FIRDI 2016

ANNUAL REPORT

RESEARCH

DEVELOPMENT

INNOVATION


研究大樓
FOOD INDUSTRY RESEARCH & DEVELOPMENT INSTITUTE

Contents

2016 Annual Report
Food Industry Research & Development Institute

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Preface

In 2016, the output value of Taiwan's food industry (excluding that of tobacco manufacturing) was $ 606.3 billion, increasing by 2.43% from the previous year and accounting for 4.9% of the total manufacturing output value (ranked the 7th). Taiwan's food industry is in its mature period. With the solid management and technical ability, keen market sensing ability as well as efficient vertical integration of upstream and downstream industries and division of labor, the industry has laid good feature and value for its long-term development. Food industry has been strengthening its raw materials, processes, and technologies to make food products meet the consumer expectations for health and security. Based on the foundation, Taiwan's food industry is able to expand actively into the global food market in this globalization era.

With nearly 50 years of hard-working efforts, the Food Industry Research and Development Institute (FIRDI) has grown to be the largest food research and education and training organization in Taiwan. It is also one of a few research organizations in the globe with research and development capacity for both food and bio-resources fields. Facing the increasing demand of consumers for food health, convenience, pleasure and safety, FIRDI, based on its deep foundation in technical research and development, technical services, professional training and inspection and analysis, will continue to not only assist the food industry in building and implementing sound and good food hygiene standards, process management norms, and a comprehensive food protection and management system but also help the food industry establish a food safety management system that meets international standards so as to enhance its international market competitiveness. Furthermore, with the concept of industrial chain and industrial ecology, FIRDI will link and integrate resources from various sectors to establish relevant technology platforms and introduce interdisciplinary elements to assist the food industry in advancing its technologies, innovating its applications, and grasping new business opportunities.

After setting up for more than 30 years and with the guidance of the quality policy of "biodiversity, management systematization, service specialization and quality internationalization," the Bioresource Collection and Research Center (BCRC) has become not only an important base for the development of bio-industry in Taiwan but also the first in the world to be ISO-certified. The Center has developed into an internationally renowned bio-resources center with comprehensive functions. Through its long-term successful efforts, the BCRC has since 2016 become a full member of the Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM) and will host the consortium meeting in Taiwan in 2017. The BCRC has actively developed the Bio Risk Management Practices and integrated the Practices into the ISO 9001 quality control system. It was granted the "Model Award" prize by the Centers for Disease Control of the Ministry of Health and Welfare this year. In the future, the BCRC vows to provide a solid bio-resource infrastructure to help the food industry expand its bio-economic opportunities.

In line with the government policy, FIRDI has branched out into the Southern Taiwan Innovation and Research Park and set up the Southern Taiwan Service Center there to promote integration and innovation and cooperation in food machinery and process development since 2005. It has since 2011 stationed and taken the responsibility to operate the Chiayi Industrial Innovation and Research Center (CIIC), so as to integrate the industrial and academic research capacity in the Yunling-Chiayi-Tainan area and assist in the development of local specialty industries. In recent years, the CIIC has established a rapid commercialization service platform for the aseptic processing of functional health drinks and elderly-oriented foods, which has helped the industry to develop new products quickly and reduce the risk of R & D and early investment. Moreover, in line with the promotion of industrial structure optimization policy, the Southern Taiwan Service Center has been recognized by the Industrial Development Bureau, MOEA, as an "automation service agency" to assist the food industry in the future in accelerating its intelligent automated manufacturing development in such areas as automatic product design, manufacturing, material storage, transportation and other technical services.

To meet the needs of food industry and to keep the domestic certification system abreast with international standards, FIRDI has gained approval of the Safe Quality Food Institute (SQFI) to become a Safe Quality Food (SQF) certification body in mid-2016 and has established its own food certification center in the same year. It is hoped that FIRDI can deepen its own certification service to improve the food safety certification mechanism and help construct the safety chain for food industry. Meanwhile, FIRDI also hopes to enhance the competitiveness of those local products that have passed the conformity assessment of its certification system. In addition, FIRDI also adjusts the organization and tasks of its Technical Service and Extension Center, in which promotion and service functions are strengthened and expert teams are organized to provide professional technical guidance and build up protection mechanism for factory risk management in line with international standards, so as to effectively solve the problems for food factories and strengthen service-based value addition of the role and energy of FIRDI in the industrial value chain.

FIRDI has long provided testing services that meet the ISO international quality standards. It is a laboratory accredited by both the Taiwan Food and Drug Administration (TFDA) of the Ministry of Health and Welfare and the Taiwan Accreditation Foundation (TAF). It is also the inspection unit recognized by the Brazilian Customs for non-alcoholic beverage, vinegar and wine. Since 2016, it has also become a laboratory accredited by the Indonesian Agency for Agriculture Research and Development to provide relevant testing reports for agricultural products exported to Indonesia. Moreover, several laboratories were renovated this year in order to improve the environment and inspection quality for microbiological testing and an entrustment analysis and service group is newly established to provide better contract tests and consulting services for those companies which voluntarily apply for certification.

It is always the mission of FIRDI to nurture and develop talents for the food industry. To provide a variety of innovative learning courses for the cultivation of interdisciplinary manpower, the FIRDI Academy has set up since 2015, which has gradually established innovative learning platforms for education and training of professionals in the food and related industries, constructed the industrial learning map, created international training courses, implemented and supervised certification examinations, provided training courses for the relevant certifications, and offered consultancy for law and regulation services and related training services. In the future, the FIRDI Academy will gradually promote professional certification courses to help educate and train talents to meet the development trend and the need of the food industry. It is hoped that FIRDI will become a professional training center and the lifelong learning center for professionals in food-related industries in Taiwan.

FIRDI will celebrate its 50th founding anniversary in 2017. To make FIRDI better and timeless, we have refitted a number of old experimental facilities and pilot plants over the past two years and completed successively and used, such as the laboratory space of the research buildings, the classrooms of the FIRDI Academy and the auditorium, the canned food processing pilot plant, and the Zeng Tong Memorial Library. It is hoped that we can provide the best workplace to create a high-quality R & D team. In the future, FIRDI will still uphold its core rationale of industrial services and continue to deepen its research and development capacity and strengthen its service quality, in the hope to lead the industry toward innovation and transformation and expand domestic and foreign markets. We are looking forward to your continued advice and support to fight together for the sustainable development of the industry.

