application for certification, product or modification in production line, and so on. Additionally, we also held a technical committee meeting to review recent technical issues related to certification and also elaborated the revised certification standard draft as the reference for the government authority.

The Quality Seafood Certification System

As for the certification of premium seafood products, In 2017 we have assisted the Fisheries Agencies of the Council of Agriculture conducting a total of 28 seafood processing factories, 70 factory surveillance inspections, and sampling 117 products for testing. Moreover, we supervised the establishment of food safety monitoring plan for factories producing certified products, assisted the analysis and improvement of facilities and manufacturing process, and conducted risk monitoring of raw materials, semi-products, and products. We also held the food safety regulation seminar for seafood industries.

The Alcohol Quality Certification System

In 2017, on behalf of the National Treasury Administration, we have conducted on-site assessment on 3 production lines of 3 new factories, guided 29 factories to participate in certification, and reviewed 19 new product certification cases, with a total of 35 factories, 46 production lines, and a total of 229 alcoholic beverages passed certification. Furthermore, we have also conducted 186 surveillance inspections and sampled 107 certificated alcoholic beverages for testing. Additionally, we helped the Ministry of Finance to amend its "Examination Operation Procedures for Alcohol Quality Certification" and the "Follow-up Inspection and Management Procedures for Alcohol Quality Certification System", and held professional training courses regarding testing techniques and process for alcoholic beverages and others.

Certification for Second-tier Quality Assurance

Certification for second-tier quality assurance is the accreditation/certification operation procedures laid down by the Taiwan Food Drugs Administration based on the Act Governing Food Safety and Sanitation, and executed by civil voluntary mode. Since the recognition of FIRDI as an eligible certification body in June 2016, there have been 93 certified factories for this certification scheme as of the end of 2017. In addition to designated food sector industries (including food additives, canned foods, fats and oils, dairy products, flour, and sugar) announced by the government that are required for mandatory certification, the scheme is also opened to other food sector industries for voluntary registration. The characteristic of this scheme is that the factory does not choose the certification body. Instead, the management platform selects the certification body and notifies the food factory after assignment.

Development of Accreditation/ Certification System for Standardization of Value-addition for Innovative Agricultural Processing Industry

In order to improve hygiene and added value of primary agricultural products, we have established the Taiwan Good Agricultural Practices (TGAP) for 7 processed agricultural products, including jam, dried fruits and vegetables, vacuum packaging and sterilization products, packaging and circulation of fruits and vegetables, fresh sliced fruits and vegetables, frozen fruits and vegetables, and pickled fruits and vegetables. We also held 2 sessions of professional meetings regarding this issue to review regulatory structure and lay down direction, and verify the manufacturing process and safety standards of each category. Furthermore, we also constructed standard procedures for HALAL and TGAP certification and held a seminar on the development trend of agricultural products in Southeast Asia and TGAP agricultural products to make the industry understand the potential market and requirements.

Voluntary Certification Services SQF Certification Service

FIRDI has gained approval as the international SQF certification body with recognized certification scheme of GFSI. Through the SQF certification service, FIRDI assisted

the quality assurance system of the food industry to keep pace with international trends. In 2017, there have been 5 factories gained the SQF certificate, including oil factories, dairy product factories, and flavoring sauce factories. The certified factories not only has fulfilled the requirements for manufacturing and quality management of national standards, but also are comparable with the international quality assurance system for the food industry, which is an important strategy to gain the consumer's trust.



In 2017, FIRDI became SQFI licensed certification body.

Taiwan Quality Food Certification

Taiwan Quality Food (TQF) certification service is transformed from GMP food certification system. Since the transformation, we have offered certification services to 204 production lines and 128 factories. The certified items of labeled and non-labeled products have reached more than 3,000 which include industry categories of beverage, oil, dairy, soy sauce, edible ice, soybean processing, frozen food, canned food, flavoring sauce, meat processing, chilled prepared food, alcoholic beverage, food additives, and functional foods with a total of 14 types. This service has conformed to the international certification standards. FIRDI will actively be in line with other international standards to facilitate the domestic food industry overcome export barriers.

ISO 22000 Certification Service

Since 2010, FIRDI has become the certification body for food safety management system. Currently, the certification scope covers a large portion of food manufacturers and will continually be expanded to those manufacturing and processing enterprises in the food supply chain. In 2017, there have been a total of 32 factories gained the certificate. ISO 22000 is one of the schemes of the ISO organization to standardize the integrated management system for the food industry which includes HACCP principles. It is expected to provide full guarantee for food safety and can be used as a reference for constructing various schemes around the world.



Product project manager training

Professional Training and Education

In 2017, 217 classes were offered with 6,329 trainees. In order to continue improving the quality of professional training services, FIRDI took assessment of its Talent Quality-management System (TTQS) and won the Silver Medal for TTQS Training Organization Version in 2017. FIRDI also became a licensed SQF Training Center for the expansion of its international training business in September 2017.

