



Transcending
BOUNDARIES
for Inclusive
DEVELOPMENT



Department of Agriculture

PHILIPPINE CARABAO CENTER

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About PCC

The Philippine Carabao Center (PCC) operates as an attached agency of the Department of Agriculture (DA). PCC is mandated under Republic Act No. 7307 or the Philippine Carabao Act of 1992 to conserve, propagate and promote the carabao as a source of draft animal power, meat, milk and hide to benefit the rural farmers.

Per DA Administrative Order No. 9, series of 2008, PCC likewise is the lead Institution in Livestock Biotechnology research and development.

Vision

To become a premier institution promoting profitable and sustainable carabao-based enterprises designed to improve the income and nutrition of rural farming communities.

Mission

Improve the general well-being of rural farming communities through carabao genetic improvement, technology development and dissemination, and establishment of carabao-based enterprises, thus ensuring higher income and better nutrition.

Powers and Functions

RA 7307, which was signed on March 27, 1992 and operationalized on April 1, 1993, provides that PCC's powers and functions are:

- Conserve, propagate and promote the Philippine carabao as a source of draft animal power, meat, milk and hide;
- Enable the farmers, particularly smallholder-farmers and CARP beneficiaries, to avail themselves of good quality carabao stocks at all times and at reasonable prices through an organized program of production, breeding, training, and dispersal;
- Undertake training programs for farmers, particularly smallholder-farmers and CARP beneficiaries, designed to transfer technology on the proper care and reproduction of the carabao and the processing of its meat and milk;
- Encourage backyard dairy development in rural areas by raising carabaos so as to meet the nutritional needs of the smallholder-farmers and their families and reduce dependence on imported milk by-products;
- Undertake research activities in all disciplines that lead to the improvement of the overall productivity of the Philippine carabao;
- Increase the existing annual population growth of the Philippine carabao to keep pace with human population growth;
- Enter into memoranda of agreement and receive donations through the Department of Agriculture from local and foreign sources. Upon the recommendation of the PCC Advisory Board, the individual carabao centers may enter into agreements directly with funding agencies through their respective board of regents or head of agency.





GENETIC IMPROVEMENT PROGRAM

1

Purebred and Crossbred Dairy Buffaloes

National Gene Pool. The PCC's National Gene Pool (NGP), operates as an "open nucleus herd", i.e., it allows entry of breeding stocks into a herd of purebred (riverine) dairy buffaloes where systematic breeding, selection, and genetic evaluation procedures are being carried out. The purpose of which is to eventually produce an elite herd of dairy buffaloes that would be sources of superior germplasm for future generations. The NGP is nestled on a two-hectare facility and is supported by around nine hectares of improved forage. As of December 2014, the facility maintains 486 purebred dairy buffaloes (389 Bulgarian, 95 Brazilian, two Italian-Mediterranean) and 14 crossbred buffaloes for the purpose. Some 262 of these are female breeders with average conception rate of 40%, average calving interval of 15 months, and calving rate of 55%.

Regional Centers. Institutional herds of purebred riverine buffaloes numbering to 1,123 (7 Murrah, 894 Bulgarian, 79 American, 80 Brazilian, and 63 Italian-Mediterranean) and 305 crossbred buffaloes are also maintained at the PCC's 13 regional centers. Performance or production data from these buffaloes are also registered in the PCC-wide recording system for genetic evaluation and selection.

Quarantine Site in Tayabo, San Jose. In 2014, a total of 1,556 Italian-Mediterranean Buffaloes (IMBs) were released from the quarantine and distributed to the PCC regional centers in La Carlota Stock Farm and West Visayas State University and to farmer-cooperatives based in Laguna, Cavite, Batangas, Rizal, Quezon, Occidental Mindoro, Oriental Mindoro, Pampanga, Tarlac, Bulacan, Aurora, Bataan, Pangasinan, La Union, and Ilocos Norte. There are still 667 IMBs being maintained at the quarantine facilities and are programmed for distribution to Cagayan Valley, Nueva Ecija, Laguna, Tarlac, Bohol, and part of Mindanao next year.

National and Regional Impact Zones. Purebred dairy buffaloes were also entrusted to farmer-cooperators in various cities and municipalities in Nueva Ecija, dubbed as the "National Impact Zone" or NIZ for dairy buffalo development, and in the "Regional Impact Zones" (RIZs) being stewarded by the PCC's regional centers. Current inventory of purebred dairy buffaloes in these impact areas is 5,455 (Table 1), which represents an increase of around 11.53% from the previous year.

Table 1 Purebred dairy buffalo inventory in the NIZ and RIZs.

Category	NIZ	RIZ	Total
Pregnant	373	317	690
Nonpregnant	1,810	1,323	3,133
Female Calves	189	181	370
Male Calves	232	155	387
Junior/Adult Bulls	545	330	875
Total	3,149	2,306	5,455

As of December 2014, the PCC NGP maintains 486 purebred dairy buffaloes (389 Bulgarian, 95 Brazilian, two Italian-Mediterranean) and 14 crossbred buffaloes. Some 262 of these are female breeders with average conception rate of 40%, average calving interval of 15 months, and calving rate of 55%.



Philippine Native (Swamp) Buffaloes

The PCC's regional centers also raise and maintain Philippine native carabaos in their institutional facilities (*ex situ*) for purpose of conservation, propagation, and selection within breed. As of 2014, a total of 236 native carabaos are raised in the PCC's regional centers, most of which are found in PCC at CSU (n=91) and PCC at USF (n=101).

Growth potential

With the establishment of nucleus herd of swamp buffaloes at PCC at CSU in 2003, regular recording of growth performance of calves born out of the selected cows and bulls was done. Three young bulls born in 2004 were selected for semen collection from the first round of evaluation in 2006 based on average daily gain. The top ranked bull had an average daily gain of 0.62 and 0.38 at 200D and 400D respectively. However, out of the three, only two bulls passed semen quality evaluation. Other young bulls were subsequently selected for breeding either as semen donor or for natural service. In 2014, four bulls were the latest batch selected for semen collection. It is planned that every year, the best performing bulls will be set aside for semen collection.

To date, frozen semen from these selected sires is

available for distribution to farmers and interested individuals upon request. There are currently 5,895 doses of frozen semen in stock at the semen bank. With the addition of four more swamp buffalo bulls, production could increase with demand.

Genetic conservation

In-situ conservation: Village-based gene pool and sanctuaries. To complement and validate the effort of increasing the growth potential of the swamp buffaloes, village-based gene pools or sanctuaries are also being set up in various locations throughout the Philippines. In Cagayan Valley, the carabao stud farm of Isabela State University has been a regular recipient of selected bulls from PCC at CSU. Artificial insemination has also been done on a regular basis to manage inbreeding. Village-based gene pool has also been identified by PCC at CSU in Tabuk, Kalinga where an initial 25 heads of cows have been dispersed together with a bull. On the other hand, the island Municipality of Carlos Garcia in Bohol has been identified by PCC at USF as its sanctuary where only swamp buffalo genetics are to be introduced. Ten swamp buffalo bulls are scheduled to be transported to the island for bull loan. While these areas have been identified, the system of formal recording of individual calf performance is yet to be finalized and

will be given emphasis next year and the subsequent years.

The identification and maintenance of sanctuaries or village-based gene pools are encouraged in areas of concern of other centers as well. It is preferable to have village-based gene pools in Luzon, Visayas and Mindanao.

Ex-situ conservation: Cryo-banking. The cryo-preservation of representative sub-populations of swamp buffalo genetics in the Philippines is also being initiated by PCC. A project to genotype various carabao populations nationwide in order that genetic distance, phylogenetic trees and genetic diversity of these various carabao populations could be determined have been proposed entitled "Genetic Diversity of the Philippine Carabao using mtDNA (COI) and microsatellite markers (FAO STRs)". By cryo-preservation of gametes and genetic material of these representative populations, we are ensuring their availability for future generations. Another objective of the project is to genotype representative swamp buffalo populations using the FAO recommended micro-satellite markers for submission to FAO so that we can uniquely identify Philippine carabao as a distinct breed from other Asiatic swamp buffalo populations.

As of 2014, a total of 236 native carabaos are raised in the PCC's regional centers.



Dairy Buffalo Breeding Program

In 2014, the PCC's Genetic Improvement Program Laboratory implemented for the first time the use of multi-trait random regression test day model (MT-RRM) for breeding value estimation (EBV) in Philippine dairy buffaloes. This is a refinement in genetic evaluation model from a research on estimation of genetic parameters. Based on the new model, MT-RRM, 114 bulls (47 of which are island-born) and 1,401 cows were reported with breeding values for milk, fat and protein yields. Sixteen young bulls were identified for breeding but the actual number of bulls to become semen donor will depend on these bulls passing the semen quality evaluation.

Initiatives on establishing breeding program for the Italian buffaloes include identification of PCC at LCSF and PCC at WVSU as nucleus herd for the said breed. Furthermore, several private farms have been identified and evaluated for the establishment of multiplier farms, two of which have been recipients of 120 Italian buffalo heifers in 2014. These farms will be assisted by PCC and shall complement the efforts of the two nucleus herds in establishing the breeding program and determining the performance of the Italian buffaloes under Philippine conditions.

Establishment of performance recording for dairy buffaloes in the various cooperatives of Nueva Ecija is continuous. With the enrollment of another cooperative in 2014, there are now six cooperatives/associations undergoing milk test day recording.

Estimated Breeding Values of Individual Cows and Bulls

For the latest evaluation that included performance records of cows from 1997 to 2013, there were 1,644 animals, 133 of which are sires included in the pedigree file extending to five generations. Out of the data set, 1,401 cows had EBVs. The National Gene Pool (NGP) remains to be the largest contributor of cows with performance records due to the fact that it is the largest and the first herd to be enrolled. This was followed by PCC at CMU, the second largest herd. Other herds had minimal contribution ranging from 4% to 7%. Two herds were included for the first time in this round of evaluation run namely PCC at VSU and PCC at USF. While PCC at VSU only contributed 4% due to a small herd size, PCC at USF contributed substantially with 11% of cows enrolled. Although the genetic link of the two to the rest of the enrolled herds is not quite strong yet, it is expected that their contribution will become substantial in the future.

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Top-Ranking Cows

Table 2 presents the top 12 cows based on milk yield total lactation EBV. Based on milk yield EBV of total production (EBV305), cows of PCC at VSU and PCC at CMU dominated the list with a single cow each from NGP and PCC at UPLB herd joining the top 12. Based on total merit index (TMI) for persistency, the top five cows retained the same ranking. However, there was re-ranking in the lower ranked cows. It was also quite noticeable that those at the top were dominated by new cows born in 2009 and 2010. There was also re-ranking with EBVs based on fat or protein yield. The re-ranking indicates some animals could be excluded/included in selection depending on which trait is given emphasis in selection.

Table 2. Estimated breeding values (EBVs) of top 12 cows from various institutional herds

Herd	ID Number	Milk yield		Total merit index		Fat yield		Protein yield	
		EBV305	Rank	EBVTMI	Rank	EBV305	Rank	EBV305	Rank
CMU	2CM10042	1004.01	1	1.55	1	42.2	1	39.8	1
VSU	2LS09009	864.44	2	1.34	2	35.9	3	32.2	2
VSU	2LS10001	825.87	3	1.32	3	34.4	5	31.1	3
CMU	2CM04046	785.02	4	1.24	4	34.8	4	29.7	4
VSU	2LS09005	753.99	5	1.22	5	20.6	12	28.1	5
VSU	2LSC02001	724.65	6	1.136	9	24.8	11	26.7	8
UPL	2UP09006	721.85	7	1.18	6	31.2	8	27.0	7
CMU	2CM07019	704.77	8	1.13	10	32.8	7	24.4	12
CMU	2CM08047	704.10	9	1.16	7	28.1	10	26.3	9
VSU	2LS09003	696.60	10	1.140	8	32.9	6	25.4	10
NGP	2GP03036	687.24	11	1.07	12	29.1	9	24.9	11

Top-Ranking Bulls

Table 3 presents the top 12 bulls based on progeny performance. The number of progenies evaluated per bull ranged from 1 to 41 with accuracies ranging from 0.28 to 0.88. While it desired to have at least ten daughters evaluated per bull, some bulls had only one daughter evaluated especially those that were used early in the program. More effort should be done to increase the progeny group size to 15 per bull. Among the top 12 is one of the two youngest bulls in the list with only one daughter record evaluated. As their daughters records are just starting to come in, it is expected that their ranking as well as accuracies will change in the next evaluation run. What is noticeable was the predominance of younger bulls in the upper portion of the list. At the same time, all the bulls in the top 12 are already island-born except for one from PCC at CMU. These bulls have replaced the more

senior or original imported stocks that previously remained constantly on top. There was also slight re-ranking of the bulls if selection will be based on total merit index. The choice of which bulls to use to produce the next round of young bulls (sire for sires) will depend of whether persistency or milk component traits is going to be emphasized in selection. Almost all bulls came from NGP herd because early in the program implementation, it is the only source of bulls for AI. With the enrolment of more herds into the program, more young bulls are recruited now from other herds as well to become AI sires, creating a dispersed nucleus breeding program. However, progeny performance of these bulls from other herds is expected to become available only after 3 -4 more years.

Table 3. Estimated breeding values (EBVs) of top 12 bulls based on progeny performance from various institutional herds

Herd	ID Number	# of daughters	Accuracy	Milk yield		Total merit index	
				EBV305	Rank	EBV _{TMI}	Rank
VSU	2LSC02001	12	0.71	724.7	1	1.16	1
NGP	2GP01102	15	0.75	568.5	2	0.94	2
CMU	2CM07007	1	0.28	558.8	3	0.88	4
NGP	2GP02071	4	0.50	548.2	4	0.91	3
NGP	2GP03017	15	0.75	482.0	5	0.73	6
NGP	2GP03020	6	0.58	473.8	6	0.76	5
NGP	2GP04016	8	0.63	412.1	7	0.69	7
CMU	2CM93602	31	0.85	397.7	8	0.65	9
NGP	2GP03026	36	0.87	384.0	9	0.66	8
NGP	2GP01070	10	0.68	383.0	10	0.62	10
NGP	2GP99107	10	0.68	377.3	11	0.61	12
NGP	2GP03015	9	0.66	375.7	12	0.62	11

National Crossbreeding Program

The aim of the PCC's crossbreeding program is to ultimately develop a Philippine dairy breed adaptable under local conditions. The production of crossbred buffaloes is done in two ways: (1) artificial insemination (AI), and (2) natural mating through the Bull Loan Program.

Artificial Insemination (AI). A total of 71,408 AI services in 57,126 female carabaos were carried out covering 6,805 barangays in 836 municipalities and cities in 73 provinces of the 16 regions of the country. These AI services were provided by 932 AI technicians, subdivided as follows: Village-based AI Technicians (n=390), LGU AI Technicians (n=486), and PCC AI Technicians (n=56).

An additional 130 AI technicians (VBAIT and LGU) were also trained in 2014 in the five PCC Training Centers (PCC at CLSU, PCC at CMU, PCC at CSU, PCC at UPLB, and PCC at USF), which added to the pool of trained AI Technicians in the country.

As of December 2014 report, there were 12,949 calves on the ground monitored based on the 2013 AI services.