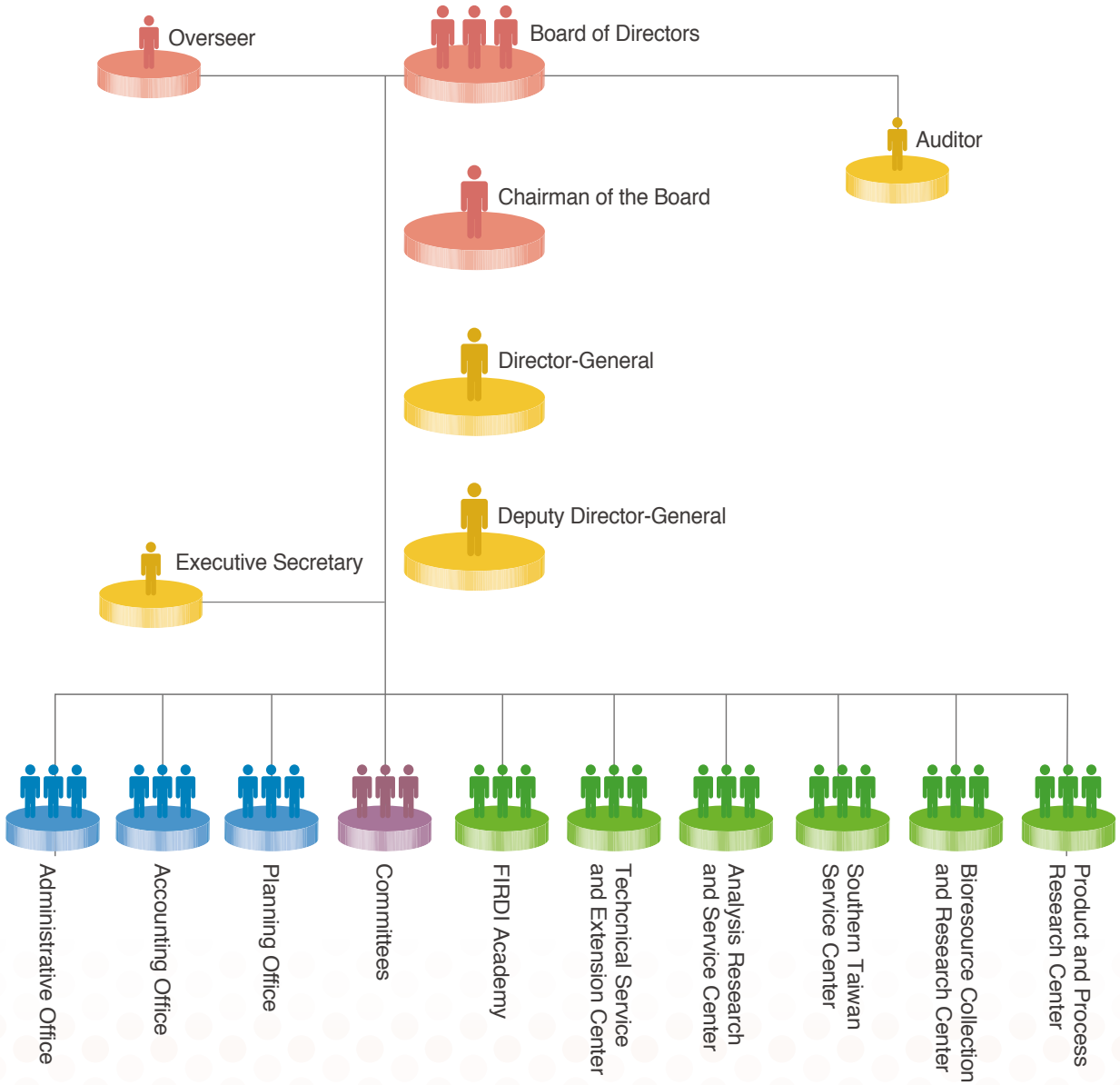
Director-General

Chii-Cherng Liao

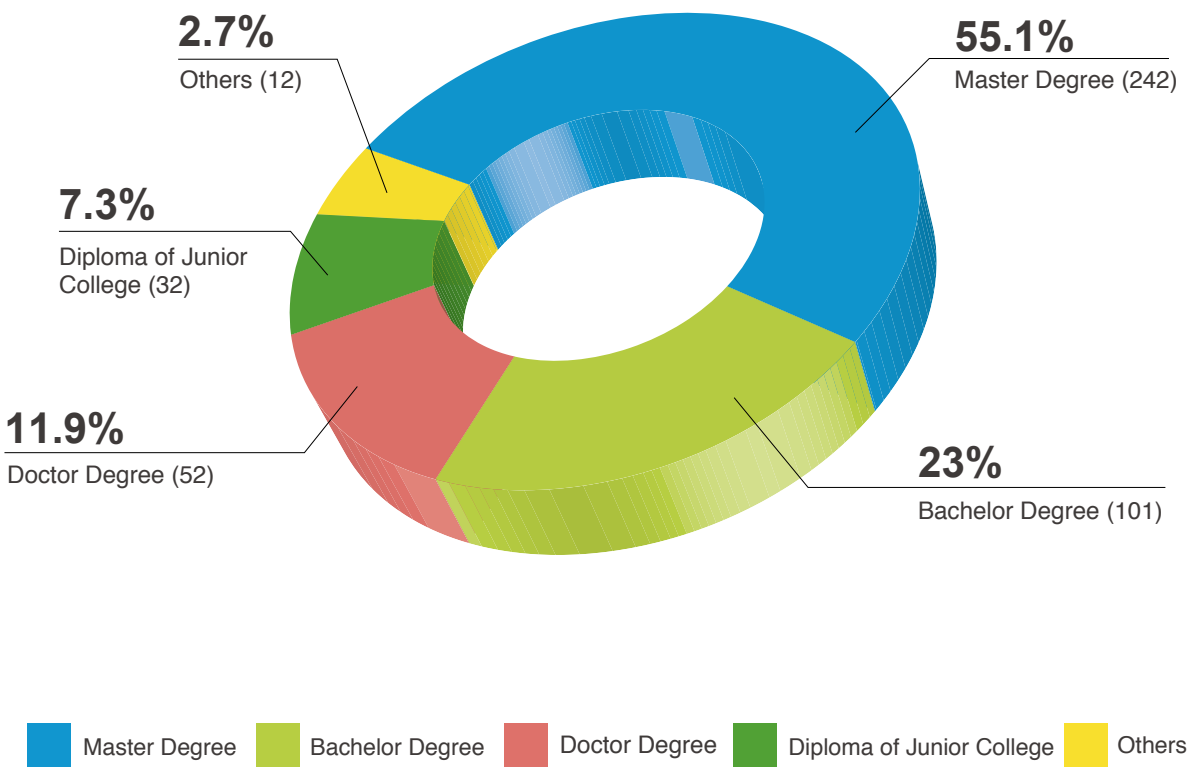
Chii-Cherng Liao
April 2017

Organization & Human Resources

Organization



Human Resources



Number of employees: 439 (Dec. 2016)

Technology Research and Development

Dr. Chii-Cherng Liao (right 5), Director General of FIRDI, and Mr. Chih-Chien Lin (left 6), mayor of Hsinchu, attend the new product launch of artificial-free meatball on January 7, 2017.

Research and Development on Products and Processing

Optimization and value-addition of agriculture and livestock products

Chicken meat tenderized by protease combining high pressure processing technology: Plant protease combining high pressure processing was used to achieve meat tenderization and hydrolysis. Hardness of the developed meat was reduced by 50% and the extraction rate of free amino acids was increased by 30%. Moreover, the meat was soft, sweet, and containing less microorganisms with prolonged shelf life.

The development of artificial-free meat products: Natural ingredients used to substitute for polymer phosphate in meat products were developed by screening protein materials originated from animal- and plant-sources and employing formulation design and processing control technology. Novel phosphate-free meat products were produced using the substitute which improves adhesion strength and the water retention of meat without artificial phosphate. We had used this platform to assist the industry to develop, such as the first of phosphate-free Taiwan-style meatball, phosphate-free pork jerky and other products in Taiwan and artificial-free meatball was given Hsinchu top 10 best buy souvenirs in 2016 (Hsinchu Good Things).

Chitosan extraction technology for mushrooms: Residues of *Flammulina velutipes* and *Pleurotus eryngii* were reused after polysaccharide extraction. The yields of chitin were 6.7% and 5.7%, respectively, after acid and alkali treatment. Hot alkali treatment is able to deacetylate more than 70% of mushroom chitosan, achieving the goal of total usage of mushrooms.

Development of burdock and onion functional drink products: Functional drinks from burdock and onion materials were developed by enzyme and aging processing technology. The products possess special flavor, phenolic compounds and α-glucosidase inhibitory activity with the potential to improve diabetes. The technology helps to enhance the value of agricultural products.

Optimization of drying technology and development of value-added by-products for mango industry: Microwave assisted hot air drying equipment was developed and patented in Japan and Taiwan. The equipment was used to establish the microwave assisted hot air drying processing technology for mango. In addition, value-add by-products of mango were developed using microbial fermentation to increase mangiferin content of the mango peel by two folds. The oil extracted from mango kernel had an oil stability index (OSI) of 59.6 hours with the characteristic of oxidation stabilizing agent in oil products.

The oil extracted from mango kernel

Development of value-added sweet potato products: Dried and beverage products of sweet potato were developed by using heat pump drying processing technology and submicro-particle milling technology. The technology had been transferred to local companies. The icy baked sweet potato developed with the technology is among the top 10 best buy souvenirs of Taichung City and has been sold to Southeast Asia.

Dried and beverage products of sweet potato

Novel processing technology

High-pressure-assisted hurdle technology: High-pressure pasteurized products have good keeping quality, while offering the fresh flavor as raw materials and better quality than thermal pasteurized products. This kind of product is more in line with the trend of consumers preference for natural, fresh food with fewer additives. Products processed with high-pressure-assisted hurdle technology have a longer shelf file, and some can even be stored at room temperature. For example, fermented dairy products processed using high-pressure-assisted hurdle technology can be stored for more than 90 days at room temperature while still containing heat sensitive components like lactoferrin and immunoglobulin. This technology can also be used to develop chilled processed meat products with a shelf life of 40 days and a sensory value of more than 7 in both texture and flavor.

Processing technology for maltooligosaccharide with low degree of polymerization: An enzyme reaction cycle screening system was developed to prepare maltooligosaccharide with low degree of polymerization. The content of 2 to 4 sugar molecules of the maltooligosaccharide was equal to or more than 90%. No acute toxicity was observed in animal study of the product. The cold storage texture of cakes containing the maltooligosaccharide was compared with that of cakes containg trehalose. The firmness

The processing technology to prepare maltooligosaccharide with low degree of polymerization using enzyme reaction cycle screening system

Maltooligosaccharide with low degree of polymerization

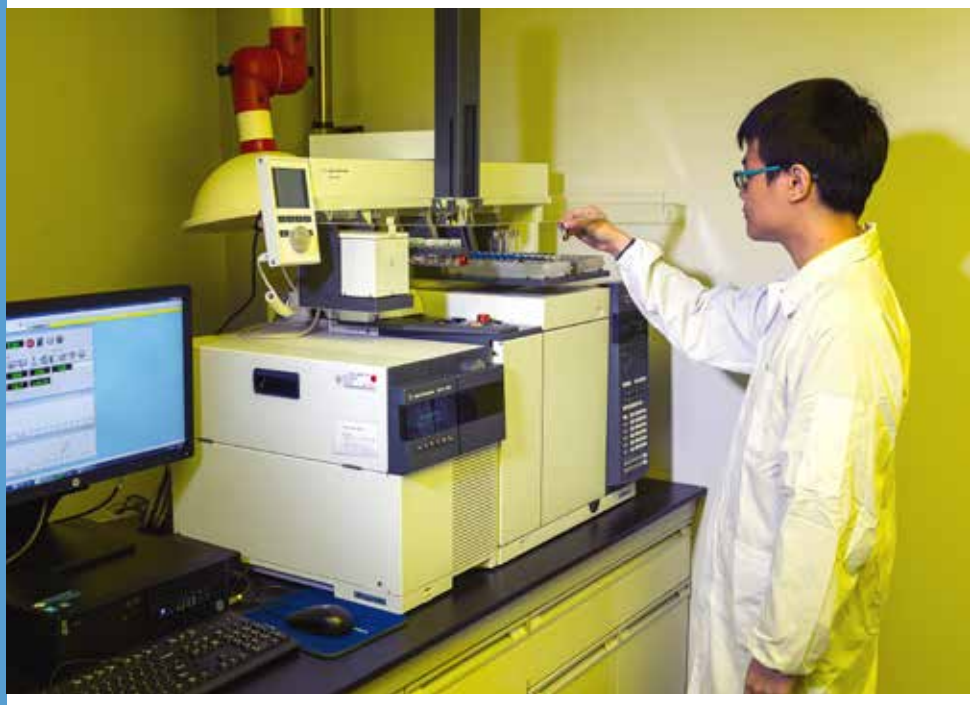
of both cakes was found to be similar after 7 days in cold storage, indicating the maltooligosaccharide can improve the cold storage texture of cakes. The technology has been used to assist manufacturers in value-added application of products.

High-intensity ultrasound-assisted extraction technique: With the integrated trough probe and batch type ultrasonic components, the material dispersion and transportation problems can be solved with special flow field design. Application of this technique to extract bioactive compounds from plant can significantly increase their yield and reduce processing time. Under the same process conditions, the extraction rate of *Salvia miltiorrhiza* polysaccharide could be increased by 2.5 times using the high-intensity ultrasound-assisted extraction technique as compared to that of the traditional hot water extraction process.

Assessment on the application of radio frequency drying technology: Radio frequency (RF) drying is generated within the products by molecular friction in high-frequency alternating electric field to achieve rapid heating. It has the advantage of shortening the drying time, saving energy and improving the quality. The drying time of agricultural products, such as peanut, could be reduced by half using the technology and the product quality is better than those prepared with hot air drying.

Processing technology of high efficiency hydrolyzation on animal allergenic proteins: A product development and process optimization platform using ultrasonic assisted heat processing and enzymatic hydrolysis techniques was established and provided for external services. With the technique, we could reduce the tropomyosin content of animal sources and the combining capacity of allergenic proteins with IgE by 99%. Combined with evaluation of target component analysis and quality assurance test, products with low allergenic proteins could be produced by applying the technology to various types of aquatic products and/or products containing aquatic seasoning powder such as shrimp powder or fish.

Reduction and monitoring techniques of oil process-induced hazards： To improve the oxidative stability and shelf life of functional oils enriched in unsaturated fatty acids, the content of lipid oxidation products in oils were reduced by several physical methods including process optimization and modified atmosphere control. These techniques could also assist in establishment of entire manufacturing process of novel structured lipids. Furthermore, the process-induced hazards in pressed oils, such as trans fatty acids, were also monitored and reduced by gradient roasting technique, which not only preserved the original color and flavor of pressed oils, but improved the quality and safety of oils in edible oil industry.



Establishment of oil and fats database

Trans fatty acids in pressed oils could be reduced by gradient roasting technique, and the color and flavor were both well-maintained and similar to those of traditional pressed oils.

Fermentation setup and optimization to accelerate process development

Services and Value Addition of Bioresources

Bioresources bank and international cooperation

BCRC became an official member of ACM: BCRC has been invited to participate in the annual meeting of the Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM) since 2010, continuously communicating with other Asian bioresources centers. After years of efforts, we became a full member at the 13th ACM conference held in India in 2016 and will host the 14th ACM conference in Taiwan in 2017.

Two new test items received TAF certification: FIRDI has established a GM food testing platform and began to provide the contract services since 1999. FIRDI continues to improve the testing techniques and their quality management. The test item "the qualitative detection of GM soybean raw materials and related products" passed the FAPAS competency test and BCRC was accredited by the Taiwan Accreditation Foundation (TAF) as a testing laboratory for the item in 2016. BCRC provided contract services of bacterial identification on polyphasic taxonomy for probiotics strains. BCRC conducted an inter-laboratory comparison on lactic

Dr. Gwo-Fang Yuan (Director of BCRC, the middle of the first row) and colleagues participated in the 13th annual meeting (ACM13) held in India from November 8 to November 10, 2016.

acid bacteria identification with the China Center of Industrial Culture Collection (CICC), China and received mutual recognition of proficiency. The service item "identification of lactic acid bacteria" passed the accreditation of TAF, which enhances the credibility of the identification service of FIRDI.