Training for industry self-management and food protection: FIRDI conducted projects consigned by the Industry Development Bureau (IDB) to strengthen the food industry personnel's professional competency, which included (1) improving the self-management system of the food industry and establishing professional capabilities by offering a total of 19 self-management courses with 545 trainees; (2) assisting the introduction of a comprehensive food protection mechanism to the food industry and responding to requirements of the Food Safety Modernization Act (FSMA) by offering a total of 22 food safety and food safety related technical courses with 449 trainees; and (3) hosting 3 international conferences with 308 participants. Conference topics included content of GFSI, food protection guidelines, FSMA authorized third party certification and Foreign

Supplier Verification Programs (FSVP), as well as Food Safety Preventive Controls Alliance (FSPCA) expert's sharing on FSMA practices and food protection to enhance the ability of Taiwan's industry to respond to international trends in food safety management and expand global market.

Food hygiene auditing training: Consigned projects from the Taiwan Food and Drug Administration (TFDA) were executed to train hygiene inspectors from local health bureaus across the country to strengthen the capability of the first-line inspectors. In 2017, 34 classes were offered with 1,274 trainees.

Internationalized training program: International accredited programs were introduced and offered to assist the food industry to be in line with global management systems and respond to FSMA's



The FIRDI Academy won the Silver Medal for TTQS Training Organization Version in December 2017.

impact on Taiwan's food industry. The lecturers of the Institute obtained the qualifications of professional training instructors accredited by the Safe Quality Food Institute (SQFI) and the Food Safety Preventive Controls Alliance (FSPCA). In 2017, one international course of "Introduction of SQF System" and one course of "Preventive Controls Qualified Individual (PCQI)" were offered.

Food safety and regulation training: In addition to HACCP courses, related personnel continued education and training courses, and domestic food regulation courses, FIRDI also offered series of international food regulation courses specifically for the export industry, including Codex, food management regulations and trends in the US, China, Southeast Asia regions, and Halal certification to assist the industry in grasping the pulse of international regulations and expanding business opportunities. Online mini-courses were produced to help personnel of outlying islands and mini-enterprises enhance their professional skills. FIRDI also took root in food safety education by hosting food safety summer camps for senior high school students to help them learn about the correct knowledge of food safety and implement it in their daily life through courses, practices, visits, and other activities.

Qualification Assessment for Food Industry Talents

In 2017, FIRDI held qualification assessment of "Food Quality Assurance Engineer" and "Health

Food Engineers" for food industry talent. The former certification was issued by the Ministry of Economic Affairs (MOEA), and the latter was issued jointly by FIRDI and the Health Food Society of Taiwan. The assessment was approved by the iPAS program of the Industrial Development Bureau of MOEA. In 2017, 6 assessments were held on 44 examination sites in 97 test rooms with 7,347 applicants. In total, 421 "MOEA Certified Food Quality Assurance Associate", 14 "MOEA Certified Food Quality Assurance Specialist", 666 "Professional Health Food Engineer-Entry Level", and 2 "Professional Health Food Engineer-Intermediate Level" were certified. Throughout the year, we have provided more than 1,000 professional talents for jobs related to food quality assurance and research and development of health food in the food industry.

In 2017, follow-up surveys were conducted on the certified applicants. According to the survey of 1,566 certified applicants, 95.9% of the certified graduates were successfully employed. Twenty six percent of the certified employees got pay raise or received open encouragement and higher performance rating. FIRDI also worked with the Taiwan Food Association in offering two courses of "Assessment Training for Associate Food Quality Assurance Engineers", with the aim to enlarge training capacity and nurturing professionals in different functions based on industry needs.



Training for culture activation and preservation



Microbiological testing class

Refurbishment of R&D Fields

FIRDI has been refitting its old laboratories, offices, public spaces, and walkways since 2014 and has completed the following projects by the end of October 2017:

Service building: Auditorium and the FIRDI Academy on the fourth floor; Zengtong Memorial Library and Economic Analysis Unit office on the third floor; conference room on the second floor; lobby, reception room, and exhibition space on the first floor.

Bio-resources building: The Microbiological Testing Laboratory of the Analysis Research and Service Center on the seventh floor; the Fungus Sterile Operating Laboratory on the sixth floor; the Radio Frequency Dryer Laboratory on the fourth floor; the Sterile Culture Operation and Environmental Control Laboratory on the second floor; the canning pilot plant and the external service window and display space of the Bioresource Collection and Research Center (BCRC) on the first floor.

Research building: Conference room, the FIRDI Academy, the Certification Service Center, and the



- | | | | |
|---|---|---|---|
| 1 | 4 | 1.Reception area on the first floor of the Service Building | 4.Bronze statue of Mr. Cheng-Yuan Hsieh on the first floor of the Research Building |
| 2 | 5 | 2.Public space on the first floor of the Service Building | 5.Refit of main gate of the Service Building |
| 3 | 6 | 3.Corridor on the first floor of the Research Building | 6.Display space on the first-floor lobby of the Bio-resources Building |

Technical Service and Extension Center on the third floor; the Production and Process Research Center, the Technical Service and Extension Center on the second floor; the contract test service window of the Analysis Research and Service Center, the Southern Taiwan Service Center Office and the Canning Unit, the bronze statue of Mr. Cheng-Yuan Hsieh, the lobby, conference room, clinic, the General-affairs Unit on the first floor.

