Philippine Rice Research Institute

Summary Report

Philippines

Verification Survey with the Private Sector for Disseminating Japanese Technologies for Low Protein Rice for Dietary Therapy of Chronic Kidney Disease in the Philippines

November, 2017

Japan International Cooperation Agency

Biotech Japan Corporation

1. BACKGROUND

In the Philippines, lifestyle related diseases such as heart disease, cerebrovascular disease, malignant tumors, diabetes and kidney disease occupy more than a half of top 10 causes of death in 2010. The number of kidney disease patients who receive dialysis treatments was more than 23,000 in 2013, quadruple the amount from 2004, and is expected to increase rapidly from now on due to economic growth and a shift to modern lifestyle. While treatments of kidney disease are mainly dialysis treatments or transplants today, medical costs are big burdens not only for patients but also for the Government. In order to resolve these problems, disseminating dietary therapy with low protein rice and improvement of lifestyle are essential.

This survey aims to introduce BTJ's technology of processing low protein rice to the Philippines and make it suitable for concerned Philippine patients through the assistance of PhilRice. It is expected to maintain and promote the quality of life of chronic kidney disease (CKD) patients by delaying the progression of their disease and by decreasing the costs of medical treatments.

2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

(1) Purpose

This survey aims to produce the low protein rice by using Philippine rice and adding values to Philippine rice through transferring BTJ's unique and improved technology to PhilRice, and to introduce low protein dietary therapy to CKD patients and medical personnel in the Philippines and make it known nationwide.

(2) Activities

The main outcomes of the Survey are as follows:

(1) A production environment that initiates Research and Development on the low protein rice with the Philippine rice as the raw material by installing the Product and transferring technologies to PhilRice were established.
(2) The low protein rice which fits Philippine's preferences, and improved recipes and guide books for CKD patients in the Philippines were developed.
(3) A dissemination and deployment plan of the low protein rice and low protein dietary therapy for CKD patients to healthcare practitioners and patients were developed.

The main activities of the Survey were as follows:

Activities related to outcome (1)

1-1: Order to Japanese manufacturers for equipment and transport the equipment to PhilRice

1-2: Install the equipment into PhilRice and conduct performance test

1-3: Create operation and maintenance manuals of the equipment

1-4: Export lactic acid bacteria from Japan to Philippines

1-5: Select suitable Philippine rice varieties

1-6: Demonstrate the proper use of the equipment and transfer the technology of low-protein processing method.

1-7: Conduct trial production of low protein rice

1-8: Through above activities, support PhilRice in establishing its own research and development system in order for them to continue developing quality low protein rice even after the survey

Activities related to outcome (2)

2-1: Make procedures for a test without the low protein rice (control test) and a test with the low protein rice (intervention test)

2-2: Perform laboratory analysis of the low-protein rice to assess its safety and quality

2-3: Conduct orientations for medical personnel and patients after obtaining approval from hospitals such as NKTI (National Kidney and Transplant Institution) to conduct the control test and the intervention test

2-4: Select approximately 50 CKD patients to participate tests and obtain a written consent from each participant as a validation of their compliance to the rules and regulations of the control test and the intervention test

2-5: Create questionnaires for the control test and the intervention test

2-6: Develop and improve recipes and guide books for dietary therapy utilizing low protein rice

2-7: Conduct the control test without the low protein rice and collect feedback through the questionnaires

2-8: Conduct the intervention tests with low protein rice and collect feedback through the questionnaires

2-9: Collate and analyze the results of the questionnaires and modify the low-protein rice, if necessary

2-10: Modify and improve recipe books and guide books based on the result of the

questionnaires, if necessary

Activity related to outcome (3)

3-1: Research the needs of CKD patients and medical beneficiaries and the regulations or laws related to low protein rice in Philippines

3-2: Conduct promotional activities such as participating in medical conventions to disseminate the methodology of low protein dietary therapy to medical beneficiaries and patients

3-3: Consider measures to increase recognition of low protein rice in the Philippines and plot relevant marketing strategies

3-4: Consider the appropriate model of purchase of the low-protein rice for CKD patients in Philippines