Awarded the "model award" of Laboratory Biorisk Management System: The European Committee for Normalisation (CEN) issued the voluntary standard "CWA 15793: 2008" (Laboratory Biorisk Management Standard) in 2008 and revised it in 2011 to become the main basis for establishing systematic laboratory biosafety management of the World Health Organization (WHO) and countries in the world. In this year, BCRC integrated the "Criteria for Laboratory Biorisk Management" into ISO 9001 quality management framework, establishing hazard identification, risk assessment and risk control procedures. The self-management objectives were effectively achieved through the PDCA management cycle as following: (1) Becoming a laboratory that meets international standards for laboratory risk management practices and continuing to improve. (2) Improving the biosecurity of bioresources storage system; (3) Improving the biosecurity of bioresources delivery process. In preparation of the implementation, biosafety and biosecurity training courses were held, more than seven internal meetings of 90 people were conducted, and finally internal audit and management review were completed. Through the preparation and efforts of the foregoing, BCRC successfully passed the external auditing without nonconformity on 14th of October. By the excellent performance, BCRC was awarded the "model award" by the Centers for Disease Control (CDC) of the Ministry of Health and Welfare on 9th of December in the performance presentation of 2016 high protection / biotechnology related laboratories with successful introduction of "Laboratory Biorisk Management System".

BCRC was awarded the "Model Award" of Laboratory Biology Risk Management by CDC of the Ministry of Health and Welfare on December 9, 2016.

Expansion of bioresources and upgrading of biotechnology

The establishment of microalgae mutant-breeding platform: Microalgae have great potential in the energy and health industry. In recent years, FIRDI has established microalgae library. In order to improve the application efficiency of microalgae resources, we have further established high-efficiency mutant-breeding technology and screened microalgae with high-temperature / high-oil / high-carbon-fixation potential that meet more closely to industrial demand. Nineteen microalgal strains resistant to 37℃ and with more than 40% of oil in dry weight were obtained in this year. Two of the strains even had an oil content of more than 50%. Several strains with high-carbon-fixation efficiency were also obtained. These microalgal strains have been deposited in the microalgae library and can be used for research and development of all sectors.

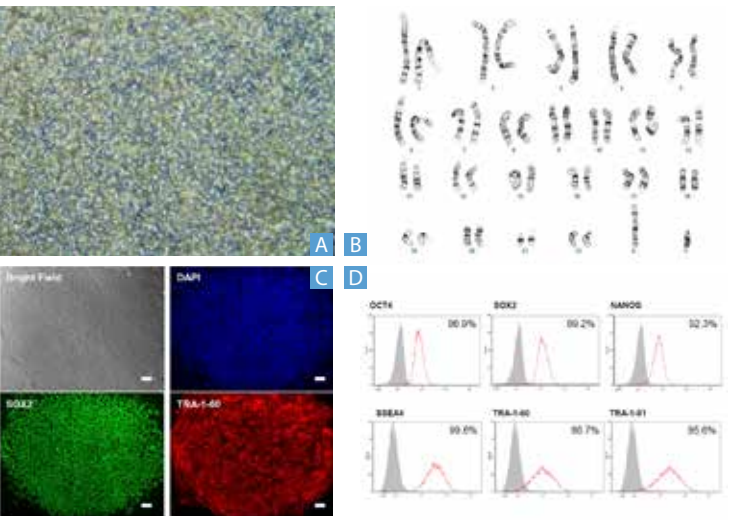
Expansion of the novel stem cell resources: FIRDI continues in preserving and expanding the stem cell resources. By joining the National Research Program for Biopharmaceuticals-Human Disease iPS Service Consortium, we provided excellent service in the identification, preservation, and distribution of iPS cells beside the human embryonic stem cells in this year. To connect with international research and development on novel iPS cells, FIRDI collected the specific iPS cell lines derived from various human diseases with research potential and have established a convenient platform for providing the high-quality services of iPS cell analysis and distribution. These cells will facilitate researchers in Taiwan to study disease pathogenicity, establish disease models, screen novel drug, and develop cell therapy in the future.

Establishment of microalgae library

Enhancing the capability of microbial identification

Whole-cell MALDI-TOF MS rapid identification platform for monitoring environmental microbial contamination to facilitate PIC/S GMP compliance of bio-pharmacies: MALDI-TOF MS has now emerged as a new technique for rapid and effective microbial identification. A customized service of "rapid bacterial identification" was open to bio-pharmacies to facilitate their PIC/S GMP compliance. Around 1,000 bacterial isolates collected in a period of 6 months for an environmental monitoring program of a bio-pharmacy were identified to species or genus level by MALDI-TOF MS. The average successful identification rate was 91.4%. An estimate of 65% cost down was achieved using MALDI-TOF MS system in comparison with the current 16S rDNA sequencing method.

Advanced techniques in the identification of medicinal fungi: The value of traditional medicinal fungi in modern pharmaceutical research and health care has attracted widely attention. However, with the progress of systematic taxonomy, many important medicinal fungi, such as *Ganoderma lucidum*, *Cordyceps* spp., and *Phellinus linteus*, have been reconsidered as new taxa according to molecular phylogeny studies. As different species may also be different in beneficial function, the correct identification of medicinal fungi has become the key to product development. Advanced identification techniques for important medicinal fungi have been developed in BCRC, for example, multi-locus strain typing (MLST) and protein mass spectrometry (MALDI-TOF) analysis techniques have been established for rapid and accurate identification of species and/or strains. These new techniques could serve the bio-industry and help in subsequent product development and validation.



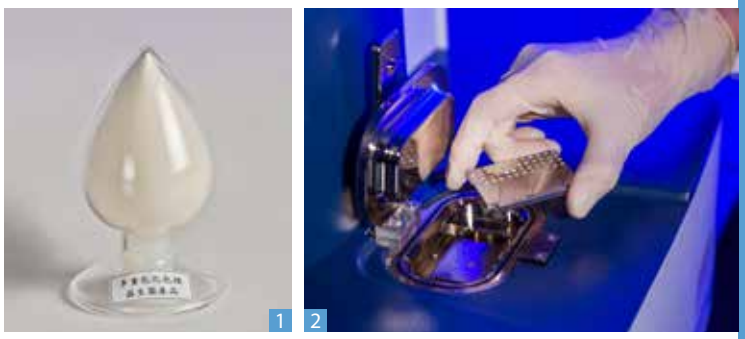
iPS characterization: (A) the morphology of iPS cells under microscope (B) karyotype analasis (C) immunocytochemistry staining of pluripotent markers (D) flowcytometry analysis of pluripotent markers

Development and application of bioresources

Innovation and application of traditional fermented food microorganisms: GRAS fermented microorganisms were screened using enzyme- and cell-based assays for strains with anti-hyperuricemia, anti-diabetes, and/or anti-arthritis potential and applied to food and bio industry. With the salient features of the anti-hyperuricemic strains, an R & D alliance was organized by food, pharmaceutical and biotechnology companies for the development of hypouricemic products. This work fully demonstrated the capacity of BCRC on supporting the development of bio-related industry.

Regulatory technology platform for pilot scale fermentation: A regulatory technology platform for liquid microbial fermentation, including liquid fermentation technology of edible microorganisms, microbial bioactive metabolites, pharmaceutical production technology, and recombinant protein production technology, was applied to assist small and medium enterprises (SMEs) and research community in scaling up laboratory results into pre-commercial scale to accelerate the capacity of commercialization.

Combination of functional supplements and formulation design technology: Novel functional ingredient production technology and comprehensive encapsulated formulation technology were integrated to construct a service platform for complete food biotechnology product development. With the assistance of this service platform, companies are able to develop high value-added special products such as that containing both miracle fruit and lactic acid bacteria. Furthermore, a product formulation design platform was established with multiple formulation technology. High quality probiotic products were developed using multiple emulsions technology, which enhances the technology threshold of product development. These technologies have assisted many companies in accelerating their product commercialization process.



1.Encapsulation of a probiotic product by multiple emulsion
2.Rapid microbial identification by MALDI-TOF MS

Integrating Process Equipment

Commercialization service platform

Formulation and process scaling up technology for dietary supplement drinks: The effects of dietary fiber on physicochemical properties of dietary supplement drinks, such as viscosity, particle size, rate of migration, were investigated. Emulsion stabilization technology for substituting thickeners with dietary fiber in the formula was developed. Combining the quality assessment model for physicochemical properties of formula ingredients and process scaling up technology, we have helped food manufacturers to develop dietary supplement drinks for different needs. The combination 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 could be conducted that will contribute to the development of the dietary supplement drink market.

Commercialization technology for elderly food: Due to the degeneration of elderly people in chewing/swallowing and digestion, the object of present technology was to develop commercialization process for soften food and safety assessment technology of product distribution. Multiple semi-products of soften food ingredients and/or soften food were developed via the establishment of food texture softening technology. These could be grouped according the degree of softening into: easy to chewing (hardness 5×10^5 N/m^2 or less), and easily crushed by gum (hardness 5×10^4 N/m^2 or less). At the same time, an experience assessment model of elderly population was applied to meet closely the needs of the elderly market and make product development and application more competitive, providing a rapid commercialization service platform to the industry for developing elderly food.

R&D service platform for aseptic processing and packaging pilot test of healthy functional drinks: Innovative processing technology and equipment, from mixing, degassing, homogenization, refinement, sterilization to aseptic filling process of formula, were integrated to provide total solutions for commercialization in hope of assisting the industry in reducing the R & D cost in advance and commercialization. FIRDI has helped several companies, including Uni-president and AGV, in trial production and advanced testing of processing parameters of over 40 types of product formula, with 10 products now available on the market.

Promotion of the development, design, and quality evaluation technology for elderly rice food

Aseptic processing and packaging pilot for functional drinks

Ebeam system:
(A) ITB electron gun
(B) control panel
(C) Shielding Chamber

Integration and validation of novel physical sterilization technology

Extending food shelf life by using a pulsed light treatment to decontaminate packaging materials: Pulsed light (PL), a novel non-thermal and physical technique for surface decontamination treatment of food packages, can reduce the residues of chemical agents. PL treatment can be applied not only in surface decontamination of beverage factories, but farm products with relative uniform surface and aromatic herbs. The technology can be combined with UV trigger packaging materials in the future to perform surface decontamination and release antibacterial materials, which shall extend further the food shelf life.

Validation of electron beam sterilization for packaging materials: In this study, we used radiation discoloration film to establish the absorbed dose of low energy electron beam delivered to surface by B3 Radiochromic Dosimeters and evaluated the sterilization effect on microbial spores under fixed irradiation conditions. Research on inactivation of 5 target spore-forming bacteria using electron beam irradiation has been completed in 2016, which will help to establish sterilization conditions of electron beam irradiation for packaging materials of PET bottles, reduce the use of chemical fungicides, and reduce operating costs and pharmaceutical residues.

Safety assessment of high pressure sterilization of food: The core sterilization technology for high pressure processing was established by using pressure-resistant spore-forming bacteria as indicator for food safety to evaluate and validate the inactivation kinetics of spores under ultra-high pressure and various temperatures. The results of this work can accumulate the overall R & D capacity of domestic high pressure processing, promote investment will of the food industry, and drive food machinery manufacturers into research and development of high pressure equipment.