General Assembly for Celebration of FIRDI's 50th Anniversary

FIRDI celebrated its 50th founding anniversary on November 1, 2017. President Ing-Wen Tsai extended on a plaque her congratulatory message "Forward-looking and in pursuit of Excellence". Held in the Auditorium of the Service Building was a General Assembly, attending to which were more than 100 VIPs from the industry, the government, academia, research institutes, associations and FIRDI.

Tien-Tzu Wu, Chairman of the Board of FIRDI, thanked the industry, the government, the academia, and the research institutes for their support to FIRDI. He also

encouraged and expected that FIRDI would lead the food industry for the next 50 years to create a new era for the industry, based on the solid foundation built by previous chairmen of the board, director-generals and colleagues. Subsequently, Director-General Chii-Cherng Liao revealed FIRDI's future R&D directions for food innovation, food biotechnology, and food safety and expected that FIRDI would focus its efforts on five major businesses, namely research, inspection, training, certification, and counseling so as to become a positive and leading force to support and enhance the sustainable development of the food industry.

FIRDI also received a lot of blessing and encouragement from guests. Zhao-Zhong Guo, Senior Technical Specialist from the Minister of Economic Affairs, wished FIRDI, on behalf of Minister Rong-Jin Shen, a permanent



VIP guests and FIRDI supervisors attended FIRDI's General Assembly and witnessed FIRDI's 50th Anniversary Ceremony on November 1, 2017.



The unveiling ceremony of "Innovation and Inheritance to Recall the Founder, the Inauguration of the Bronze Statue of Mr. Cheng-Yuan Hsieh" was held on the first-floor lobby of the Research Building on November 1, 2017.

leader in the food industry. Jian-Bin Chen, Director-General of the Agriculture and Food Agency, Council of Agriculture, confirmed the value-added contributions of FIRDI to Taiwan's agricultural products. Shou-Mei Wu, Director-General of the Food and Drug Administration, congratulated FIRDI a happy birthday and wished FIRDI to fulfill its vision for food safety for the next 50 years. Guan-Han Chen, Chairman of the Cannery Association, wished FIRDI to come forward again for the food industry. Ter-Fung Tsao, Chairman of the Standard Foods Taiwan Ltd., expressed his reliance on and trust in the professional value of FIRDI. Meng-Zhang Hsieh, Chairman of the Synmax Biochemical Co., thanked FIRDI for its remarkable achievements and contributions to the food industry in the past 50 years. Lucy Sun Huang, adjunct professor of the Institute of Food Science and Technology, National Taiwan University, affirmed the role of FIRDI in filling the gap between the food industry and the academia. Been-Huang Chiang, distinguished professor of the Institute of Food Science and Technology, National Taiwan University, believed that the profession and earnest of FIRDI's staff can carry forward the cause pioneered by its predecessors and forge ahead into the future. Then, VIP guests attending the 50th anniversary ceremony jointly turned on the signboard with "FIRDI 50 to Lead the New Era of the Food Industry" for this important ceremony.

On the day of celebration, a ceremony of "Innovation and Inheritance to Recall the Founder, the Inauguration of the Bronze Statue of Mr. Cheng-Yuan Hsieh" was held in the lobby of the newly renovated Research Building. FIRDI Chairman Tien-Tzu Wu, FIRDI Director-General Chii-Cherng Liao, Chairman Guan-Han Chen of the Cannery Association, and President Meng-Zhang Hsieh, family representative of Cheng-Yuan Hsieh attended and co-chaired the inauguration ceremony.

Special Issue for Celebration of FIRDI's 50th Anniversary

To celebrate FIRDI's 50th founding anniversary, a special issue has been compiled. It contains more than 50 major businesses, key technologies, and commercialized products that FIRDI has developed. Significant changes in organization, personnel, facilities, new technologies, and new products over the past 50 years matched with the political, economic, and industrial trends at the time of their occurrence were transformed into "The 50-year Historical Development Chart of FIRDI" and published in the special issue.

Major Key Businesses

Mainly included are the development of the canning business, research and development of food packaging, research and development of flavor technology, the development of small-scale food processing in rural areas, research and development of edible oils and fats technology and the setup of oils and fats pilot plants, investment in research and development of aseptic processing technology, establishment of a culture collection center to enter the field of bio-resources, promotion of food accreditation and certification systems, the development of inspection business, development of food professional training, investment into analysis of the food industry, promotion of counseling services to outlying islands and local industries, expansion of overseas cooperation and exchanges, assistance to the government for laying down and promoting policies and regulations.

Major Key Technologies

Advancement of traditional technologies:

Included are technologies for edible oils and fats, canning, post-harvest handling, leafy vegetables processing, and value-added technologies to make traditional meat healthful and convenient to use.

Introduction of emerging technologies: Included are health food design and development platform, non-thermal processing, emerging thermal processing, food modification, design and development of small capacity aseptic filling system, the development of healthful food ingredients, and innovative service platform.