3-5: Formulate the dissemination plan of the low-protein rice and the low-protein dietary therapy for CKD patients in Philippines

(3) Information of Product/ Technology to be Provided

Technology:

BTJ's patented rice processing technology (Japan Patent #5383302) can reduce protein in the rice which is specifically made for CKD patients on low-protein diet. By reducing the protein in the staple food, patients can enjoy food with higher biological value. BTJ's technology changes the composition of natural rice by fermentation with plant-origin lactic acid bacteria. Proteolytic enzymes from the bacteria break down proteins into amino acids. These amino acids are washed away with water, thus lowering the total content of protein in the rice. As few enzymes are used, the original taste and texture of the rice remains. The shelf-life is also extended. This method can also be applied to several rice varieties, including Philippine rice breeds.

Equipment:

- Rice washing machine - stirs raw rice and water in the tub; has a built-in water tank; heat and acid-resistant
- Water warmer and tank - has a capacity to warm/heat and store 200L of water up to 80ºCelsius; the water is used for washing rice
- Thermostat - has heating and cooling mechanisms; with automatic temperature control/adjustment (5-50ºCelsius); for fermentation
- Refrigerator - 800L internal volume; for cooling of fermented rice; chilled

storage of fermented rice

- Rice steamer - effuses steam from its steam hole; for steaming of fermented rice.
- Sealer - seals pouch by heat; with a capacity of 300 packs/hour
- Steam convection oven - generates steam and convects steamed air by fan; for sterilization of rice pouch

(4) Counterpart Organization

- PhilRice (Counter part):

Philippine Rice Research Institute (PhilRice) is a government corporate entity attached to the Department of Agriculture created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding and cost-reducing technologies so farmers can produce enough rice for all Filipinos.

The Institute accomplishes this through research and development work in our central and branch stations, coordinating with a network that comprises 57 agencies and 70 seed centers strategically located nationwide.

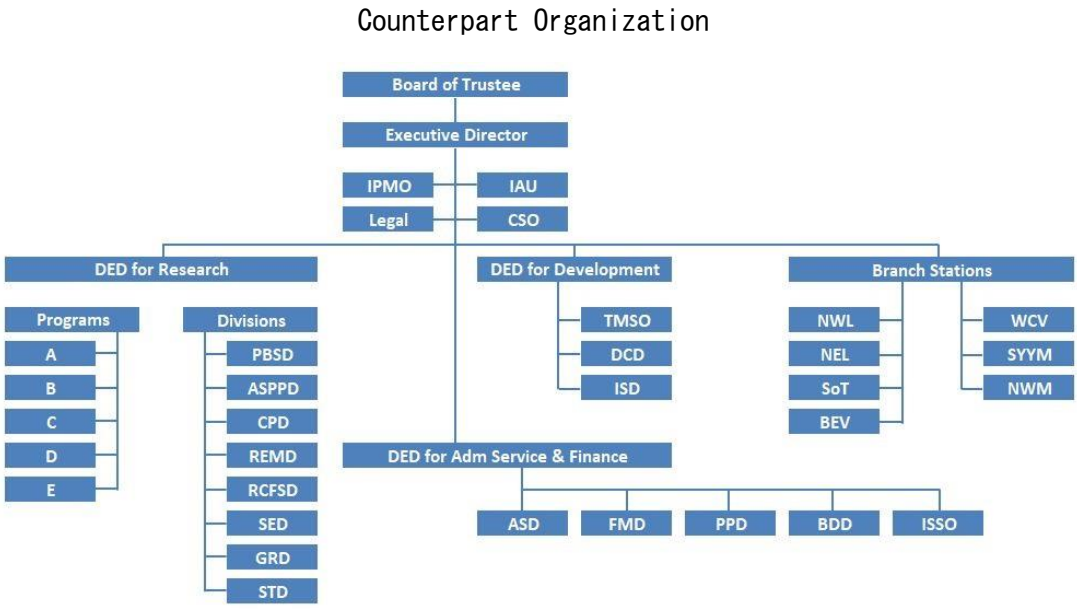


Figure-1

(5) Target Area and Beneficiaries

Direct beneficiaries:

- CKD patients who receive medical treatment for the maintenance and improvement of their kidney condition

Indirect beneficiaries:

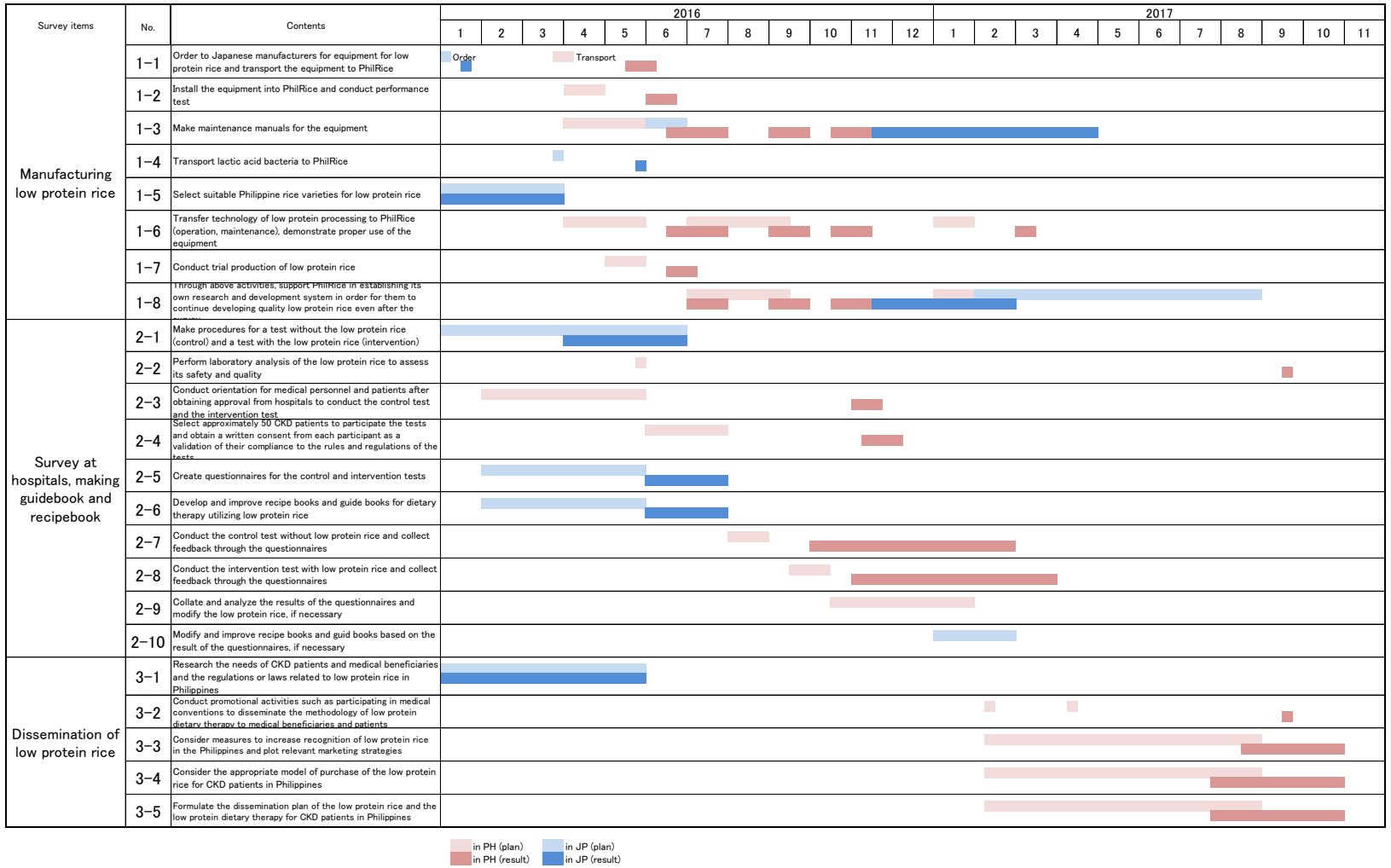
- Department of Health: reduction of medical expenses for dialysis treatment or transplantation
- Department of Agriculture/PhilRice: production of (value-added) rice
- Rice producers: expansion of (value-added) rice consumption
- Rice consumers: access to low-protein rice for consumption

