

# ANNUAL REPORT

## 2017



Department of Agriculture

**PHILIPPINE CARABAO CENTER**

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**PHILIPPINE CARABAO CENTER**  
ANNUAL REPORT 2017

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# PHILIPPINE CARABAO

National Headquarters  
Science City of Muñoz

## ABOUT US

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.



# RABAO CENTER

ers and Gene Pool  
ñoz, Nueva Ecija

## 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



- **Inventory.** The year-end inventory of the water buffaloes (Philippine native Carabao, Murrah (dairy) buffaloes and crossbreds) in the 12 network centers and the National Gene Pool Farm totaled 2,466 heads, comprising of 810 cows, 633 heifers, 538 calves, 406 bulls, 79 draft bulls and training animals. Of this population, there were 259 Philippine Carabao, 1,854 Murrah (Bulgarian, Brazilian, Indian and US), 206 Italian Mediterranean, and 147 crossbreds. The end of the year inventory of lactating dairy buffalo cows was 426 heads.

- **Calf Production.** There were 470 calves born during the year.

- **Milk Production.** A total of 671,435.84 kg of milk was produced for the year with 369 lactating cows that contributed in the production. It has a daily average of 5.21 kg of milk per cow from the 369 heads in the milking line.

- **Meat Production.** PCC institutional business modules sales of meat and live animals were worth Php4,493,777.34.

- **Forage Production.** Regional centers have maintained 974.6 ha and developed 20.45 ha improved forage area during the year.

# 2,466 heads

Inventory of the water buffaloes (Philippine native Carabao, Murrah (dairy) buffaloes and crossbreds) in 2017

# 470 calves

Calves born in 2017

# 671,435.84 kg

Milk production in 2017

# Php4,493,777.34

Sales of meat and live animals in 2017

# 974.6 ha

Maintained forage area

# 20.45 ha

Improved forage area developed

- **Bull Farm.** There are two bull farms maintained at PCC Regional Centers, one of which is located at PCC at CLSU in Carranglan, Digidig, Nueva Ecija and the other one at PCC at UPLB in Los Baños, Laguna. There are 59 heads of donor bulls that actively contributed in the production of frozen semen, 48 of which were from PCC at CLSU and 11 from PCC at UPLB bull farms.
  
- **Semen Production and Distribution.** The semen processing facilities at the PCC at CLSU (n=159,814) and PCC at UPLB (n=73,015) produced a total 232,829 doses of frozen semen, which were deposited in the PCC's semen bank. Of this total, 234,732 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 and/or future research work. To maintain the quality and viability of the frozen semen for AI, PCC distributed a total of 2,038 dewars of liquid nitrogen to its regional centers and partner-entities nationwide.

# 59 heads

Active donor bulls

# 232,829 doses

Frozen semen produced in 2017

# 234,732 doses

Frozen semen distributed in 2017

## Carabao Crossbreeding Program

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The long-term goal of crossbreeding is to develop a Philippine dairy breed adaptable under the Philippine conditions. The crossbred buffalo production was done via: (a) artificial insemination (AI), and (b) natural mating through the Bull Loan Program.

- **Artificial Insemination (AI).** There were 67,157 AI Services, out of which 47,010 heads were artificially inseminated covering 6,946 barangays, 885 municipalities and cities in 73 provinces of the 17 regions of the country. These AI services were made possible by 929 AI technicians, subdivided among the Village-based AI Technicians (n=332), LGU AI Technicians (n=533), and PCC AI Technicians (n=64). An additional 121 AI technicians (VBAIT and LGU) were trained this year in the five (5) PCC Training centers (PCC at CLSU, PCC at CSU, PCC at CMU, PCC at UPLB, and PCC at USF), which added to the pool of trained AI Technicians in the country. As of December 2017 report, the monitored calves on the ground based on the 2016 AI services were 14,232 calves.

- **Bull Loan Program (BLP).** In support of the carabao upgrading program, in areas where AI service were not accessible, farmers availed of the bull loan program. As of December 2017, a total of 153 bulls were loaned out to farmers. Consequently, there are 999 existing Murrah breeding bulls in the villages around the country. Out of these bulls, 438 have records of active service, which registered 2,072 services and benefited more than 1,305 carabao raisers (owners of the female carabaos naturally serviced and bull handlers). Monitored calves on the ground from 2016 services of the active bulls totaled 1,436 as of December 2017.

# 67,157

AI Services in 2017

# 47,010 heads

No. of heads artificially inseminated

# 14,232 calves

Monitored calves on the ground based on the 2016 AI services

# 153 bulls

Bulls loaned out to the farmers

# 2,072

Bull services in 2017

# 1,436 calves

Monitored calves on the ground based on the 2016 services of the active bulls

- In 2017, the Genetic Improvement Program Laboratory (GIPL) continued 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. Pedigree and performance records of animals from ten (10) enrolled herds of PCC (NGP, UPLB, CSU, MMSU, VSU, USF, CMU, USM, MLPC, CLSU) up to December 2016 were included in the genetic evaluation run. This is the first time that PCC at CLSU dairy herd was included in the genetic evaluation. There were 2,269 buffaloes in the pedigree file extending to six (6) generations with 12,288 monthly milk test day records as well as 6,924 and 6,806 fat and protein test day records respectively. Based on the MT-RRM model, there were 178 bulls with progeny performance and breeding values, 75 of which are island born. The youngest bull reported with progeny performance was born in 2009, although the young bulls added in 2017 genetic evaluation run were actually born in 2008 with the exception of the lone bull born in 2009. Incidentally, the top ranked semen donor bull is among the youngest, born 2008. The top ranking daughter of the number one bull is also the youngest hence, we are now looking at the younger generation starting to surpass the previous. There were also 2,091 cows reported with breeding values for milk, fat and protein yields. Top ranked cows based on EBVs came exclusively from CMU, VSU and NGP herds.

# 2,269 heads

No. of buffaloes in the pedigree file

# 178 bulls

No. of bulls with progeny performance and breeding value

# 2,091 cows

No. of cows reported with breeding values for milk, fat and protein

- The year 2017 marks the first time that young crossbred bulls with 93% riverine blood, sons of the crossbred cows that were included in the genetic evaluation last year, were selected to become breeder bulls on loan at San Agustin, Isabela. These bulls are the first “purebred” dairy buffaloes developed by PCC from continuous backcrossing of female buffaloes with swamp blood to “full blood” island born riverine buffaloes that have undergone selection and genetic evaluation to be loaned out for breeding to crossbred heifers within the area to increase the number of “Philippine Dairy Buffalo” breed or locally can be called “Pinoy buffalo”.

**93% riverine blood**

Bloodline of young crossbred bulls included in the genetic evaluation in 2017

- The Stephenhann and LAMAC multiplier farms as well as Bungo-Gapan dairy cooperative were enrolled in the monthly milk test day recording. This was added to the existing seven (7) cooperatives/associations and three (3) multiplier farms undergoing monthly testing resulting in an average of 319 cows tested per month. On the other hand, an average of 102 cows were sampled and recorded per month for the National Gene Pool. There were eleven (11) other Institutional herds that also submitted monthly milk samples as part of their performance testing activity. Thus, for the whole year, 9,963 milk samples were analyzed. Average milk yield, fat and protein percentage is 5.4kg, 7.2% and 4.2% respectively. The highest average test day milk yield is PCC at CSU at 6.9kg while the highest test day Fat% is shared by PCC UPLB and PCC at USF at 8.8%. The highest average test day protein% at 4.5% is PCC at USF. Fat% is generally higher with herds that are grazing as cows can have access to good pasture such as PCC at USF with 8.8% average milk Fat%.

**319 COWS**

Average no. of cows milk tested per month

**9,963**

No. of milk samples analyzed in 2017



# CARABAO-BASED ENTERPRISE DEVELOPMENT

## Newly created carabao-based modules

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- 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 crossbreds 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 are 5 newly organized cooperatives/associations in 12 regions of the country.

**5 cooperatives**

No. of coops/associations newly organized in 12 regions

## Infusion of Purebred Buffaloes

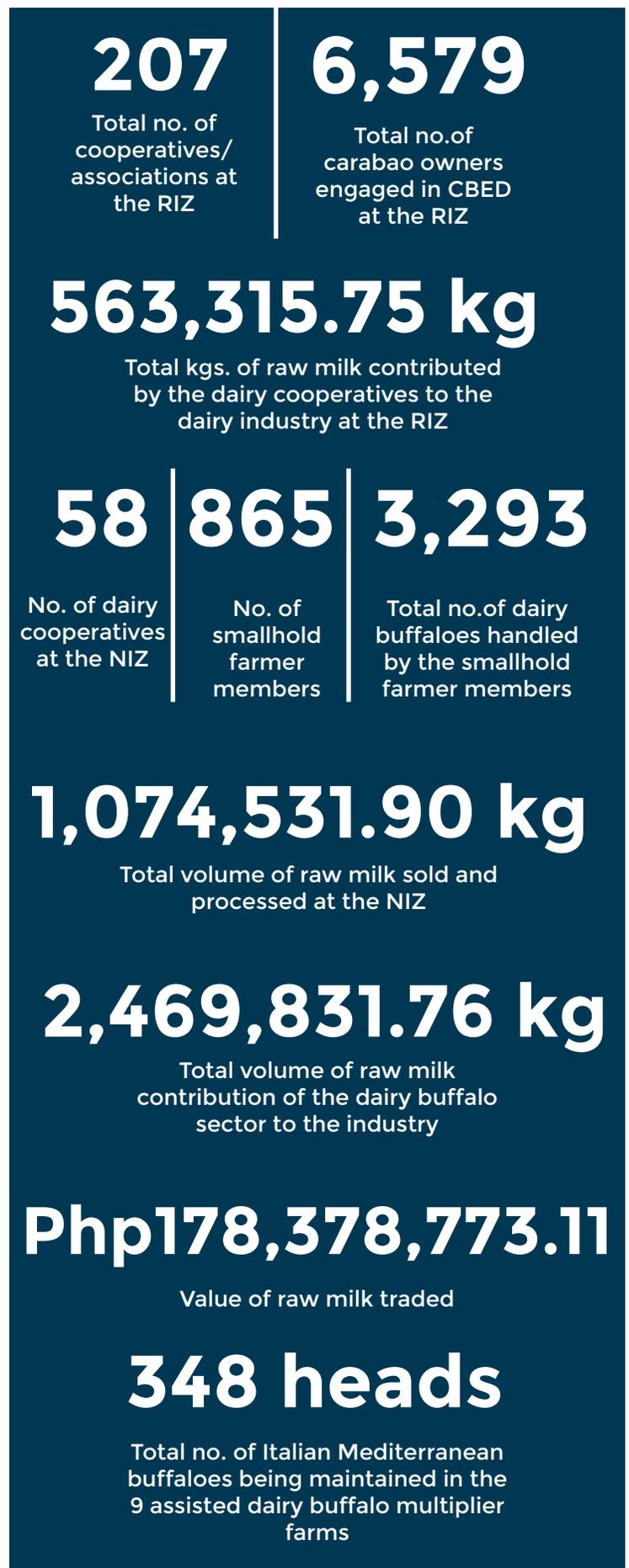
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- The PCC entrusted a total of 204 female purebred dairy buffaloes to selected farmer trustees, DBMF operators and institution assisted by NIZ (64), PCC at CLSU (12), PCC at CSU (39), PCC at MMSU (15), PCC at UPLB (12), PCC at USF (10), PCC at LCSF (3), PCC at VSU (11), PCC at USM (16), and PCC at CMU (22).