Science and technology of food safety: Included are non-targeted analysis, food hurdle preservation, microbial control, hygiene design and testing laboratory accredited by EHEDG, the establishment of food safety and protection mechanisms.

Science and technology of bio-resources: Included are the preservation of diverse bio-resources, traditional and pioneering culture identification, utilization of cell and stem cell resources, genome decoding and functional mining, modernization of traditional fermented products, strain improvement and evaluation and value-addition of bio-activity, product design for microbial ingredients, fermentation process and scale-up production.

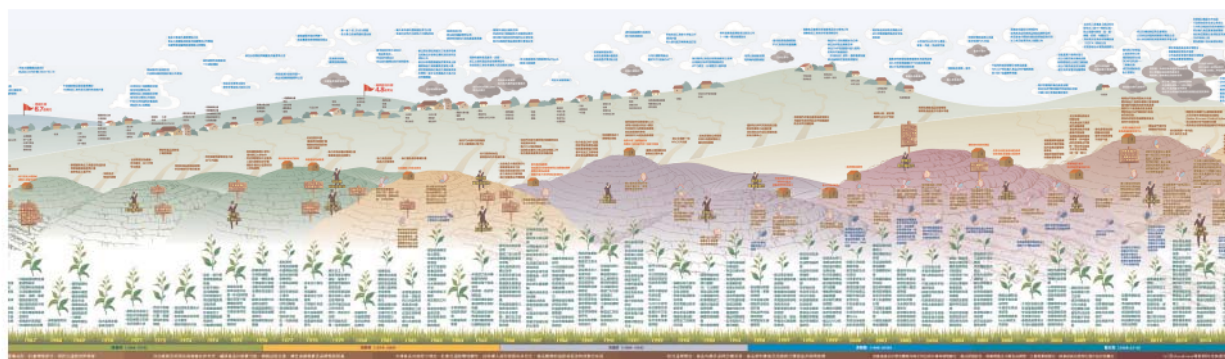
Major Commercialized Products

Mainly included are functional oils and fats, key raw



Congratulatory message from President Ing-Wen Tsai to encourage FIRDI for its 50th Anniversary

materials of texturized vegetable protein, pickle products for room temperature circulation, fresh potato chip snack, whole fruits and vegetables juices, functional agricultural, seafood, and livestock products, dietary supplement drinks, nutritional formula products, aseptic processing products, microwave frying machine, hot-filling machine, non-thermal processing products, serial products derived from healthy meal service, reconstituted multi-grains products, and bio-resources products developed from modernization of fermented sweet rice wine, *Acetobacter* spp., red koji, diversified lactic acid bacteria, and agricultural microorganisms.



The 50-year Historical Development Chart of FIRDI

Gift Box for Celebration of FIRDl's 50th Anniversary

To convey the idea that FIRDl was originally founded with the development of the canning industry in Taiwan, to express our gratitude to all sectors, to demonstrate our consistent dedication to the future of the food industry, and to signify FIRDl's strength to navigate freely into the future, we have designed our 50th anniversary gift box into a 3-in-1 gift set. The first gift is a timer made of low-acid can, meaning FIRDl insists on its mission, professionalism, and intention to serve the food industry as always; the second gift is a portable jug also made of low-acid can, showing our gratitude towards the long-term encouragement and support from all walks of life; and the third gift is an Easy Card specially crafted for FIRDl's 50th anniversary to expect and encourage FIRDl to work with all walks of life in the future to gain a foothold in Taiwan and march around the world.

Luncheon for Celebration of FIRDl's 50th Anniversary

FIRDl meticulously planned luncheon for celebration of FIRDl's 50th anniversary. Twelve exquisite and unique courses with ingredients mainly derived from the results of technical transfer and counseling in the past years were served and highly praised.

Appetizers: Included are microwave combined with hot-air-dried Penghu small fish, drunk chicken of Matsu aged wine prepared by modern fermentation technology, Taiwan's first non-additive pickle products circulated at room temperature, vegetable barbecued pork analog and vegetable eel analog prepared by twin screw extrusion technology, and salad prepared with CAS freshly-cut vegetables.

Main courses: Raw materials include phosphate free meatballs, quality *Pleurotus eryngii* produced with modern cultivation techniques, red yeast rice developed with pure culture technology introduced by FIRDl to the Matsu manufacturers, black garlic

developed with maturation technology in Kimen manufacturers counseled by FIRDl, Penghu gold bonito that has won the Elder-friendly Food Award, and 100% pure rice noodles from industrialized production.

Desserts and beverages: Included are cheesecake prepared by ohmic heating steamer and cooker, fermented glutinous rice dumpling prepared with the first Taiwanese sweet fermented rice product circulated at room temperature, Matsu aged wine made from quality *Monascus anka* starter, health vinegar rich in anthocyanins and organic acids, and non-thermal processing watermelon milk drink produce by membrane filtration technology.



The FIRDl's 50th anniversary gift box contains a can-shaped timer, a portable jug, and a specially crafted Easy Card marked with FIRDl 50.



Aerial walkway on the second floor of the Service Building.