(6) Duration

・2 years and 2 months (Jan.2016 ~ Feb.2018)

(7) Progress Schedule : as shown below

Survey items	No.	Contents
Manufacturing low protein rice	1-1	Order to Japanese manufacturers for equipment for low protein rice and transport the equipment to PhilRice
	1-2	Install the equipment into PhilRice and conduct performance test
	1-3	Make maintenance manuals for the equipment
	1-4	Transport lactic acid bacteria to PhilRice
	1-5	Select suitable Philippine rice varieties for low protein rice
	1-6	Transfer technology of low protein processing to PhilRice (operation, maintenance), demonstrate proper use of the equipment
	1-7	Conduct trial production of low protein rice
	1-8	Through above activities, support PhilRice in establishing its own research and development system in order for them to continue developing quality low protein rice even after the
Survey at hospitals, making guidebook and recipebook	2-1	Make procedures for a test without the low protein rice (control) and a test with the low protein rice (intervention)
	2-2	Perform laboratory analysis of the low protein rice to assess its safety and quality
	2-3	Conduct orientation for medical personnel and patients after obtaining approval from hospitals to conduct the control test and the intervention test
	2-4	Select approximately 50 CKD patients to participate the tests and obtain a written consent from each participant as a validation of their compliance to the rules and regulations of the tests
	2-5	Create questionnaires for the control and intervention tests
	2-6	Develop and improve recipe books and guide books for dietary therapy utilizing low protein rice
	2-7	Conduct the control test without low protein rice and collect feedback through the questionnaires
	2-8	Conduct the intervention test with low protein rice and collect feedback through the questionnaires
	2-9	Collate and analyze the results of the questionnaires and modify the low protein rice, if necessary
	2-10	Modify and improve recipe books and guid books based on the result of the questionnaires, if necessary
Dissemination of low protein rice	3-1	Research the needs of CKD patients and medical beneficiaries and the regulations or laws related to low protein rice in Philippines
	3-2	Conduct promotional activities such as participating in medical conventions to disseminate the methodology of low protein dietary therapy to medical beneficiaries and patients
	3-3	Consider measures to increase recognition of low protein rice in the Philippines and plot relevant marketing strategies
	3-4	Consider the appropriate model of purchase of the low protein rice for CKD patients in Philippines
	3-5	Formulate the dissemination plan of the low protein rice and the low protein dietary therapy for CKD patients in Philippines