Application of plasma technology on sterilization of packaging materials: Key technology for microwave plasma sterilization and modular technology were developed and integrated to apply in the sterile filling system for container sterilization to produce low acidity (pH ≧ 4.6) liquid food capable of room temperature storage, with the sterilization efficiency of packaging materials achieving commercial sterilization standards. These technologies can be applied to the coating of packaging materials to improve gas cut off and ensure product quality and effectiveness.

Safety validation of new packaging materials in food systems

Pulsed light triggering technology of oxygen scavenging caps and its application in oxygen-sensitive foods: Oxygen scavenging materials in different countries have different types of commercial products with varying activation modes and oxygen scavenging efficiency. Pulsed light triggered oxygen scavenging materials were integrated into bottle caps and/or multilayer films and combined with a variety of barrier packaging to investigate oxidative degradation of contents. The results can help food factories to establish the best packaging specifications and performance testing methods. Using bottled orange juice as model, the headspace concentration of oxygen could be reduced to below 1% within 5 days, thus slowing down the degradation of flavor and vitamin C within the container. The L value was also decreased as compared to that of traditional packaging.

Development of antimicrobial packaging and effectiveness validation in food systems: Antibacterial materials at home and abroad have a variety of commercial products, and have been used in fresh fruits and vegetables, meat products, aquatic products, dairy products and other products. A patented coating technique for food packaging using natural plant extracts as antimicrobials was developed. Packaging with antimicrobial coating would release continuously the antimicrobials that inhibit the growth of microorganisms within the packaging atmosphere. Thus, the packaging possesses both seal and antimicrobial function which can keep freshness and extend the shelf life of packaged foods.

Industrial Services

Dr. Wei-Hsiang Fu (right 1), Director General of the Department of Industrial Technology, MOEA, visited CIIC for lab tour of food processing laboratory of FIRDI, accompanied by Dr. Chii-Cherng Liao, (right 2) Director General of FIRDI, and Mr. Binghuei Barry Yang (left 2), Director of the Southern Taiwan Service Center of FIRDI, on Jul. 15, 2016.

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

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

Integrating service capacity to assist local business with innovative research

By executing "Counseling seminars of governmental programs for encouraging firms' innovative researches" and "Plan-writing gifted classes" for firms to enhance understanding of government firm-guiding resources, we assisted the firms counseled by the Chiayi specialists of academia and research institutes to apply for government research grants to achieve technical upgrading and transformation. We visited local firms in Chiayi, Yunlin and Tainan industrial parks actively. In 2016, we visited 361 firms 660 times. To satisfy firms' demands, 23 firms have become business tenants in CIIC. There were also 42 conferences and training courses held, providing 1,693 attendees with professional knowledge. Furthermore, the Food Safety Inspection Center established in 2011 has served 215 firms, providing a more convenient and faster inspection service for the local food industry. Additionally, the nine research communities formed by the research institutes in CIIC have held 22 fora 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 characteristic industries, we have integrated four research institutes in the CIIC and constructed cross-cooperation model on the basis of health food commercialization R&D service platform. In 2016, the fast prototype platform service of cross-cooperation of four research institutes in CIIC were promoted and the cooperation project on "milkfish industry value chain" was continuously performed.

Also, the CIIC was entrusted by Chiayi City Government to handle the Local Small Business Innovation Research Program (Local SBIR) from 2012. We further extended our service to the local SBIR program of Yunlin County in 2013 and Chiayi County in 2014. The CIIC acts as the communication channel between local government and enterprises with earned reputation. The CIIC has also assisted 20 cases of local

businesses to obtain central/local government R&D subsidies in 2016 with 6 cases applying Chiayi County/City and Yunlin County Local SBIR.

Promoting cooperation of academia and institutes to serve local industry

We constructed and operated the Research Resource Integration and Service Platform website by integrating resources of the academia and research institutes in Chiayi/Yunlin. In 2016, the CIIC coordinated with the Tatung Institute of Technology and the Chung Jen Junior College of Nursing, Health Science and Management to upload the technology service information to our Service Platform. To this day, there were already 8 research institutes in Chiayi/Yunlin uploading their service information to our Service Platform. To promote the page view count, the registered members of the Service Platform would receive updated information by weekly newsletter. Special lectures for firms were continuously conducted with the Douliu Industrial Park Service Center, MOEAIDB. We were accompanied by the Southern Industry Service Division of Industries Assistance Center, MOEA and several universities to visit firms in the Southern Industrial Parks. "Care plan of SMEs in Yunlin County" was implemented in 2016 to expand and extend the service tentacles of the CIIC into various industrial clusters in the region. In addition, the CIIC was in conjunction with the Employment Program of National Chiayi University and others to help nurturing talents for the local industries to facilitate regional industrial development.

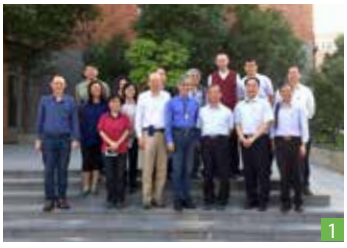
Upgrade and Innovation of the Local Food Industry

Upgrade and innovation of the offshore food industry

Kinmen: A Kinmen expert service group was established based on the core concept of integrating the " Kinmen local featured resources". Aimed at the industrial chain of Kinmen specialty resources, product innovation/application and value addition were conducted through consultation, diagnosis and introduction of process technology. In this year, we assisted the industry in applying for the Central and Kinmen Local SBIR projects. Through product design and process refinement, we developed phosphate-free pork slices. In addition, we continued to provide consultation service and organized seminars on food sanitation and technical guidance in hope of promoting the development of the offshore food industry.

Mazu: Under the basis of Mazu' s fermented food industrial chain, FIRDI expanded the guiding activity from the improvement of starters to product development and cross-industry links. More than ten souvenirs with *Monascus* features and two DIY tours, Mazu old wine and Hong-Zao facial mask DIY tours, have been developed. FIRDI has also assisted the introduction of some of the products into big hypermarkets and famous restaurants. In this year, we organized a number of technical seminars and assisted the development of several products, such as sour Chinese cabbage, frozen Hong-Zao pork and *Crossostephium chinense* (L.) Makino laminates pitch. Moreover, we helped three local companies obtain SBIR project subsidies to develop frozen Hong-Zao chicken, grass herbal tea and other diversified products with local agricultural specialty resources.

Penghu: Aimed at the development and demand of Penghu' s feature souvenir industry, we have conducted technical visit 3 times, hygiene counseling 3 times, and diagnosis visit 2 times of Penghu food manufacturers in 2016. Food processing and hygiene training courses were also held to provide suggestion for technical upgrading and hygiene management. FIRDI also helped manufacturers to apply for a local SBIR project to establish microwave combined with infrared drying technology for clove fish. The process drying time of the fish was reduced to 4 hours. In another case, Penghu scallop sauce industry alliance was formed through collaboration of sauce manufacturers, the Penghu Technical University and local government to resolve the problems of factory registration and hygiene certificate.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1. Dr. Tony J. Fang (right 4), Deputy Director-General of FIRDI, together with Dr. Huei-Song Hong (right 3), Director of the Industrial Development Bureau, MOEA, visited the Kinmen University to establish the " Kinmen Agriculture Development Advisory Service Platform" on May 12, 2016.
2. Prototype souvenirs with Mazu elements developed by FIRDI were exhibited in the "Fashion Institute of Taipei" on November 29, 2016. FIRDI' s senior research scientist Dr. Yen-Lin Chen (left 2) introduced the products to the chief of the Construction Bureau of Lianjiang County and the manager of Mazu companies.
3. The "Food Industry Trend Sharing Workshop and Hand-made Workshop" using Mazu special food ingredients to create interesting new dishes and Western desserts was held in Mazu on June 1, 2016.
4. Dr. Tony J. Fang (right 2), Deputy Director-General of FIRDI, together with Dr. Huei-Song Hong (right 3), Director of the Industrial Development Bureau, MOEA, explored the land for industrial usage in Mazu on October 26, 2016.

Upgrade and Innovation of the Food Industry

Guidance on innovation and value addition of the prepared food industry

Value addition technologies such as quality control, quality optimization of manufacturing, product innovation and development for key industrial processes were led in based on the common problems of the food industry chain at all stages to establish core technology platform for technology/product innovation and value addition of the prepared food industry to guide its upgrade and transformation. In 2016, focused on the factory raw material safety inspection and process and product optimization, we have established quality screening technology for microbial/drug residues and pesticide residues, high efficiency extraction process technology, hurdle technology for refrigerated food products and thermal processing optimization technology to assist in the development of new products and set up indicators for product quality and specifications.

Processing development to reduce sugar/fat in Chinese pastries in the baking industry

The target of the project was to develop special food ingredients needed for preparing Chinese pastries, including inverted sugar syrup, pastry, and filling, with reduced sugar and fat content but intensified functionality, good flavor, and calorie reduction year by year. Processing technology for reducing sugar and fat of the bean filling in Chinese pastries was established in 2016. Through the treatment of the technology, a filling ingredient that could replace the fat and the raw red bean paste of the bean filling was developed. The new ingredient possesses good color and flavor with functionality of dietary fiber and could reduce costs by 5%. Chinese pastries containing this ingredient had a calorie reduction by 20% and could be stored at room temperature for over 14 days. The technology is of help for baking raw materials dealers and filling manufacturers of the baking industry to develop specialty products and will promote commercial opportunities for healthy value addition.

Chinese pastries with reduced sugar/fat content and functional syrup and powder

Guidance for Food Factories' Good Hygiene Practice

In 2016, we completed 1,260 on-site inspections and technical guidance for 821 food factories, helping enhance overall their self-management capacity. Meanwhile, we also completed on-site diagnosis and technical visit on food processing equipment and containers for 20 factories to help review their compliance with the "Hygienic Food Container Standards". We held symposiums as well to promote exchanges between all sectors and the food associations. Moreover, to strengthen quality assurance capacity of the industry, we held 12 seminars on self-management and the "Hygienic Food Container Standards" and 30 related training classes. In addition, we led in key processes, food traceability management, quality and safety enhancement, supply chain control and other customized services according to the needs of the industry. By so doing, we have helped the upgrade and transformation of more than 50 factories.

Certification Services

Expansion of certification business

The certification services that we provide include the government-sponsored certification programs and those applied independently by the food companies. Some of the examples are Certification for Food Hygiene and Safety Management System, Accreditation of Taiwan Premium Agricultural Products, Accreditation of Taiwan Quality Food (TQF), ISO 22000 Certification, and SQF Certification. Among them, CAS is certified by the COA, whereas Certification for Food Hygiene and Safety Management System is certified by the Ministry of Health and Welfare. The rest of certification services meet the standards of ISO 17021, ISO 17065 and ISO 22003 and are accredited by the Taiwan Accreditation Foundation (TAF). To expand our service scope, we have been actively seeking to become an accreditation body of the international certification programs, and we did become an accreditation body that meets SQFI requirements in 2016. Meanwhile, in response to the Government's second-level quality management certification, we have also become an accreditation body for food safety and hygiene management systems after we passed the certification of the Food and Drug Administration, Ministry of Health and Welfare this year. To continue offering certification services, we will actively seek the qualification recognition of more programs in the future to provide more professional and impartial certification services to the food industry.

Certification for food hygiene and safety management system

Certified by the Food and Drug Administration (FDA), Ministry of Health and Welfare in 2016, we have since become an accreditation body for the Food Hygiene and Safety Management System. The scope of certification is the FDA-listed food factories based on compliance of related food laws and regulations. In 2016, we carried out 117 certifications. Starting from February 2017, we will offer services to those companies which voluntarily apply for a certification.