**204 females**

Total no. of female purebred dairy buffaloes entrusted to selected farmers

- There are 207 cooperatives/associations comprising of 6,579 carabao owners engaged in carabao-based enterprises, which are mostly located in Luzon and the Visayas Regional Impact Zones (RIZ). The most notable dairy cooperatives particularly based in Pampanga, Cavite, Batangas, Bulacan, Laguna, Leyte and Isabela and Quirino contributed 563,315.75 kg of milk to the dairy industry.
- At the NIZ, there are 58 dairy cooperatives consisting of 865 smallhold farmer members handling a total population of 3,293 head dairy buffaloes (comprising of 1,197 cows; 915 heifers; 358 female calves; and 823 males of various ages). The National Impact Zone posted a total of 1,074,531.90 kg of raw milk 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.
- **Milk Production and Marketing.** The contributions of the dairy buffalo sector to the industry registered a total of 2,469,831.76 kg of raw milk coming from Regional Impact Zone, National Impact Zone, and PCC Institutional Herd. The value of raw milk traded was Php 178,378,773.11.
- **Dairy Buffalo Multiplier Farm (DBMF).** The PCC explored the concept of partnering with the qualified farmers operating a dairy farm and/or to those private individuals with the capacity to manage a dairy farm. 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.
- To date, a total of 348 heads of Italian Mediterranean buffaloes are being maintained in the 9 assisted dairy buffalo multiplier farms all over the country.



- The PCC Regional centers conducted 150 types of training in support to the assisted cooperatives and associations. These trainings were attended by 4,938 participants from Luzon, Visayas and Mindanao. In addition, PCC Regional centers oriented a total of 28,148 clients for Carabao Development Program (CDP)/Carabao Upgrading Program (CUP).
- The National Impact Zone (NIZ) unit conducted 10 types of training for the farmer-trustees of cooperatives and associations assisted by PCC. These trainings were attended by 225 participants.
- The Biosafety and Environment Section (BES) has also conducted 20 technical seminars/caucuses and trainings for others researchers, members of the academe, veterinary practitioners, farmers, and other stakeholders.
- The PCC has continued the adoption of Farmer Livestock School on Dairy Buffalo Production (FLS-DBP) modality as its new learning platform for facilitators and for farmer-clients in selected localities. In 2017, a total of 60 farmer-participants from Nueva Ecija and Ilocos Norte have completed the season-long (once-a-week session for 34 weeks) FLS-DBP. Evaluation of the effect of FLS-DBP on the farmers' knowledge and actual practices is forthcoming.

# 4,938

Total no. of participants nationwide who attended the trainings in support to the assisted coops and associations

# 28,148

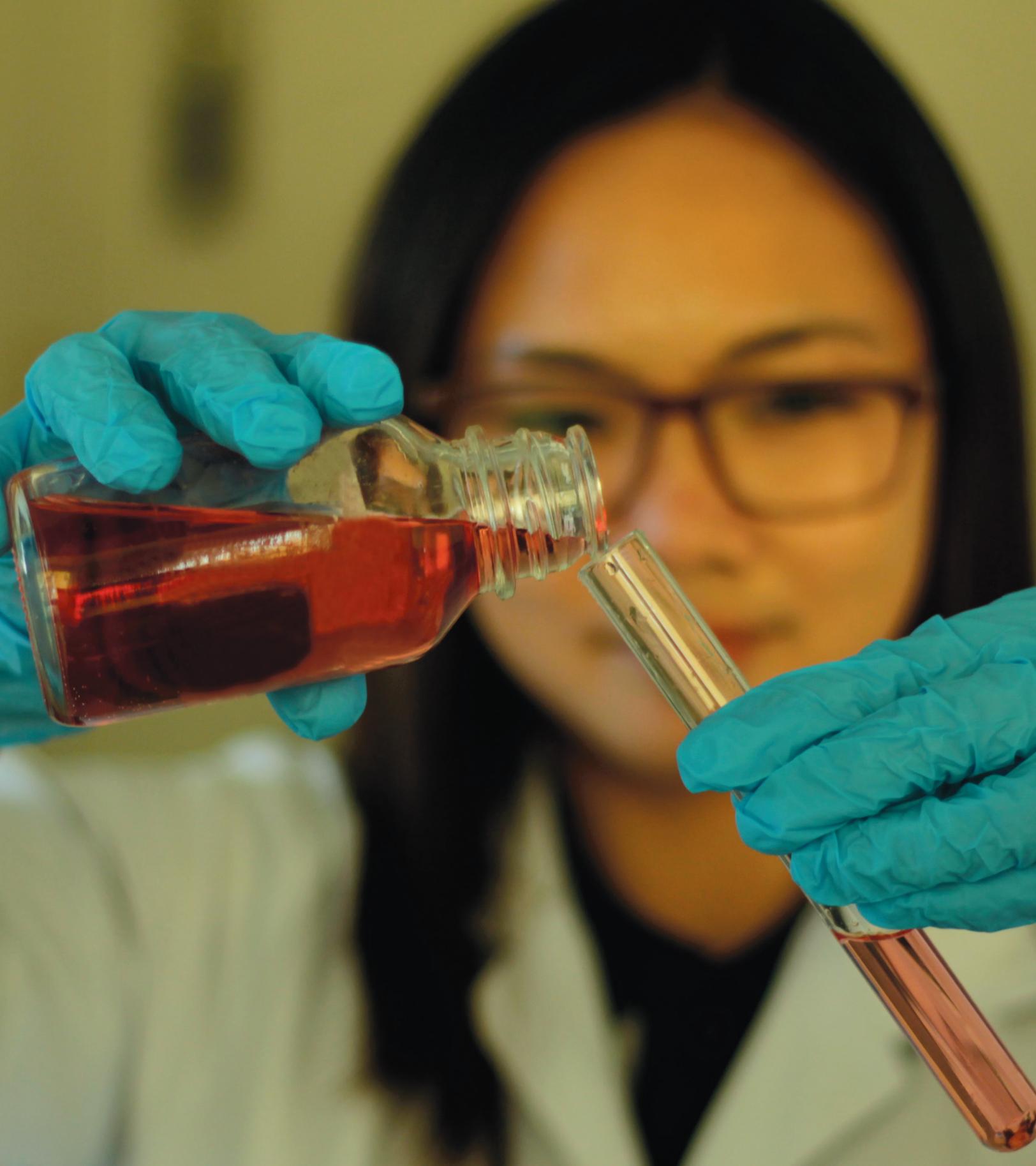
Total no. of clients oriented for Carabao Development Program/ Carabao Upgrading Program

# 20

Total no. of technical seminars/ caucuses conducted

# 60

Total no. of farmer-participants from Nueva Ecija and Ilocos Norte who completed the season-long FLS-DBP



# RESEARCH FOR DEVELOPMENT

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 2017, 26 researches were completed while another 70 were still being conducted (Tables 1). Likewise, twenty (20) of the ongoing researches are externally funded. These researches were also presented in the agency's Pre-In-House and Annual R4D In-House Reviews held at the PCC National Headquarters. Some of the completed researches were also presented in scientific conventions.

*Table 1. Type, number, and status of researches.*

<b>Field</b>	<b>Completed</b>	<b>Ongoing</b>
Production Management System	4	10
Biosafety and Environment	5	15
Genetic Resource Utilization (Breeding and Genetic Evaluation)	2	10
Genetic Resource Utilization (Reproductive Bio techniques)	8	26
Product Development	1	3
Enterprise Development	0	1
Socio-Economics	4	3
Technology Transfer	1	1
Institutional Development	1	1
<b>TOTAL</b>	<b>26</b>	<b>70</b>

Research for Development is one of the major thrusts of the Philippine Carabao Center (PCC). It helps propel the agency to work towards a better understanding of the foundation and dynamics of genetic improvement, animal health and nutrition, buffalo-based enterprises, and the underlying socio-economic issues related to program implementation. The R&D agenda has been drafted and laid down since the initial operation of the Center in 1993. Revisions and refinement were regularly injected and in 2004, the concept of operational research evolved. In 2013, the PCC's R&D has been shifted into its new paradigm, the R4D or Research for Development. The PCC is moving into a nontraditional, problem-oriented, and focused Research for Development, which has more relevance to the industry's stakeholders.

Along this line the PCC's R4D pre-in-house and in-house reviews were organized as a monitoring and evaluation tool that ensures alignment of R4D efforts with the R4D Agenda. It is a continuing activity that demonstrates and recognizes the PCC's research initiatives. Likewise, it helps create opportunities for researchers and scientists to present their notable accomplishments, and more importantly, to interact and share learning with one another.

This year 2017, the in-house review was held last July 4-7 2017, there were 42 research studies presented, 13 of which were completed, 26 were on-going and 2 were commissioned researches. The researches presented covered the thematic areas on biosafety, genetic improvement-reproductive biotechnology, genetic improvement – animal genomics, socio-economic dimensions of CDP implementation, production management system, technology transfer and product development. Moderators, who served during the paper presentations were (1) Ms. Paula Blanca V. Gaban, (2) Ms. Excel Rio S. Maylem, (3) Ms. Paulene S. Pineda, (4) Mr. Ivan Carl J. dela Rosa, (4) Ms. Teresita M. Baltazar and (5) Ms. Wilma T. Del Rosario.

Four experts were topped and served as panel of external evaluators, namely, (1) Dr. Ma. Anita M. Bautista, Associate Professor VII, National Institute of Molecular Biology and Biotechnology, University of the Philippines Diliman; (2) Dr. Consuelo Amor S. Estrella, Associate Professor II, Animal and Dairy Sciences Cluster, College of Agriculture, University of the Philippines Los Baños; (3) Dr. Ma. Cristina F. Olo, Professor, Department of Animal Science and Natural Resources, Cavite State University; and (4) Mr. Peter James C. Icalia, Instructor, College of Agriculture, Mariano Marcos State University.

Several awards were competed during the activity. The completed research paper entitled "Enhancing AI Efficiency through Synchronized Ovulation and Fixed Time AI in Water Buffaloes" presented by Dr. Eufrocina P. Atabay garnered the Best Paper Award. The presenter, Dr. Joram J. Gautane, of the research paper entitled "Development of Loop-Mediated Isothermal Amplification (LAMP) Assay Based Test Kit for the Detection/Screening of Caprine Arthritis Encephalitis Virus (CAEV)" was conferred the Best Presenter Award. Moreover, the research paper entitled "Developmental Competence of Embryos Produced in Vitro from High and Low-Fertile Bulls Classified by Fourier Harmonic Analysis" presented by Ms. Herren Donna M. Daag, won the Best Student Thesis Award.



## **R4D ANNUAL IN-HOUSE REVIEW 2017**

## 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 (Appendix 6). There were 19 research papers published in refereed journals while 19 papers were included in scientific proceedings (Appendices 5a and 5b).

## Technical Seminars Conducted and/or Facilitated

The R&D Division has conducted or facilitated series of Technical Caucus/Seminars on various topics (Table 2). Its aim was 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.

Table 2. List of Technical Caucus/Seminars conducted for CY 2017.