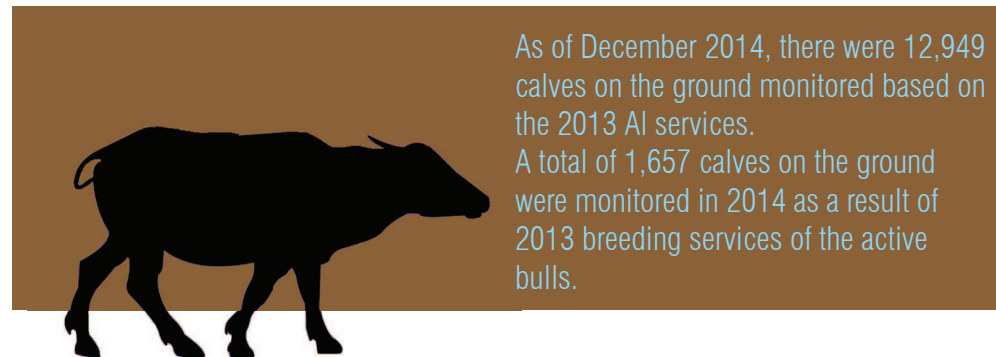
Frozen semen production and distribution. The semen processing facilities at the PCC at CLSU and PCC at UPLB have produced 346,801 doses of frozen semen, which were deposited in the PCC's semen bank. Of this total, 188,931 doses were distributed to the PCC regional centers and other partner agencies and individuals for the conduct of nationwide AI for water buffaloes. The remaining doses were stored for reference or for future research work. To maintain the quality and viability of the frozen semen for AI, the PCC has also distributed a total of 11,504 dewars of liquid nitrogen to its regional centers and partner-entities nationwide.

Natural Mating via Bull Loan Program. This program complements AI services. In principle, in areas where AI service is not accessible, farmers avail of the bull loan program. As of December 2014, a total of 146 bulls were loaned out to farmer-bull handlers. At the same time, there were 927 existing Murrah breeding bulls in the villages around the country. Of these bulls, 400 have records of active breeding services, which in 2014 totaled to 2,260 and benefitted more



than 1,780 carabao raisers (owners of female carabaos naturally serviced and bull handlers).

A total of 1,657 calves on the ground were monitored in 2014 as a result of 2013 breeding services of the active bulls.



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CARABAO-BASED ENTERPRISE DEVELOPMENT (CBED)

2

Newly Created Carabao-Based Modules

In order to expand the development reach of the carabao-based enterprises, the PCC mobilized and helped organized more carabao owners particularly, the owners of crossbred buffaloes produced out of AI and bull loan programs in the regional impact zones. The CBED aims at creating more income-generating opportunities for the smallholder-carabao raisers. There were 37 newly organized cooperatives/associations in 12 regions of the country.

Existing Carabao-Based Modules

There are 164 existing cooperatives/associations of 3,124 carabao owners engaged in carabao-based enterprises, which are mostly located in Luzon and the Visayas Regional Impact Zones (RIZs). The most notable dairy cooperatives particularly based in Cavite, Laguna, Rizal, Bulacan, Pampanga, Pangasinan, Cagayan, Ilocos Norte, Cebu, and Bohol contributed 554,741 kg of milk to the local dairy industry.

At the National Impact Zone (NIZ) in Nueva Ecija, there are 54 existing dairy cooperatives consisting of 1,025 smallhold farmer-members handling a total population of 3,149 dairy buffaloes (comprising of 981 cows, 1,202 heifers, 189 female calves, and 777 calves of various ages). Majority of these cooperatives are members of the Nueva Ecija Federation of Dairy Carabao Cooperatives (NEFEDCCO). The NEFEDCCO supplied a total of 510,648 kg of raw milk (an increase of 4.8% from the previous year) to the milk pool and portion of which was sold to the local processors while the rest was sold as processed milk products (basically, pastillas, kesong puti and flavored milk) to the local market. In addition, 8.51% or 43,456 kg of total raw milk produced from NEFEDCCO was sold to the Centralized Milk Processing Plant at the PCC National Headquarters for processing and selling to its Milka Krem product outlet.

Dairy Buffalo Multiplier Farm (DBMF)

The PCC explored the concept of partnering with the qualified farmers operating a dairy farm and/or with private individuals with a capacity to manage a dairy farm. The DBMF was initiated in order to improve efficiency in the multiplication of good quality genetics and to establish a viable commercial buffalo-based dairy farm. In 2014, the PCC entrusted 95 heads of Italian Mediterranean buffaloes to two DBMF Operators namely Michael Dragon T. Javier of Javier, Leyte (50 buffaloes) and Alfred Belen, Jr. of Magao, Concepcion, Tarlac (45 buffaloes).

Post-Production Support

The PCC distributed 32 aluminum coolers with styropor inside-lining to the PCC regional centers at CMU (n=5), USF (n=8), MSU (n=5), VSU (n=5), WVSU (n=3), LCSF (n=3), MLPC (n=2) and Milka Krem (n=1) in support of their dairy processing activities.

Capability Building and Strengthening Support to the Farmer-Clients and Other Stakeholders

The PCC National Headquarters (NHQ) and regional centers conducted 94 types of trainings in support of the assisted cooperatives, associations, individual farmers, and field personnel from the DA-RFUs. A total of 4,624 participants from Luzon, Visayas, and Mindanao participated in these trainings (Appendix 1).

The NIZ unit also conducted 15 training sessions for the farmer-trustees of cooperatives and associations assisted by PCC within the Province of Nueva Ecija (Appendix 2). These trainings were attended by 415 participants.



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RESEARCH FOR DEVELOPMENT

3

The PCC has formally launched a new approach in conducting research. Tagged as R4D (“Research for Development”), it calls for the conduct of researches that are problem-driven with outputs that are of practical significance or application by the carabao (and other livestock) industry stakeholders particularly smallholder-farmers. In other words, the emphasis is placed on “development” by way of a more applied research but without disregard to basic or foundational science.

Under the R4D, ten thematic (disciplinary) areas were identified as priorities. These are (1) genetic improvement, (2) biosafety, (3) production management system, (4) environment and climate change, (5) technology transfer, (6) enterprise development, (7) product development, (8) socio-economic dimensions of CDP implementation, (9) industry and policy, and (10) institutional development. These research areas are expected to interface with one another to evolve an interdisciplinary knowledge system.

Likewise, as a matter of policy, 80% of the PCC’s total number of researches utilizing biotechnology shall be performed in ruminants while 20% shall be in non-ruminants. For ruminant

biotechnology studies, 60% shall be in water buffaloes, 20% shall be in cattle, and 20% shall be in goats and sheep. All other researches that do not involve any biotechnology procedures shall be related to carabaos or water buffaloes.

Completed and Ongoing Researches

The PCC has continued conducting researches in various disciplines and particular thematic areas as determined under the agency’s R4D Agenda. Many of the researches have applied the concepts and methodologies in biotechnology. This is in keeping with the designation of PCC by the Department of Agriculture as its lead agency for livestock biotechnology R&D. The latter is complemented by relevant researches that explore and address problems or issues that are being encountered in the course of the agency’s implementation of the Carabao Development Program (CDP).

In 2014, 19 researches were completed while another 25 were still being conducted (Table 4 and Appendices 3a and 3b). These researches were also presented in the agency’s Annual R&D In-House Review held on June 17-18, 2014 at the PCC National Headquarters.

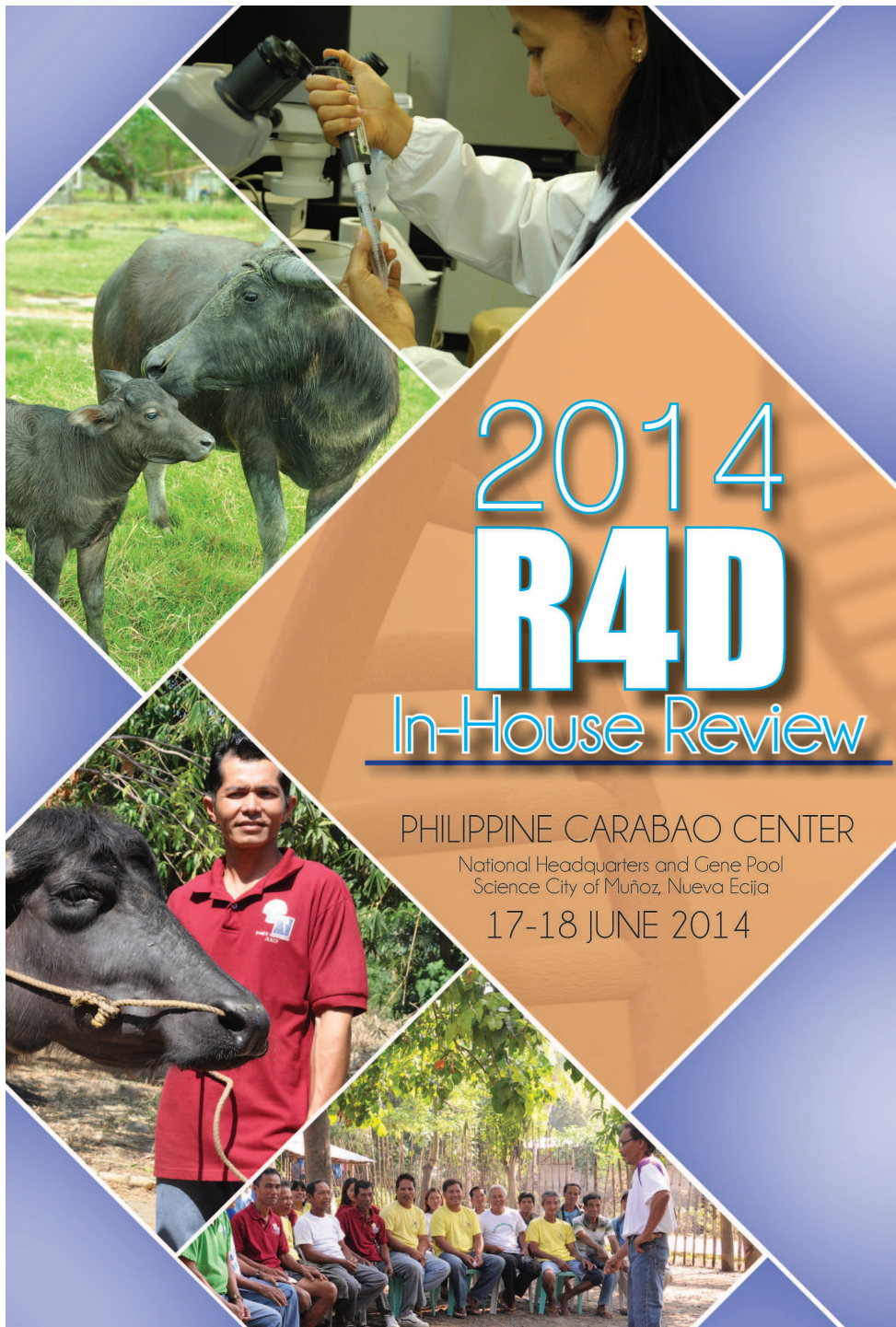
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Table 4 Type, numbers, and status of researches

R4D Thematic Area	Completed	Ongoing
Production Management System	4	4
Biosafety	9	3
Product Development	2	4
Genetic Improvement (Breeding and Genetic Evaluation)	-	2
Genetic Improvement (Reproductive Biotechnology)	2	10
Socioeconomic Dimensions of CDP Implementation	2	2
TOTAL	19	25

Appendix 4 presents the abstracts of some completed researches in 2014.





2014 R4D In-House Review

PHILIPPINE CARABAO CENTER

National Headquarters and Gene Pool
Science City of Muñoz, Nueva Ecija

17-18 JUNE 2014

R4D Annual In-House Review

The PCC's Annual R4D In-House Review is a tool to evaluate both the completed and on-going research activities as to their merits, problems, limitations, and opportunities for improvement. It serves as a venue for sharing research results with the research and development community and as a motivating tool for researchers to strengthen their interest in conducting pertinent researches in line with the agency's mandate. It is also aimed at giving due recognition to those individuals who excelled in their research endeavors.

There were 25 research studies presented during the 2014 in-house review, 18 of which are completed while seven are still on-going. Completed researches, which also included undergraduate student thesis, delved in the areas of biosafety, production management system, reproductive biotechnology, molecular genetics, and socio-economics.

Dr. Eduardo Torres and Dr. Rio John Ducusin, both from the University of the Philippines Los Baños College of Veterinary Medicine and Dr. Fe L. Porciuncula, Professor VI and Director of Ramon Magsaysay Center for Agricultural Resources and Environment Studies (RM-CARES) in Central Luzon State University served as panel of external evaluators during the review.

Out of 25 research studies presented, a completed research study titled "Molecular Characterization of Gag Gene of Caprine Arthritis Encephalitis Virus of Goats Present in the Philippines" presented by Mr. Ryan Bismark C. Padiernos, won the best paper award. Mr. Ariel S. Galamgam was adjudged the best presenter for his research titled "Motion Kinematics of Goat (*Capra hircus*) Spermatozoa as Influenced by Penetrating Cryoprotectants Under Various Stages of the Cryopreservation Process". The study titled "Detection of Horse and Rat Meat from Meat Products Declared as Pork, Beef, or Poultry Meat in the Philippines Using Polymerase Chain Reaction Assay", won the award for best undergraduate student research. The students who conducted the research are Leslie M. Domingo and Francis G. Dimalanta under the supervision of Dr. Claro N. Mingala of PCC.

Hosting of the DA-Livestock Biotechnology Center

By virtue of the Department of Agriculture-Administrative Order (DA-AO) #21 series of 2005, which established the Agricultural Biotechnology Center and in order to meet the requirements of a modernized livestock agricultural sector, the DA-AO #9 series of 2008 identified the PCC as the lead agency in ruminant biotechnology research. Along this line, the PCC was formally designated to host the DA-Livestock Biotechnology Center (LBC), which became operational on August 06, 2014.

The LBC promotes and supports livestock biotechnology in the Philippines with the following vision and mission statements:

Vision

“Livestock Biotechnology Center as the stronghold of livestock biotechnology research and development in the Philippines”

Mission

“To empower the livestock biotechnology stakeholder towards the production of research and development programs for the improvement of livestock industry in the Philippines”

The LBC provides funding opportunities for R&D projects that address the following priority areas:

- Improvement of livestock production and competitiveness through reproductive biotechnologies, Marker Assisted Selection (MAS) and other biotechniques
- Development and/or improvement of reproductive biotechnologies in livestock for more meat and/or milk
- Development and/or improvement of animal feedstuff, vaccines, antibiotic production and waste utilization and management; and,
- Viable solutions to pressing problems in livestock production and sustainability

In 2014, the LBC coordinator and support staff conducted formal orientation, information dissemination, and promotion activities to various institutions about livestock biotechnology and research funding opportunities that it offers to researchers. The institutions and organizations provided with such orientations were as follow:



This edifice symbolizes the steadfast commitment of the Philippine Carabao Center in advancing sciences through biotechnology and innovative solutions toward an inclusive development, competitiveness and sustainability of the livestock industry.