■ FIRDI Became an International SQF Certification Body and Training Center

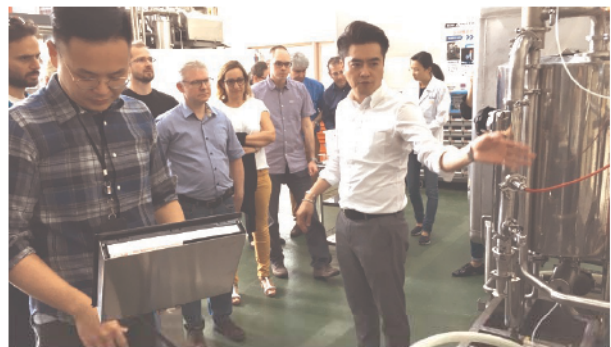
Complying with the standards of the Global Safe Quality Food Initiative (SQFI), FIRDI has become a SQF certification body and training center since September 2017. SQF is the most comprehensive and strict Safe Quality Food (SQF) management system in the world. Through its own independent efforts, the Certification Service Center of FIRDI has become the accredited SQF certification body in Taiwan. All of our lecturers are qualified professional instructors with SQFI accreditation. In 2017, FIRDI conducted an international course of "Introduction of SQF System" to help the food industry understand the relevant regulations and international market trends. In the future, FIRDI will actively assist domestic food manufacturers to obtain SQF certification, conform to international standards, and explore the global market.



On September 21, 2017, the inauguration ceremony for the Certification Service Center of FIRDI as the eligible SQF certification body was held and the first batch of food manufacturers certified by FIRDI was granted SQF certificates in Taiwan. Robert Garfield, Senior Vice President of SQF US Headquarters; LeAnn Chuboff, Senior Technical Director of SQF US Headquarters; and Bill McBride, Representative of Asia Pacific Region were invited to the event and offered congratulations.

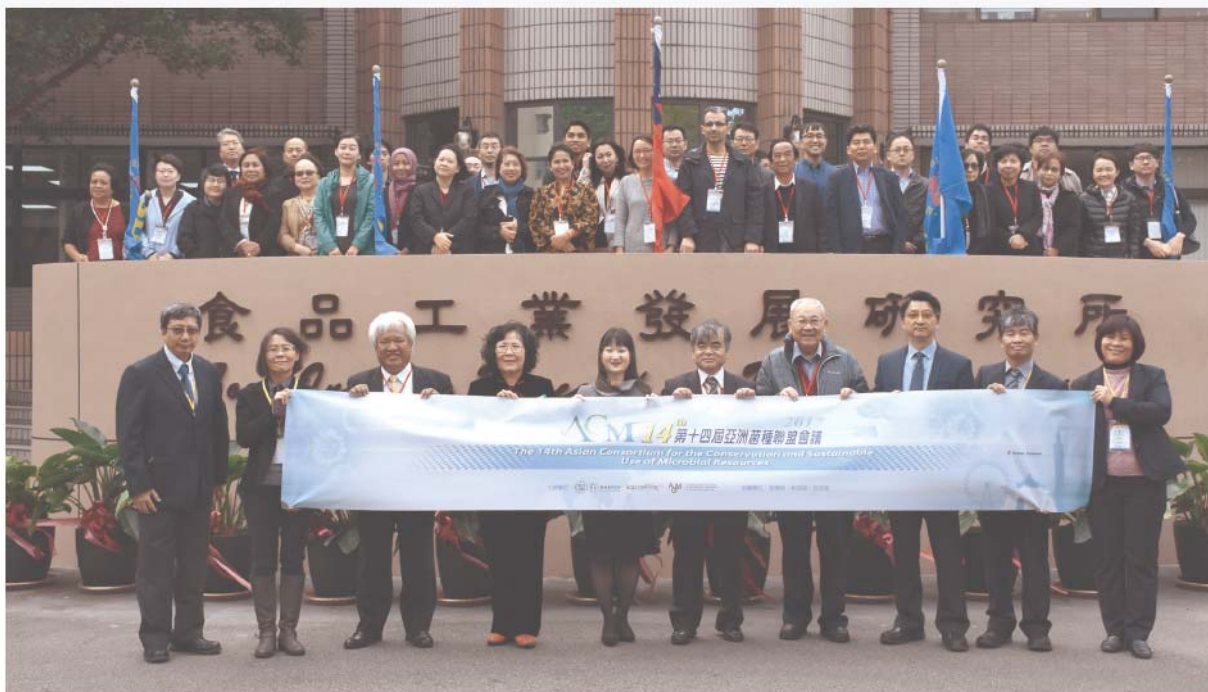
■ FIRDI Became an EHEDG Accredited Testing Laboratory

FIRDI has joined the EHEDG (European Hygienic Engineering Design Group) as an institute member since 2009. FIRDI has actively assisted the food machinery industry in promoting the hygienic design to meet international regulations and standards. In 2013, a testing and verification platform of cleanliness for food machinery component and module cleaning was established in the Chiayi Industry Innovation



1. The inauguration ceremony of FIRDI as the eligible SQF certification body and training center was held on September 21, 2017.
2. The first batch of SQF certified food manufacturers in Taiwan, including Standard Foods Taiwan Ltd. and Haw-Di-I Foods Co., Ltd., was awarded certificates on September 21, 2017.
- 3-4. EHEDG authorized experts from abroad verified the cultivation of microorganism and evaluated the cleaning testing ability.