(8) Manning Schedule : as shown below

Role	Name	Organization	2016												2017												person-month	
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	PH (plan) PH (result)	JP (plan) JP (result)
Project manager	Kiyosada Egawa	Biotech Japan	kick-off meeting 4			meeting with PhilRice, FNRI 7		7 meeting		7		7		7		Meeting with PhilRice, meeting with FNRIPhilRice 7											0.00	2.30
			6	0.5		1	1	1	5		1	1	2	7	4	2	4	4									0.00	1.98
Asssistant project manager	Jo Egawa	Biotech Japan	kick-off meeting 4		8	meeting with PhilRice, FNRI 7				7		Japanese activity tour 3	2	7	3	7	3	2	5	7	5	5	5					1.30	2.05
			5	2	0.5	5.5		1	8	1	1	5	5		1	3		3	6		3	2		5		5	2		1.50	2.50
Business related to nutritional part	Masaki Yamaguchi	Biotech Japan			3	4	meeting with FNRI about recipes and guidebooks 7		7 meeting		3	7	Japanese activity tour 3	7	3	7	3	2	5	7	8	5	5					1.63	2.55
			2		2	4		1	5	1	1	5	5		1	3		4	6		3	4		5		5	2		1.23	3.00
Business related to production	Kazunori Yamada	Biotech Japan				6	Establish pilot plant at PhilRi 28		15																			1.43	0.30
								3	6	9		10		23														1.27	0.65
Business related to production and nutritional part	Yuta Tsurumaki	Biotech Japan	kick-off meeting 1	4	3	6	Establish pilot plant at PhilRice 28	30		3	31	30	15	5	Japanese activity tour 4	3											Improve low protein rice 31	3	7		Draft report 5	5	5	5					5.87	2.40
			5	3	2	6		2	8	1	5	18	31	11	7	23	1	4	15	15	4	3					5	2		1	5	14		7		1	3	1		4	3		3	5	3		5.13	3.35
Business related to production	Yasushi Oguro	Biotech Japan							3	31	30	15																2.53	0.15
																												0.00	0.00
Business related to production	Hiromi Araki	Biotech Japan																										0.67	0.00
																												0.57	0.00
Business related to production	Kaho Nagasawa	Biotech Japan																										0.67	0.00
																												1.00	0.00
Business related to nutritional part	Trisha Ann Garcia (2016.2～)	Biotech Japan																										0.20	0.00
																												0.20	0.00
Chief adviser	Eiichiro Ashida	Daiwa Institute of Research	kick-off meeting 4			3	meeting with PhilRice, FNRI 7		7		3	7	Japanese activity tour 8	7	3	7			8	12	8	12						1.07	3.20
			2		0.5	0.5	1	4	1	1	4	5		0.5	5	5	11	7	5	3	2	1	3	2	5	4		0.90	3.15
Support for planning, reporting, coordination	Shohei Kuwayama	Daiwa Institute of Research				3	meeting with PhilRice, FNRI 7		7		3	7	Japanese activity tour 8	7	3	7			8	12	8	12						0.93	3.20
			2		0.5	0.5	0.5	1	5		0.5	6	5	10	7	3	2	4	4	3	2	2	1	3	2	5		0.33	2.98
Support for planning, reporting, coordination	Hironaka Takada	Daiwa Institute of Research	kick-off meeting 4																									0.13	0.00
			4	2	0.5				4	3		0.5																0.27	0.30
																				person-month plan (Biotech Japan)							14.30	9.75
																				person-month plan (Daiwa Institute of Research)							2.13	6.40
																				person-month plan							16.43	16.15
																				person-month result (BiotechJapan)							10.90	11.48
																				person-month result (Daiwa Institute of Research)							1.50	6.43
																				person-month result							12.40	17.90

PH (plan)
PH (result)
JP (plan)
JP (result)

(9) Implementation System

Japan Side: Biotech Japan Corporation (BTJ)

Philippine Side: Philippine Rice Research Institute (PhilRice)

Roles of Respective organizations

●BTJ:

1. Project planning and conducting of the Survey
2. Conducting manufacturing low protein rice with PhilRice
3. Conducting survey via questionnaire and making guidebook and recipes with FNRI

●PhilRice (Counter part):