Technical Caucus		
Date (2017)	Title and/or Topic Presented	Resource Speaker
15-Feb-17	Animal Genetic Resources in Japan and an International Collaboration (A SATREPS project)	Dr. Kazuhiro Kikuchi
	Copy Number Analysis of Porcine Endogenous Retro Virus	Dr. Masaaki Taniguchi
	Phylogenetic Relationship of Vietnamese Pig Breeds	Dr. Aisaku Arakawa
4-Apr-17	Gender Analysis: Concept and Tools	Ms. Maria Fe B. Singson
25-May-17	Current Post Harvest Milk Technology from Farm to Processing and Milk Testing in New Zealand	Ms. Paulene S. Pineda Ms. Patrizia Camille O. Saturno
17-Jul-17	BAI-NSPRDC and Regional Livestock R&D Breakthroughs	Ms. Karen C. Dimaranan Ms. Lou Denise-Marie U. Somera
12-Oct-17	Cellular Senescence in Female Reproduction	Dr. Michael Velarde
	Technologies and Signaling Pathways for Potential Application to Improve Carabao Production and Milk Yield	Dr. Rosalia C.M. Simmen
4-Dec-17	Technical Round Table Discussion Re: Carabao and Cow Reproductive Immunology and Fertility in the Philippines	Dr. Joyce Ibane Dr. Rey Carabeo
19-Dec-17	Capacity Building on Animal Products Quality Evaluation Technology Development with Traceability System	Ms. Patrizia Camille O. Saturno

## Awards and Recognitions

The PCC staff members continued to gain recognition from various award-giving bodies in 2017 (Table 3a). Several PCC researchers were also cited in their paper or poster presentations in scientific conferences (Table 3b).

*Table 3a. Recognitions received by PCC staff members.*

<b>Awardee</b>	<b>Title of Recognition</b>	<b>Award-Giving Body</b>
AJDS Escudro, LP Villamor, AM Paraguas	Best Poster Award (2nd Place)	Philippine Society for Biochemistry and Molecular Biology (PSBMP) Central Luzon Chapter
AM Paraguas, TC Cailipan, EB Flores, LP Villamor	Best Scientific Oral Presentation for the Breeding and Genetics-	Philippine Society of Animal Science
CNMingala	2016 National Research Council of the Philippines Achievement Award	DOST-NRCP
Danilda Hufana-Duran	NRCP Achievement Award	NRCP Division 6
Gundolino Bajenting	Outstanding Farm Manager	Philippine Society of Animal Science
Arnel N. del Barrio	PSAS Distinguished Fellow	Philippine Society of Animal Science

*Table 3b. Citations for PCC staff members who presented papers or posters in scientific conferences.*

<b>Awardee</b>	<b>Title of Recognition</b>	<b>Award-Giving Body</b>
AJDS Escudro, LP Villamor, AM Paraguas	Best Poster Award (2nd Place)	Philippine Society for Biochemistry and Molecular Biology (PSBMP) Central Luzon Chapter
AM Paraguas, TC Cailipan, EB Flores, LP Villamor	Best Scientific Oral Presentation for the Breeding and Genetics-	Philippine Society of Animal Science
MM Balbin, DG DelaCruz, JJ Gautane	Best Presenter Award	Philippine Carabao Center National Headquarters and Gene Pool
E. P. Atabay, E. C. Atabay, Excel Rio S. Maylem, Ramesh C. Tilwani, Ester B. Flores, and Annabelle S. Sarabia	Best Paper Award	Philippine Carabao Center National Headquarters and Gene Pool

Table 3b. Citations for PCC staff members who presented papers or posters in scientific conferences.

Awardee	Title of Recognition	Award-Giving Body
Maylem, ERS, Rivera SM, Atabay EP, Atabay EC, and Venturina EV.	Best Paper in Reproduction Category	Philippine Society of Animal Science
Alfred D. Sayson, Ma. Elizabeth C. Leoveras, Edwin C. Atabay, Excel Rio S. Maylem, Eufrocina P. Atabay	Best Poster Award	Philippine Society of Animal Science
E. P. Atabay, E. C. Atabay, Excel Rio S. Maylem, Ramesh C. Tilwani, Ester B. Flores, and Annabelle S. Sarabia	Finalist/3rd Place	Department of Agriculture – Bureau of Agricultural Research
Danilda Hufana-Duran, Matt Daniel Peralta, Emma V Venturina, Fe A Venturina, Peregrino G Duran, Felomino V Mamuad, Hernando V Venturina	Qualifier AFMA R&D	Department of Agriculture – Bureau of Agricultural Resources
Danilda Hufana-Duran, Herren Donna Miguel Daag, Matt Daniel Peralta, Emma Venturina, Felomino V. Mamuad, Peregrino G. Duran, Fe Venturina, Hernando Venturina, and John Parrish	Best Poster Award	National Academy of Science and Technology
Palacpac, E.P.	Best Paper Presentation	Philippine Extension and Advisory Services Network, Inc.
Palacpac, E.P., Valiente E. M., Jacang, R.T., Manito, T.M.	Outstanding Research Paper on Extension	Philippine Extension and Advisory Services Network, Inc.

### Biosafety and Environment Section

Under the rationalized PCC, the Animal Health Unit was incorporated into the Biosafety and Environment Section (BES). The function of which covers risk reduction measures in carabao commercial establishments with focus on the development of diagnostic/test kits related to animal health and product quality.

For its production support services, the Biosafety and Environment Section (BES) have provided 271 animal health activities for the National Impact Zone (NIZ), 84 in the Gene Pool (GP); and 102 in LBRAF (Saranay). In LBRAF, the team had evaluated 29 head buffaloes for rehabilitation and 166 heads for dispersal. On the other hand, 10 animal health activities were also rendered in goat farm and 200 in PCC regional centers.

As its operational support, the BES Team had evaluated/tested and prepared 180 head buffaloes prior to release to farmer cooperators, 578 were collected blood samples and evaluated prior to cryobanking; and 3,737 were tested for mastitis. Also, the team rendered animal health services to 2,218 buffaloes and 1,189 other animal species from walk-in clients.

The team was able to develop three IEC materials wherein two of which, are currently used for information dissemination campaign to educate the farmers for the economically important diseases such as Fasciolosis and Trypanosomiasis. The IEC materials for mastitis was currently finished and will be used for information dissemination for the succeeding years. In addition to its extension works, BES had conducted 14 technical seminars/caucuses and 6 trainings for other researchers, members of the academe, veterinary practitioners, farmers, and other stakeholders.

### Reproduction and Physiology Section

The Reproduction and Physiology Section (RPS) main contribution along the Major Final Output (MFO) of the agency was the pregnancies produced from fixed time artificial insemination (FTAI), which was initiated in the later part of 2014 and was directed towards increasing AI efficiency. The FTAI technology basically is preceded by hormonal synchronization of ovulation among animals followed by timed AI. FTAI activities in 2014 were focused at dealing with the hard-breeders at the National Genepool (GP) farm. In 2015, the technology was introduced to the National Impact Zone (NIZ) and some regional centers (PCC at CLSU, PCC at UPLB, PCC at CSU, PCC at USM) resulting in total pregnancies of 160 head breedable dairy buffaloes. For 2017, the total number of pregnancies as outcome of FTAI activities was 268 covering the following areas: NIZ, NGP, Regional Centers, and some multiplier farms and likewise, the Section had rendered 1,344 pregnancy diagnosis.



# 2,218

No. of animal health services rendered to buffaloes from walk-in clients

# 1,189

No. of animal health services rendered to other animal species from walk-in clients



# 268

No. of pregnancies as outcome of FTAI activities conducted in NIZ, NGP, Regional Centers and multiplier farms

## Production Systems and Nutrition Section

The Production Systems and Nutrition Section (PSNS) as one of the RDD Sections, covers the development and application of biotechnologies to improve the nutritional and physiological status of the carabao. As the former Animal Nutrition Unit, the section continuously handles the research endeavors on forage production, utilization and improvement, with the establishment and maintenance of the forage garden as an initial effort to showcase cum demonstration area of the various forage grasses as ruminant feeds and sources of planting materials for the farmers and other interested clients; feeds and feeding system to include among others the improvement of the nutritive value of conserved feeds and increase digestibility of low quality forages/feeds/farm by-products; and understanding and improving rumen function through rumen biotechnology with the end in mind of addressing the multifaceted issues in nutrition on dairy buffaloes in the villages particularly in the dairy communities of Nueva Ecija and selected areas in Isabela.

In 2017, PSNS had provided technical services and information to 22 clients, that comprise of students, researchers and other clients requesting for analysis. There were 403 different samples of feedstuff analyzed using proximate analysis, which assessed the nutritive value of feedstuff and other related samples. The team also assisted 628 clients (farmer-partners, private individuals, LGU staff and NGO staff) and distributed a total of 606,892 planting materials (seeds, tillers, rootstock and cuttings) of improved grasses and legumes for forage establishment and its expansion. Moreover, four (4) on-site farmers' trainings were conducted specifically for newly created cooperative or associations and existing cooperative members with problems on forage production, attended by 100 participants (farmers, LGU staff and Barangay Officials). This training aimed to (1) assist farmers in the establishment of improved forage production as source of feed to support the nutritional requirements of their animals, (2) demonstrate the technical and economic viability of home grown production of improved forages, and (3) explain the benefits of conservation and utilization of improved forages. As an output of the training, these farmers are expected to practice what they have learned in their own farms to improve animal productivity and enhance their profitability.

## Carabao Enterprise Development Section

Another section created under the umbrella of the Research and Development Division (RDD) is the Carabao Enterprise Development Section (CEDS), which is in-charged to handle application of biotechniques to improve milk and meat quality. Basically, the section covers the product development areas in milk, meat, hide and other carabao by-products that may evolve into enterprises.

The Central Dairy Collecting and Processing Facility (CDCPF) and the Milka Krem are the two units being managed by the section. These two units serve as the research laboratories for the processing of developed milk products and the avenue for the promotion of such products.



**628**

No. of assisted clients  
(farmer-partners,  
private individuals, LGU  
staff and NGO staff)

**606,892**

Total no. of distributed  
planting materials  
(seeds, tillers, rootstock  
and cuttings) of  
improved grasses and  
legumes for forage  
establishment and its  
expansion

In 2017, the CDCPF received a total of 282,991.16 kg of raw milk, 148,861.16 kg (53%) of which, were delivered by the dairy cooperatives and multiplier farms; and 134,130.00 kg (47%) came from the National Gene Pool farm. The dairy cooperatives, individual farmers and multiplier farms that delivered raw milk to CDCPF were Catalanacan Primary Multi-Purpose Cooperative (CAMPC), Ayos Lomboy Dairy Producers Cooperative (ALDPC), Eastern Primary Multi-Purpose Cooperative (EPMPC), STEPHENHANN Multiplier Farm, Michael Pascual, PAO Producers Cooperative, SIPBU, Licaong Dairy Cooperative, NEFEDCCO, CINENSE Dairy Producer Cooperative, and SUNBEAM Multi-Purpose Cooperative. A portion of the raw milk received was sold as frozen raw milk to some processors and walk-in buyers while the remaining raw milk was sold as processed dairy products and used in research activities. These dairy products were distributed to regular institutional buyers in Tagaytay, Bulacan, Manila, Baguio and in the PCC product outlet, the Milka Krem. The CDCPF and Milka Kreme have gross sales of PhP16,541,444.49 and PhP26,347,529.50, respectively, and the combined gross income was PhP42,888,973.99.

Moreover, the section has maintained a partnership with the private sector, Carabao Creamery Inc. (CCI), a social enterprise in GK Enchanted Farm, which was focused on the entire dairy value chain and ensures that every link was optimized to enrich the lives of all stakeholders, especially the impoverished farmers. CCI provided concepts and ideas on all natural, minimally-processed carabao-based milk products to be developed, while PCC, through science, translated the concepts into product prototypes. Best sellers among the products developed for CCI were the cultured butter and yogurt from carabao's milk. The butter came in jars (100g), 18g disc shaped butter pats (food service and retail packs) and in 500g and 1000g butter blocks, while yogurt variants (plain and with coco sugar) came in 135 grams plastic jars. CalaBoo products were available in institutional markets such as White Space for food service packs and Amanpulo for retail packs.