1	3
2	4



Members attending the ACM 14 annual meeting visited FIRD on December 6, 2017.

Center. In May 2015, we became the ISO 17025 certified Hygienic Design and Testing Laboratory.

In November 2017, the Hygienic Design and Testing Laboratory of the Chiayi Industry Innovation Center passed the evaluation of a total of 10 leaders from the EHEDG authorized testing laboratories of England, Germany, Spain, France, United States, Italy, and Denmark to become the first Authorized Testing Laboratory (ATL) accredited by EHEDG in Asia. Thus, FIRD will be able to issue "EHEDG Certificate of Compliance" for the key food machinery and components in Asia to add value for equipment and products, increase the international competitiveness for food producers and equipment manufacturers in Taiwan, and undertake the certification service for food machinery equipment in Asia.

BCRC Successfully Held the ACM14 Annual Meeting

After joining the Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM) in 2016 as a member, BCRC hosted

the 14th annual meeting of ACM with related conferences and activities on December 4-6, 2017, which was supported by MOEA, MOST, and MOFA.

On day one, the conference on "The International Microbial Sustainable Use" was held at the International Convention Center of the National Taiwan University Hospital (NTUH), Taipei with more than 150 participants from ACM members, life scientists and microbiologists from around the world. The event included special talks from international and national experts, including Dr. Ipek Kurthböke, the president of WFCC; Dr. Shung-Chang Jong, International Affairs Specialist of ATCC; Dr. Wen-Hsiung Li and Dr. Chiu-Chung Young from Academia Sinica, etc. On the second and the third day, ACM Taskforce and General Assembly was held at FIRD with contents of topical forum on "International Standardization Trends of the Bio-resources Center Management", country member reports, and annual work reports of task forces, etc.

The annual meeting has attracted the participation of a total of 42 foreign scholars from 11 member countries and 16 ACM member organizations, including the directors, culture managers and various

culture experts from a variety of culture collection centers, covering the vast majority of important ones in Asia. The participation was enthusiastic and the meeting was highly appraised. The successful organization of this event will be very helpful for FIRDI's participation in the discussion of issues such as the distribution, management, rights, and security of microbial resources in the Asian region, as well as extremely important for the protection and use of national resources. In the future, Taiwan will be able to promote the southward and internationalization of the industry through the linkage between BCRC and the international bio-resources centers.

Promotion of Overseas Cooperation and Exchange

Taiwan-Thailand Industry Docking Summit Forum

In line with the New Southbound Policy, FIRDI planned and hosted the "2017 Taiwan-Thailand Industry Docking Summit Forum" on 27 July, 2017 grandly opened in Bangkok, Thailand. Under the guidance of the Industrial Development Bureau of the Ministry of Economic Affairs and sponsored by the Chinese National Federation of Industries (CNFI), this forum was highly valued and jointly promoted by all the sectors in Taiwan and Thailand. Rock Hsu, Chairman of the CNFI, led 180 delegates from Taiwan to attend this Forum. More than 600 delegates from Taiwan and Thailand

took part to discuss possible modes of physical industry docking and multiple innovation cooperation between "Thailand 4.0" and Taiwan's "5+2 Industrial Innovation Plan". A total of 14 memorandums of cooperation were signed by industrial representatives of both countries, opening a new relationship for close cooperation between Taiwan and Thailand in the future.

This Forum focused on the actual links of five major industries, including food biotech, textile, cultural creativity, intelligent machinery, and information services, whose co-sponsors were thus FIRDI, the Biomedical Group, the Taiwan Textile Research Institute (TTRI), the Cultural Creation Center, the Industrial Technology Research Institute (ITRI), and the Institute for Information Industry (III), respectively. Each of them was also responsible for promoting cooperation with the respective industrial agencies in Thailand to explore business opportunities. All our expert representatives were actively engaged in sharing experiences and cooperation ideas and matchmaking enterprises for relevant activities and business opportunities.

Taiwan-Indonesia and Taiwan-Malaysia Industry Docking Summit Forum

In March 2017, held in Kaohsiung was the "Taiwan-Indonesia Industry Chain Summit 2017", in which FIRDI was responsible for the food biotechnology sub-forum to which Indonesian representatives from the industry, the government, academia, and research institutes were invited to fully and pragmatically communicate



FIRDI planned and hosted the "2017 Taiwan-Thailand Industry Docking Summit Forum" in Bangkok, Thailand in July 2017.



1
2 | 3

1.FIRDI hosted the "2017 Taiwan-Indonesia Industry Docking Summit Forum-Food Biotechnology Sub-forum" in Kaohsiung in March 2017.