Accreditation of Taiwan premium agricultural products

In 2016, to assist the Council of Agriculture to promote the certification system for premium agricultural products, we conducted inspections on 93 factories with CAS certification marks, 152 follow-up factory inspections, and sampled 227 products for testing. To strengthen the sampling of hazardous substances in raw materials (including animal drugs, pesticides, etc.), we sampled 66 raw materials and assisted those factories to solve problems for their defected products and improve their manufacturing process. Moreover, we conducted 3 joint inspections, in which we audited the new products for those certified factories and tracked their follow-up inspections and product testing. Additionally, we also inspected and sampled food ingredients from the kitchens of educational institutions (including campus food products).

The alcohol quality certification system

In 2016, we conducted on-site assessment on 4 factory lines of 3 new manufacturers and continued to guide 28 factories to take part in the certification process, and helped review 17 new product certification cases. In total, we assisted 37 factories to obtain certificates for their 48 factory lines and 205 alcoholic drink products. Moreover, we also conducted 190 follow-up inspections on those certified wineries and took 483 samples from their factory lines for testing. In addition, we helped the Ministry of Finance to draft one article for its Standards for Evaluation of the Certification of Alcohol Quality and amend 9 articles, offered liquor manufacturer inspection technology courses, and prepared the investigation and assessment report for high-risk liquor product plasticizers.

Accreditation of Taiwan quality food

We have obtained the certification of the Taiwan Accreditation Foundation (TAF) and passed the ISO 17065 and the Accreditation of Taiwan Quality Food programs to provide certification services for a variety of food traders and producers. Currently, we offered certification services to more than 200 factory lines and 130 factories. In 2016, we conducted certification and follow-up inspections more than 300 times and sampled more than 2,000 products for testing. Our certification services have reached international certification standards and will be geared up to be in line with the international standards, so as to help the domestic food industry to reduce export barriers.

ISO 22000 certification services

In 1999, we passed the certification of Taiwan Accreditation Foundation (TAF) to become a certification body for the food safety management system. Currently, the certification scope covers a large portion of food manufacturers, and we hope to further expand to those of the manufacturing and processing enterprises in the food supply chain. In this year alone, 7 enterprises passed the certification, pushing up the accumulated total to 32.

SQF certification services

To keep abreast with the trend in which Taiwanese food companies are going more and more international, we applied and passed the certification of the Safe Quality Food (SQF) Institute to become an SQF certification body in 2016. We can provide more diversified options for the accreditation of domestic food companies in the future. SQF is one of the accreditation programs recognized by GFSI. Thus, our SQF certification services can help the quality systems of Taiwanese food companies keep pace with those of the international manufacturers and expand into the international food channels.

Accreditation of Food Quality Control

Quality control guidance

Construction of supply chain management for bulk agricultural products: A product supply chain working group was formed for the domestic large-scale agricultural products, such as cabbage, leek, corn and bamboo shoots. The working group held 12 working meetings, coordinated 40 collaboration meetings for the supply-chain members, match-made 13 cooperation cases, hosted 4 explanation sessions and seminars to the producers and traders, conducted 8 relevant education and training sessions, convened 2 risk-assessment expert meetings, and complied 4 volumes of Agricultural Supply Chain Management Guide. Moreover, the working group has set up a "Bulk Agricultural Supply Chain" platform to provide procurement information for the reference of the producers and traders. We also screened and guided 32 producers and processing factories to report information on-line, conducted on-site teaching at their factories, and helped them solve problems regarding agricultural supply chain and demand.

Guidance for optimization of coarse industry structure: We continued to update the basic data and the production and marketing status of coarse cereals and invited experts to draft certification benchmark and management mode. So far, we have completed the CAS coarse-cereal certification benchmark (draft), revised the certification specifications for processed products as brewed foods and snack foods (such as soy milk, tofu and brewed soy sauce), set up the preliminary identification analysis technology for soybean varieties, collected soybean samples and established database to be used in the certification management. Moreover, 4 announcement meetings for certification benchmark and 1 training course were held.

Guidance for aquatic product providers to establish supply chain in the Free Economic Pilot Zone: We assisted 6 aquatic product manufacturing plants stationed in the Free Economic Pilot Zone to establish their own international certification standards and gain certifications required by target markets. We also helped them to strengthen safety and quality control on raw materials, so that they have an effective traceability system for aquatic products from raw materials to finished products. Moreover, we sampled and tested 25 imported raw materials and finished products for their risk monitoring. In addition, we helped match-make the production and marketing system, assisted the producers and traders to establish the process and supply chain management, and set up the specialty food production and marketing system and chain by mixing imported main raw materials with domestic raw materials or products.

Help food factories establish food protection programs: The Food Safety Modernization Act (FSMA) of the United States has since 2016 required all the traders and producers engaged in food production and importation in the United States territory to establish their own food safety programs for risk prevention and control. Covering three main aspects, namely security, defense and adulteration, the FSMA has drawn attention around the world and many countries have followed up to set up their own programs. The Global Food Safety Initiative (GFSI) has also decided to modify its specifications in 2017. This year, when we carried out the "Food Safety Protection Mechanism Establishment Plan" for the Industrial Development Bureau, Ministry of Economic Affairs, we referred to the European and American food protection technologies, incorporated the current situations and characteristics of the domestic food industry and then developed a set of food protection techniques and tools that meet the needs of domestic food industry and aligns with the international standards. In 2017, we will first target and help those food factories that have set up their GHP / HACCP systems and/or have export potential to adopt the Program, in which we have added "quality" on top of the three aspects (namely safety, defense, and adulteration) featured in the US FSMA. By taking four aspects into account, our Program will be more effective in helping food factories establish a comprehensive food safety management system.

Food Protection Plan Builder

Hygiene and safety management verification review and security analysis for the edible oil industry: This year we carried out 60 verification review operations on 30 edible oil manufacturing plants and 2 explanation sessions and seminars. With reference to the regulations of the UN Codex Alimentarius Commission and those of major countries, we drafted hygiene guidelines for edible oil manufacturers to follow.

Sanitary control and assisting in the canned food industry: This year, we carried out Sanitary Control and Assisting in the Canned Food Manufacturers project that was entrusted to handle by the Ministry of Health and Welfare. In the project, we assisted 66 canned food manufacturers based on the Food Good Hygienic Practices Regulations and also branch out into assisted 8 low water activity food manufacturers. In the other hand, we carried out a total of 4 event of briefing sessions of exports to the US regulations, the draft amendment on the Chapter eight of Food Good Hygienic Practices Regulations and canned food manufacturers. In addition, we carried out a training seminar and composed an inspection manual for competent health authority and sanitary inspectors in order to strengthen their capacity on the inspection of canned food manufacturers.

Guidelines for catering providers to implement food safety self-control system: This year, we conducted HACCP inspections on the kitchen facilities of 95 hotels, schools, medical institutions, discount stores, central kitchens and restaurants, and held 3 management and health quality seminars. In addition, we also completed investigation on the operating status and business models of general catering providers and chain restaurants in Taiwan. The report summarized the possible risks facing the food industry and can serve as a reference for the continuous improvement of the industry.

Management and quality improvement of vacuum-packed ready-to-eat foods: This year, FIRDI visited and guided 6 vacuum-packed food providers and implemented traceability management for 11 manufacturers through inspection registration. We also spot checked 149 pieces of vacuum-packed food to ensure that they conformed to relevant standards, including those related to storage conditions and identification of suppressed *Clostridium botulinum*, products stored at room temperature or refrigerated for more than 10 days, pH, and water activity, among others. Furthermore, we helped TFDA in reviewing the inspection registration applications of 17 pieces of vacuum-packed soybean ready-to-eat food products.

Food traceability system

Promotion and guidance regarding the food traceability system: This year, we aided 216 traders and producers of aquatic products, dairy products, packaged tea beverage products, edible oil, major staples (flour, starch, sugar, and salt), soy products, egg products and edible vinegar products to establish their own tracking and tracing systems. Moreover, we held meetings with experts and scholars, offered consensus camps for health authorities, and hosted explanation sessions and tutorial classes for food traders and producers in a hope to help them establish their own food tracking and tracing systems. We also established a food factory process management information system platform and helped food traders and producers manage their processes, establish their own tracking and tracing systems and gather and compile external demand format files to prevent repeated data registration and input errors. Up to the end of 2016, we offered assistance to more than 30 food traders and producers.

Promoting production traceability of CAS Good Agricultural Products: We help good agricultural product manufacturing plants in gathering agricultural product traceability information and uploading it onto *Taiwan's good agricultural product management web portal*. By doing so, CAS product information becomes available to both certification units and consumers. In 2016, we screened and confirmed 59 companies to join the production traceability project, and they uploaded 2,904 visiting registration messages. We continued to guide and review the visiting registration of 69 factories, which we had guided during the previous two years, and they uploaded a total of 10,462 messages. We also helped producers and traders to add 15 products online. Moreover, we conducted 3 training seminars on how to operate the production traceability cloud platform system and 1 internal education and training workshop for staff in charge of the production traceability system. With the operations of this platform, we have been able to implement the CAS certification system for the management, traceability, and review of products and raw materials, and the informatization of each product batch.

Refurbishment of the canned food pilot plant

The "International Conference on Food Quality and Safety Management" was held in Taipei on March 22, 2016.

Food Industry Knowledge Service

Dynamic analysis of food industry development

Under the support of the projects of the Ministry of Economic Affairs, the Council of Agriculture, the Ministry of Health and Welfare, and the Office of Science and Technology Executive Yuan, we have completed several survey and dynamic analysis of the development of the food industry, and conducted communication and service outwards with various ways. The main achievements were included in the following.

Publication of "Food Market Information" monthly: We have collected and published information on policies and regulations, new products and technologies, food consumption and market development trends which affect food import and export in 12 issues of the journal, including 1,246 papers/abstracts and 655 figures or tables. Hopefully, the provision of the information may help the government and the industry in development and R & D strategy planning.

Publication of "Almanac of Food Industry, 2016": This publication covered information of foreign food industry, environmental change of global economy, and major food industries in Taiwan, including non-alcoholic beverage, frozen food, instant noodle, edible oil, health food, fresh deli food, animal feed, seasonings, food package and machinery, food services, and food distribution, with information of status quo of market development, trend for development, change of policy, and business dynamics.

Publication of "Almanac of Food Consumption Survey, 2016": This publication included basic data of consumers surveyed, consumer choice of food channel, personal eating habit and demand, consumer behaviors for various foods. The almanac provides information on consumption characteristics and consumer behavior for various agricultural products and processed foods.

Expanding information services and sharing: Various industry surveys and research information were disseminated and exchanged through book publication, web presentation, E-mailing, workshop, share meeting, and seminars. In addition to the activities of the food information knowledge club, we developed also knowledge club in specific field, including non-alcoholic beverage, and industrial technology intelligence services, to provide members with first-hand information and business dynamics.