- (a) PCC National Headquarters and Regional Centers
- (b) Fisheries Biotechnology Center (also a collaborator in the LBC’s promotion activities)
- (c) Central Luzon State University
- (d) Philippine Society of Animal Science
- (e) Southern Mindanao Agriculture Resources Research and Development Consortium (SMARRDEC)
- (f) Ilocos Agriculture Resources Research and Development Consortium (ILARRDEC)
- (g) Mindanao State University (MSU)
- (h) Philippine Society of Biochemistry and Molecular Biology (PSBMB)
- (i) Central Luzon Agriculture Resources Research and Development Consortium (CLARRDEC)
- (j) Southwestern University

Other promotional activities included distribution of information, education, and communication (IEC) materials such as pamphlet, posters, advertisement layout for souvenir publications in scientific conventions, and uploading of its programs in the PCC website.

Currently, the LBC is already receiving and reviewing research proposals for appropriate review. It shall hold office in the newly constructed Livestock Innovations and Biotechnology Complex within the PCC compound starting second quarter of 2015.

Table 5 Technical Seminars conducted for CY 2014

Date (2014)	Title and/or Topic Presented	Resource Speaker
6 February	ILRI's Program and R&D Priorities in the Southeast Asia	Dr. Steve J. Staal
7 February	Lecture Series on Nanotechnology (Part I – An Overview on Nanotechnology and Part II – Nanotechnology : A Breakthrough in Food, Agriculture and Medicine)	Assoc. Prof. Juvy J. Monserate
20 February	DA-BIOTECH Program FY 2014-2015	Dr. Antonio Alfonso
26 February	Principle of TMR Feeding in Dairy Cow Methane Mitigation by Microbial Approach	Dr. Sang-Suk Lee Dr. Dong-Keun Kam Dr. Lovelia L. Mamuad
26 March	Orientation on PCC's R4D (Research for Development) Agenda	Dr. Eric P. Palacpac
1 April	The Importance of Fat Supplement in Lactating Diet of Dairy Animals	Mr. Allan McGillivray
6 May	Super Hybrid Napier : Production and Utilization Buffalo Extension in Thailand	Dr. Krailas Kiyothong Dr. Sarakit Tnawinprawat
10 November	Stem Cell: Application to Livestock Nanobiosensor for DNA Hybridization Detection	Dr. Michelle Balbin Mr. Gener Gregorio

Table 6a Recognitions received by PCC staff members

Awardee	Title of Recognition	Award-Giving Body
Dr. Danilda H. Duran	PSAS Bounty Agro Ventures Inc. Distinguished Researcher in Animal Science	Philippine Society of Animal Scientists
Dr. Arnel N. del Barrio	Scientist I Conferment	Scientific Career Council
Dr. Edwin C. Atabay	Scientist I Conferment	Scientific Career Council
Dr. Eufrocina P. Atabay	Scientist I Conferment	Scientific Career Council
Dr. Rosalina M. Lapitan	Scientist I Conferment	Scientific Career Council
Dr. Claro N. Mingala	2014 Most Outstanding Veterinary Practitioner	Veterinary Practitioners Association of the Philippines

Conference Presentations and Journal Publications

Consistent with the norm of sharing R&D outputs to wider research and scientific communities, the PCC researchers have actively participated in local and international scientific conferences (see portion of Appendix 5). Likewise, 19 papers were published in refereed journals (Appendix 6).

Technical Seminars Conducted and/or Facilitated

The PCC has also conducted or facilitated a series of Technical Seminars at its National Headquarters on various topics (Table 5). The aim is to improve and sustain awareness of PCC staff and other invited researchers and students from the academe and government institutions on technical matters and issues relevant to the livestock industry in general and PCC operations in particular.

Technology Board

The main function of the PCC's Technology Board is to review potential technologies (in the forms of products, information, process, or service) out of completed research studies for purpose of promotion and dissemination and possible commercialization. In 2014, the board also conducted a series of field visits to the PCC's regional centers in Luzon, Visayas, and Mindanao to verify and document the technologies or actual practices being applied in their respective operations.

Awards and Recognitions

The PCC staff members continued to gain recognition from various award-giving bodies in 2014 (Table 6a). Several PCC researchers were also cited in their paper or poster presentations in scientific conferences (Table 6b).

Table 6b Citations for PCC staff members who presented papers or posters in scientific conferences

Title of Citation	Title of Paper/Poster	Awardees	Title of Scientific Conference
1st Place Infographics Poster Competition (Applied Biotechnology Category)	Caprine arthritis encephalitis virus detection by loop mediated isothermal amplification (LAMP) assay	CNMingala, RBPadiernos & MBalbin	National Biotechnology Week
Top 10 Best Poster	Effect of the duration of transport time and holding temperature in the cryopreservation of boar semen	FAquino	11th Asian Reproductive Biotechnology Society Convention
Best Paper (Socio-Economics Category)	To Milk or Not to Milk: Understanding the Socio-Economic Characteristics and Behavioral Intentions of Crossbred Buffalo Owners in San Agustin, Isabela	EPPalacpac, MGHonorio, EMValiente, RTJacang, HMBaltazar & ASSarabia	51st Scientific Seminar and Annual Convention of the Philippine Society of Animal Science
Best Paper (Breeding & Genetics Category)	Genetic Screening of Scrotal Hernia in Domesticated Swine using PCR-Restriction Fragment Length Polymorphism	JFBambico, RLApilado, NDAntonio, J.Manalaysay & CNMingala	51st Scientific Seminar and Annual Convention of the Philippine Society of Animal Science
Best Poster	Molecular Characterization of Gal-9 and TIM-3 Genes of Swamp-type and Riverine-type Water Buffaloes	PLHDuran, RBPadiernos, EAAbella & CNMingala	51st Scientific Seminar and Annual Convention of the Philippine Society of Animal Science
2nd Place Best Scientific Poster	Genetic Testing for Porcine Stress Syndrome using Mutagenically Separated-Polymerase Chain Reaction	JManalaysay, DFGamboja, RPAIili & CNMingala	1st International Symposium on Biotechnology
Best Scientific Poster (Biological Science Category)	Motility Characteristics of Ejaculated Bovine Spermatozoa in L-Carnitine Supplemented Tris Egg Yolk Extender	DHDuran, PCInocillas, MBMagat, JDSalvatierra, JRRafanan, EVVenturina, DHDuran & FVMamuad	36th Annual Scientific Meeting (ASM) of National Academy of Science and Technology
Finalist	The Kinetics of Sperm Penetration	ERSMaylem, EPAtabay, LCOcampo & FLAquino	26th DA-BAR National Research Symposium



KNOWLEDGE MANAGEMENT

4

Production and Distribution of Information, Education, and Communication (IEC) Materials

The Applied Communication Section of the Knowledge Resource Management being the lead in the information dissemination activities of PCC plays a significant role in promoting the institution in general and its programs in particular. Recent undertakings emanating from the PCC's R&D activities, including scientific collaborations and other related events, were made available to the public thru sustained efforts of information dissemination. These matured and verified information about its activities and technologies were packaged, relayed and disseminated using mixed media approaches.

Consistent with its goal of image-building and program promotion, the ACS has also endeavored in using another media approach thru AV and web-based publications utilizing the advancements in information communication technology (ICT) in delivering the agency's accomplishments in narrative and creative content.

Publications and Productions

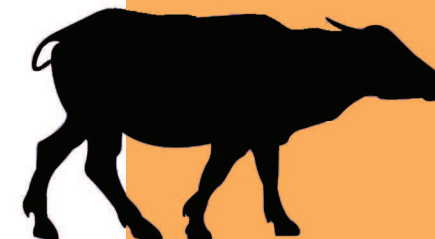
Twelve issues of "NIZ Balitaan" were produced. Written in Filipino, it utilizes the tabloid format. With farmers as the specific intended readers, it is produced and released monthly focusing on the PCC's National Impact Zone. This publication presents significant news and feature stories about people and technologies involved in buffalo-raising by smallhold dairy farmers in Nueva Ecija and NIZ-related undertakings of PCC. It seeks to inspire and empower dairy farmers as well as current and future program partners, and ultimately contribute to the improvement of the Philippine dairy industry.

One issue of the PCC Newsletter was produced in 2014. The other regular publications that were circulated to the general public were two issues of the PCC Balita and one issue of R4D Highlights. Various comics, namely Artificial Insemination sa Kalabaw, Pagpapahiram ng Bulugan, Mapa-Wow sa Kabuhayan mula sa Kalabaw and Pagpapanatili ng Kalidad ng Gatas ng Kalabaw were also updated and translated into four dialects; Cebuano, Hiligaynon, Ilonggo and Ilocano.

A total of 73,974 copies of these IEC materials were dispatched to regional centers and distributed to PCC stakeholders, visitors, and partner institutions, among others.

Four audio-visual productions were produced by the unit. One of which was the tribute video produced for Dr. Libertado C. Cruz presented during his send-off program. Another one is the Livestock Biotechnology AVP which was launched during the PCC 21st Anniversary. Two new corporate AVPs were also produced. The English AVP highlights the transitioning of PCC into a research for development institution while the new farmer's AVP documented the success stories of our dairy farmers from Luzon, Visayas and Mindanao. The new corporate AVPs will be presented at the PCC's 22nd anniversary celebration.

One documentary film entitled "White Gold" was produced and directed by Ms. Rowena G. Bumanlag as part of her subject requirement in her masters' degree. The documentary film pays tribute to the dairy farmers. The film was presented during the PCC's 21st anniversary celebration.



A total of 73,974 copies of IEC materials were dispatched to regional centers and distributed to PCC stakeholders, visitors, and partner institutions, among others.

Benefitting from other Media Forms

The PCC gained better media mileage thru 13 television and radio interviews and guesting this year. Major TV networks such as ABS-CBN, GMA7, GMA Dagupan and Solar News Channel covered various activities of PCC that highlighted PCC's programs, services and dairy products. Guesting in radio stations were also monitored in Radyo ng Bayan, DZMM Teleradyo sa Kabukiran, DWNE Radio Vision and Agri Tayo dito sa Radyo.

The agency also gained exposure through regular news releases in the Philippine Daily Inquirer and Pampanga-based local newspaper Punto! Central Luzon. Other write-ups from different broadsheet newspapers such as Manila Bulletin, Agriculture Magazine, PhilStar and Ilocos Times were also monitored.

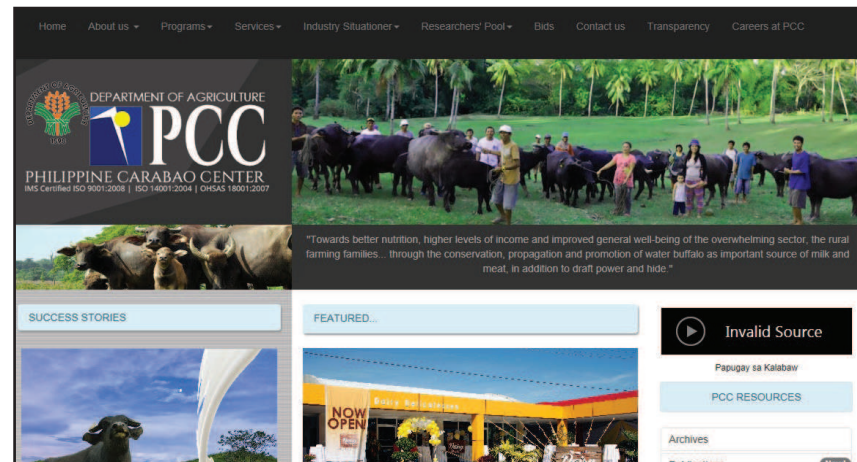
The PCC's website with URL www.pcc.gov.ph serves as a venue to publicize articles about the current undertakings of the agency. A total of 62 web articles were uploaded by the Applied Communication staff writers while 95 scoured press releases related to PCC were monitored. The PCC online and print press releases recorded totaled 177 this year.

Regular placements of PCC advertorials in souvenir programs of various entities were published in 10 advertisements. Aside from the use of the traditional and digital media, the PCC co-sponsored several trade fairs and exhibits that served as venues for program and product promotion. Such were the Agri-Aqua Trade Fair, Farmers Festival, DairyConEx 2014, S&T Agri-Aqua Trade Fair, Market Market Agro Industrial Trade Fair, Agri Tayo Trade Fair, Kalivungan Fest, Farmers Congress, 9th Negros Organic Festival, Gatas ng Kalabaw Festival, SEARCA, NAST Annual Scientific Meeting and 2014 Exhibit and Conference.

Prioritizing Customers' Satisfaction

A total of 5,599 scheduled and walk-in visitors were received, oriented, and toured to the PCC facilities in 2014 following the standards of the Integrated Management Systems. A majority of the visitors were students and farmers, the others were either government officials or employees and researchers.

With the purpose of continually improving its systems in receiving visitors, the ACS conducts a Visitors Satisfaction Survey quarterly. In 2014, the Visitors Bureau, which is composed of the ACS staff members and security guards, were able to sustain its good rating. The bureau earned a satisfaction rating of 4.63 (very good to excellent), which is above the agency's Quality Management Systems (QMS) target rating of 4.25 percent.



Scientific Library Services

The PCC's Knowledge Resources Management Center (KRMC) or Scientific Library is now introducing the electronic book (e-book) system to provide more accessible reference resources and maximize the use of its library collection. It is also continuously strengthening its collections of references in the Animal Sciences to include Livestock Biotechnology, Cryopreservation, Genomics and Bioinformatics, Animal Health and Nutrition, Biosafety, Reproductive Biotechnology and Physiology.

The library in-charge is proactively encouraging the participation of the agency's scientists and researchers to recommend titles of books, references, international refereed journals/articles, and multimedia materials that they use frequently in the course of their research. This will beef-up selection and acquisition function of the library.

Currently, the KRMC has total collection of 3,931 bibliographic entries of books, e-books, journals, thesis and multimedia on its web-based Electronic Integrated Library System (EILS) and linkages with 14 external journal databases that can be accessed through an Online Public Access Catalog (OPAC) for ease of locating and retrieving the needed library materials.

The KRMC also facilitates the publication of research papers of PCC's researchers and scientists in appropriate scientific journals. Likewise, it assists in the renewal of their memberships in various international scientific societies and associations.

The KRMC manages and maintains the database of the International Buffalo Knowledge Resource Service (IBKRS), a web-based hub for research literatures in buffalo. To date, the IBKRS has a total of 9,872 e-journal articles in full-text and abstracts from different refereed journals, which are accessible thru URL: www.ibkrs.net.

For more than two years, the KRMC has also been managing the web administration of the agency's website that can be accessed thru URL: www.pcc.gov.ph.

Information Management System

The Information and Communication Technologies Section (ICTS) conducted an initial roll-out installation and configuration of the Information System, Buffalo Integration Database System (BIDS) in the regional centers in coordination with the PCC's Genetic Improvement Program Unit and Operations Unit. The section also maintained and backed up existing Information System of the Electronic National Government Accounting

System (e-NGAS) and continuously improved the Human Resource Management Information System (HRMIS) and Document Tracking System. Likewise, it performed regular maintenance and check-up of PCC and IBKRS websites connection to ensure they are secured online 24/7.