2-3.FIRDI co-hosted the "2017 Taiwan-Malaysia Industry Docking Summit Forum-Food Biotechnology Sub-forum" in Taichung in October 2017.

with the domestic industry on such topics as competitive advantages of their own respective resources, characteristic capabilities, and business opportunities for cooperation. In October of the same year, the "2017 Taiwan-Malaysia Industry Docking Summit Forum" was held in Taichung, in which FIRDI was responsible for the forum of food, medicine, and cosmetics industries, to which more than 170 Malaysian and Taiwanese representatives from the food-biotech and cosmetics industries were invited to share, interact and talk over the relevant issues.

Certification for ISO/IEC 27001: 2013 Information Security Management System

In order to establish an information security management system and implement various control

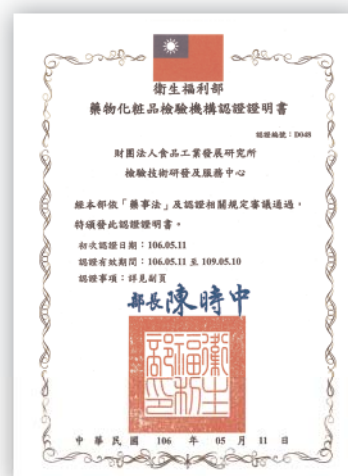
measures, enhance the functions of information security administrators, manage effectively information security and risk, and assist in promoting C-level work items required by the Department of Industrial Technology (DoIT) of the Ministry of Economic Affairs, FIRDI started in August 2016 to set up the procedures in accordance with the rules of ISO / IEC 27001:2013 system for its own administration systems, accounting general ledger systems, contract analysis systems, external service systems, electronic document systems, other inbound service systems, SQL databases, equipment hosting management, and internet services. FIRDI has also organized its own Information Security Committee to implement information security management. Passing the system certification in October 2017, FIRDI has since entered a new milestone in information security management.

Awards and Certifications Obtained in 2017

- Passing the accreditation of the Taiwan Food and Drug Administration (TFDA) of the Ministry of Health and Welfare, FIRDI was an approved certification body for medicals and cosmetics on May 11, 2017.
- The FIRDI Academy continued improving its quality of professional training services. It passed the qualification tests held by the Workforce Development Agency of the Ministry of Labor for the Corporate Training Version of the Talent Quality-management System (TTQS) and won the Silver Medal on December 5, 2017.
- FIRDI became the international SQF certification body and training center. The opening ceremony was held on September 21, 2017.
- On October 7, 2017, FIRDI passed the certification of the ISO/IEC 27001:2013 Information Security Management System.
- The "Hygienic Design Test and Certification Laboratory" set up at Chiayi Industry Innovation and Research Center, MOEA passed the qualification tests held in December 2017 and has since become the first EHEDG accredited hygiene design and testing laboratory in Asia.
- FIRDI's winner list for awards conferred by the Taiwan Association for Food Science and Technology in 2017: Chairman Tien-Tzu Wu won the "Special Contribution to Taiwan's Food Industry Award", Director-General Chii-Cherng Liao won the "Professor Stephen S. Chang's Outstanding Achievement in Food Science and Technology Award", Research Scientist Bai-Hong Wu won the "Food Science and Technology Research and Development Achievement Award", Research Scientist Joon-Hsun Huang won the "Mrs. Lien-Chen Chiang Hsu's Food Science and Technology Research Award", and Technologist Ming-Yuan Guo and Technologist Xiao-Si Yang were awarded the "Extension and Service Achievement Award". All of them received their recognition at the Annual General Assembly held in Kaohsiung on December 1, 2017.
- FIRDI's R&D and Service Team for Microbial Identification was awarded the "Mr. Cheng-Yuan Hsieh Special Contribution Award" by Mr. Hsieh Cheng-Yuan Food Technology Development Foundation and FIRDI's Food Clean-labeling Promotion Team won the "Mr. Chung-Pi Hsieh Innovation Award".



The awarding ceremony for ISO/IEC 27001:2013 certification was held at FIRDI on October 7, 2017.



FIRDI passed the accreditation to become the TFDA testing laboratory for medicals and cosmetics in 2017

1

01/07

Having developed phosphate free meatballs, FIRDI transferred the technology to Hua Pin Co. Ltd. and hosted a seminar for the product launch.



3

03/02

Miss Nisakorn Jungjaroentharn, Deputy Permanent Secretary of the Ministry of Industry of Thailand, led 23 delegates from Thailand food industry to visit FIRDI.



03/22

FIRDI held "2017 Announcement on Research Achievements and Performance" and "Explanation Meeting on Cooperation Projects with Industrial Partners".



03/29

A group of 4 guests, including Dr. Rindit Pambayun, Chairman of the Indonesian Food Science and Technology Association and Mr. Umar Habson, Director of Center for Agro-Based Industry, visited FIRDI and Dr. Rindit Pambayun delivered a keynote speech.



03/31

A group of 6 guests from Thailand, including Mr. Saknarong Siripornna Rajasima, Executive Advisor of the National Food Institute, and Ms. Namporn ananthaweewat, Office of the National Economic and Social Development Board, visited FIRDI.



4

04/19

A group of 3 guests from the USA, including Dr. Ken Swartzel, Fellow of the American National Academy of Engineering and Professor Emeritus of Food, Bioprocessing and Nutrition Sciences, North Carolina State University; Dr. Josip Simunovic, Chief Science Officer of SinnovaTek Co.; and Dr. John Miles, President of MicroThermics Corp., visited FIRDI and delivered keynote speeches.