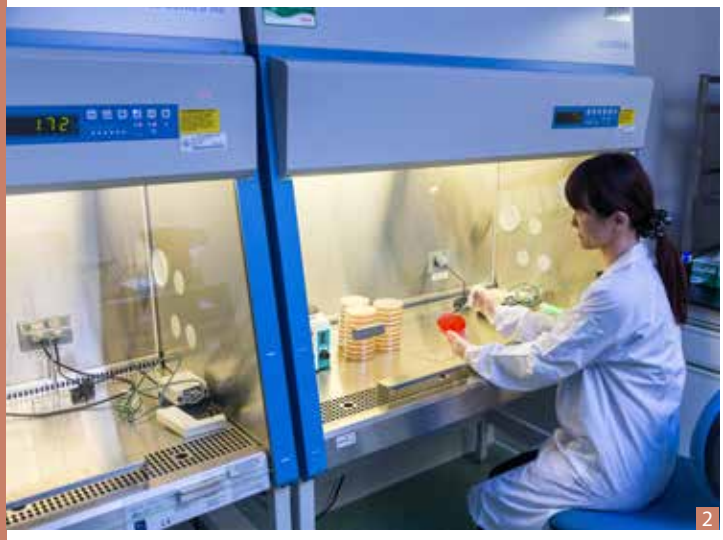
Survey and research on the food industry

We have published several specific subject reports, including study on tasting experience of 2016 awarded Taiwan senior-friendly foods, study on the structure of imported pork supply chain and competitiveness, study on the developmental trends of dairy market and international competition, study on supply chain to explore the value added featured agricultural processed products in eastern Taiwan, trends and business opportunities for global food clean labels and foods toward cleanliness, developmental trend and business opportunities for food industry intelligence supply chain ecology, survey on snack food consumption behavior and life style in Taiwan 2015, niche products and operation strategies in Southeastern food market 2016, prepared food market opportunities and operation strategies in Indonesia, trend of food market, business opportunities and operation strategies in Mainland China, survey on health food consumption behaviors and life style in Taiwan 2016, survey on demand for professional personnel in food industry, and research on food material used in foods for elderly people. Meanwhile, we disseminated the information through industrial fast new report, and industrial analyzing report to provide industry information with insight instantly, hopefully to help firms to keep abreast of the food market, law and regulation in Taiwan and China.

Knowledge service for the food industry

We have finished several customized market research for food industries, including drink market reports, health food reports, and information dissemination via holding 8 seminars on food market analysis and industry innovation and providing 9 lectures or information services for food associations and food enterprises on innovation and market trends in food and drink industry. The information service may also help the government and enterprises in getting new and whole industry information, and thus immediately making clear the global and domestic market change and development trend to effectively grab the market pulse to do research and development and planning for marketing strategy.

Food Inspection and Safety Evaluation



1、2. Relocated and renovated microbiological testing laboratory

Optimizing Service Scope

Upgrade and monitoring of microbiological testing space

Our microbiological testing laboratory has been accredited by both the Taiwan Food and Drug Administration (TFDA) and the Taiwan Accreditation Foundation (TAF) in accordance with ISO 17025. In order to comply with ISO requirements for food testing laboratories and to reinforce credibility toward testing results generated by FIRDI, the microbiological testing laboratory has undergone relocation and space remodeling and renovation in 2016. The brand new laboratory was designed to address physical separation of space according to workflow, comprising change/entry room, sample preparation room, sample testing room, incubator room and identification room. Given that, cross-contamination can be effectively minimized. In addition, the upgraded facility also improves the quality of microbiological examination and expands testing capability in response of the rising demand for testing service.

Establishing the "Entrustment Analysis and Service Group"

Owing to business development needs and for enhancing professional service quality, the original "Delegated Service Office" has been upgraded into a specialized "Entrustment Analysis and Service Group" as a platform for providing product inspection, technical support and services for FIRDI and other sectors.

Establishing the "Entrustment Analysis and Service Group"

Enhancing Professional Image

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 standard. The ARSC has been granted 492 accredited testing items from TFDA and 466 accreditations from TAF. The newly accredited items acquired this year include those related to malachite green and its metabolites, and total sugars (glucose, sucrose, fructose, lactose and maltose).

Quality assurance and specification testing for imported food products

FIRDI is recognized by the National Treasury Administration as an accreditation laboratory for tobacco and wine products concerning their hygiene standards. In addition, we have also been approved by the Brazilian Customs Office for inspecting non-alcoholic beverages, vinegar, and wine products, and assist in providing quality assurance services to vendors for importing food products. This year, the Indonesian Agency for Agricultural Research and Development has stipulated laboratory approval reports for 103 fresh produce-related plants or products, including fruits, vegetables, grains, nuts, and legumes. The testing items include pesticide residue, heavy metals, mycotoxin, ochratoxin, *Salmonella*, and *Escherichia coli*. Once again, ARSC has been approved by Indonesian government as the laboratory for providing above-mentioned inspection and test reports for various sectors.

Laboratory accreditation consultation

To serve industries and assist them in adhering to the Act Governing Food Safety and Sanitation and the Three-tier Quality Control 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-level quality control that meet international standards.

Extending Testing Techniques

New test service items

FIRDI actively collects information related to food testing and develops testing techniques to serve industry needs. We have added new testing service items this year, namely, pesticide residues in dairy foods (60 items), phosphate in foods, volatile substances in alcohol and spirits (GC/MS), sugars in foods(included galactose), beta–cyclodextrin, inspection for *Campylobacter* spp. in foods, inspection for thermophilic acidophilic bacilli in juice, and qualitative screening tests for animal-derived ingredients in foods (*Thunnus* spp., *Oncorhynchus* spp., *Salmo salar*, *Oncorhynchus mykiss*, *Istiophoridae*). In addition, in accordance with the Act Governing Test Methods in Food Additives announced by TFDA, new test service items for sweeteners, preservatives, and antioxidants in food products have been added to our service scope. We also provide event-specific qualitative and quantitative detection services for genetically modified foods such as soybeans and corn according to TFDA' s recommended testing methods.

Establishing adulteration identification techniques

Besides providing services related to composition analysis of general and specific food products to external parties, our food adulteration identification and rice grade inspection services 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 this year. We will continue to accumulate our technical capacity in identifying food adulteration. By integrating equipment such as EA-IRMS (Elemental Analysis-Isotope Ratio Mass Spectrometry) and GC-IMS (Gas Chromatograph-Ion Mobility Spectrometer), novel high-value food testing services regarding adulteration can be conducted by examining differences in spectral profiles on the ratios of stable isotopes and volatile components in food products.

Analytical performance of multiplex real-time PCR assay

Multiplex real-time PCR assay can be used for the determination of fish species and its content in aquatic products and, thus, provide a solution for current predicament caused by lack of analytical methods. In addition, it can be utilized to assure product quality and against adulterations of raw materials of common fish as the substitute for high price fish.

Evaluation on usability of rapid analytical assay for pathogens detection

TFDA has announced a number of analytical methods for the testing of food pathogens by real-time PCR assay. ARSC has analyzed commercial refrigerated products by rapid detection platforms and came up with the result in accordance with that of the traditional analytical method. Therefore, it can be concluded that using real-time PCR for the detection of food pathogens not only will cut down the turnover time to within 1-2 days, but also will greatly help the food industry with quality control of raw materials and semi-finished and finished products.

The flagship real-time gene qualitative and quantitative detection system

Expanding Testing Technique Range

Developing and maintaining the food nutrition database and the edible oil database in Taiwan

This year, the contents of the food composition database were 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. Saturated fat, trans fat and sugars data were incorporated into the expanded database. Furthermore, fatty acids composition, triacylglyceride, phytosterol and tocopherol composition of palm oil, coconut oil, rice barn oil and grape seed oil were integrated in this project. All results in this study could be further used as a reference for the government to update the Taiwan edible oil database.

Compiling food adulteration data and establishing the database

This study systematically compiled research discourses, investigation records, and media reports regarding food adulteration to establish the database. The collected data mainly focused on food scandals in Taiwan and China, with supplementary data documenting food scandals in Europe and the United States. The established food adulteration database can provide related information to the general public through the website services in the TFDA.

Food additive specifications inspection service

FIRDI is assisting the TFDA in setting up testing methods for food additives and executing the test of specification compliance for food additives. Furthermore, referring to international specifications and regulations, we are compiling and amending current food additives specifications and test methods. This year, we have completed most test method development and setup for food additives. Furthermore, we have provided the whole test services for food additives specifications to help the food industry comply the food additives specifications and implement self-management.

Evaluation on product quality and specifications

This evaluation technique could monitor the quality specifications of specific products (such as the free amino acid fingerprints of the chicken essence, and the volatile odor fingerprints of the products, etc.). By using the statistical analysis techniques, the main component database was established to identify the differences between samples. In concert with data analysis, we could draw up indicators and their reasonable range suitable for product specifications. The technique can help the industry quickly assess product qualities and enhance production efficiency.

Quality assessment technique during storage

This evaluation technique was combined with the gas chromatograph-ion mobility spectrometer (GC-IMS), the chemical analysis technique and the sensory evaluation to establish the volatile flavor molecular fingerprint database of product quality. Manufacturers can identify the factors affecting product deterioration as quality improvement basis for product development and help reduce production time and cost.

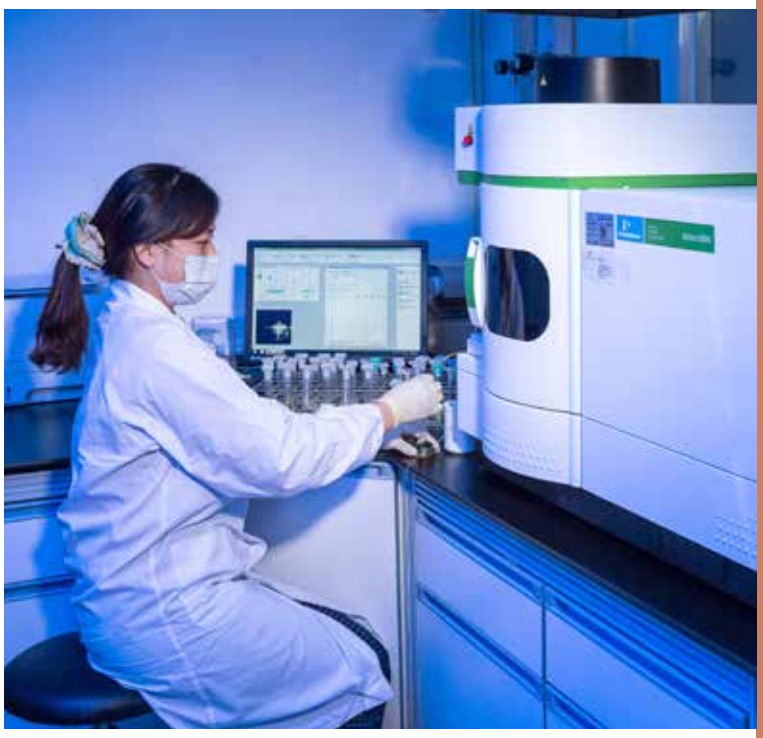
Food safety assessment technology

FIRDI has established *in vitro* microbes, cell-based models and *in vivo* animal testing techniques for genotoxicity, acute toxicity, and subacute toxicity. This year the sub-chronic and teratogenic toxicity assessments were also established. These techniques can be used to assure the safety of "Non-Traditional Food" and the "Third Class Health Food", such as *Antrodia cinnamomea*, *Phellinus linteus* and others, to assist in the development of a new generation health food.

Managing new generation biotechnology food and promoting GM feed registration

The "Management principle of biotechnology foods derived from oligonucleotide-directed mutagenesis technique" was drafted for the Ministry of Health and Welfare in 2016. The key components of the imported GM and imported 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 managing the products derived from GM microorganisms and GM feeds in 2016. We provided the professional service to promote GM feed registration.