Another partnership was created with the San Miguel Corporation (Magnolia Dairy). Somehow, this partnership addressed the problem of surplus milk by smallholder dairy farmers during peak season of milk production. The dairy farmers, through the PCC, supplied carabao's milk to Magnolia for the production of Ice Cream.

In the area of technology/products promotion, the section and its units participated in various food exhibits, Gatas Festival 2017 and video shoot in the Biyaheng Bukid of PTV 4, Umagang Kay Ganda of ABS-CBN and Eat Bulaga of GMA 7.



**148,861.16 kg**

Volume of raw milk received by CDCPF delivered by the dairy cooperatives and multiplier farms

**134,130.00 kg**

Volume of raw milk received by CDCPF from the National Gene Pool farm

**282,991.16 kg**

Combined total volume of raw milk received by CDCPF delivered by the dairy cooperatives, multiplier farms and NGP farm

**Php16M+**

CDCPF gross sales for 2017

**Php26M+**

Milka Krem gross sales for 2017

**Php42M+**

Combined gross income of CDCPF and Milka Krem for 2017



## Socio-Economics and Policy Research Section

The section was the overall coordinator of the convergence project with DSWD titled “Pilot Nutrition and Livelihood Interventions through a Milk Supplementation Program under the Supplementary Feeding Program (SFP) and Sustainable Livelihood Program (SLP) of DSWD in partnership with PCC” completed last May 2017. The section was also involved in the implementation of PCAARRD-funded research project titled “Strengthening the San Agustin Crossbred Carabao-based Enterprise Development (CBED) Model” and PCC-LGU funded project “Nutrition Intervention through A Milk Supplementation Program for Primary Schoolchildren in Nueva Ecija”.

A total of 9,860 pre-school children in Child Development Centers in Talibon, Bohol and Aliaga, Nueva Ecija were fed for 120 days through the PCC-DSWD milk supplementation program and results showed that (1) the number of severely underweight children had decreased by 75.27%; (2) the number of underweight children had decreased by 60.54% and; (3) the number of overweight children had decreased by 20%.

The section also conducted GAD-related activities for clients. In observance of the “International Rural Women’s Day”, the section in coordination with Carabao Enterprise Development Section and National Impact Zone (NIZ) led the conduct of the “Training on Milk Processing cum GAD Orientation” on October 17-18, 2017 at the NIZ Bldg., PCC National Headquarters and Gene Pool, participated in by 15 female clients. The NIZ is a unit under the supervision of this Section.

# 9,860

Total no. of pre-school children in Child Development Centers in Bohol and Nueva Ecija who benefited from the PCC-DSWD Milk Supplementation Program for 120 days

# 75.27%

Reduction in the total no. of severely underweight children

# 60.54%

Reduction in the total no. of underweight children

# 20%

Reduction in the total no. of overweight children

## Animal Genetic Resource Section

The Section is in-house created in 2015, which consists of three units, namely, Cryobank (CRU), National Gene Pool (NGP) and Livestock Biotechnology Research and Animal Facility (LBRAF). The function of the section is to take charge of the conservation and utilization of the carabao and other indigenous animal species and introduced breeds, which have economic importance and exhibit adaptable and resilient traits towards diseases and environmental elements in the country. The CRU is responsible in the in vitro conservation (preservation) of animal genetic resources, both indigenous and introduced breeds. The NGP engages in the propagation and conservation in vivo of genetically improved/superior buffalo dairy animals. On the other hand, the LBRAF is the farm facility that houses and manages the animals for research purposes on biotechnology and related fields.

- *Cryobank Unit.* In 2017, CRU provided strengthening linkages to various sectors (universities, other agencies, breeders, farmers, private sectors, etc.) through dissemination and sharing of information on cryobanking animal genetic resources through presentations/meetings/IEC material/brochure. Furthermore, the unit was able to collect samples from 1,267 individual animals or 26,295 units of semen, blood and DNA. Prior to cryobanking of samples, 588 individual animals were screened for infectious diseases with the assistance of BES.

- *Livestock Biotechnology Research and Animal Facility.* The research facility is currently used as a temporary rehabilitation center/shelter for animals that were retrieved from the farmers due to nutrition and management issues; those recovering from surgery/disease; and animal payments for loaned animals. Also, the research facility was able to release 49 bulls for bull loan and 48 cows for the Paiwi loan program.



# 26,295

Units of semen, blood and DNA collected from 1,267 individual animals

# 49

No. of bulls released for the Bull Loan Program

# 48

No. of cows released for the Paiwi Loan Program

- National Gene Pool Farm.* The farm maintains a herd population of 565 head dairy buffaloes, which comprised of 276 breedable females. On the average, conception rate through AI was 37.95%, producing 121 calves (57 males, 64 females) at a calving interval of 15.4 months. From January to December, the farm released 36 bulls for bull loan and dispersed 58 cows under the Paiwi loan program. Moreover, the farm has produced 192,688 kg raw milk in year 2017. Around 135,680 kg were traded with a value of PhP6,784,000.00. Furthermore, the farm produced 2,787 bags of vermicast (50 kg/bag) through its waste management program, 50.95% (1,420 bags) of which, was sold amounting to PhP365,000.00.

The NGP farm served also as the training ground for the college students taking BS in Agriculture (Major in Animal Science) and Doctor of Veterinary Medicine. There were 148 students coming from ten (10) different universities in the country that undertook their internship program and specialization in the NGP farm. So with the farmers, who were venturing and planning to venture in dairy production, they were also trained in basic knowledge in dairy animal management and proper milking and milk handling.

**37.95%**

Average conception rate through AI

**121**

No. of calves produced through AI

**15.4 mos.**

Calving interval

**36**

No. of bulls released for Bull Loan

**58**

No. of dispersed cows under the Paiwi Loan Program

**192,688 kg**

Total volume of raw milk produced by the NGP farm

**Php6M+**

Value of raw milk (135,680 kg) traded

**2,787 bags**

Total no. of vermicast bags produced through its waste management program

**Php365,000**

Value of vermicast (1,420 bags) sold



# SUPPORT SERVICES

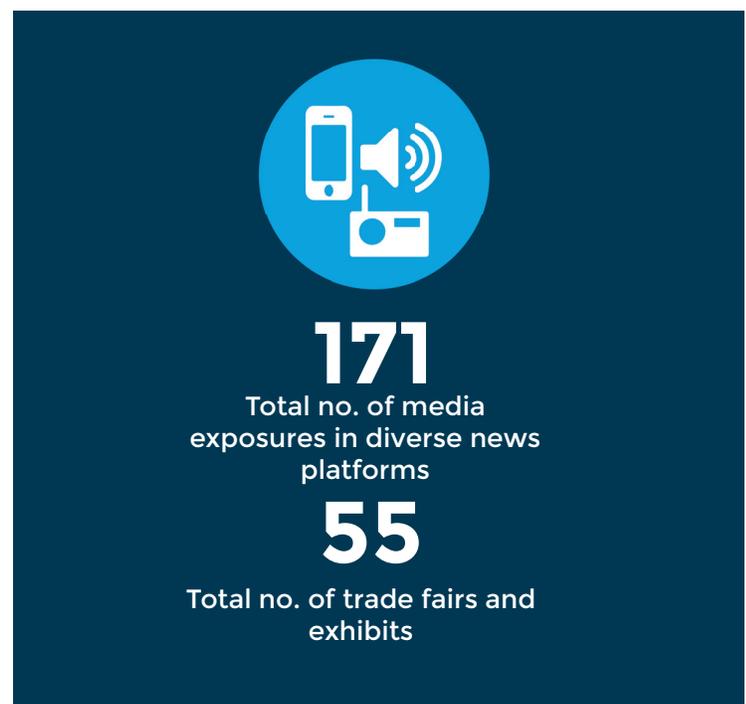
- The PCC collaborated with the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) to host an International Conference on Carabao-Based Enterprise Development on October 26-27, which saw the launching of 10 knowledge products or KPs (a type of information, education, and communication or IEC publication) related to carabao production and management, processing of buffalo dairy products, and policy advocacy. The event featured plenary presentations by invited resource speakers from India, Laos, Thailand, and the Philippines.
- The PCC through its Knowledge Management Division (KMD) started conducting a project titled “Strengthening Carabao Development Program (CDP) Communication for Development Campaign in Visayas and Mindanao”, which aims at understanding the concerns and needs (related to communication) of farmer-clients in the PCC’s expansion areas in Panay Island, South Cotabato, Bukidnon, and Zamboanga del Norte and designing and implementing appropriate communication interventions.
- *Production and distribution of printed IEC materials:*
  - Six issues of NIZ Balitaan
  - Four issues of Karbaw Magazine
  - Four issues of Roundup Newsletter
  - One issue of R4D Highlights
  - Six kinds of IEC materials translated in four dialects (Filipino, Cebuano, Ilocano, and Ilonggo) were updated and reprinted: AI comics, Bull loan comics, Mapawow sa Kabuhayang mula sa Kalabaw comics, Pagpapanatili sa Kalidad ng Gatas comics, AI brochure, and AI poster
  - Six other IEC materials were produced and updated: “Wastong Pangangalaga sa Gatasang Kalabaw”, FAQs, Corporate brochure, Farmers’ Calendar, 2016 Annual Report, NCC Souvenir program
  - Through the Biosafety and Environment Section (BES), three IEC materials were produced. Two of which are currently used for information dissemination campaign to educate the farmers for the economically important diseases such as Fasciolosis and Trypanosomiasis. The IEC materials for mastitis were currently being finished and will be used for information dissemination for the succeeding years. In addition to its extension works, the BES has conducted technical seminars/caucuses and trainings for other researchers, members of the academe, veterinary practitioners, farmers, and other stakeholders.

- A total of 142,003 copies of IEC materials were distributed by the KMD and regional centers to 67,109 identified PCC stakeholders, visitors, clients, and partner institutions



• *Other Media Forms*

- Six Knowledge café/media fora were organized and held last March 13 and March 31 during the PCC 24th Anniversary; last August in Iloilo; last November in Polanco, Zamboanga del Norte and Ipil, Zamboanga Sibugay respectively; and last December in Bukidnon
- 171 media exposures in diverse news platforms (TV, Radio, Press, Online, Social Media)
- Participation in 55 trade fairs and exhibits



- *Customers' Satisfaction*

- A total of 5,603 (158 groups) scheduled and walk-in visitors were received, oriented on the PCC's programs and services, and toured to the PCC's facilities.
- The visitor's bureau earned a satisfaction rating of 4.69.



*Scientific Library Services*

- Sourced out additional 63 reference materials on its web-based Electronic Integrated Library System (EILS) and additional 506 titles of buffalo researches on its web-based International Buffalo Knowledge Resource Service (IBKRS). A total of 107 active linkages to external journal databases for sources of buffalo and livestock information have been established
- The KRMC has an active subscription to Science Direct Journal which enables researchers and scientists to access over 1,600 journal titles from 24 subject collections.



- *Planning and Performance Review.* The Agency, once again, successfully passed the stringent measures of the AO 25 secretariat and was eligible to implement the Performance-Based Bonus. This is the second year of implementation which means the Agency has passed the criteria for Good Governance, General Administrative and Support Services and Physical Accomplishments.
- In its 4th year of implementation of the iREB (Intensified Research-based Enterprise Build-Up), the Agency through the Planning and Information Management Division (PIMD) conducted an island cluster planning workshop to discuss the components of the 2018 Budget. Likewise, the division applied the Two-Tier Budgeting Approach introduced by the DBM, which aims at funding the new or expansion of program in the PCC's respective areas. The Mindanao Cluster Planning session was held at Maramag, Bukidnon with PCC at CMU as the host Center. It was able to generate four (4) Tier 2 proposals from the centers. The Visayas Cluster Planning Session with PCC at USF as the host center was held at Lamac, Cebu and was able to generate five (5) proposals. The Luzon Cluster Planning Workshop with PCC at DMMMSU as host center was held in Baguio City and was able to generate five (5) proposals.
- The Information and Communications Technologies Section (ICTS) conducted training of PCC Regional Center Coordinators on the use of Remote Access to the GIP Server located at the National Headquarters and Gene Pool in preparation on the use of the online Buffalo Integrated Database System (BIDS). In coordination with the Genomics and Bioinformatics Unit, the team distributed Tablet PCs to regional center coordinators for the hands-on training on geo-tagging to PCC assisted dairy cooperatives, associations, farmers and other facilities in their respective area of coverage.