04/24

Mr. John G. Jung, Chairman & Co-Founder of Intelligent Community Forum (ICF) visited the Chiayi Industry Innovation and Research Center as part of due diligence investigation for the Smart City Competition of Chiayi.



05/18

DATO' Tengku Putera Bin Tengku Awang, EXCO Investment and Industry (Terengganu), Malaysia, led a group of 12 guests visited FIRDI.



5

05/16

A group of 10 guests, including Dr. Sanchai Jaturasitha, professor of Chiang Mai University in Thailand, visited FIRDI.



6

06/20

A group of 8 guests from the Philippines, including Engr. Raul D. Castañeda, Provincial Director, Department of Science and Technology-Cavite, visited FIRDI.



05/17

Opening Ceremony for "Kinmen Food Industry Development Advisory Service Office" and "Experience-sharing Seminar on Innovation and Value-added Strategy for Kinmen Specialty Products" was held at the Kinmen University.



06/20

A group of 5 guests from Thailand, including Mr. Yongvut Saovapruk, Chairman of Thailand NFI, visited FIRDI to discuss training and R&D cooperation for aseptic technologies.



06/22

A group of 15 guests from China, including Cai Li, Researcher of the Division of Industrial Development of the Bureau of Produce Processing, the Ministry of Agriculture, visited FIRD.



06/29

FIRD participated in the "Taiwan Biotechnology Exhibition 2017" held in Taipei from June 29 to July 2.



07/27

Chairman Tien-Tzu Wu and Director-General Chii-Cherng Liao led a delegation to attend the "Taiwan-Thailand Industry Docking Summit Forum" held in Bangkok, Thailand and visit research institutes.



8

08/30

Mr. Zhi-Ping Ye, former Director of the Division for Supervision on Certification of the Shanghai Exit-Entry Inspection and Quarantine Bureau, Mr. Shou-Song Li, former Deputy Director of the Quanzhou Exit-Entry Inspection and Quarantine Bureau, visited FIRD.



9

09/10

FIRD participated in "The 21st World Congress on Information Technology" (WCIT 2017) show held in Taipei from September 10 to 13.



09/21

"SQF Supplier Seminar Series" with the inauguration ceremony for FIRD to become an international SQF certification body and training center was held in Hsinchu. The first batch of Taiwan's food manufacturers certified by FIRD was awarded SQF certificates. Robert Garfield, Senior Vice President of SQF US Headquarters; LeAnn Chuboff, Senior Technical Director of SQF US Headquarters; and Bill McBride, Representative of Asia Pacific Region were invited to the event and offered congratulations.



09/28

FIRDI participated in the "2017 Taipei International Invention Show and Technomart" held in Taipei from September 28 to 30.



10/26

A group of 5 guests from Malaysia, including Dr. Nik Ismail Nik Daud, Immediate Past President of the Malaysian Institute of Food Technology, visited FIRDI.



10 **10/12**

A press conference for "Announcement of the Winners of Second-term Elder-friendly Foods" was held at the Council of Agriculture with the opening ceremony for the "Cooperation and Promotion of Elder-friendly Food Industrial Chain".



11

11/01

FIRDI celebrated its 50th anniversary. President Ing-Wen Tsai extended her congratulatory message of "Forward-looking and in Pursuit of Excellence" for encouragement. A General Assembly was held in the Auditorium of the Service Building with the attendance of more than 100 guests from the industry, the government, academia, research institutes, and associations and members from the FIRDI Board.

11/04

Activities for celebrating FIRDI's 50th anniversary was held.



10/25

FIRDI hosted the "Taiwan-Malaysia Industry Docking Summit Forum—Food, Medicals, and Cosmetics Industry Sub-forum" in Taichung.



11/20

A group of 10 leaders from EHEDG authorized testing laboratories in Europe, including Mr. Juergen Hofmann of the TU München Testing Laboratory, Germany, visited FIRDI.



11/22

A group of 5 guests from Malaysia, including Mr. Muhammad Lukmani Ibrahim, Deputy Director of the National Pharmaceutical Regulatory Agency (NPRA), visited FIRD.



11/28

Dr. Ta-Sheng Lo, Director-General of the Department of Industrial Technology (DoIT), Ministry of Economic Affairs, visited FIRD.



12/15

A group of 5 guests from Thailand, including Dr. Luxsamee Plangsangmas, Governor of the Thailand Institute of Scientific and Technological Research, visited FIRD.



12/20

Mr. Adhi Lukman, Chairman of the Indonesian Food Producers Association (GAPMMI) and Dr. Rika Ampuh Hadiguna, Senior Lecturer of the Andalas University, Indonesia visited FIRD.



12

12/05

FIRD hosted the "14th Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM)" in Taipei and Hsinchu on December 5 and 6 with the participation of a total of 42 foreign scholars from 11 member countries and 16 ACM member organizations.





財團法人

食品工業發展研究所

Food Industry Research and Development Institute

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