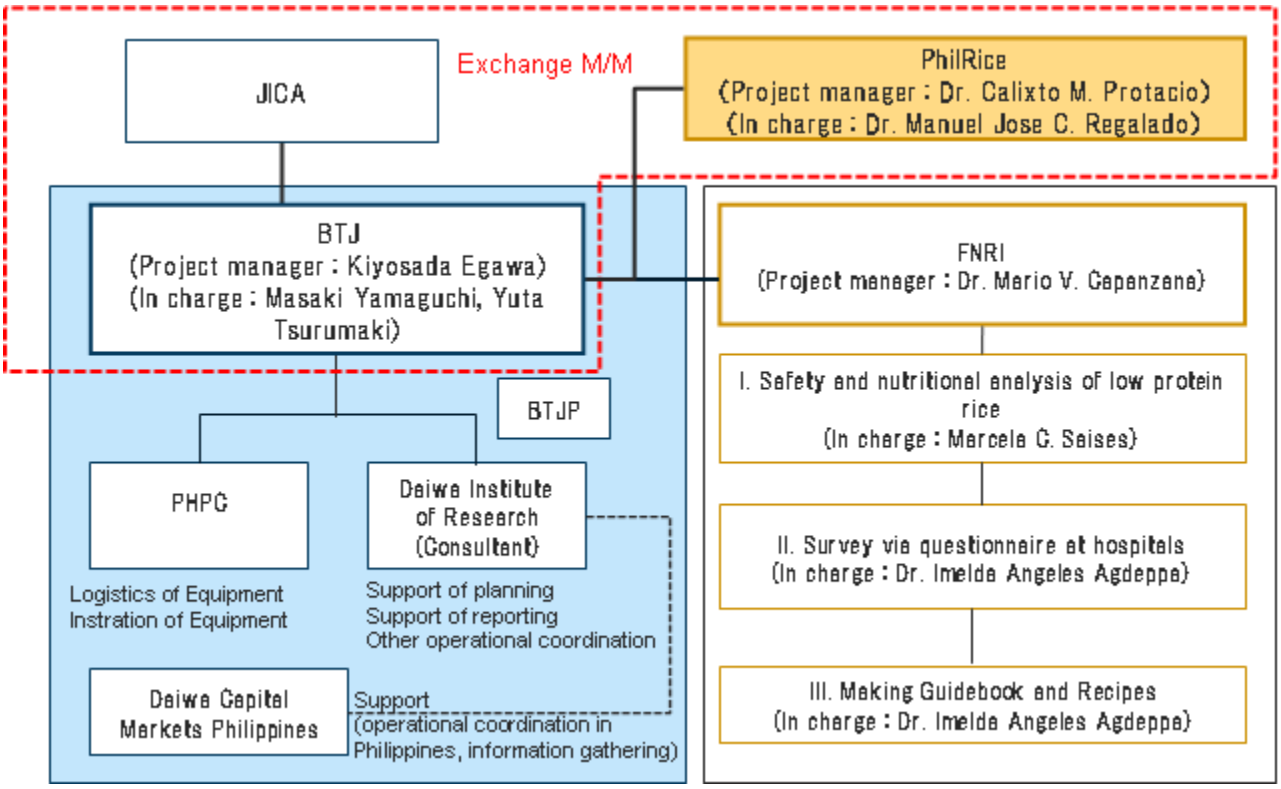
Conducting manufacturing low protein rice with BTJ

●Daiwa Institute of Research (Consultant):

Support of planning and conducting of the Survey, support of reporting, other operational coordination

●FNRI (sub-contractor):

1. Safety analysis and nutritional analysis of low protein rice
2. Survey via questionnaire at hospitals with BTJ
3. Making guidebook and recipes with BTJ



3. ACHIEVEMENT OF THE SURVEY

(1) Outputs and Outcomes of the Survey

1. Increased an additional value to Philippine rice, utilizing the technology for manufacturing low protein rice.

2. For the first time in the Philippines, guidebooks and recipe books for patients with CKD ware completed. They are devised so that contents can be understood easily by patients with CKD.

3. Verified effectiveness of low protein dietary therapy with low protein rice thorough the survey.

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

1. Each equipment is not dedicated equipment specialized for low protein rice production but can also be used enough for general food processing and research development. Therefore, it is expected to promote more advanced rice research.

2. After this survey, BTJP (BTJ's subsidiary company in the Philippines) will continue to establish a system to cooperate with PhilRice about rice variety information and a part of research and development.

4. FUTURE PROSPECTS

(1) Impact and Effect on the Concerned Development Issues through Business Development of the Product/ Technology in the Surveyed Country

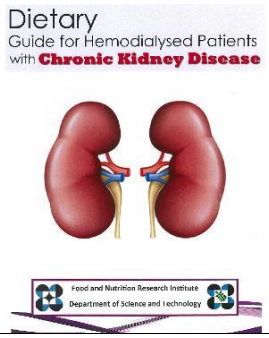
In the Philippines, there is no low protein rice for CKD patients in market. Dissemination of low protein rice and low protein dietary therapy methodology will contribute to maintaining and improving CKD patients' QOL. Furthermore, the dissemination will lead to decrease of mortality by renal disease, number of patients under dialysis, and number of patients who need kidney transplant. It will expected to result in containment of health care cost.