- *Business Development and Commercialization*

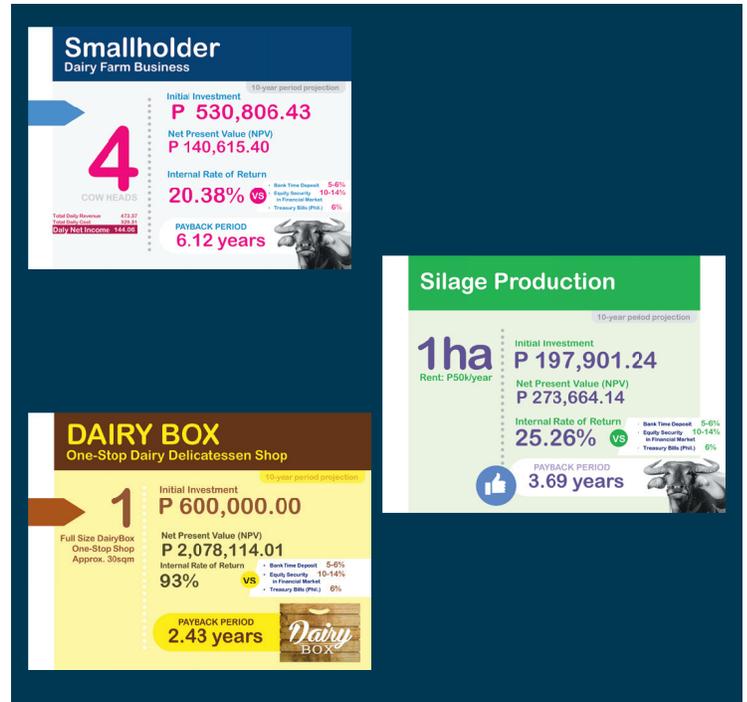
- *Business Portfolio Analysis.*  
The portfolio analysis aims to determine the investment worthiness and viability of each business opportunity in Carabao Raising. Three of which are: Dairy Farming Business Portfolio, Dairy Box Portfolio, and Portfolio for Silage Production. The Dairy Farming Business Portfolio was categorized into four depending on the cow-head level (smallholder, family module, semi-commercial and commercial) to determine which portfolio has the highest return based on several business profitability measurements on a 10-year Cash flow Projection. The Dairy Box Portfolio and Silage Production Portfolio indicate the investment

**a variety of options**

 <p><b>DAIRY FARM BUSINESS (DFB)</b> Smallholder (4) Family Module (5) Semi Commercial (10) Semi Commercial (15) Commercial (20+)</p>	 <p><b>SILAGE PRODUCTION</b> 1 hectare, rented land</p>	 <p><b>MILK PROCESSING</b> DairyBox Prototyping</p>
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**Business Portfolio Analysis**

necessary in putting-up the business. It also shows the potential income that can be generated in investing in each business. The Dairy Box Portfolio has been used to put up several shops in Nueva Ecija and Visayas. The first draft of the portfolio has been drawn and after consultation with several experts, it is already under the final layout and eventually for distribution to different DA agencies, bureaus and potential, and interested investors



- *Analysis of Financial Performance of PCC Models.* Farmer's involvement in cooperatives, associations and organizations can be beneficial not only to the farmer but also to the community. The stability of a cooperatives reflects the values and camaraderie among the members of the community. The PCC's participation in strengthening this organization can be traced to community development, business development and operationalization, leadership and management coaching, and training and seminar provision. To determine the agency's effect on the status of each cooperative's stability, a review of each organization's financial statements is summarized. The Financial Statements of 23 PCC-supported cooperatives/ associations with the most organized financial information are available at the Business Development and Commercialization Unit (BDCU) upon request. This will serve as a baseline data to determine the behavior of each cooperative through the years, to determine the existing and potential problems and intervention, support and other necessities of the cooperative that PCC can provide.

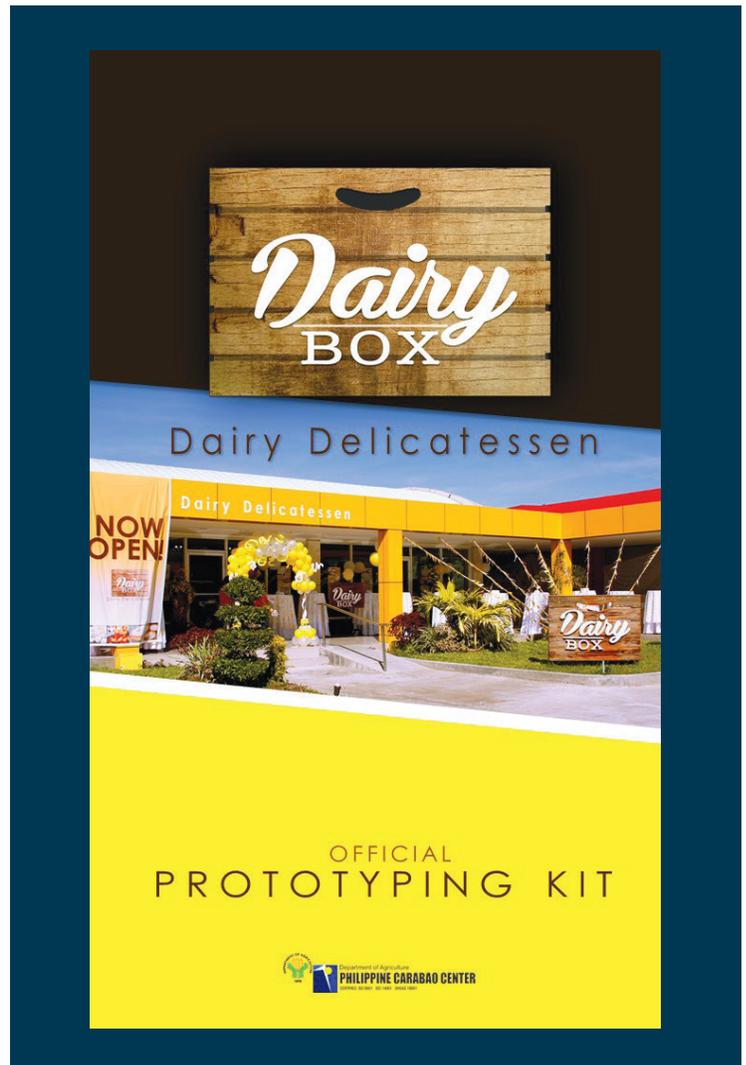
Communicating the iREB Dashboard. The iREB Dashboard is a monitoring tool that oversees the Financial and Operational/ Production Performance of a Carabao Family Business. It is a visual representation of key performance indices of each farm to know the status and condition of the farm. This tool aims to provide the owner the information he needs to help them assess their own operation, determine appropriate interventions and ultimately make decisions to improve their respective own farms. In line with the Agency's outcome to increase the farmers of each business farmers, we can determine the effect of the Carabao business in the each family's total income using the dashboard. Accordingly, we can also determine what services PCC can provide to improve the performance of their farm. Consistently, PCC Business Units (Institutional Herds and Processing and Marketing Outlets) have their own respective dashboards for monitoring and decision-making purposes. This tool was modified to fit the needs of each unit. It was piloted in PCC at CLSU and eventually cascaded to all 11 Institutional Herds across the country. These reports will be submitted quarterly in compliance with the PIB Principle No. 1 or Value-For-Money Principle or spending the government fund at the most reasonable amount. The result was presented during the PMC meeting last December and was decided the continual implementation of the tool.



- *Dairy Box build up.* Since the launch of the first Dairy Box in Nueva Ecija, the agency's dairy marketing business model has advanced with remarkable milestones for the year 2017. Through its humble mission to link carabao's milk-flavored products to mainstream markets and to stimulate business confidence among CBED clients, the Dairy Box module has effectively contributed to the livelihood of "dairypreneurs" in the National Impact Zone and in the Visayas islands (particularly through its branches in Lamac, Cebu and Carmen and Tagbilaran City, Bohol). Packaged with the Dairy Box business concept are:

- Dairy Box Branding & Business Concept for Marketing & Store Set-up Assistance
- Dashboard for Operations & Financial Performance Monitoring
- Hands-on Support from PCC Regional Center

. *Credit Facilitation.* Since the inception of the Department of Agriculture's credit program called Production Loan Easy Access (PLEA), the PCC has been working closely with Agricultural Credit Policy Council (ACPC) in assisting marginal livestock farmers especially carabao raisers by enabling their cooperatives or

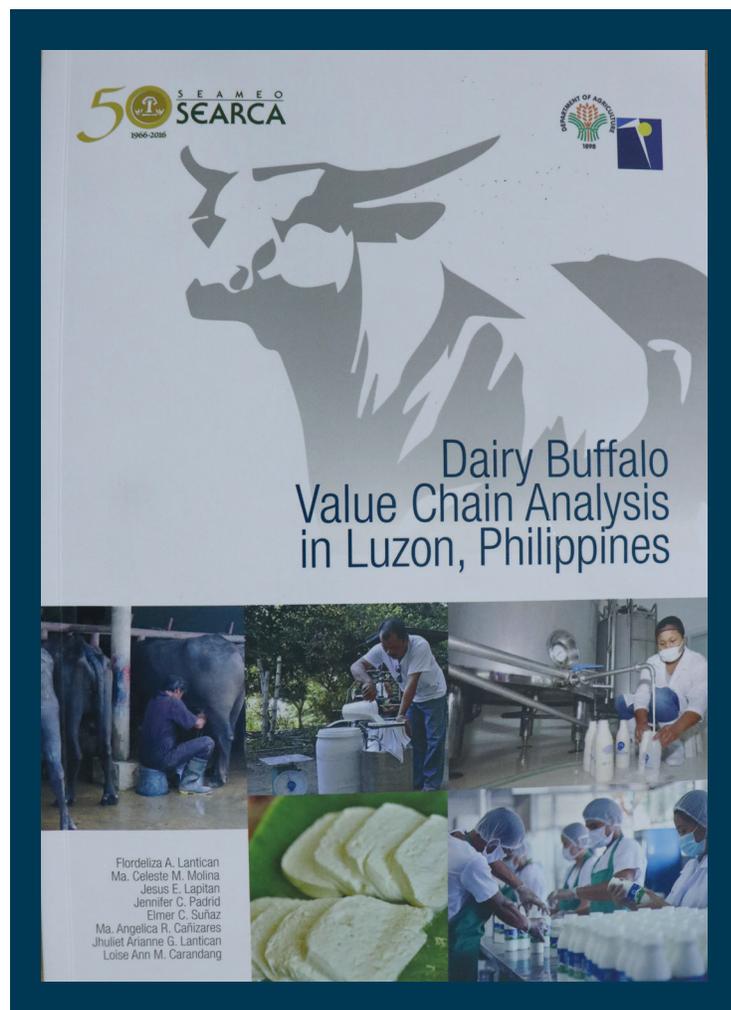


# Php5.2 million

Amount released to over 100 carabao keepers (members of cooperatives) in Nueva Ecija.

associations to be the program's Credit Conduit. Due to the PLEA's low attractive features (low interest rate at 6% and easy process), three (3) cooperatives from Nueva Ecija already availed of the program. Two (2) more cooperatives in Nueva Ecija are being evaluated while another is scheduled to release fund in January 2018. In the Visayas region, five (5) cooperatives are being evaluated by ACPC to be their Credit Conduits. Since August 2017, a total amount of Php5.2 million was already released to over 100 carabao keepers (members of cooperatives) in Nueva Ecija.