Gas chromatography–mass spectrometry for hazardous substance analysis - pesticide residues, PAHs, and others



Inductively coupled plasma mass spectrometry-trace elements analysis

Industrial Personnel Training

The "International Symposium on Enhancing Food Quality and Compliance" was held on Dec.12-13, 2106.

FIRDI is Taiwan's largest food professional training institute. In 2015, the FIRDI Academy was established in the organization reform and its inauguration ceremony was held in July 2017. In the future, the FIRDI Academy will play an important role in training food industry personnel and enhancing international exchange of technology knowledge.

Professional Training and Education

This year, 180 classes were offered with 5,887 trainees.

Training on industry self-management and food protection: FIRDI managed the Industry Development Bureau (IDB) consigned projects to strengthen the food industry personnel' s professional competency, which included (1) enhancing the professional ability of source management and self-management system by offering a total of 30 self-management courses and training 1,017 trainees; (2) assisting the introduction of a comprehensive food protection mechanism to the food industry by offering a total of 4 basic training courses in food protection and training 109 trainees; (3) hosting 4 international conferences with 505 participants. Conference topics included GFSI, SQF, food defense, food adulteration, allergen control, HARPC, Food Safety Modernization Act/ Foreign Supplier Verification Programs (FSMA / FSVP) and food quality enhancement and compliance, in order to improve Taiwan' s food industry management systems to comply with international standards and expand global market.

Training of canned seaming inspection

1. Refurbishment training facilities: auditorium 2. Group discussion 3. On-site training of food hygiene and safety

Training on food hygiene and safety auditor: Consigned projects from the Taiwan Food and Drug Administration (TFDA) were executed to train hygiene inspectors and auditors from various local and municipal health bureaus across the country. This year, 34 classes were offered by the government project with 1,269 trainees.

Training on food safety and regulation: In addition to assisting the food industry in expanding business to the United States and hosting continuously the Better Process Control School (BPCS), FIRDI offered 4 food safety monitoring training courses to industry that required food safety monitoring programs and trained 121 trainees in 2016. This would help industry build the capacity for establishing food safety monitoring programs and mandatory inspection programs to meet regulatory requirements. In order to assist the food safety management of the offshore islands, 3 food safety-related training courses were offered to the islands of Kinmen, Mazu and Penghu based on the characteristics of local industries. Additionally, in order to promote continuing education and training, FIRDI cooperated with local schools and offered continuing education courses for professionals, which were recognized by the Ministry of Education as equivalent of college-or-above educational credits.

Qualification Assessment for Food Industry Professionals

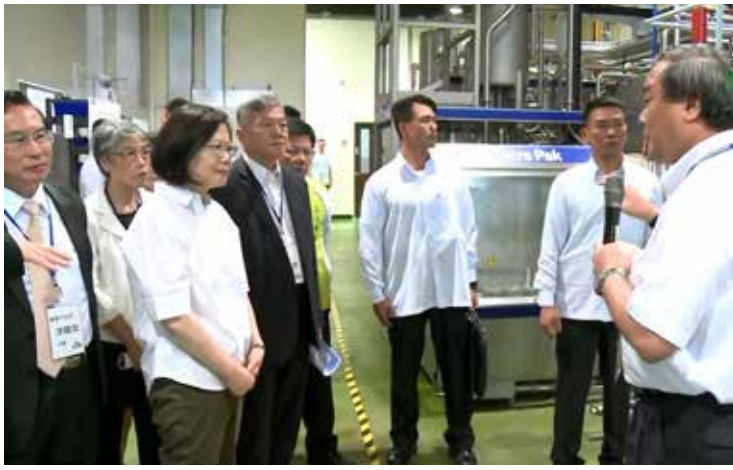
This year, FIRDI held qualification assessment of "Food Quality Assurance Engineer" and "Health Food Engineers" for food industry talent. The former certification was issued by the Ministry of Economic Affairs (MOEA), and the latter was issued jointly between FIRDI and the Health Food Society of Taiwan and was approved by IDB (MOEA) iPAS program. This year, 6 assessments were held on 53 examination sites in 120 test rooms, and the number of applicants was 9,382 people. In total, 136 Associate Food Quality Assurance Engineers, 18 specialist Food Quality Assurance Engineers, 565 Associate Health Food Engineers and 2 Health Food Research and Development Engineers were certified. In 2016, FIRDI authenticated competent Food Quality Assurance Engineers as well as Health Food Research and Development Engineers with a total number of 721 people.

In response to the changes in industry demand, "expertise and skill gap of the test-takers of health food research and development engineers" was proposed to be the guidelines for design and development of special training courses or courses that help bridge the skill gap. FIRDI also cooperated with the "Food Association of Taiwan" to offer two "training for the Associate Food Quality Assurance Engineers assessment test", with the aim of nurturing professionals in different functions based on the industry demand.

Special Reports

President Tsai Visit Chiayi Industry Innovation and Research Center (CIIC), MOEA

Accompanied by Ms. Mei-Yun Ho, the Consultant of Board of Science and Technology, the Executive Yuanh (BOST), Mr. Shiing-Jer Twu, Mayor of Chiayi City, Chun-Yi Lee, member of the Legislative Yuan, and Jong-Chin Shen, the Deputy Minister of MOEA, ROC, President Tsai visited CIIC on Oct. 14, 2016. She acknowledged CIIC' s endeavor and achievement for the last five years in assisting local business with innovative research and incorporated services to achieve technical upgrading, technology-based product development and transformation counseling and integrating resources of industries, government, academia and research institutes. President Tsai also looked forward to CIIC to promote more investment cases and create more local employment opportunities during the matchmaking, R&D and/or manufacturing process in the future.



Dr. Binghuei Barry Yang (right 1), Director of the Southern Taiwan Service Center introduced the innovation service platform and equipment for health functional food process to President Ing-Wen Tsai (left 2)

President Ing-Wen Tsai (left 4 up front), Ms. Mei-Yun Ho (left 3 up front), the Consultant of Board of Science and Technology, Executive Yuan, Mr. Shiing-Jer Twu (right 3 up front), Mayor of Chiayi City, Chun-Yi Lee (right 1 up front), member of the Legislative Yuan, and Jong-Chin Shen (left 2 up front), Deputy Minister of MOEA, ROC took a group photo with Dr. Chii-Cherng Liao (left 1 up front), Director General of FIRDI, Dr. Binghuei Barry Yang (right 3 in the back) and the representatives of the research institutes stationed in CIIC on Oct.14, 2016.

Industry Development Bureau, MOEA Certified the Southern Taiwan Service Center as an "Automation Service Institute"

In order to coordinate the government's policy to promote industrial structure optimization, FIRDI in STSC applied to be one of the "IDB Automation Service Institutes" in February, 2015 and received the certificate on March 25, 2016. We now provide more services including: automation product design (computer aided design CAD), automated manufacturing (design and build machine, online monitor and control process design), and automated material storage and transportation (factory layout and planning, material handling system). FIRDI will apply project research capacity via factory diagnosis and technical guidance to assist the knowledge-based operation of the industry in R & D innovation, manufacturing performance improvement, and industry upgrading, which shall accelerate the development of the smart manufacturing in the food industry.

Certificate of IDB Automation Service Institute

Efforts to Achieve Corporate Social Responsibility

"Love for remote area. Act for food nutrition and safety": To take care of the nutritional intake among the rural school children, FIRDI has researched and developed calcium-fortified soy milk which was enriched with calcium, vegetable protein and vitamin A to provide the required nutrients what the toddlers or school children need in the prime of growth stage, also to promote basic knowledge about food safety and food nutrition. FIRDI's propaganda has served up to 500 children from nine rural elementary schools around the stretch of southern Taiwan to Penghu.

Promotion of business opportunities in Hualien-Taitung area: FIRDI has assisted the Hualian Soy Sauce Company to improve product quality and management skills. It has hosted a "Food Variety Show" to promote local food innovation and development and business opportunities in Taitung and organized a "Food Business Opportunity Sharing Seminar" in Hualien to promote the characteristics and features of local foods. Both events have got ardent response from the traders in the food industry.

Loving care for the offshore islands industry and hand-made workshop: This year, the "Food Industry Trend Sharing Workshop and Hand-made Workshop" was held in Mazu. In the workshop, we used the ohmic heating technology and equipment developed by FIRDI to process Mazu-featured ingredients and used this example to guide the local food manufacturers to make interesting new dishes and western-style desserts. We also helped the enterprises in Kinmen and Mazu apply for government subsidies and develop honeydew jerky without artificial phosphate, frozen Hong-Zao chicken, sour Chinese cabbage pot and other new fancy and healthy dishes with local raw materials.

Group photo of FIRDI staffs with school teachers and students and the certificate of thanks given by the school during the activity of「Love for remote area, Act for food nutrition and safety」

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1. FIRDI held a press conference and award ceremony for the selected silver-hair friendly products in the auditorium of COA on Oct 6, 2016, to assist the development of the silver-hair food industry, broaden the application of food ingredients, and increase the dietary pleasure of the elderly.
2. Group photo of Director Xiang-Tang Jian (left 2) and lecturers of "Cross-strait Big Data Analysis Applied in Food Safety Management Seminar"

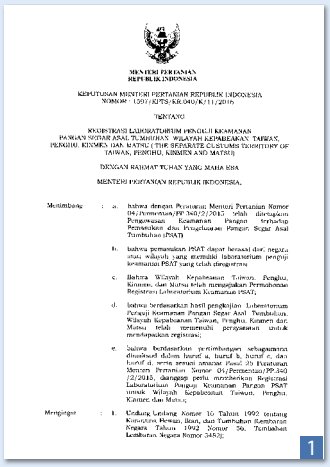
Promoting Cross-strait Food Safety Exchanges

FIRDI has assisted the Food and Drug Administration to promote cross-strait food safety exchanges. Main achievements are as follows: (1) inviting domestic experts to form a promotion group to discuss and give suggestions on a regular basis; (2) arranging food safety experts from both sides of the Taiwan Strait to visit each other and exchanging ideas for 7 times; (3) organizing 6 related conferences and forums with 956 attendees, including food transaction management and big data analysis applied in food safety management, so as to pragmatically promote cross-strait exchanges; and (4) carrying out collection of real-time information and research on China's food industry and food safety and economic and trade practices to provide references for cross-strait exchanges.

Dr. Chii-Cherng Liao, Director General of FIRDI, delivered a remark on "Cross-straits On-line Food Trading Management Specification and Practice Seminar"

Organizing Evaluation Contest for Silver-hair Friendly Foods

This year, FIRDI has organized Evaluation Contest for the Silver-hair Friendly Foods according to the project consigned by Council of Agriculture (COA). 29 manufacturers have sent in a total of 135 entries for the evaluation contest. After the first trial, 23 products were chosen by the committee, according to theme classification of the staple food / main courses / side dishes / soups / drinks / snacks / RTC ingredients and based on the utilization of local food materials, hygiene and safety, and the concept of silver-hair friendliness. The final trial was done according to product characteristics of silver-hair friendliness (including color, aroma, taste, type, texture, nutrition and health that meet the needs of the elderly) and product special features (including the characteristics of ingredients, processing technology, functionality, story, rigor, etc.). Each of the 23 products was asked to make a presentation and was evaluated. In the end, 10 silver-hair friendly products were chosen. On press conference held on October 6 this year in the COA auditorium, the award has been granted to the selected products by Minister Chi-Hung Tsao of COA. For the 10 selected products, FIRDI has arranged the elderly to taste the products in residential areas, houses and institutions, and tasting reports were provided to the selected manufacturers. In addition, FIRDI has also planned sales promotion activities on sales channels and platforms, etc.