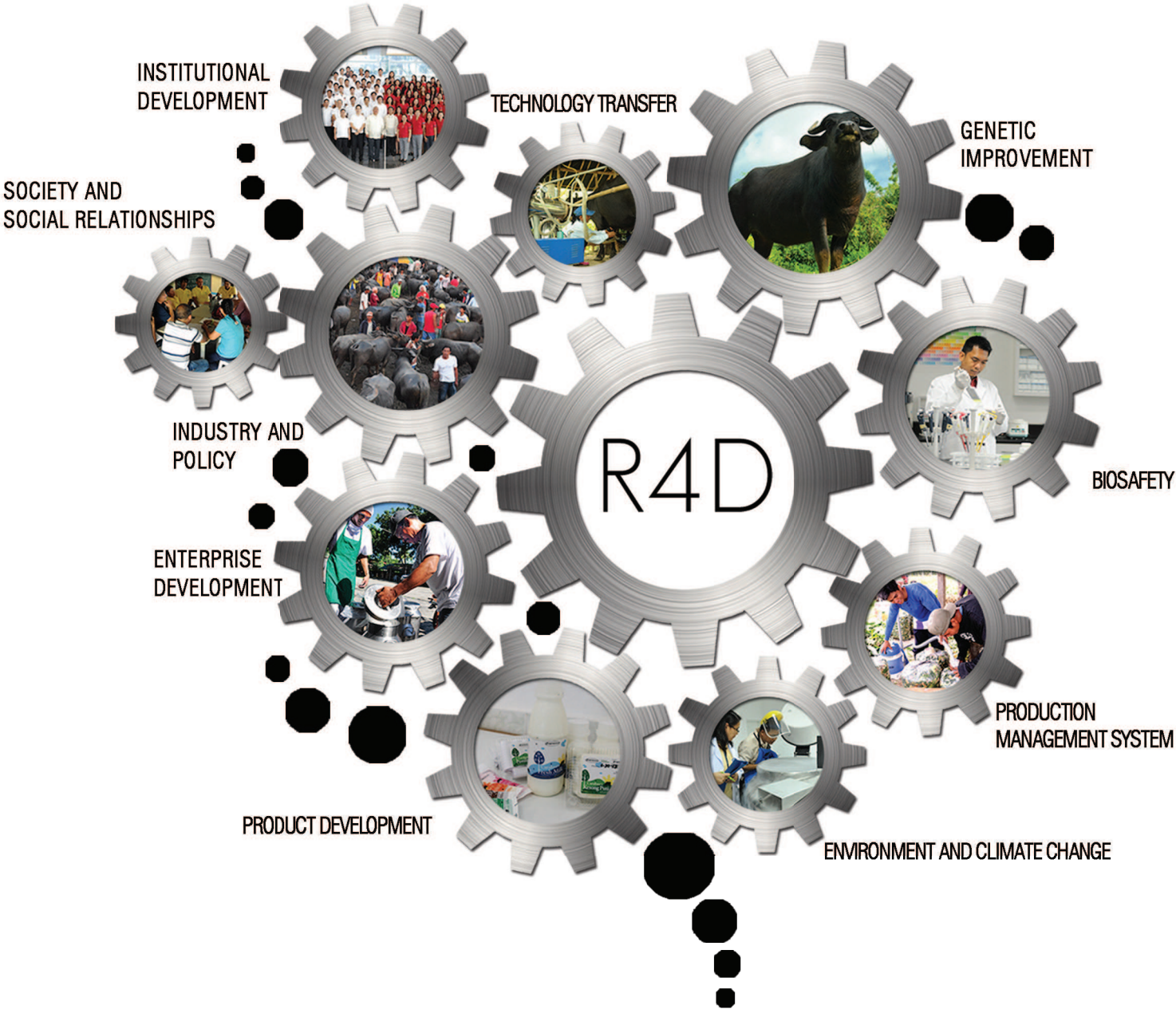
The ICTS continuously enhanced or upgraded several Central Processing Units (CPUs) and laptops at the PCC operating units/section and its regional centers. The upgrading has ensured making workstations up-to-date. Continuous maintenance and patch upgrading of Windows Server Enterprise 2008 R2 edition Operating System, and Microsoft Forefront Threat Management Gateway, regular maintenance of Microsoft Windows 7 32 and 64-bit Operating System and Microsoft Office 2010 was also achieved making a secure web gateway that provides comprehensive protection against web-based threats and allows users to safely and productively use the internet for research without worrying about malware and other threats.

Regular updating of Symantec End Point Protection Server and Client-based anti-virus were conducted to ensure a virus-free Local Area Network (LAN). This also ensures protection to all computer units joined in the LAN from any fortuitous computer viruses.

Subscription to internet services from SMART-PLDT and Globe Communications was provided to the PCC personnel in line with their research and collaborative activities with international and local agencies. The ICTS also maintains wireless internet connectivity at the PCC Hostel, Training Halls, Gene Pool, Dairy Processing Plant, Milka Krem, Main and Annex buildings.

Capacity building of staff in terms of knowledge and applications on Information Technology (IT) was conducted as one ICTS staff has successfully undergone a Graduate Program Study on Service Management Engineering. Other ICTS staff members also attended the Training Seminar Workshop of the Department of Agriculture-Information Technology Center for Agriculture and Fisheries (DA-ITCAF) Information Technology Round-In for Agriculture and Fisheries' Communication Thrust (DA-INTERACT) focusing on the initial development and creation of an Enterprise Architecture framework in the context of Information Technology within Agencies. This Enterprise Architecture will serve as the living reference and blue-print for all IT-related activities of the Department of Agriculture.

CDP Strategic Shift



INSTITUTIONAL DEVELOPMENT

5

CDP Strategic Shift, Development Theme, and Program Statement

A series of consultations and planning workshops were conducted in 2014 to craft and finalize the details of strategic shift in the Carabao Development Program (CDP) implementation and accompanying major final outputs (MFO) of the agency. Such a strategic shift is deemed necessary to pursue a “new” and overarching development theme of PCC, i.e., “How to make PCC an effective R&D agency contributing to the competitiveness of the livestock and agriculture sectors.” In keeping with this theme, a development program statement for 2016-2025 was suggested by Dr. Libertado C. Cruz (former Executive Director of PCC) as follows:

“PCC’s iREB, Embracing Research for Development: In 2016-2025, PCC is committed to carry out continuing and expanding initiative in intensified research-based enterprise build-up (iREB) in rural communities. The major focus is on organized and wide-scale genetic improvement program, systematic extension and technology delivery, and creation of favorable environment for enterprise development. Achievement of the set objectives and target is heavily grounded on a strengthened human resource competencies and growing linkages and partnerships” (Dr. Libertado C. Cruz, 2014).

Completion of the Livestock Innovations and Biotechnology (LIB) Complex

The construction of the LIB Complex (named after Dr. “Lib” Cruz) was completed during the year. Funded by the Philippine government and the United States PL480 Program with support from the Korea International Cooperation Agency

(KOICA), it is an edifice that symbolizes PCC’s intensified effort to conduct meaningful researches that make use of livestock biotechnologies and other innovations. The complex houses the laboratories and offices in Animal Genetic Resources, Cryobank, Reproductive Biotechnology and Physiology, Animal Breeding and Genetics, Molecular Genetics, Milk Analysis, Animal Health and Biosafety, and Product Development. It also houses the Office of the DA-Livestock Biotechnology Center. The complex will be inaugurated during the PCC’s 22nd anniversary celebration in March 2015.

Institutional Linkages

International Institutional Benchmarking on Livestock Research and Development

The PCC participated in a series of overseas study mission, which was coordinated and administered by the Los Baños-based Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA).

The mission aimed to benchmark the institutional capability of the PCC with similarly situated institutions in other countries for purposes of drawing lessons and best practices in livestock research, development, and management. It also explored possible collaboration with the said institutions in the fields of molecular biology, animal health, animal breeding, bioinformatics, vaccine production, and transformation of knowledge into something that is acceptable to the farmers. Table 7 presents the members of the study mission and the research institutions visited.

“PCC’s iREB, Embracing Research for Development: In 2016-2025, PCC is committed to carry out continuing and expanding initiative in intensified research-based enterprise build-up (iREB) in rural communities. The major focus is on organized and wide-scale genetic improvement program, systematic extension and technology delivery, and creation of favorable environment for enterprise development. Achievement of the set objectives and target is heavily grounded on a strengthened human resource competencies and growing linkages and partnerships.” (Dr. Libertado C. Cruz, 2014).

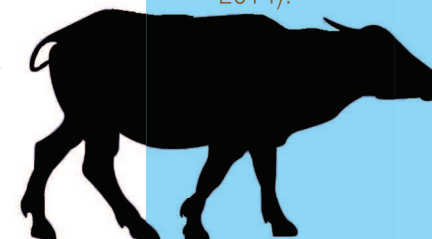


Table 7 International Institutional Benchmarking on Livestock Research and Development

Participants	Country Visited	Institutions Visited	Date of Visit (2014)
1. Arnel N. del Barrio 2. Libertado C. Cruz 3. Eric P. Palacpac 4. Liza G. Battad 5. Annabelle S. Sarabia 6. Claro N. Mingala	Kenya	(1)International Livestock Research Institute (ILRI) (2)Ministry of Livestock Development Subcounty Office, Kikuyu District (3)Kenya Dairy Board (KDB) (4)African Technology Policy Studies (ATPS) (5)Heifer International (Heifer Kenya) (6)African Conservation Centre (ACC)	March 15-23
1. Arnel N. del Barrio 2. Felomino V. Mamuad 3. Libertado C. Cruz 4. Eric P. Palacpac 5. Liza G. Battad 6. Annabelle S. Sarabia 7. Claro N. Mingala	Japan	(1)RIKEN (Institute of Physical and Chemical Research) (2)National Institute of Agrobiological Sciences (NIAS) (3)National Institute of Animal Health (NIAH) (4)NARO Institute of Livestock and Grassland Science (NILGS) (5)Kyoritsu Seiyaku (KS)	May 12-17
1. Arnel N. del Barrio 2. Libertado C. Cruz 3. Eric P. Palacpac 4. Liza G. Battad 5. Ester B. Flores 6. Annabelle S. Sarabia 7. Claro N. Mingala	Australia	(1)Agricultural Business Research Institute, University of New England (UNE) (2)Animal Genetics and Breeding Unit, UNE (3)Meat and Livestock Australia (MLA) (4)Australian Centre for International Agricultural Research (ACIAR) (5)Department of Agriculture, Fisheries and Forestry	June 29-July 10
1. Arnel N. del Barrio 2. Libertado C. Cruz 3. Liza G. Battad	S. Korea	(1) Korea Institute for Animal Products Quality Evaluation (KAPE) (2) Korea International Cooperation Agency (KOICA) (3) Korea Food Research Institute (KFRI)	August 11-15

Partnerships and Collaborations

The PCC has established new partnerships and collaborations during the year while maintaining existing ones with various institutions for purposes of research, development, technical cooperation, and capability building (Appendix 7).

Likewise, the PCC has sustained its partnerships with state colleges and institutions that host its regional centers and with the local government units, farmer-cooperatives, and private entities nationwide for the sustained implementation of the CDP.

Integrated Management System



The PCC through its Integrated Management Audit Section (IMAS) ensured that the established Integrated Management System (IMS) that has been certified to ISO 9001 (Quality Management System); ISO 14001 (Environmental Management System); and OHSAS 18001 (Occupational Health and Safety Management System) is maintained and effectively carried out. During the first quarter of 2014, a second round of Surveillance audit was conducted by TÜV SÜD. The activity culminated with the confirmation of the continuing validity of the IMS Certification for PCC National Headquarters and Gene Pool, completing its three-year cycle.

To ensure sustained effective implementation of the IMS, two batches of Internal Audits covering all areas at the National Headquarters were conducted. The audits were done purposely to check on the operating unit's compliance not only to the requirements of the three standards but to applicable legal, regulatory and other requirements (LOR) without compromising customer requirements.

To warrant efficient conduct of internal audits, eight members of the Internal Audit Team were sent for a comprehensive training on internal auditing. It was complemented with two refresher sessions (onsite and offsite) where techniques in auditing

were specifically discussed to continuously improve the process. Implementation of both EMS and OSHMS was enhanced by sending Pollution Control Officers (PCO) and prospective Safety Officers to a seminar pertaining to updates on LOR and Basic Occupational Safety and Health (BOSH) respectively.

Apart from overseeing the maintenance of IMS at the National Headquarters, the IMAS also assisted the PCC regional centers in both their quests and maintenance of certification. The following were accomplished in 2014:

- Assisted in the conduct of re-certification audit of PCC at Mariano Marcos State University (MMSU);
- Assisted in the surveillance audits of PCC at Cagayan State University, PCC at University of Southern Mindanao, PCC at University of the Philippines at Los Baños, and PCC at Ubay Stock Farm; and
- Conducted QMS Documentation and Internal Quality Auditing trainings at the PCC at Central Mindanao University, PCC at La Carlota Stock Farm, and PCC at Visayas State University

Human Resources Management

Through the PCC's Human Resources Management Section (HRMS), significant steps were made towards fulfilling the PCC's mission and initiatives primarily in putting up and maintaining a system or process of recruiting, developing, rewarding, motivating and retaining employees who are contributing to the attainment of the agency's MFO Accountability Report Card (MARC) through aligned target outputs of its programs, projects, and development priorities. Direct results of PCC's effective human resource management were manifested through the attainment of 109% of the agency's MFO targets for the year (Appendix 8).

The major accomplishments of the section were summed up in terms of implementation and continual improvement of the Strategic Performance Management System, realization of the agency Strategic HR Plan, improved and continues updating of the Human Resource Management Information System (HRMIS) and the appropriate nurturing of teams for the institutionalization of PCC Core values (excellence, professionalism, integrity, commitment, and social and ecological responsibility or EPICS) and facilitating the provision of favorable environment for promotion of employees' productivity.

Consequently, these accomplishments as well as challenges encountered resulting in under-achievement served as bases for continual improvement and setting target for the succeeding year.



Recruitment, Selection, and Staffing

During the year, the HRMS performed the following:

- Accepted and screened one hundred sixty eight (168) application documents for different Job Order positions.
- Administered Proficiency Tests to seventy four (74) applicants for various available Job Order positions.
- Facilitated scheduling and conduct interview to forty-three (43) applicants who passed the proficiency test for various Job Order positions available positions.
- Facilitated the posting and publication of fifty four (54) vacant and newly created positions for filing up.
- Received and evaluated ninety five (95) application documents for vacant/newly created plantilla positions
- Facilitated the interview of sixty eight applicants (OED & Regional Centers)
- Administered psychosocial tests to forty one (41) applicants
- Facilitated the hiring of 39 additional Job Order (J.O.) staff for different Division/Section/Units

Likewise, there are 54 positions for filling up under the agency's approved rationalization plan. Of these 54 positions, 21 are old vacant positions while 33 are newly created with corresponding Notice of Organization, Staffing and Compensation Action (NOSCA) issued by the DBM. Accordingly, 15 of the 21 old positions were filled up as well as those 18 of the 33 newly created positions. In summary, 21 of the 54 positions plus 10 from vacated positions or a total of 31 positions are subject to re-publication and publication, respectively.

As of December 31, 2014, the agency has a total workforce of 404 personnel (including job order) (Tables 8a and 8b).