- Value Chain Analysis (VCA).*  
 The VCA of Carabao and Carabao-based Products across island clusters serves as an eye opener for PCC to address the gaps in the value chain. As a response to the calling, the PCC embarked on a project in collaboration with the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) titled "Building Capacity and Strengthening Partnerships for the Carabao Development Program". This project adopts a three-pronged strategy: Knowledge Management (KM), Capacity building, and Enterprise Development. The latter involves relevant interventions ranging from knowledge sharing to provision of support services and resources to identified Cooperative beneficiaries of selected PCC Regional Centers. The signing of a memorandum of agreement and distribution of equipment to cooperative beneficiaries commenced on February 16, 2017 and is expected to culminate by June 2018.



## Integrated Management System

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The PCC through its Management Systems Audit Office (MSAO) 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 2017, second surveillance audit for the second cycle was conducted by TÜV SÜD. The activity culminated with the confirmation of the continuing validity of IMS Certification for PCC National Headquarters and Gene Pool.

To ensure sustained effective implementation of the IMS, two batches of Internal Audits covering all areas at the National Headquarters and gene pool 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, continued coaching and sharing of learnings and experiences among the internal audit team was done to improve the Internal Auditors' skills.

Likewise, efforts were made to transition to the 2015 version of ISO 9001 and ISO 14001. As such, in-house trainings and seminar-workshops on the following were organized for the employees of PCC National Headquarters and Gene Pool:

1. ISO 9001:2015 and ISO 14001-2015 Significant Changes, Interpretation and Application
2. Course on Effective Internal IMS Auditing
3. Workshop on Risks and Opportunities Determination and Assessment

To ensure preparedness in any eventualities, Training-Workshop on Basic Disaster Risk Reduction and Management in the Workplace was conducted by the Philippine Red Cross Nueva Ecija Chapter for the employees of the PCC National Headquarters and Gene Pool.

Apart from overseeing the maintenance of IMS at the National Headquarters, the MSAO also assisted the PCC regional centers in their maintenance of certification to ISO 9001 and preparation for transition to the 2015 version. The following Centers have maintained their certification: PCC@Cagayan State University (CSU); and PCC@University of Southern Mindanao (USM); PCC@Mariano Marcos State University (MMSU); and PCC@Ubay Stock Farm (USF).

Training-workshops on: ISO 9001:2015 Interpretation and Application; Risks and Opportunities Determination and Assessment; and Course on Effective Internal Quality Auditing were also organized for the above listed centers.

Meanwhile, an Awareness Training on ISO 9001:2015 was also conducted during the 24th anniversary month celebration for the rest of the Regional Center who are gearing for certification to ISO 9001 in 2018 and beyond.



### • Sources and Usage of Funds

The agency main sources of funds to support its operation are provided by the national government through the General Appropriation Act (GAA). Details of allotment and utilization are as follows:

Table 4. Fund source and utilization (Php M)

Fund Source	Authorized Allotment (Php M)	Usage (Php M)	% Utilization
<b>GAA-Current &amp; Continuing</b>	<b>444.13</b>	<b>443.10</b>	<b>99.8%</b>
Personnel Services	118.21	117.47	99.4%
Maintenance & Other Operating Expenses	301.46	301.41	100.0%
Financial Expenses	0.05	0.00	0.0%
Capital Outlay	24.41	24.22	99.2%
<b>Revolving Fund- Dairy Business Module</b>	<b>196.40</b>	<b>104.05</b>	<b>53%</b>
<b>Locally funded special projects/research funds</b>	<b>147.93</b>	<b>125.25</b>	<b>84.7%</b>
<b>Foreign Assisted Projects</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>TOTAL</b>	<b>788.46</b>	<b>672.40</b>	<b>85.3%</b>

Externally funded projects funds 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.

### • PCC's Financial Condition

PCC's Statement of Financial Position at the end of FY 2017 is presented in Table 5.

PCC's total assets as of December 31, 2017 are Php 1,910.87 million comprising mainly of the agency Property, Plant & Equipment (PPE) and Biological assets. The new standard for accounting for biological assets as per Philippine Public Sector Accounting Standards affected the significant decrease in agency's biological assets. The decrease by 78% or Php630.7 million is due to the recognition of biological assets at fair market value less cost to sell and the dropping of dead animals from the books of accounts. The number of death of the said animals is within the acceptable rate of mortality.

Total liabilities posted Php 232.14 million and total accumulated surplus reached Php 1,678.73 million. The increase in liabilities represents payables from various suppliers and contractors and increase of funds from the externally funded projects at year end.

Table 5. Statement of Financial Position as of December 31 (Php M)

Particulars	FY 2017	FY 2016	% Change
Assets			
<b>Current Assets</b>	<b>602.36</b>	<b>538.25</b>	<b>12%</b>
Property, Plant & Equipment	1,120.89	1,093.28	3%
Biological assets	182.45	813.13	-78%
Other assets	5.17	6.80	-24%
<b>Total Assets</b>	<b>1,910.87</b>	<b>2,451.46</b>	<b>-22%</b>
Liabilities	232.14	207.03	12%
Accumulated Surplus	1,678.73	2,244.43	-25%
<b>Total Liabilities &amp; Gov. Equity</b>	<b>1,910.87</b>	<b>2,451.46</b>	<b>-22%</b>

PCC's Statement of Financial Performance for the year end FY 2017 is presented in Table 6.

PCC's total revenue for the year reached Php 145.17 million comprising mainly of the business income from the sales of milk, meat, live animals, and other by-products as a consequence of the operation of the institutional dairy business module of the regional centers and Milka Krem.

Personnel services expenses posted Php 115.29 million, while total maintenance and other operating expenses including other expenses is Php 927.0 million giving a deficit from current operation of Php 897.10 million. The increase in personnel services is due to the 2nd tranche implementation of the Salary Standardization Law of 2016. The significant increase by 142% of the other expenses is due to the recognition of loss from changes in fair value less costs to sell of biological assets due to physical change. The posted deficit for the period is attributed to the decrease in subsidy from the national government due to the decrease in the budget for non-recurring expenditures such as infrastructure projects and recognition of loss from changes in fair value less costs to sell of biological assets due to physical change.

Table 6. Statement of Financial Performance for the period ending of December 31 (Php M)

Particulars	FY 2017	FY 2016	% Change
<b>Revenue</b>			
<b>Business Income</b>	<b>106.77</b>	<b>90.46</b>	<b>18%</b>
Other Income	38.40	20.30	89%
Total Revenue	145.17	110.77	31%
<b>Current Operating Expenses</b>			
<b>Personnel Services</b>	<b>115.29</b>	<b>102.51</b>	<b>12%</b>
Maintenance & Other Operating Expenses	362.16	361.91	0%
Other expenses	564.82	233.81	142%
<b>Total Current Operating Expenses</b>	<b>1,042.27</b>	<b>698.23</b>	<b>49%</b>
<b>Surplus (Deficit) from Current Operation</b>	<b>(897.10)</b>	<b>(587.46)</b>	<b>53%</b>
<b>Assistance and Subsidy</b>	<b>412.82</b>	<b>476.26</b>	<b>-13%</b>
<b>Gain/(Loss) of Assets</b>	<b>(25.27)</b>	<b>(49.68)</b>	<b>-49%</b>
<b>Surplus (Deficit) for the period</b>	<b>(509.55)</b>	<b>(160.88)</b>	<b>217%</b>

# appendices

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
1	Hands-on Training on Milk Processing (Pasteurized Milk, Choco Milk, Kesong Puti and Pastillas de Leche)	1	January	CLSU
2	Basic Training on Proper Milk Handling	18	January	CMU
3	Social Preparation Training	80	January	CSU
4	Hands-on Milking Seminar	39	January	DMMMSU
5	Training on Database encoding and management	2	January	LCSF
6	Advances in animal Health	20	January	LCSF
7	Dairy Buffalo Enterprise Development	20	January	LCSF
8	Dairy Buffalo Production and Management	20	January	LCSF
9	Database encoding and management	3	January	LCSF
10	Farmers Livestock School Lesson 21: Basket of Options	14	January	MMSU
11	Farmers Livestock School Lesson 18 : Meat-Based Enterprises	23	January	MMSU
12	Occupational Internship Program on Dairy Buffalo Management and Milk Handling and Processing	7	January	MMSU
13	Farmers Livestock School Lesson 19 : Milk-Based Enterprises	40	January	MMSU
14	Farmers Livestock School Lesson 17 & 21: Forage-Based Enterprises; Basket of Options	48	January	MMSU
15	Farmers Livestock School Lesson 20: Manure-Based Enterprises	29	January	MMSU
16	Dairy Volunteer (Hands-on Training)	1	January	USF
17	Year End A.I. Assessment and Planning Workshop	101	January	VSU
18	Values Orientation Training	24	February	CLSU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
19	Hands-on Training on Milk Processing & Milk Evaluation (Pasteurized Milk, Choco Milk, Kesong Puti and Pastillas de Leche)	4	February	CLSU
20	Hands-on Training on Silage Production and Urea-Treated Rice Straw	89	February	CLSU
21	Social Preparation Training	121	February	CSU
22	Hands-on Training on Silage Production and Urea-Treated Rice Straw	107	February	DMMMSU
23	Dairy Buffalo Production and Management	28	February	LCSF
24	Milk and Milk Handling	28	February	LCSF
25	Training on Milk Handling	23	February	LCSF
26	Advances in Animal Health	31	February	LCSF
27	Training on Dairy Buffalo Production and Management	9	February	LCSF
28	Hands-on Training on Dairy Herd Management, Silage Making and Milk Processing	22	February	MMSU
29	Farmers Orientation on the Carabao Development Program	71	February	MMSU
30	Basic Training Course on AI & PD in Large Ruminants	11	February	UPLB
31	Social Preparation Training	81	February	USF
32	Basic Training Course On Artificial Insemination And Pregnancy Diagnosis On Large Ruminants For Village-Based & Lgu Technicians	14	February	USF
33	Fodder Production Development Training	35	February	VSU
34	Values Orientation Training	39	March	CLSU
35	Training on Republic Act No. 9184 and It's Revised Implementing Rules and Regulations	23	March	CLSU
36	Hands-on Training on Milk Processing (Pasteurized Milk, Choco Milk, Kesong Puti and Pastillas de Leche)	4	March	CLSU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
37	Training on Silage Production & Urea-Treated Rice Straw	25	March	CLSU
38	Pasture Management	36	March	CMU
39	Feedlot Management	36	March	CMU
40	Dairy Buffalo Production Management	24	March	CMU
41	Milk and Milk Handling and Milk Control and Milk Processing	24	March	CMU
42	Calf Management	58	March	CMU
43	Dairy Buffalo Management	22	March	CMU
44	Milk and Milk Handling	58	March	CMU
45	Pasture Management	57	March	CMU
46	Dairy Management	36	March	CMU
47	Information Drive to Visitors from Samar	26	March	DMMMSU
48	Dairy Buffalo Production and Management	61	March	LCSF
49	Skills Training on Carabao Raising and Management Leading to Raw Milk Production cum Vermi-composting	19	March	MMSU
50	Occupational Internship Program on Dairy Buffalo Management and Milk Handling and Processing	5	March	MMSU
51	Hands-on Training on Milk Processing (Pastillas, Polvoron and Chocolate-Flavored Milk)	9	March	MMSU
52	Training on Dairy Processing	21	March	UPLB
53	IQA Training: Training on Auditing QMS and Preparation for Training	11	March	UPLB
54	IQA Training	140	March	UPLB