MENTERI PERTANIAN
REPUBLIK INDONESIA

KEPUTUSAN MENTERI PERTANIAN REPUBLIK INDONESIA
NOMOR : 1207/KPTS/KR.040/K/11/2016

TENTANG

KOORDINASI LABORATORIUM PENGUJI KEAMANAN PANGAN SEGAR ASAL TUMBUHAN WILAYAH KEPABEANAN TAIWAN, PENGHU, KINMEN DAN MATSU (THE SEPARATE CUSTOMS TERRITORY OF TAIWAN, PENGHU, KINMEN AND MATSU)

DENGAN RAHMAT TUHAN YANG MAHA ESA

MENTERI PERTANIAN REPUBLIK INDONESIA,

Menimbang : a. bahwa dengan Peraturan Menteri Pertanian Nomor 04/Permentan/PP.340/2/2015 telah ditetapkan Pemasukan Keamanan Pangan terhadap Pemasukan dan Pengeluaran Pangan Segar Asal Tumbuhan (PSAT)

b. bahwa pemasukan PSAT dapat berasal dari negara atau wilayah yang memiliki laboratorium penguji keamanan PSAT yang telah ditegaskan

c. Bahwa Wilayah Kepabeanan Taiwan, Penghu, Kinmen, dan Matsu telah menyediakan Permohonan Registrasi Laboratorium Keamanan PSAT;

d. bahwa berdasarkan hasil pengkajian Laboratorium Pengujі Keamanan Pangan Segar Asal Tumbuhan, Wilayah Kepabeanan Taiwan, Penghu, Kinmen dan Matsu telah memenuhi persyaratan untuk mendapatkan registrasi;

e. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a, huruf b, huruf c, dan huruf d, perlu untuk mencabut Pasal 29 Peraturan Menteri Pertanian Nomor 04/Permentan/PP.340 /2/2015, dengan perlu menetapkan Registrasi Laboratorium Pengujі Keamanan Pangan PSAT untuk Wilayah Kepabeanan Taiwan, Penghu, Kinmen dan Matsu;

Mengingat : 1. Undang-Undang Nomor 16 Tahun 1992 tentang Karantina Hewan, Ikan, dan Tumbuhan (Lembaran Negara Tahun 1992 Nomor 56, Tambahan Lembaran Negara Nomor 3482);

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Awards and Certifications Obtained in 2016

★ FIRDI is a certification and execution institution of SQF and has officially registered on the official website of the United States Safe Quality Food Institute since September 10, 2016.

★ FIRDI' s Analysis Research and Service Center has been accredited by the Indonesian Agency for Agriculture Research and Development as its approved laboratory since November 8, 2016. (Figure1)

★ The Southern Taiwan Service Center applied for an "automation service institution" under the Industrial Development Bureau, Ministry of Economic Affairs and was certified on March 25, 2016.

★ The Bioresource Collection and Research Center was awarded the "Model Award" by the Centers for Disease Control of the Ministry of Health and Welfare on December 9 in the performance presentation of 2016 high protection / biotechnology related laboratories with successful introduction of "Laboratory Biorisk Management System".

★ FIRDI executed the Happiness Dessert Project promoted by the Industrial Development Bureau and was rated as Excellent Project by the Industrial Development Bureau on April 13, 2016.

★ The FIRDI Academy and the Zhongzhou University of Science and Technology have cooperated to open vocational education courses with credits recognized by the Ministry of Education.

★ FIRDI took part in the Announcement of Industrial Upgrading and Transformation Achievements and Backbone Enterprise Innovation Forum - "Innovation Team Competition @ Kaohsiung" event held in Kaohsiung on November 2, and its offshore counseling service team won the "Best Team Award." (Figure 2 & 3)

★ The FIRDI Academy was awarded Mr. Hsieh Cheng-Yuan Special Contribution Award by Mr. Hsieh Cheng-Yuan Food Technology Development Foundation and FIRDI' s service team for catering health and technology won Mr. Hsieh Chung-Pi Innovation Award.

★ Senior research scientist Wei-Guang Fu won the "National Standardization Achievement Award" at the 17th National Standardization Award Competition held by the Bureau of Standards, Metrology & Inspection of the Ministry of Economic Affairs, and was honored at the 17th National Standardization Award Ceremony in Taipei on October 14, 2016.

★ List of finalists for awards from the Taiwan Association for Food Science and Technology in 2016: senior research scientist Jin-Tsu Lai won "Zeng Tong Memorial Patent Invention Award"; technologist Mei-Ying Chen won "Food Science and Technology R & D Achievement Award"; technologist Hsiao-Chih Chiu and technologist Shu-Chi Tsai won "Extension and Service Achievement Award". They were awarded and honored on the Annual General Meeting held in Taichung on December 2, 2016.

Major Events

1/11

Deputy Director Da-Sheng Lo and researcher Zhen Shao from the Department of Industrial Technology, MOEA visited the Institute.

1/28

Teachers and students from the College of Food Science and Technology, Jiangnan University, China visited the Institute.

2/23

Mr. Pornchai Tarkulwaranont, Deputy Minister of the Ministry of Industry of Thailand, and several delegates visited the Institute.

3/22

Mr. Koh Boon Liang, Chairman of the Singapore Institute of Food Safety Science and Technology, and food manufacturers and teachers from food related departments visited the Institute.

6/17

Secretary-General Zhe-Sheng Wu of the Chinese Professional Management Association led a delegate of 34 people to visit FIRDI.

6/22

FIRDI took part in the "2016 Taipei International Food Exhibition" held in Taipei from June 22 to June 25 to strengthen communication of processed food safety by playing games.

7/6

The Technology Transfer and Contract Signing Ceremony of FIRDI and Namiya fermentation Co., Ltd. was held. The contract was co-signed by Dr. Chii-Cherng Liao, Director General of FIRDI, and Ming-Xi Chiou, Chairman of Namiya Fermentation Co., Ltd.

7/14

Mr. Pornchai Tarkulwarranont, Deputy Minister of the Ministry of Industry of Thailand, and several accompanying experts visited FIRDI. A Ceremony for Memorandum of Understanding Signing was held and co-hosted by Mr. Yongvut Sarovapruk, Chairman of NFI, and Dr. Tony J. Fang, Deputy Director-General of FIRDI.

3/29

FIRDI hosted the 2016 Announcement on Research Achievements and Performance and Briefings on Cooperation Projects with Industrial Partners in Chiayi and Hsinchu on March 29 and March 31, respectively.

4/28

The technology transfer ceremony of FIRDI and Fengshiji Co., Ltd. was co-hosted by Mr. Zheng-Gang Leou, Chairman of Fengshiji Co., Ltd., and Dr. Chii-Cherng Liao, Director General of FIRDI.

5/27

FIRDI took part in the Kaohsiung decryption technology treasure exhibition held by the Ministry of Economic Affairs from May 28 to June 19.

6/15

The technology transfer ceremony of FIRDI and Jinguang Biotechnology Co., Ltd. was co-hosted by Dr. Chii-Cherng Liao, Director General of FIRDI, and Mr. Qin-Shan Yang, Chairman of Jinguang Biotechnology Co., Ltd.

7/18

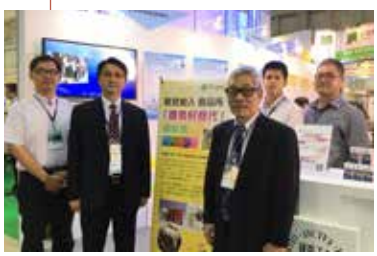
The Opening Ceremony of The FIRDI Academy was co-hosted by Dr. Chii-Cherng Liao, Director General of FIRDI, and Dr. Tony J. Fang, Deputy Director-General of FIRDI and Director of the FIRDI Academy.

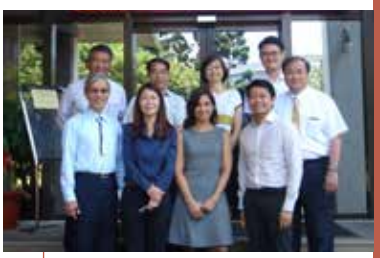
7/20

Section Chief Shi-Fu Xu and his delegates from the Veterinary Medicine Supervision Office in Anhui Province, China visited the Institute.

7/21

FIRDI took part in the "2016 Taiwan Biotechnology Exhibition" held in Taipei from July 21 to July 24.





7/21

Dr. Nefertiti Campos, Manager of Abbott Laboratories in Singapore, and his colleagues visited the Institute.

7/22

Mr. Sakuma Yoshinori, Deputy Director of the Japan Food Analysis Center, and Ms. Yoka, Director of the Customer Service Center, visited the Institute.

7/27

Deputy Director Yan Wang from Cross-strait Cooperation and Exchange Center of Science and Technology, China visited the Institute.

8/5

The "Mushroom Product Promotion Exhibition" was held at the Exhibition Hall 1 of the Taipei World Trade Center.

8/24

Guang-Jian Lo, President of the Institute of Food of Jiangsu Food and Drug Vocational and Technical College in Mainland China, and several delegates visited the Institute.

11/2

FIRDI participated in the Announcement of Industrial Upgrading and Transformation Achievements and Backbone Enterprise Innovation Forum - "Innovation Team Competition @ Kaohsiung" event held in Kaohsiung.

10/21

The Technology Transfer and Contract Signing Ceremony of FIRDI and Boxiao Biotechnology Co., Ltd. was held. The contract was co-signed by Dr. Chii-Cherng Liao, Director General of FIRDI, and Bor-Yau Sheu, General Manager of Bioyo Biotechnology Co., Ltd.

10/29

The 49th anniversary celebration of FIRDI was held.

11/10

Researcher Mei-Mei Chang of the Research Center of Food Safety of Chinese Law Society and associate professor Wei Hong of the Department of Management Science and Engineering of Jiangnan University, China visited the Institute.

9/1

Mr. Christophe Legillon, Director of Commercial Office of French Institute in Taipei, and several delegates visited the Institute.

9/29

FIRDI participated in the "2016 Taipei International Invention Show & Technomart" held in Taipei from September 29 to October 1.

10/6

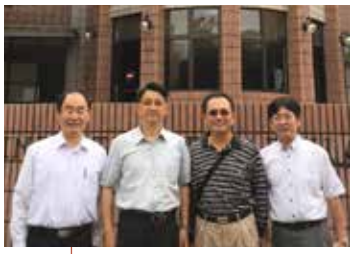
Press Conference for 2016 Awarded Silver-hair Friendly Foods was held in Taipei.

10/14

President Ing-Wen Tsai visited the Chiayi Industry Innovation & Research Center, MOEA.

11/15

Xue-Lin Chang, Deputy Director of Zhejiang Administration of Industry and Commerce, China visited the Institute.



11/18

Professor Wu-Yin Weng of the School of Food and Bioengineering, the Jimei University, Xiamen visited the Institute.

11/21

Director Sheng-Feng Su and others from the Guangdong Provincial Food and Drug Administration Inspection Bureau, China visited the Institute.

11/25

Dr. Miranda Mirosa, Lecturer of the Food Science Department, the University of Otago, New Zealand, visited the Institute.

11/30

Ji-Wu Yang, General Manager of Innovation Center of China's Inner Mongolia Yili Industrial Group Co., Ltd., visited the Institute.

FIRDI 2016

Research, Development, Innovation

SINCE 1965

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