It was also this year, when Dr. Arnel N. Del Barrio, the newly appointed active executive director of the Philippine Carabao Center took his oath of office before Agriculture Secretary Proceso J. Alcala during the Department of Agriculture Management Meeting held June 24 in Laoag City, Ilocos Norte. He later on officially accepted the "torch of leadership", duties and responsibilities from the agency's retired former head Dr. Libertado C. Cruz in a turnover ceremony held June 27 at the PCC national headquarters in the Science City of Muñoz, Nueva Ecija.

**Table 8a.
Distribution
of PCC
Plantilla
(Regular)
Personnel,
CY 2014**

Office/Center	Technical Staff	Non-Technical Support Staff	Administrative Staff	Total
Office of the Executive Director	36	7	9	52
PCC at CLSU	21		2	23
PCC at UPLB	22		2	24
PCC at CSU	9		1	10
PCC at MMSU	8		1	9
PCC at DMMMSU	6		1	7
PCC at USF	6		1	7
PCC at VSU	5		1	6
PCC at WVSU	8		1	9
PCC at LCSF	5		1	6
PCC at CMU	14		1	15
PCC at USM	5		1	6
PCC at MSU	2			2
PCC at MLPC	5		1	6
Total	152	7	23	182

**Table 8b.
Distribution
of PCC
Contractual
(Job Order)
Personnel,
CY 2014**

Office/Center	Technical Staff	Non-Technical Support Staff	Administrative Staff	Total
Office of the Executive Director	24	30	21	75
PCC at CLSU	9		21	30
PCC at UPLB	1	12	1	14
PCC at CSU	2	2	3	7
PCC at MMSU	1	9		10
PCC at DMMMSU		2		2
PCC at USF	6	4	7	17
PCC at VSU	1	10		11
PCC at WVSU	8			8
PCC at LCSF		6	3	9
PCC at CMU	2			2
PCC at USM	1	14		15
PCC at MSU		4	2	6
PCC at MLPC		13	3	16
Total	55	106	61	222

Budget and Finance Management

Consistent with the public financial management reform roadmap of the government, the PCC adopts in 2014 the Unified Accounts Code Structure (UACS) system across the regional centers. The UACS provides a harmonized budgetary and accounting code classification that will facilitate the efficient and accurate financial reporting of actual revenue collections and expenditures of the center. The PCC accountants and bookkeepers across the network were trained for the adoption and smooth implementation of the new system.

Likewise, the PCC has complied with all mandatory financial accountability reports as prescribed by regulating and coordinating agencies such as the Commission on Audit, Department of Budget and Management, and the Department of Agriculture. Budgetary requirements of the operating units of the center were provided on time and in accordance with the approved plans. Appropriate administrative policies, procedures and processes were also issued and implemented to enhance transparency of operation and minimize lead time in processing financial claims and administrative services.

Highlights of FY 2014 Budgetary Expenditures

The FY 2014 expenditures were focused on setting programs and activities to meet the mandate of the newly rationalized Philippine Carabao Center as a Research for Development agency. Major expenditures for FY 2014 supported the PCC's long term genetic improvement program, technology development, and creation of models for viable and competitive carabao-based enterprises. Specifically, the usage of funds was channelled to meet the requirements for the expansion of R&D implementation on three areas:

- a. Genetic Improvement Program (GIP). This program focuses in the improvement of genetic potential of carabaos for milk and meat thru organized breeding & selection (artificial insemination and natural mating) and conduct of R&D and related production support activities. In 2014, expenditures were focused on technology development, DNA-based selection for disease resistance, selection of best genetics through bio-informatics and genomics to include the expansion of the GIP system in water buffaloes.
- b. Cryobanking of Animal Genetic Resources. Conservation of genetic materials of important livestock species/breeds is the main thrust of this sub-program component. This would include characterization of indigenous and introduced breeds. In 2014, the PCC sustained and expanded the implementation of

the in-vitro conservation of animal genetic materials needed for long-term breeding requirements and in response to changing global environment.

- c. Intensified Research and Development. A good portion of the budget supported the efforts towards the development of DNA-based technologies applicable across species. The R&D efforts supported the conduct of the development of DNA-based biotechnologies, improving rumen functions – probiotics and microbial manipulations, improvement in reproductive biotechniques, modelling of carabao enterprises, and other livestock policy studies.

Sources and Usage of Funds

The agency's main sources of funds to support its operation are provided by the national government through the General Appropriations Act (GAA). Table 9 presents the details of fund allotment and utilization.

Table 9. PCC Sources and Utilization of Funds as of December 31, 2014 (Php Million)

Fund Source	Authorized Allotment	Usage	%Utilization
GAA-Current & Continuing	418.57	401.30	96
Personnel Services	110.15	104.55	95
Maintenance & Other Operating Expenses	295.48	285.92	97
Capital Outlay	12.94	10.83	84
Revolving Fund- Dairy Business Module	78.55	60.01	76
Locally Funded Special Projects/ Research Funds	83.24	75.70	91
Foreign Assisted Projects	128.99	112.84	87
TOTAL	709.35	649.85	92

Special projects fund are the receipt of research funds from various government agencies and institutions. Project funds utilization is mainly on the maintenance and operating requirements of the project.

Financial Condition

The PCC's total assets as of December 31, 2014 are valued at Php 2,675.19 million comprising mainly of the agency's Property, Plant & Equipment (PPE) and biological assets (Table 10). The significant change in biological assets or breeding stocks represents the booking of the cost of 1,150 heads of imported Italian-Mediterranean buffaloes. Total liabilities posted Php124.85 million and total accumulated surplus reached Php2,550.34 million. Significant decrease in liabilities represents liquidation of various special projects funds to the respective funding agencies.

Table 10. Statement of Financial Condition as of December 31, 2014 (Php Million)

Particulars	FY 2014	FY 2013	% Change
Assets			
Current Assets	428.95	752.59	-43
Property, Plant & Equipment	1,001.70	919.92	9
Biological assets	1,226.45	900.31	36
Other assets	18.08		
Total Assets	2,675.19	2,572.82	4
Liabilities	124.85	171.55	-27
Accumulated Surplus	2,550.34	2,401.27	6
Total Liabilities & Government Equity	2,675.19	2,572.82	4

Income and Expenses

The PCC's total income for the year reached Php669.87 million comprising mainly of the subsidy from the national government (Table 11). The business income represents the sales of milk, meat, live animals, and other by-products as a consequence of the operation of the institutional dairy business modules of the regional centers.

Personnel services expenses posted Php103.85 million, while total maintenance and other operating expenses including non-cash expenses for the depreciation was Php398.94 million giving a net income or surplus from operation of Php167.08 million. The decrease in net income for FY 2014 is attributed to the decrease in subsidy from the national government.

Table 11. Statement of Income and Expenses as of December 31, 2014 (Php Million)

Particulars	FY 2014	FY 2013	% Change
Income			
Subsidy Income	590.18	844.19	-30
Business Income	79.34	68.59	16
Other Income	0.35	0.31	13
Total Income	669.87	913.08	-27
Expenses			
Personnel Services	103.85	86.30	20
Maintenance & Operating Expenses	340.51	277.16	23
Non-cash expenses - Depreciation	58.43	57.27	2
Total Expenses	502.79	420.73	20
Net Income	167.08	492.35	-66

Appendix 1. CY 2014 Trainings Conducted by PCC and Number of Participants

No.	Title of Training Conducted	No. of Participants	Month (2014)	Center
1	Training on Milk Handling & Processing	45	January	CLSU
2	Buffalo management training	25	January	CLSU
3	Planning workshop Expanded AI	32	January	VSU
4	Training on Enterprise	16	January	UPLB
5	OJT milk processing	42	January	MMSU, DMMMSU, CLSU
6	Training on mik handling	70	February	MMSU, CSU, UPLB, WVSU,
7	Buffalo management training	25	February	CLSU
8	Social Preparation Training	25	February	CLSU
9	Milk Processing	9	February	USF
10	OJT Clinicians	29	February	UPLB, WVSU
11	OJT	7	February	CLSU
12	Training on Milk Handling & Processing	98	March	MMSU, CSU
13	UTRS production Training	144	March	CLSU, DMMMSU
14	Training on silage production	144	March	CLSU, DMMMSU
15	Training on total mix Ration	144	March	CLSU, DMMMSU
16	Training on proper milking	144	March	CLSU, DMMMSU
17	Traning on vermi-composting	144	March	CLSU, DMMMSU
18	Training on actual heat detection	144	March	CLSU, DMMMSU
19	Buffalo management training	25	March	CSU
20	Social Preparation Training	40	March	UPLB
21	Basic Training course on AI	12	March	UPLB
22	Technical Training on Dairy	40	MArch	UPLB
23	Field Trip	58	March	WVSU
24	Milk Processing	7	March	UPLB
25	OJT	5	March	UPLB
26	Training on Milk Handling & Processing	8	April	CSU
27	Basic Training course on AI	25	April	MMSU
28	Training on carabao upgrading	25	April	MMSU
29	OJT	84	April	CLSU, WVSU

(continued) CY 2014 Trainings Conducted by PCC and Number of Participants

No.	Title of Training Conducted	No. of Participants	Month (2014)	Center
30	Buffalo management training	79	April	CLSU, USM
31	Social Preparation Training	88	April	CLSU, USM
32	Technical Training on Dairy Buffalo Mgt.	95	April	UPLB
33	OJT	81	April	CLSU, WVSU
34	OJT	89	April	LCSF, UPLB
35	Training on Milk Handling & Processing	28	May	UPLB
36	Buffalo management training	79	May	CLSU, USM
37	Social Preparation Training	88	May	USM, CLSU
38	Technical Training on Dairy Buffalo Mgt.	95	May	UPLB
39	OJT	81	May	CLSU, WVSU
40	OJT	89	May	LCSF, UPLB
41	Pregnancy Diagnosis Lecture and Practicum	20	June	CSU
42	Castration of large animals	56	June	MMSU
43	Simple bookkeeping and Accounting	42	June	CSU
44	Buffalo management training	18	June	USF
45	Milk handling and milk processing	2	June	CLSU
46	Hands on milking	1	June	WVSU
47	OJT-Clinicians	4	June	CLSU
48	OJT- Apprentice	16	June	CLSU
49	Bull handler's Training	5	July	MLPC
50	Training on Feeds and Feeding	25	July	WVSU
51	Training on Animal health management	11	July	UPLB
52	Training on Milk Handling & Processing	9	August	CLSU
53	Pregnancy Diagnosis Lecture and Practicum	12	August	CSU
54	Training on proper milking	33	August	DMMMSU
55	Orientation on dairy profile and basic selling	10	August	UPLB
56	Modelling dairy buffaloes capabilities and farm mgt. requirement in milk and herd production	29	August	CSU

(continued) CY 2014 Trainings Conducted by PCC and Number of Participants

No.	Title of Training Conducted	No. of Participants	Month (2014)	Center
57	Buffalo management training	70	August	UPLB
58	Basic Training Course on AI & PD in Large Ruminants	12	August	UPLB
59	Hands on milking	1	August	WWSU
60	OJT-Clinicians	3	August	UPLB
61	OJT	1	August	CLSU
62	Training on Milk Handling & Processing	64	September	DMMMSU, CSU
63	Training on silage production	148	September	USF
64	Training on proper milking	26	September	UPLB
65	Social Preparation Training	73	September	UPLB, CSU, MMSU
66	Basic Training Course on AI & PD in Large Ruminants	27	September	CLSU, UPLB
67	Technical Training on Dairy Buffalo Management	16	September	UPLB
68	Training on Milk Soap Formulation and Basic Management	154	September	USF
69	Training on Animal health management	48	September	MMSU
70	OJT-Clinicians	11	September	UPLB
71	OJT	19	September	CSU
72	Training on Milk Handling & Processing	6	October	CLSU
73	Training on proper milking	12	October	UPLB
74	Basic Training Course on AI & PD in Large Ruminants	15	October	CLSU
75	Technical Training on Dairy Buffalo Management	14	October	UPLB
76	OJT-Clinicians	15	October	UPLB
77	OJT	1	October	MMSU
78	Harnessing Livestock Extension Services on Animal Nutrition, Forage Production, Conservation and Pasture Development	40	October	PCC National Headquarters
78	Training on Milk Handling & Processing	25	November	USM
79	CUP/CDP orientation	561	November	MMSU, CSU, UPLB, USM, USF

(continued) CY 2014 Trainings Conducted by PCC and Number of Participants

No.	Title of Training Conducted	No. of Participants	Month (2014)	Center
80	Training on silage production	51	November	USF
81	Buffalo management training	21	November	USM
82	Social Preparation Training	120	November	CSU
83	Basic Training Course on AI & PD inLarge Ruminants	38	November	CLSU, UPLB, USF
84	Milk handling and milk processing	44	November	MMSU
85	Carabao production Management	104	November	DMMMSU, LCSF
86	Milk processing	6	November	UPLB
87	OJT-Clinicians	4	November	CLSU
88	Basic Training Course on AI & PD inLarge Ruminants	24	December	UPLB, CSU, DMMMSU
89	Milk handling and milk processing	8	December	UPLB, DMMMSU
90	Carabao production Management	6	December	WVSU
91	Training on Milk Soap Formulation and Basic Management	11	December	USF
92	Bull Management Training	14	December	CLSU
93	Occupational Internship Program on Dairy Buffalo Management and Milk Handling and Processing	10	December	MMSU
	TOTAL	4,624		

Appendix 2. CY 2014 Trainings Conducted for the National Impact Zone (Nueva Ecija)

No.	Title	Date (2014)	No. of Participants
1	Social Preparation Training	May 15-16	21
2	Basic Dairy Buffalo Production and Management	May 27-28	21
3	Milk Handling, Testing and Processing	August 19-21; August 26-27	6
4	Pregnancy Diagnosis	August 4-8	17
5	Animal Health Care and Management	February 18-20	20
6	Rules Formulation	November 12-13	44
7	Cooperative Standards	November 10-11	52
8	Data Management	September 10-12	10
9	Records Management	November 24-25	41
10	Basic Dairy Buffalo Management	December 22-23	21
11	Milk Handling and Quality Control	November 3-4	19
12	Milk Handling and Quality Control	November 5-6	16
13	Milk Handling and Quality Control	November 24-25	36
14	Seminar on Health, Nutrition Improvement and Family Planning for Women of National Dairy Impact Zone Farmer-Trustees	March 21	50
15	Seminar on Health, Nutrition Improvement and Family Planning for Women of National Dairy Impact Zone Farmer-Trustees	September 1	41
	TOTAL		415