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
55	IQA Training ISO 9001:2015	26	March	UPLB
56	ISO 9001:2015 IQA TRAINING	26	March	UPLB
57	Dairy Volunter (Hands-on Training)	2	March	USF
58	Organizational Development Training ("SMILE")	27	March	USF
59	Training on Small holder Cattle and Carabao Management	53	March	USM
60	Fodder Production Development Training	25	March	VSU
61	Training on Pasture Development	27	March	VSU
62	Cornerstones Workshop	42	March	WVSU
63	Animal Herd Management	28	March	WVSU
64	Milk Quality and Control Processing	27	March	WVSU
65	Hands-on on Feeds & Feeding	39	March	WVSU
66	Short Training on Pregnancy Diagnosis in Water Buffaloes	20	April	CLSU
67	Calf Management	33	April	CMU
68	Milk and Milk Handling	37	April	CMU
69	Dairy Buffalo Management	33	April	CMU
70	Pasture Management	35	April	CMU
71	Bull Management Training	17	April	CSU
72	Social Preparation Training	55	April	CSU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
73	Hands on Training on Milking	12	April	CSU
74	Good Manufacturing Services Seminar	23	April	DMMMSU
75	Advances on Animal Health	31	April	LCSF
76	Dairy Buffalo Enterprise and Development	31	April	LCSF
77	Dairy Buffalo Production and Management	31	April	LCSF
78	Milk and Milk handling	31	April	LCSF
79	Advances in Animal Health	27	April	LCSF
80	Dairy Buffalo Enterprise	27	April	LCSF
81	Practical Practices on Dairy Buffalo Management Training	61	April	MLPC
82	Hands-on Training on Processing of Milk and Milk Products	240	April	MMSU
83	Farmer's Livestock School Exposure Trip	25	April	MMSU
84	Technical Training on Dairy Buffalo Production and Management	75	April	UPLB
85	Refresher Course on Animal Health	39	April	UPLB
86	Hands on milk collection	1	April	USF
87	Training milk collection	2	April	USF
88	Dairy Buffalo Production and Management	88	April	WVSU
89	Milk Quality and Control Processing	88	April	WVSU
90	On-the-Job-Training	63	April	WVSU
91	Basic Training Course on Artificial Insemination & Pregnancy Diagnosis in Water Buffaloes	14	May	CLSU
92	Calf Management	10	May	CMU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
93	Dairy Buffalo Management	10	May	CMU
94	Milk and Milk Handling	9	May	CMU
95	Pasture Management	9	May	CMU
96	Basic Training Course on Artificial Insemination and Pregnancy Diagnosis	13	May	CMU
97	Basic Training course On Pregnancy diagnosis and Artificial Insemination	13	May	CMU
98	Dairy Buffalo Management Training	10	May	CSU
99	Hands-on training for walk in	15	May	LCSF
100	Milk control and milk processing	16	May	LCSF
101	Carabao-based Livelihood Opportunities Orientation/Seminar	31	May	MLPC
102	Milk Collection, Handling and Products Processing Training	14	May	MLPC
103	Training on Gouda Cheese Processing	6	May	USF
104	Refresher Course on AI and PD on Large Ruminants	8	May	USF
105	Training on Forage Pasture Management	92	May	VSU
106	Dairy Buffalo Production and Management	34	May	WVSU
107	Milk Quality and Control Processing	34	May	WVSU
108	On-the-Job-Training	16	May	WVSU
109	Calf Rearing Management	35	June	CMU
110	Dairy Management	32	June	CMU
111	Feeds and Feeding Management	33	June	CMU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
112	Milk Handling and Processing	39	June	CMU
113	Pasture Management	40	June	CMU
114	Processing & Marketing Management	35	June	CMU
115	Practical training on feeding, forage production and calf management	24	June	LCSF
116	Dairy Buffalo Enterprise and Development	59	June	LCSF
117	Milk control and milk processing	50	June	LCSF
118	Milk and milk handling	26	June	LCSF
119	Strategic Planning and Savings Management Training	24	June	USF
120	Organizational Development Training and SMILE First Savings Meeting	16	June	USF
121	Training on Forage Pasture Management	89	June	VSU
122	Dairy Buffalo Production and Management	25	June	WVSU
123	Milk Control and Processing	25	June	WVSU
124	On-the-Job-Training	15	June	WVSU
125	Calf Rearing Management	40	July	CMU
126	Dairy Management	43	July	CMU
127	Feeds and Feeding Management	39	July	CMU
128	Processing & Marketing Management	40	July	CMU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
129	Basic Training Course on Artificial Insemination and Pregnancy Diagnosis	16	July	CMU
130	Basic Training course On Pregnancy diagnosis and Artificial Insemination	16	July	CMU
131	Organizational and Project and Formulation of Policies, Systems and Procedures	25	July	CSU
132	Social Preparation Training (SPT) of Carabao Raisers in Caloagan, Piat, Cagayan	34	July	CSU
133	Basic Training Course on Artificial Insemination & Pregnancy Diagnosis in Water Buffaloes	12	July	CSU
134	Animal management- breeding, milking, housing	60	July	LCSF
135	Dairy Buffalo Production and Management	52	July	LCSF
136	Carabao-based Livelihood Opportunities Orientation/Seminar	48	July	MLPC
137	Farmer's Orientation Seminar	9	July	MMSU
138	Basic Training Course on Artificial Insemination and Pregnancy Diagnosis on Large Ruminants	15	July	USF
139	Para-vet Seminar	45	July	VSU
140	Farmer's Livestock Farming System Training	130	July	VSU
141	Hands-on Training on Milk Processing	2	July	CLSU
142	Social Preparation Training	31	July	CLSU
143	Maigsing Pagsasanay sa Pangangalaga at Pamamahala ng Gatasang Kalabaw	31	July	CLSU
144	Skills Training on Yogurt & Kesong Puti Making	14	July	CLSU
145	Hands-on Training on Milk Processing	2	August	CLSU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
146	Training on Operation and Maintenance of Bucket Milking Machine	10	August	CLSU
147	Social Preparation Training (SPT) of Carabao Raisers of Piat, Cagayan	61	August	CSU
148	Dairy Buffalo Production and Management	52	August	LCSF
149	Skills Training on Carabao Raising and Management Leading to Raw Milk Production cum Vermi-composting	23	August	MMSU
150	Walk In Training	10	August	UPLB
151	Ruminant Production	193	August	VSU
152	Livestock-Based Farming System	37	August	VSU
153	Milking, Milk Processing, Forage Production, Carabao Care and Management	3	August	VSU
154	Dairy Production Training	26	August	VSU
155	Maigsing Pagsasanay sa Pangangalaga at Pamamahala ng Gatasang Kalabaw	10	September	CLSU
156	Milk Processing	16	September	CMU
157	Training on Milk Handling and Processing	27	September	CSU
158	Hands on training on milking machine	8	September	CSU
159	Lakbay Aral Sinocalan Irrigators Association	27	September	DMMMSU
160	Advances in animal Health	62	September	LCSF
161	Farmers Livestock School - Sorting Out Farm Problems Using Problem Tree Analysis; Understanding the Potentials of Dairy Buffalo Production	39	September	MMSU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
162	Skills Training on Carabao Raising and Management Leading to Raw Milk Production cum Vermi-composting	35	September	MMSU
163	Farmers Livestock School - Exposure Trip to PCC at MMSU	31	September	MMSU
164	Farmers Livestock School - Village Characterization thru Story Map and Calendars	37	September	MMSU
165	Training on Milking, Milk Handling and Processing of Buffalo milk	12	September	USM
166	Milking, Milk Processing, Forage Production, Carabao Care and Management	31	September	VSU
167	Ruminant Production	57	September	VSU
168	Dairy Production	49	September	VSU
169	Geotagging	7	September	VSU
170	Milk Collection, Handling and Processing	6	September	VSU
171	Orientation/Identification the Different types of Forage	44	September	VSU
172	Basic Training Course on Artificial Insemination & Pregnancy Diagnosis in Water Buffaloes	15	October	CLSU
173	Social Preparation Training	14	October	CMU
174	Pasture Management	4	October	CMU
175	Feeds and Feeding Management	4	October	CMU
176	Calf Rearing Management	3	October	CMU
177	Dairy Management	3	October	CMU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
178	Cup Orientation	39	October	DMMMSU
179	Info Drive and Training on Animal Management	24	October	DMMMSU
180	Orientation on Cup and Dairy Buffalo	26	October	DMMMSU
181	Training and Information Drive on Carabao Production	37	October	DMMMSU
182	Orientation on Dairy Buffalo Farming	16	October	DMMMSU
183	Training on Dairy Production and Management	103	October	LCSF
184	Milk and Milk Handling	30	October	LCSF
185	Milk control and milk processing	61	October	LCSF
186	Social Preparation Training	38	October	MLPC
187	Skills Training on Carabao Raising and Management Leading to Raw Milk Production cum Vermi-composting	38	October	MMSU
188	Farmers Livestock School - Feed Resources for Buffales	30	October	MMSU
189	Farmers Livestock School - Forage Conservation & Enrichment of Quality of Farm By-Products; Silage Making	25	October	MMSU
190	Farmers Livestock School - Understanding the Potentials of Dairy Buffao Production & Health Management for all Stages of Growth	28	October	MMSU
191	Practical Training on Product Costing	1	October	UPLB
192	Practical Training on Recording	1	October	UPLB
193	Training on Dairy Processing	3	October	UPLB

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
194	Training on Milk Handling and Quality Control	3	October	UPLB
195	Basic Animal Health Training & Hands-one Milking	26	October	USF
196	Training on Dairy Production and Management	33	October	USM
197	Bull Management Training	14	October	USM
198	Training on Hand Milking and Pasteurization	21	October	USM
199	On-the-Job-Training	26	October	WVSU
200	On-the-Job-Training	14	November	CMU
201	Basic Training Course on Artificial Insemination and Pregnancy Diagnosis	15	December	CMU
202	Cup Orientation	37	December	DMMMSU
203	Advances in Animal Health	34	December	LCSF
204	Hands-on training for walk in	9	December	LCSF
205	Skills Training on Carabao Raising and Management Leading to Raw Milk Production cum Vermi-composting	36	December	MMSU
206	Farmers Livestock School - Feeding the Different Physiological Stages	26	December	MMSU
207	Farmers Livestock School - Discussion of Health Manifestations and Predisposing Factors	26	December	MMSU
208	Training on Dairy Processing	3	December	UPLB
209	Hands-on Training on Farm Management	14	December	UPLB

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

<b>No.</b>	<b>Title of Training Conducted</b>	<b>No. of Participants</b>	<b>Month</b>	<b>Center</b>
210	Practical Milking, Milk Handling	3	December	UPLB
211	Practical Training on Dairy Buffalo Management	3	December	UPLB
212	Dairy Processing Training	5	December	USF
213	Hands-on Training on Milking	64	December	USF
214	Advances in Animal Health and Hands-on Training on Milking	19	December	USF
215	Social Preparation Training	13	December	USF
216	Hands-on Training on Milking	26	December	USF
217	Training of Trainors on Small Holders Cattle and Carabao Production	10	December	USM
218	Cara-dairying	18	December	VSU
219	On-the-Job-Training	5	December	WVSU
220	Gender Sensitivity and Appreciation of CEDAW Principles	36	December	CLSU
221	Employee Motivation and Engagement Training	57	December	CLSU
222	AI FORUM	33	December	DMMMSU
223	Care and Management of Dairy Buffaloes	47	December	DMMMSU
224	Re - Orientation On Dairy Buffalo Management	23	December	DMMMSU
225	Orientation on Dairy Buffalo Business	37	December	DMMMSU
226	Training on Animal Production	19	December	DMMMSU
227	Info Drive- I (Senior High Sto. Tomas La Union)	19	December	DMMMSU