(2) Lessons Learned and Recommendation through the Survey

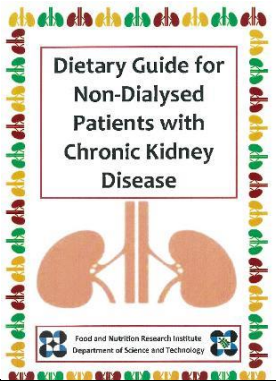
Quality rice-processed food needs quality raw rice. In the case of low protein rice, low protein rice requires less broken, and even milling rated (less variation in every delivery) rice.

Development and improvement of post-harvest processing technology (drying, threshing, milling, storage, and so on) will lead to improvement of rice-processed food quality. Quality raw rice and quality rice-processed food will contribute to increase of farmer and manufacturer's income.

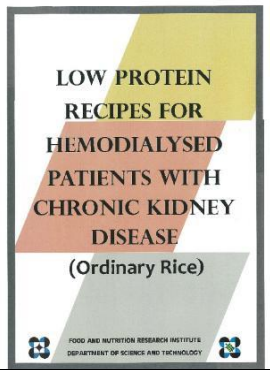
ATTACHMENT: ‘Dietary Guide’ and ‘Low Protein Recipes’



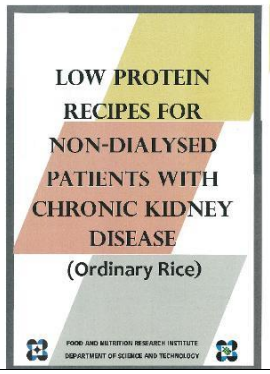
a Dietary Guide for Hemodialysed Patients with CKD



b Dietary Guide for Non-Dialysed Patients with CKD

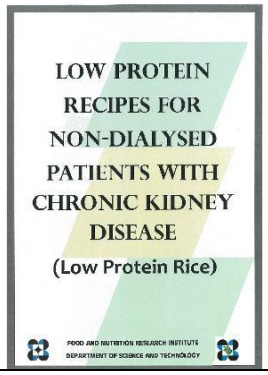


c Low Protein Recipes for Hemodialysed Patients with CKD (OD Rice)



d Low Protein Recipes for Non-Dialysed Patients with CKD (OD Rice)

e Low Protein Recipes for Hemodialysed Patients with CKD (LP Rice)



f Low Protein Recipes for Non-Dialysed Patients with CKD (LP Rice)

Philippines

Verification Survey with the Private Sector for Disseminating Japanese Technologies for Low Protein Rice for Dietary Therapy of Chronic Kidney Disease in Philippines

Biotech Japan Corporation, Niigata, Japan

Concerned Development Issues in the Philippines

- Suppressing health care cost which is predicted to increase due to the increasing number of chronic kidney disease (CKD) patients in the Philippines
- Supporting the dietary habits of patients with CKD which is rapidly increasing

Implemented Activities in the Survey

- Produce low protein rice with Philippine rice by providing necessary equipment and transferring manufacturing know-hows to Philippine Rice Research Institute
- Develop low protein rice which suits Philippine peoples ' taste by providing them to CKD patients in the Philippines
- Develop future business plan, by revising diet therapy guide books and recipe books and holding dissemination seminar

Proposed Products/Technologies

Low protein rice processing technology utilizing plant origin lactic acid bacteria

— Enabling protein content reduction of rice using plant lactbacillus
— Possessing over 3000 strains of plant origin lactic acid bacteria , the lactic acid bacteria fermentation technology can be applied to many kind of grains like Indica varieties (long grain rice), brown rice and wheat as well as Japonica varieties

Survey Overview
Name of Counterpart: Philippine Rice Research Institute
Survey duration: 1/2016～2/2018
Survey Area: Muñoz, Manila

Impact on the Concerned Development Issues in the Phillipines

- Increase additional values to Philippine rice, utilizing the technology for manufacturing low protein rice
- Suppresses increase of the number of CKD patients by disseminating of the proper low protein rice diet therapy among the patients

Outcomes for Biotech Japan Corporation

Current progress

- Establish the technology which manufactures low protein rice fitting local taste from Indica variety(long grain rice)
- Start manufacturing and sales business of the low protein rice by establishing the local subsidiary in the Philippines

Future prospects

- Attempt dissemination of low protein rice among doctors, dieticians and nutritionists, as well as to continue promotion activities to hospitals