Appendix 3a List of Completed Researches, CY 2014

R4D Thematic Area	Title	Researchers*
Biosafety	1. Application of Loop Mediated Isothermal Amplification (LAMP) in the Screening of Caprine Arthritis Encephalitis Virus (CAEV) an Molecular Characterization of CAEV Species Present in the Philippines	RBPadiernos and CNMingala
	2. Development of LAMP Assay and Quick Test Kits for Gastro Intestinal Infections of Swine	RPAIili
	3. Molecular Characterization of Gag Gene of Caprine Arthritis Encephalitis Virus of Goats Present in the Philippines	RBPAdiernos, MMBalbin, AMParayno and CNMingala
	Student Thesis	
	1. Genetic Screening of the Acid Meat Condition and Scrotal hernia in Domesticated Swine Using PCR-RFLP	JFBambico, RLApilado, NDAntonio and CNMingala
	2. DNA-Based Identification of Bacteria from Nasal Cavity of Swine Before Slaughter	MMVicho, GGGarcia and CNMingala
	3. Morphological Characterization and Molecular Identification of Bacteria from Abortion and Still Birth of Ruminants	JLCatabona, MBCervantes, IMCorpuz, GGGarcia and CNMingala
	4. Field Application of Loop-mediated Isothermal Amplification for Detection of Leptospirosis Using Universal Primers	GATubalinal, CYDomingo and CNMingala
Product Development	5. Screening of Polymorphic Region in Myxovirus Resistance 1 (Mx1) Gene Associated with Philippine Native Pigs (Sus scrofa)	MDMuñoz, MDUy , JRUndan and CNMingala
	6. Detection of Infectious Bovine Rhinotracheitis Virus (Bovine Herpesvirus Type1) in Dairy Cattle Blood Using Nested Polymerase Chain reaction	RTManuela, JVLazaro, and CNMingala
	1. Development Of Chilled Coffee-Flavored Buffalo Milk-Based Drink	LMParungao, TLCanaria and RMLapitan
Production Management System	Student Thesis	
	1. Detection of Horse and Rat Meat from Meat Products Declared as Pork, Beef or Poultry Meat in the Philippines Using Polymerase Chain Reaction	FGDimalanta, LMDomingo Jr. and CNMingala
Production Management System	1. Establishment of Brachiaria humidicola as feed source and a biological control of obnoxious weeds in native pasture	MBWandagan and RMarcos
	2. Effects of Feed Enhancer on Milk Peak and Lactation Performance of Brazilian and Bulgarian Buffaloes	JPSantos and DLAquino

(continued) Appendix 3a List of Completed Researches, CY 2014

R4D Thematic Area	Title	Researchers*
Production Management System	3. The Use of Day-in Day out in Assessing the Pasture Quality and the Performance of Buffaloes Under Pure Grazing Management Scheme	MWandagan and RMarcos
	Student Thesis	
	1. Supplementation of Commercial Liquid Probiotics (RPL8 +AKE) for Milk Production in Buffaloes	HREensoy and JGAbela
Genetic Improvement (Reproductive Biotechnology)	1. Improved bovine Blastocysts Development Potential by L- carnitine Supplementation	PCVManzano, MBOcampo and JVLazaro
	Student Thesis	
	1. Motility, Livability, and Acrosome Integrity at Extended Condition of Water Buffalo (Bubalus bubalis L.) Spermatozoa Thawed at Various Temperature and Time	PHCInocillas, MBMagat, JRD Salvatierra, JRRafanan, EVVenturina, DHDuran and FVMamuad
Socioeconomic Dimensions of CDP Implementation	1. "To Milk or Not to Milk": Understanding the Socio-Economic Characteristics and Behavioral Intentions of Crossbred Buffalo Owners in San Agustin, Isabela	EPPalacpac, MGHonorio, EMValiente, RTJacang, HMBaltazar and ASSarabia
	2. A Case Study on the Implementation of the Bull Loan Program in Select PCC Regional Centers: PCC at CSU, CLSU and UPLB	GCBumanlag and MTolentino

*Names in bold fonts are PCC researchers; the rest are students or university researchers

Appendix 3b List of Ongoing Researches, CY 2014

R4D Thematic Area	Title	Researchers*
Biosafety	Student Thesis	
	1. Molecular Characterizations of Tim-3 and Gal-9 in Swamp and Riverine Buffaloes	PLHDuran, RBPadiernos , EAAbella and CNMingala
	2. Gene Marker Identification Targeting Toll-Like Receptor 4 (TLR4), Breast cancer 1 (BRCA1) and Adenosine Triphosphate 1 Alpha 1 (ATPA1) Genes: Assessing their Association with Subclinical Mastitis in Dairy Water Buffaloes (Bubalus bubalis)	CCBlendima, MRUy and CNMingala
	3. Characterization of Sixth Intron of Philippine Native Pig Natural Resistance-Associated Macrophage Protein 1 (NRAMP1) Gene as An Optimal Marker Gene for Disease Resistance	RDTadeo, RBPadiernos , JDUndan and CNMingala
Genetic Improvement (Reproductive Biotechnology)	1. Enhancing AI Efficiency and Reducing Calving Interval Through Fixed Time AI in Post-Partum Dairy Buffaloes	EPAtabay, ECAtabay, EBFlores, ESMaylem, MBOcampo, LCOcampo, DHDuran, FPAquino, DLAquino and ASSarabia
	2. Kinetics of Sperm Penetration and Embryo Development as Predictors of Fertility of Frozen-Thawed Buffalo Semen	ESMAylem, EPAtabay, EVVenturina, FPAquino and LCOcampo
	3. Epididymal Sperm Cryopreservation as a Potential Tool for Breed Conservation In-Vitro of Indigenous Livestock and/or Endangered Wildlife in the Country: Prospects for Animal Genetic Resource (AnGR) Cryobanking	LCOcampo, EPAtabay, ECAtabay, MBOcampo, FPAquino and ESMaylem
	4. Epididymal Sperm Freezing from Post Mortem Testes of Native Carabaos for AnGR Cryobanking	LCOcampo, EPAtabay, ECAtabay, MBOcampo, and FPAquino
	5. Optimizing Artificial Reproductive Technologies (Art) in Water Buffaloes Through the Regulation of Ovarian Function	EPAtabay, ECAtabay, MBOcampo, LCOcampo, FPAquino and ESMaylem
	6. Genetic Propagation of Girolando Dairy Cattle by Reproductive Techniques	EPAtabay, ECAtabay, MBOcampo, LCOcampo, FPAquino and ESMaylem
	7. Production of Genetically Superior Goat/Sheep and Germplasm Cryopreservation Through Assisted Reproductive Techniques	MBOcampo, LCOcampo, EPAtabay, FPAquino and ESMaylem

(continued) Appendix 3b List of Ongoing Researches, CY 2014

R4D Thematic Area	Title	Researchers*
Genetic Improvement (Reproductive Biotechnology)	8. Screening for Sperm-factor (Phospholipase C-zeta) by Molecular Technique as a Novel Biomarker of Bull Fertility for Genetic Improvement in Water Buffaloes	EPAtabay, ECAtabay, EVVenturina, CNMingala and RAFissore
	Student Thesis	
	1. Motion Kinematics of Goat (<i>Capra hircus</i>) Spermatozoa as Influenced by Penetrating Cryoprotectants Under Various Stages of the Cryopreservation Process	ASGalamgam, EMCruz, EPAtabay, FPAquino, LCOcampo, and ESMaylem
	2. Cryopreservation of Boar Semen from Locally raised Boar Stud Using LEY Freezing Extender	PGranadosin, MSAndres, FPAquino, LCOcampo, EPAtabay, MBOcampo and ESMaylem
	3. Development of RT-LAMP Assay and Quick Test Kit for Viral Gastro Intestinal Infections (PED and TGE) of Swine	EPAtabay, LSValino, ESace, MLDeLa Cruz and RPAIili
	4. Private-Public Partnership in the Application of Animal Genomics to Increase Productivity and Improve Efficiency of the Philippine Swine Industry Project 1. Development and application of genetic markers in selecting genes for prolificacy and other positive traits of swine	JRHerrera, LMLabonite, SMatias and HCruz
Production Management System	1. Establishment of Tropical Feed Library Utilizing Locally Available Feed Resources for Ruminant Production in the Philippines	DLAquino, TFujihara and JSantos
	2. S&T Community Based Farm (STCBF) On Cassava Foliage Feeding For Dairy Buffaloes In Bohol	CBSalces, GPBajenting, EJEscala and MVAbela
	3. Community-based S&T Project on the Preparation & Utilization of Urea-Treated Rice Straw (URTS) as Fodder for Dairy Buffaloes	DLAquino, JPSantos, DKDomingo and TFujihara
	4. Commercialization of Grass/Forage Corn Silage for Dairy Buffaloes in Lupao, Nueva Ecija Through Technomart	EPPalacpac, Dr. DLAquino, TFujihara, HBaltazar and CICastillo
Socioeconomic Dimensions of CDP Implementation	1. Profiling the Modalities of Carabao-Based Enterprises Led by the Philippine Carabao Center and Its Partner Institutions	EPPalacpac, MGFHonoio, EMValiente and RTJacang
	2. Extension Methods for Technology Adoption for Dairy Buffalo in Selected Barangays in Nueva Ecija and in Ilocos Norte	EPPalacpac, ECAtabay, MGRecta, MGFHonorio, EMValiente and RTJacang

(continued) Appendix 3b List of Ongoing Researches, CY 2014

R4D Thematic Area	Title	Researchers*
Product Development	1. Production and Commercialization of Nutri-Rice Milk	MPAbella and MRomero
Product Development	Student Thesis	
	1. Evaluation of Probiotic Properties of Lactobacillus from Yogurt	CNCallejo, MPAbella , AMParayno and FGPineda
	2. Production of Sports Drink Using Delactosed Whey	MLLeano, JDMalig, GLMartin, MPAbella , and VCQuines
	3. Utilization of Whey as Suubstrate for Vinegar Production	CJCallaga, RDPErez, MPVeneracion, JRustia and MPAbella

**Names in bold fonts are PCC researchers; the rest are students or university researchers*

Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
1. DNA-Based Identification Of Bacteria From Nasal Cavity Of Swine Before Slaughter	M.M. Vicho	A study was undertaken to isolate and identify bacteria present in the nasal cavity of swine before slaughter through conventional bacterial culture, Gram staining and Deoxyribonucleic acid-based methods (Polymerase Chain Reaction and DNA sequencing) and validate the relationship of these isolates phylogenetically. PCR analysis that used universal primers targeting the 16S rRNA gene of most bacteria (NF, Forward primer, 5' GGCGGCAK GCCTAAYACATGCAAGT 3' and NR, Reverse primer, 5' GACGACAGCCATGCASCAC CTGT 3') revealed the recovery of 5 bacterial DNA which had amplicon sizes of 1025 BP. Results showed that the alignment of DNA sequences and comparison of these sequences with those of bacteria with close DNA homologies in the gene bank and phylogenetic studies confirm the identity of five isolates of <i>Klebsiella pneumoniae</i> , <i>Proteus mirabilis</i> , <i>Staphylococcus nepalensis</i> , <i>Staphylococcus arlettae</i> and <i>Aeromonas hydrophila</i> . This information call for the conduct of a thorough ante mortem examination that applies conventional and recent molecular protocols in order to draw a sound judgment in considering food animals for slaughter.
2. Morphological Characterization and Molecular Identification of Bacteria from Abortion and Stillbirth of Ruminants	J.L.S. Catabona, M.B.M.Cervantes, I.M.R. Corpuz, G.G. Garcia, and C.N. Mingala	A study was undertaken to identify abortion-associated bacteria from carabaos morphologically in terms of colony and virulence features and molecularly through DNA sequence analysis. Spleen and liver samples from five aborted fetus of carabao, five placental samples from abortion of goats and five stomach and liver samples from stillbirth of goats were collected and subjected to conventional microbial culture and cultivation. Bacterial isolates were characterized based on colony features and virulence in-vitro through hemolytic test, congo red uptake and salt aggregation test. Potential bacterial isolates were subjected to polymerase chain reaction (PCR) to amplify the DNA through the use of universal primers (NR, 5' GACGACAGCCATGCASCAC 3' and NF, 5' GGCGGCAKGCCTAAYACATGCAAGT 3'). The amplified PCR products were subjected to DNA sequence analysis. The DNA sequences of the isolated bacteria were aligned with the DNA sequences of bacteria in the GenBank through BLAST. Results of the DNA sequencing confirmed the identification of <i>Bacillus</i> sp. (4), <i>Enterobacter</i> sp. (1), <i>Pseudomonas</i> sp. (2), <i>Proteus</i> sp. (2), and <i>Exigobacterium</i> sp. (1) as potential bacteria associated with abortion of carabaos; <i>Staphylococcus</i> sp. (1), <i>Macroccoccus</i> sp. (1), <i>Kurthia</i> sp. (1), <i>Acinetobacter</i> sp. (1), <i>Proteus</i> sp. (2), <i>Klebsiella</i> sp. (1), and <i>Bacillus</i> sp. (1) from goats diagnosed with abortion; and bacteria-associated to stillbirth of goats were identified as <i>Staphylococcus</i> sp. (4), <i>Enterococcus</i> sp. (1), <i>Pseudomonas</i> sp. (1), <i>Oceanobacillus</i> sp. (1), <i>Acinetobacter</i> sp. (2).

(continued) Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
3. Field Application of Loop-mediated Isothermal Amplification for Detection of Leptospirosis Using Universal Primers	G. A.S.P. Tubalinal, C. Y.J. Domingo, and C. N. Mingala	<p>This study determined the application of LAMP as rapid, more sensitive and economical diagnostic assay for the field detection of Leptospirosis among domesticated animals with PCR as the “gold standard”. Specifically, it evaluated the ability of LAMP to amplify DNA of <i>Leptospira</i> spp. targeting the <i>rrs</i> gene, using the dye color change, fluorescence and gel electrophoresis as parameters. It also compared the LAMP results against nested PCR which targets the <i>flaB</i> gene, based on the positivity rate (%) and validity (sensitivity and specificity) by animal commodity. Lastly, it compared the duration of time consumed from the start of the assay up to the results and comparison of the cost analysis to conduct LAMP and nested-PCR. Leptospiral antigens were detected in the following animal groups: buffalo, 40% (4/10) in nPCR and 45% (9/20) in LAMP; dog, 15% (3/20) in nPCR and 45% (9/20) in LAMP; rat, 15% (3/20) in nPCR and 20% (4/20) in LAMP; pig, 10% (2/20) in nPCR and 35% (7/20) in LAMP; goat, both 5% (1/20) in nPCR and LAMP; cat, 0% in nPCR and 30% (6/20) in LAMP; and finally, cattle, 0% in nPCR and 10% (2/20) in LAMP. In general, positivity rate of leptospirosis was 9.28% (13/140) for nested PCR and 29% (40/140) for LAMP. Overall sensitivity of LAMP was 100% but the probability that an animal that tested positive actually had the pathogen in the urine was only 33% except for rats that registered 75%. In contrast, the specificity of LAMP was 79% but the probability that the animal that tested negative in LAMP and actually did not have the pathogen in the urine was 100%. Lastly, time consumed by LAMP is almost half of the time needed to complete nested PCR assay and the cost analysis showed that a difference of merely P10 was needed in order to perform both tests. However, specialized equipment such as a thermocycler is needed for the completion of PCR amplification which is more expensive than that of LAMP assay that only needs a heat block or a water bath. In the long run, LAMP is more cost effective, more sensitive, and rapid than nested PCR.</p>

(continued) Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
4. Genetic Screening of the Acid Meat Condition and Scrotal Hernia in Domesticated Swine Using PCR-RFLP	N.D.Antonio, R.L. Apilado, and J.F. Bambico	The Acid meat condition and Scrotal Hernia are swine genetic defects caused by a dominant gene mutation due to a non-conservative arginine to glutamine substitution on R200Q of the PRKAG3 gene and a cytosine to thymine single nucleotide polymorphism in the BAX gene of swine, respectively. The screening of genetic diseases such as these help the determination of their presence in a given swine population and reduces the unwanted effects on meat quality and production. DNA was extracted from blood samples obtained from 100 swine in commercial breeders in Luzon. Optimization techniques for annealing temperatures as well as cocktail mixture component concentrations were conducted, rendering an acceptable annealing temperature of 68oC for the Acid Meat Condition and 70oC for Scrotal Hernia using 10pmol primer concentrations for both defects. Samples were then subjected to amplification using PCR, amplifying the 249bp region containing the R200Q of the PRKAG3 gene as well as the 416bp region of the BAX gene possessing the aforementioned mutations. Results reveal 34% are normal, 63% heterozygous mutants and 3% homozygous mutants for the Acid meat condition. Conversely, a result of 35% were found to be normal for scrotal hernia whereas the remaining were carriers of at least one Scrotal Hernia allele in which 43% were heterozygous mutants and 22% were homozygous mutants. Sequencing was also conducted as a confirmatory test for the Acid Meat Condition and affirming the positive condition, specifically a carrier and a homozygous mutant, for the Scrotal Hernia. Screening of Acid meat condition and Scrotal Hernia are advised in order to eliminate the negative genes from the herd.

(continued) Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
5. Detection Of Horse And Rat Meat From Meat Products Declared As Pork, Beef Or Poultry Meat In The Philippines Using Polymerase Chain Reaction Assay	F.G. Dimalanta, L.M. Domingo Jr. and C.N. Mingala	The study aimed to detect horse DNA from meat products declared as pork, beef or poultry in the Philippines. Specifically, the study attempted to extract DNA materials from processed and canned meat products. The extracted DNA materials were used for the detection of horse DNA using PCR. DNAs of 30 commercially available canned and processed meat products (15 locally produced and 15 imported) were extracted using muscle tissue DNA extraction protocol. Cooked horse meat was used as basis for the positive control. The quality and quantity of the extracted DNAs were evaluated by targeting beta actin gene in PCR and by nanospectrophotometer, respectively. PCR detection of horse DNA was evaluated using gene specific primers for horse cyt b F: GAC CTC CCA GCT CCA TCA AAC ATC TCA TCT TGA TGA AA and R: CTC AGA TTC ACT CGA CGA GGG TAG TA with an expected amplicon size of 439 bp. Visualization of amplification was performed on 2% agarose gel stained with gel red and made visible using UV transilluminator. Specific DNA fragments were analyzed by standard 100 bp DNA size molecular ladders. Result showed that viable DNA materials from processed and canned meat products can be extracted using the muscle tissue DNA extraction protocol based on the concentration of DNA quantified using nanospectrophotometer and presence of bands after targeting beta actin gene. The result also showed that 100% (30/30) of the meat products tested negative for horse DNA after targeting horse cyt b gene.
6. Screening of Polymorphic Region in Myxovirus Resistance 1 (Mx1) Gene Associated with Philippine Native Pigs (Sus scrofa)	M.D. Muñoz, M.D. Uy, J.R. Undan, and C.N. Mingala	The study was conducted to screen the polymorphic region in Myxovirus resistance (Mx1) gene associated with Philippine native pig (Sus scrofa) and compare the sequence of commercial pig (Sus scrofa domesticus) available from the GenBank, including the Mx1 11-bp deletion polymorphisms. The DNA extracted blood samples were amplified using Polymerase Chain reaction assay using specific primers. Sequence alignment of the Mx1 between the native pig and commercial pig revealed the 11-bp deletion in commercial pig, this indicate the susceptibility of the commercial pigs and loose its ability to suppress virus propagation of diseases. These results indicate that molecular screening in the genetic make-up of Philippine native pig Mx1 protein confers resistance to swine influenza and PRRS virus and a potential marker to develop breeds that produce more resistant offspring.

(continued) Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
7. Motility, Livability, and Acrosome Integrity at Extended Condition of Water Buffalo (<i>Bubalus bubalis</i> L.) Spermatozoa Thawed at Various Temperature and Time	PH.C. Inocillas, M.B. Magat, J.R.D. Salvatierra, J.R. Rafanan, E.V. Venturina, D.H.Duran, and F.V. Mamuad	This study was conducted to assess the effect of thawing regimes on the extended quality of water buffaloes spermatozoa. Frozen semen from 3 bulls were thawed at 36°C, 39°C and 42°C at thawing time of 15, 30, 45 and 60 seconds. To assess the quality at extended period, thawed semen were divided and stored at either 28°C or 38°C in which motility, livability, and acrosome integrity were all observed every 10, 20, 30, and 60 minutes through the linear progressive movement of the sperms observed by phase contrast microscopy, eosin-nigrosin staining technique, and normal apical ridge test, respectively. Results showed that immediately after thawing, semen samples thawed at 42°C at 15 seconds significantly ($P < 0.05$) had the highest progressive motility and livability but no difference on acrosome integrity were observed between treatments. At extended storage time, semen thawed at 42°C at 15 seconds consistently had highest motility, livability and acrosome integrity but not different to those thawed at 30 seconds Storage temperature of 28°C had significantly ($P < 0.05$) higher semen quality than those stored in 38°C with motility remained above 40% up to 30 minutes of extended storage. The results show that thawing at 36 to 42°C yields good motility of spermatozoa but highest motility can be obtained at 42°C thawing temperature for 15 to 30 seconds. Acceptable quality of sperm post-thawing last up to 20 minutes and is best obtained when sperm are stored at 28°C. The results suggest that thawing of frozen semen at 42°C for 15 to 30 seconds is the best thawing regimen for water buffalo frozen semen and storage at 28°C preserved the acceptable quality up to 20 minutes of storage.
8. Detection Of Infectious Bovine Rhinotracheitis Virus (Bovine Herpesvirus Type 1) In Dairy Cattle Blood Using Nested Polymerase Chain Reaction	R.R. T. Manuela, J.V. Lazaro, C.N. Mingala	Detection of Bovine HerpesVirus Type 1 (BoHV-1) in dairy cattle blood was conducted using an optimized nested Polymerase Chain Reaction (PCR). Its detection was based in the amplification of gB, viral surface glycoprotein using two pairs of gB primers. DNA samples were extracted from the whole blood of 40 dairy cattle in a farm in Laguna. A total of 20 cattle were suspected as infected with Infectious Bovine Rhinotracheitis (IBR) based on the Enzyme Linked Immuno-Sorbent Assay (ELISA) reports of Saito (2013) and the other 20 were seronegative. Each DNA sample was subjected to nested PCR with gB-gBN primers. The PCR products were visualized under Ultra Violet light and the presence of a compact band in the 385 bp size was noted. Results showed that all 40 samples examined are negative of BoHV-1.

(continued) Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
9. Establishment of Brachiaria humidicola as feed source and a biological control of obnoxious weeds in native pasture	M.B. Wandagan and R.Marcos	A study was conducted to find solution to control the growth of Chromolaena odorata (CN: Hagonoy) in the pasture while providing improved grasses to grazing buffaloes. Results showed that B. humidicola can suppress the growth of other forage species especially C. odorata within 4 to 5 months after planting in areas that undergo cultivation before establishment. In zero tillage condition, it can suppress the growth of other forage species within 8 months after planting. This shows that grazing can commence at 4 to 5 months after planting in cultivated areas and 8 months for zero tillage. Furthermore, it was observed that the number of humidicola plants per square meter was higher in cultivated than in zero tillage. This study therefore recommends the use of humidicola as a biological control for noxious weeds in the pasture area since it can suppress broadleaves and sedges in a short period of time.
10. The use of Day in- Day out in assessing the Pasture Quality and the Performance of Buffaloes under pure grazing management scheme	M.B. Wandagan and R. Marcos	A study was conducted to assess the pasture quality before and after grazing and the weight performance of calves under rotational grazing scheme. Results showed that rotational grazing was very effective in protecting the pasture from overgrazing with only 3 (17%) paddocks out of 17 below the average herbage yield per hectare. Likewise, it could be inferred that the set herbage height of 4 inches was below the average actual height of herbage left after grazing despite longer grazing days per paddock and higher number of animals. It is recommended that the forage height should be 13.40 inches before the pasture is subjected to grazing and 4.29 inches after grazing under controlled condition. Finally, it was observed that relative humidity (RH) plays a very crucial role in the average daily gain (ADG) of calves. The latter may have an inverse association with rainfall and temperature which means that high RH results in low rainfall and temperature thus affecting yield of grasses in the pasture which eventually affects the ADG of calves.

(continued) Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
11. Molecular Characterization of Gag Gene of Caprine Arthritis Encephalitis Virus of Goats Present in the Philippines	R.B.C. Padiernos, M. M. Balbin, A.M. Parayao, and C.N. Mingala	DNA sequencing analysis showed homology of 86%-93% between Philippine CAEV and available CAEV sequences in GenBank. The study detected CAEV using nested polymerase chain reaction (PCR) and designed sets of primers in order to amplify the gag gene which is the highly conserved region of the virus. In addition, Philippine CAEV isolate clustered to principal group B of prototype caprine lentivirus. Furthermore, there is a possibility that Philippine CAEV isolate could be a new strain of CAEV based on amino acid sequence alignment or this strain is already present in the country even before the start of goat importation. Molecular characterization of CAEV gag gene is significant in the development of detection kit specific for local strain of CAEV and development of small ruminant lentiviruses eradication programs in the Philippines. This study is the first report that describes the genetic characteristic of CAEV circulating in the Philippines.
12. A Case Study On The Implementation Of The Bull Loan Program In Select PCC Regional Centers: PCC At Cagayan State University, Central Luzon State University, and University of the Philippines-Los Baños	G.C.E. Bumanlag, M.P. Tolentino, and E.D. Manlapig	This case study aimed at looking more closely into the factors affecting the implementation of the Bull Loan Program particularly in the three regional centers of the Philippine Carabao Center (PCC) with the most number of loaned out bulls namely PCCs at Central Luzon State University, University of the Philippines Los Baños, and Cagayan State University. The following were the key findings of the study: there is flexibility in the procedure of availing bull at the contracting and start-up phases, monitoring problems arise from poor database, and political accommodations in the local government level exist in the selection of beneficiaries, socio-economic background of bull loan recipients is deemed significant, and there is a risk of inbreeding due to handling practices by the bull handlers. Additionally, problems encountered by the bull handlers with their purebred bulls were identified. The bull handler's traditional knowledge in raising native carabaos is commonly used as a devised solution. Another key finding in this study is that the participants lack knowledge on breeding techniques and limited understanding on proper ways to socialize their purebred bulls. In order for the Bull Loan Program to be more effective, the implementers should consider the following: mobilizing community and local governments, develop modules on bull handling management, perform special audit and inventory, and revisit the monitoring protocol that is currently in use.

(continued) Appendix 4 Abstracts of some completed researches (CY 2014)

Research Title	Researchers	Abstract
13. "To Milk or Not to Milk": Understanding the Socio-Economic Characteristics and Behavioral Intentions of Crossbred Buffalo Owners in San Agustin, Isabela	E.P. Palacpac, E.M. Valiente, R.T. Jacang, M.G.F. Honorio, H.M. Baltazar, and A.S. Sarabia	A case study was conducted to understand why a majority of farmer-owners of female crossbred buffaloes (CB) in San Agustin, Isabela is not milking their lactating animals as a source of regular income despite efforts from national and local government entities to train these farmers on dairying, to organize them as dairy associations, and to provide them with a milk processing facility. Two types of analysis were made. The first utilized logistic regression to see if selected socio-economic data of farmer-informants (n=80) can be predictor variables that determine the odds ratio of "milking" their CBs. The second employed Ajzen's theory of planned behavior aided by correlation and regression analyses to determine any linear association between selected socio-economic data plus behavioral elements (independent variables) and behavioral intentions of farmers to milk their CBs daily (dependent variable). Results showed that the probability of "milking" increases for every unit increase in the number of CB cows owned particularly when the animals are raised purposely for dairy and when the farmer has knowledge in milking. On the other hand, mean scores for attitude and mean scores for subjective norms were found to be significant linear regressors for mean scores for behavioral intentions of farmers to milk their CBs daily. The study recommended strengthening extension activities towards improving reproduction efficiency of CBs, increasing awareness and appreciation among CB owners about the benefits of dairying, and mobilizing mentor groups of farmers to target influential people surrounding the farmer-owners of CBs during their information campaign.

Appendix 5 Conferences, Seminars, Symposia, Workshops, and Trainings Participated in by PCC Personnel, CY 2014.

Title	Venue	Date (2014)	No. of PCC Participants
INTERNATIONAL (ABROAD)			
Scientific Workshop on Measurement and Mitigation of Green House Gases in Livestock System for Green Production and Environment of APEC members	Asia Pacific Economic Community, Thailand	December 2-4	1
Short Term Training On Reproductive Biotechnology And International Research Collaboration	Hokkaido University, Japan	November 15-24	2
2014 International Society For Southeast Asian Agricultural Sciences, Inc. Annual International Congress	Tokyo, Japan	November 8-13	2
Regional Workshop on Breeding for Milk Production in Tropical/non-temperate environments	Chiang Mai, Thailand	November 4-7	1
11th Asian Reproductive Biotech Society Conference	Bangkok, Thailand	November 3 – 9	3
Production and Distribution System of Animal Products	South Korea	September 21 – October 4	4
10th World Congress on Genetics Applied to Livestock Production (WCGALP)	Canada	August 17-23	1
International Symposium on Improvement of Korean Beef Cattle Production	South Korea	May 24-28	3
Canaan Global Leadership Training in South Korea	South Korea	May –June	2
International Workshop on Buffalo Data Recording	Pakistan	April 21-23	3
Familiarization Visit of the Philippine Delegation to Explore Cooperation in the Dairy Industry	Thailand	March 10 and June 9	1
Laboratory Methods on Genetic Analysis	Taiwan	March 24-28	4
NATIONAL			
Farm Equipment Exposition	Talisay City	December 10	2
41st PSBMB Annual Convention	Cebu City	December 4-5	17
Climate Change R&D Agenda Review and Planning Workshop	Alabang City	December 2-4	1
17th Annual Conference Asia-Pacific International Molecular Biology Network	Taguig City	December 1-2	2
The 69th PICPA Annual National Convention	Cebu City	November 26-29	1
10th Cost Effective Purchasing & Efficient Procurement	Manila	November 26-27	2
4th Luzon Convention of Human Resource Management Practitioners	Subic, Zambales	November 18-20	1
Basic Training Course on AI & PD in water buffaloes	PCC at CLSU	November 18 – December 11	1

(continued) Appendix 5 Conferences, Seminars, Symposia, Workshops, and Trainings Participated in by PCC Personnel, CY 2014.

Title	Venue	Date (2014)	No. of PCC Participants
Training on Basic Occupational Safety and Health	Baguio City	November 17-21	4
Training on Environmental Management System, Occupational Health and Safety Management System and QMS	Manila	November 12-13	4
Training workshop on Sperm Analysis using CASA Equipment	PCC National Headquarters, SCM	October 28-30	6
Policy Appreciation Course for Manager	DAP	October 27-29	1
Refresher Training On Multiple Ovulation And Embryo Transfer (Moet) In Buffalo And Cattle	PCC National Headquarters, SCM	October 24-30	6
6th Rizal Library International Conference	Ateneo De Manila University, QC	October 23-24	1
Association of Government Accountants of the Phils. Inc.	Baguio City	October 21-24	1
51st PSAS Scientific Seminar and Annual Convention	Cagayan De Oro City	October 21-25	21
12th National Coop Summit	Lahug, Cebu City	October 16-18	11
Philippine Society of Animal Nutritionist (PhilSAN) Convention	Manila	October 9	1
Training on Basic Photography	PCCI, Makati	October 8-10	2
Training on Oral and Written Communication	La Carmela, Boracay	October 7-10	4
Seminar Course on Environmental Laws & Management for Pollution Control Officers	Pampanga	October 6-10	1
Consultative work shop: Harnessing livestock extension services on animal nutrition, forage production and conservation and pasture development	PCC National Headquarters, SCM	October 5-11	9
Employee Counseling and Grievance handling	Bohol	September 9-12	2
Job Evaluation and Analysis	Bohol	September 9-12	3
Workshop on Farmer Livestock School for Dairy Buffalo Production	Tagaytay City	September 3-5	17
Skills Enhancement workshop for the APEC 2015	Manila	August 27-29	1
Integration and Action Planning Workshop: PCC Overseas Comparative Study Mission	Pampanga	August 26	6
Agribiotechnology Seminar	PhilRice, SCM	August 27	3
Philippine Swine Forum "Towards Globally Competitive Philippine Swine Industry	DA-BAR, Quezon City	August 24	1
Social Research Consultation Workshop	Manila	August 18	3

(continued) Appendix 5 Conferences, Seminars, Symposia, Workshops, and Trainings Participated in by PCC Personnel, CY 2014.

Title	Venue	Date (2014)	No. of PCC Participants
Certificate Course in Talent Management	Ateneo de Manila, Quezon City	August 16,23,30 & September 6	1
Consultation workshop on cost standards for Agri. & Fisheries Extension	Manila	August 14	1
Getting you story out: Seminar Workshop on News and Feature Writing	Manila	August 14-15	1
Advanced Driving Competency Training	PCC National Headquarters, SCM	August 11-12	45
Accounting for Non-Accountants	Davao	August 5-8	1
Concept Note Preparation and Development of Projects for PPP Pipeline	Tagbilaran, Bohol	August 4-7	2
1st International Symposium on Biotechnology	PhilSino, SCM	July 25	8
36th Annual Meeting "Infrastructure, Information and Innovation for National development, Competitiveness and Resiliency	PICC, Manila	July 9	1
Certificate Course in Learning Design and Evaluation	Ateneo de Manila, Quezon City	July 8-11 & 14	1
ISO 19011:2011 Internal Audit Training (EMS) / Environmental Legal and other Requirements Training	Manila	June 24-25	2
Training Workshop for Project Development and Evaluation for DA wide clearing House System & PPP Program of DA	Tagaytay International Convention Center	June 23-27	1
ISO 14001:2004 Awareness Seminar	Manila	June 23	2
Certificate Course in Facilitating Adult Learning	Ateneo de Manila, Quezon City	June 18-24	1
Editorial Design	PCCI, Makati City	June 5-6	1
GACPA 36th Annual Convention	Palawan	May 21-24	8
17th Dairy Congress and Expo	General Santos City	May 6-10	30
Motivating Employees Towards Peak Performance	Bacolod City	April 22-25	1
Stress Management	Bacolod City	April 22-25	1
Seminar on the Safe Use of Chemicals at Work	Quezon City	April 22-24	1
6th Annual Convention of the Electronic Financial Users Circle Inc.	Baguio City	April 21-24	3
Making a Difference: A Knowledge Session on Event Management II	Manila	April 21-22	1

(continued) Appendix 5 Conferences, Seminars, Symposia, Workshops, and Trainings Participated in by PCC Personnel, CY 2014.

Title	Venue	Date (2014)	No. of PCC Participants
24th Annual PHILARM National Convention	Iloilo City	April 10-12	1
First Line of Defense: Your Community	Manila	April 8	1
Write shop for Proposal Packaging of Fiesta Event	Manila	February 27-28	1
Web Interface Design and Rich Media design Course	First Academy, Makati City	January 12 - after 7 months	4

Appendix 6 Research articles published in refereed journals, CY 2014

No.	Authors	Title of Paper	Title of Journal
1	Hufana-Duran D., R.P. Mallari, D.P. Suba, P.G. Duran, E.A. Abella, L.C. Cruz	Comparison of different osmolarities and sugar-salt solutions for hypo-osmotic swelling test of frozen-thawed water buffalo spermatozoa	Philippine Journal of Veterinary and Animal Science 2014; 40(2):97-108.
2	Cajuday L.A., A.A. Herrera, and D.H. Duran	Carbohydrate Uptake in Water Buffalo Cumulus-Oocyte Complexes (COCs) Supplemented With Retinoic Acid During In Vitro Maturation	Philippine Journal of Science 2014; 143(1):44-50.
3	Hufana-Duran D., P.G. Duran, Y. Kanai, F.V. Mamuad, L.C. Cruz, and V. Jamsawat	The effects of sequential media system in the production of water buffalo embryo in vitro	Rajamangala University of Technology Tawan-ok Research Journal 2014; 7(2):119-123
4	Ishihara, Shinya, R. Boyles, H. Matsubayashi, A. N. del Barrio, M. Cebrian, A. Ishida, R. Lapitan, E.P. Atabay, L.C. Cruz, and Y. Kanai	Long-term Community-based Monitoring of Bubalus mindorensis in Mindoro Island, Philippines	Orynx, Fauna and Flora International. Published online 01, August 2014
5	Ocampo, L.C. and M.B. Ocampo	Improved Developmental Competence of Swamp Buffalo Oocytes Matured in the Presence of Cysteamine	International Journal of Agricultural Technology. Vol. 11, No. 1, Jan. 2015, pg. 31-40
6	Ocampo, M.B., J. Manuel, R.B. Soriano, and L.C. Ocampo	Chromosome complement and developmental Competence of Swamp Buffalo Oocytes Matured and Fertilized In Vitro	International Journal of Agricultural Technology. Vol. 11, No. 1, Jan. 2015, pg. 57-68
7	Aquino, F.P. and E.P. Atabay	Embryo Transfer of Bubaline Embryos Using Oocytes Derived from Transvaginal Ultrasound-Guided Follicular Aspiration (TUFA)	International Journal of Applied Sciences and Biotechnology, 2014, Vol. 2 (2): 180-184
8	Aquino, F.P., K.G. Vergara, L.C. Ocampo, and E.P. Atabay	Viability of Extended Goat Semen Stored at Refrigerated Condition	Journal of Agricultural Science and Technology (2014) 169-176
9	Flores, E.B. and J. van der Werf	Random regression test day models to estimate genetic parameters for milk yield and milk components in Philippine dairy buffaloes.	Journal of Animal Breeding and Genetics (In press, accepted November 2014)
10	Belotindos, L.P., J.V. Lazaro, M.A. Villanueva and C.N. Mingala	Molecular Detection and Characterization of Theileria species in the Philippines	W. Stefański Institute of Parasitology, PAS Acta Parasitologica, 2014, 59(3), 448-453; ISSN 1230-2821
11	Garcia, G.G., E.H. Grivalde, L.C. Ocampo, and C.N. Mingala	Assessment of Swine (Sus scrofa domesticus) Alveolar Macrophage Viability Associated with Heavy Metal Air Pollutants	Thai Journal of Veterinary Medicine, 2014. 44(4): 461-468

(continued) Appendix 6 Research articles published in refereed journals, CY 2014

No.	Authors	Title of Paper	Title of Journal
12	Garcia, G.G., E.H. Grivalde, L.C. Ocampo, and C.N. Mingala	Assessment of Swine (<i>Sus scrofa domesticus</i>) Alveolar Macrophage Viability Associated with Heavy Metal Air Pollutants	Thai Journal of Veterinary Medicine, 2014. 44(4): 461-468
13	Garcia,G.G., A.M.Veloso, R.G.Reyes, S.P.Kalaw and C.N. Mingala	Biological activity of the Tiger mushroom (<i>Lentinus tigrinus</i>) with notes on its assessment for therapeutic consideration	AENSI Journals Advances in Environmental Biology, 8(10) June 2014, Pages: 399-403
14	Manalaysay, J.G., C.N.Mingala, D.L.Gamboa, R.Paraguison-Alili, and J.G.Rafanan	Genetic Testing for Porcine Stress Syndrome Using Mutagenically Separated-Polymerase Chain Reaction	Philippine Journal of Veterinary Medicine, 51(2): 125-130, 2014
15	Nishimori, A., S.Konnai, R.Ikebuchi, T.Okagawa, C.Nakajima, Y.Suzuki, C.N. Mingala, S. Murata and K.Ohashi	Identification and characterization of bovine programmed death-ligand 2	Microbiology and Immunology 2014; 58: 388–397 doi: 10.1111/1348-0421.12160
16	Paraguison-Alili, R., KM. Sung, L.J. Hyeon, C.A. Gutierrez, N.S. Abes, E.B. Flores and C.N. Mingala	Multiplex Polymerase Chain Reaction for Simultaneous Detection of Major Mastitis-causing Pathogens in Buffalo Milk	Research 2014;1:784 DOI http://dx.doi.org/10.13070/rs.en.1.784
17	Polat, M., A. Ohno, S.N. Takeshima, KJiyun, M.Kikuya, Y.Matsumoto, C.N. Mingala, M. Onuma and Y. Aida	Detection and Molecular Characterization of Bovine Leukemia Virus in Philippine Cattle	Arch Virol (2014) 160:285–296 DOI 10.1007/s00705-014-2280-3
18	Salvador, R.T., R.P. Abalos, A.M. Ruba and C.N. Mingala	A Comparison of FLOTAC and CFF Techniques in Detecting Gastrointestinal Parasites in Water Buffaloes (<i>Bubalus bubalis</i>)	Annals of Parasitology 2014, 60(2) 119-125, 2014 Polish Parasitology Society

Appendix 7 List of partner-institutions, CY 2014

Partner Institution	Nature of Linkage
NEW	
International Livestock Research Institute, Kenya	R&D
RIKEN (Institute of Physical and Chemical Research), Japan	R&D
Kyoritsu Seisaku (KS), Japan	R&D
National Institute of Agrobiological Sciences, Japan	R&D
National Institute of Animal Health, Japan	R&D
Kyoto University, Japan	R&D
Agricultural Business Research Institute, Australia	R&D
Animal Genetics and Breeding Unit, Australia	R&D
University of Wisconsin-Madison, USA	R&D; Technical Cooperation
Taiwan Livestock Research Institute, Taiwan, ROC	R&D; Technical Cooperation
Philippine Rice Research Institute	R&D
Bureau of Fisheries and Aquatic Research	R&D
University of the Philippines Los Baños	R&D
Southeast Asian Regional Center for Graduate Study and Research in Agriculture	R&D; Capability Building
EXISTING	
International Committee for Animal Recording (ICAR), Italy	R&D; Technical cooperation
Laboratory of Plant and Animal Science Experimental Farm, Meijo University, Japan	R&D; Technical Cooperation
BUDHI ng Pilipinas Foundation, Inc.; Tulong Dairy Farmers Association (Tulong DFA); SHAHANI GATAS ng KALABAW Products Inc. (SGKP)	Capability building
Laboratory of Infectious Diseases, School of Veterinary Medicine, Hokkaido University, Japan	R&D; Technical Cooperation
Hokkaido University Research Center for Zoonosis Control, Japan	R&D; Technical Cooperation
Consortium for Japanese Veterinary Medicinal Products Manufacturers, Japan	R&D
Korea International Cooperation Agency	Technical Cooperation
Sunchon National University, South Korea	Capability Building
Hankyong National University, South Korea	Capability Building
Korea Institute for Animal Products Quality Evaluation, South Korea	R&D; Technical Cooperation
Japan International Cooperation Agency, Japan	Capability Building

(continued) Appendix 7 List of partner-institutions, CY 2014

Partner Institution	Nature of Linkage
Rajamangala University of Technology Thanyaburi, Thailand	Technical Cooperation
Rajamangala University of Technology Tawan-ok, Thailand	Capability building
National Genetic Resources Preservation, USDA, Agricultural Research Service, Fort Collins, Colorado, USA	Technical Cooperation
Colorado State University, USA	Capability Building
Department of Veterinary and Animal Science, University of Massachusetts, USA	Capability Building
Manila Economic and Cultural Office-Taiwan Economic and Cultural Office	Technical Cooperation
Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development-Department of Science and Technology	R&D; Technology commercialization
National Academy of Science and Technology	R&D
Research Institute for Tropical Medicine-Department of Health	R&D
Central Luzon State University-College of Veterinary Science and Medicine	R&D
Central Luzon State University-Small Ruminants Center	R&D
Department of Biology-University of the Philippines Manila	R&D
Department of Biology-College of Science-University of the Philippines Baguio	R&D
Molecular Protozoology Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman	R&D
National Institute of Molecular Biology and Biotechnology, University of the Philippines Diliman	R&D
Bureau of Animal Industry	R&D
Bureau of Agricultural Research	R&D
National Dairy Authority	Development
Philippine Statistics Authority	R&D
Department of Agriculture Biotech Program	R&D
Department of Agriculture-National Agricultural and Fishery Council	R&D
Accredited Swine Breeders Association of the Philippines	R&D
Cooperative Development Authority	Development; Capability Building
Department of Trade and Industry	Development; Capability Building
Public Law (PL) 480	R&D; Capability Building
Kennedy Round (KR) 2	Development

Appendix 8. PCC's MFO Accountability Report Card (MARC) as of December 31, 2014.

MFO/PI		Performance Target		
		Target	Actual	Compliance
MFO 1: Agriculture and fisheries support services delivered				
PI set 1	1.1 Production Support Services			
	Improvement of genetic potential of carabaos for milk and meat thru organized breeding & selection (artificial insemination, natural mating) and conduct of R&D and related production support activities			
Quantity:	1.1.1 Beneficiaries directly provided with support services		124,739	
	Production support services provided to clients	119,842	129,306	108%
Quantity:	1.1.2 Calves produced	16,344	15,311	94%
Timeliness:	within 2014			
Cost:		289,154	282,401	98%
PI set 2	1.2 Market Development Services			
Quantity	1.2.1 No. of organized groups provided with market development services	174	163	94%
Quality:	1.2.2 volume of milk production traded (kgs)	924,590	1,347,990	146%
	1.2.3 value of milk production traded	75,000,000	92,951,739	124%
Timeliness:	within 2014 (monthly, quarterly)			
Cost:		19,700	18,714	95%
PI set 3	1.3 Extension Support, Education and Training Services			
	Enhance the skills of clients to elicit their active participation in the program			
Quantity:	1.3.1 No. of clients of IEC services	49,500	73,974	149%
	1.3.2 No. of individuals trained	11,064	14,329	130%
Quality:	1.3.3 Percent of clients that rated ESETS as satisfactory or better	85%	92%	108%
Cost:		32,594	29,695	91%
Timeliness:	within 2014 (monthly, quarterly)			
PI set 4	Development and review of plans, programs & policies supportive of the CDP implementation for sectoral growth			
Quantity:	3.1 Plans, programs and projects developed and endorsed/approved	4	4	100%
Quality:				
Cost:		10,326.00	7,801.00	76%
Overall Average				109%

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