**Appendix 1. CY 2017 Trainings Conducted by PCC and Number of Participants.**

No.	Title of Training Conducted	No. of Participants	Month	Center
228	Training on Animal Production	19	December	DMMMSU
229	Regional Management Conference (Department of Agriculture)	44	December	DMMMSU
230	Hands-on training for walk in	79	December	LCSF
231	Retraining of bull recipients and inactive animals	53	December	LCSF
232	Training on dairy buffalo enterprise development	19	December	LCSF
233	Hands-on in Milk Quality Testing and Milk Processing	10	December	MMSU
	<b>TOTAL</b>	<b>7701</b>		

**Appendix 2. CY 2017 Trainings Conducted for the National Impact Zone (Nueva Ecija).**

No.	Trainings/Seminar/Fora Conducted	No. of Participants	Month	Center
1	Basic Buffalo Management	27	January	Session Hall, Bongabon, Nueva Ecija
2	Milk Processing	6	February	PCC at CLSU Processing Plant, Muñoz, Nueva Ecija
3	Basic Buffalo Management	23	March	Mini Theater, LIB Complex, PCCNHG Muñoz, Nueva Ecija
4	Milk Handling and Quality Control	15	May	Mini Theater, PCCNHG, Muñoz, Nueva Ecija
5	Twice Milking Technology	56	May	Eusebio Hall, PCCNHG, Muñoz, Nueva Ecija
6	Milk Quality Assurance and Control	13	June	NIZ Hall, PCCNHG, Muñoz, Nueva Ecija

Appendix 2. CY 2017 Trainings Conducted for the National Impact Zone (Nueva Ecija).

No.	Trainings/Seminar/Fora Conducted	No. of Participants	Month	Center
7	Milk Processing	5	June	Milk Krem Processing Plant, PCCNHG, Muñoz, Nueva Ecija
8	Milk Processing	5	June	Ayos Lomboy, Guimba, Nueva Ecija
9	Business Management and Operations	43	June	NIZ Hall, PCCNHG, Muñoz, Nueva Ecija
10	Twice Milking Technology	14	July	Campos Hall, PCCNHG, Muñoz, Nueva Ecija
11	Ice Cream Making	20	July	Eastern PMPC and Milka Krem Processing Plant, Muñoz, Nueva Ecija
12	On-site Training on Feeding Management and Improve Forage Production and Conservation	15	July	Pias, General Tinio, Nueva Ecija
13	Animal Health Care Management Training	25	August	NIZ Hall, PCCNHG, Muñoz, Nueva Ecija; San Jose City; Genepool and Aliaga
14	On-site Training on Feeding Management and Improve Forage Production and Conservation	20	September	Pesa, Bongabon, Nueva Ecija
15	Milk Processing	13	October	NIZ Hall, PCCNHG, Muñoz, Nueva Ecija
16	Financial Management	50	November	NIZ Hall, PCCNHG, Muñoz, Nueva Ecija
17	On-site Training on Feeding Management and Improve Forage Production and Conservation	18	December	Buliran, San Antonio, Nueva Ecija
	<b>TOTAL</b>	368		

Appendix 3a. List of On-going Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/ Proponents
Genetic Improvement	Establishment of Dairy Cattle Foundation Breeder Herd Thru ET Using Imported Pedigreed Frozen Embryos	J Lopez
	Association of Bovine Genetic Markers with Marbling and Tenderness in Buffaloes ( <i>Bubalus bubalis</i> )	EB Flores
	Molecular Characterization and Screening of $\beta$ -Casomorphin Gene ( $\beta$ -Casein Milk Variants) in Different Breeds of Buffaloes in the Philippines	P Pineda
	Application of Genomic Information in Dairy Buffalo Breeding Program: Genotyping the Philippine Water Buffalo using Medium Density 90k Buffalo SNP Panel	EB Flores
	Improving Artificial Insemination Efficiencies using Fertility Indexed Bulls Selected by Fourier Harmonic Analysis and Screened from Environmental Instabilities	PG Duran
	a. Effect of Season on Bull Fertility	
	b. Factors affecting the success of AI in the villages	
	c. The Use of cattle Oocytes on IVF	
	Assay of buffalo Sperm	
	d. In Vitro Fertilization Assay Using Oocytes from Large Follicles	
	Genetic Diversity of the Philippine Carabao mtDNA (COI) and microsatellite markers (FAO STRs)	LP Villamor
Gene Expression Analysis and Detection of Heat Shock Protein (HSP70) and its Correlation with Buffalo Semen Quality and Seasonal Variation	ERS Maylem	

Thematic Areas	Program/Project Title	Project Leader/ Proponents
Genetic Improvement	Development of Reproductive Management Program for Increased Efficiency of AI in Dairy Buffaloes	EC Atabay
	a. Follicular dynamics and hormone profile during estrus cycle of Swamp and Dairy buffaloes	
	b. Follicular dynamics and hormone profile during ovulation synchronization treatments for FTAI in buffaloes	
	c. The Use of Pregnancy Associated Glycoprotein in Early Pregnancy Detection following FTAI in Dairy Buffaloes	
	d. Improving Efficiency of Prostaglandin-based Estrus Synchronization for Pre-determined AI in Water buffaloes (Enhanced AI)	
	Utilization of DNA Marker Selection in Breeder and Commercial Swine Farm Units	EB Flores
	Optimizing Artificial Reproductive Technologies (Art) in Water Buffaloes Through the Regulation of Ovarian Function	EP Atabay
	a. In Vitro Embryo Production from OPU-derived Oocytes for Vitrification and Embryo Transfer in Water Buffaloes	
	b. Integration of Transrectal Ultrasonography and Hormone Analysis in Fixed Timed Artificial Insemination to Enhance Pregnancy Diagnosis and Rebreding in Water Buffaloes ( <i>Bubalus bubalis</i> )	
	c. Validation of Ovulation Synchronization Protocols and Optimization of its Efficiency in Water Buffaloes	
	d. Factors Affecting Efficiency of FTAI in Water Buffaloes	
	The Kinetics of Sperm Penetration and Embryo development as Predictors of Fertility of Frozen Buffalo Semen	ERS Maylem
	a. Characterization of Sperm Kinematics by Computer Assisted Sperm Analysis and Its Implication in Genetic Improvement of Water Buffaloes	

Appendix 3a. List of On-going Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/ Proponents
Genetic Improvement	Genetic Propagation of Girolando Dairy Cattle by Reproductive Techniques	EP Atabay
	Production of Genetically Superior Goat/Sheep and Germplasm Cryopreservation Through Assisted Reproductive Techniques	LC Ocampo
	Cryopreservation of Chicken Sperm for Cryobanking	FP Aquino
	Screening for additional microsatellite markers for second stage validation protocol of parentage testing in buffaloes ( <i>Bubalus bubalis</i> )	EB Flores
	Association of single nucleotide markers with estimated breeding values (EBVs) for milk yield and milk component traits of Philippine dairy buffaloes	EB Flores
	Evaluation of milk production performance of dairy buffaloes in selected cooperatives in Nueva Ecija	GG Gantioque,
	Ultrasonographic Measurement of Carcass Traits in Male Buffaloes ( <i>Bubalus bubalis</i> )	KJB Prades
	Detection of Foreign Body in Rumen and Reticulum of Buffaloes ( <i>Bubalus bubalis</i> ) Using Ultrasonography	KJB Prades
	Early Pregnancy Diagnosis by Detection of Pregnancy-Associated Glycoproteins Using Various Biotechnologies in Water Buffaloes Using Ultrasonography	EP Atabay
	Intervention in Post-Partum Management to Improve Artificial Insemination Efficiency in Water Buffaloes	BH Granada
	Screening of Sperm-Factor (Phospholipase C-Zeta) by Molecular Technique as a Novel Biomarker of Bull Fertility for Genetic Improvement in Water Buffaloes	EP Atabay
	a. Quantitative Expression of PLCzeta mRNA as index to Assess Oocyte-Activation and Fertilization Potential of Water Buffalo ( <i>Bubalus bubalis</i> ) Semen	
	b. Detection and Localization of Phospholipase C Zeta (PLCZ1) Protein in Water Buffalo Sperm and Its Correlation with Fertilization Ability	

Appendix 3a. List of On-going Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/ Proponents
Production Management System	Nutritive Value, Digestability and Performance of Buffaloes Using Banana Stalks and Water Lily	DL Aquino
	Development of Feeding Protocols and Practices to Support the Nutritional Requirement of Dairy Buffaloes	DL Aquino
	Establishment of Tropical Feed Library Utilizing Locally Available Feed Resources for Ruminant Production in the Philippines	DL Aquino
	Effects of Chitosan from Shrimp Shells on the Growth and Yield in Forage Grasses	RD Amido
	Assessment of Microbiota Dynamics of Water Buffalo Calf Digestive Tract on Different Weaning Diet	DL Aquino
	Performance of Growing Buffalo Calves Fed with Mulato II Grass ( <i>Brachiaria</i> sp.) with or without Concentrate Supplementation	LC Paraguas
	Performance of dairy buffaloes fed ration with baker's yeast ( <i>Saccharomyces cerevisiae</i> ) - fermented cassava pulp	CB Salces
	Growth and Reproductive Performance of Dairy Buffalo heifer with Mineral Block and Locally Formulated Mineral Supplement	GP Bajenting
	Herbage Yield and Nutrient Composition of Five Improved Forage Grasses Applied with Biogas Sludge as Fertilizer	VG Lopez
Biosafety	Development of Health Care Technologies and Practical Farm Practices in Support of Increasing Buffalo Milk Production	CN Mingala
	a. Alpha-2-Macroglobulin Gene Polymorphism in Water Buffaloes with Clinical and Subclinical Mastitis	
	Gene Marker Identification Targeting Toll-like Receptor 4 (TLR4), Breast Cancer 1 (BRCA1), and Adenosine Triphosphatase 1 Alpha 1 (ATP1A1) Genes: Assessing Their Association with Subclinical Mastitis Cases in Dairy Water Buffaloes, <i>Bubalus bubalis</i>	CN Mingala
	Bovine Vaccine Trial of <i>Schistosoma japonicum</i> Paramyosin	MSL Jiz

Appendix 3a. List of On-going Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/ Proponents
Biosafety	Isolation and Purification of Cathepsin L Proteinase and Paramyosin from Mature Fasciola spp.	CN Mingala
	Molecular Characterization of Lactic Acid Bacteria Isolated from Water Buffalo's Milk Functioning as Reservoirs of Mobile Antibiotic Resistance Genes	MM Balbin
	Molecular Characterization of Coccidia spp. in water buffaloes towards vaccine development	NS Abes
	Epidemiological Surveillance and Development of Diagnostic Protocols for Neglected Disease of Large Ruminants (Water Buffalo and Cattle) in the Philippines	MA Villanueva
	Application of a Cheap, Sensitive, and Rapid Point of Care Diagnostic Kit for Brucellosis Detection in Water Buffalo	CN Mingala
	Correlates of Immunity to hemorrhagic septicemia in water buffaloes	SH Gamol
	Mycoflora in Bubaline Milk and Detection of Aflatoxin M1	MW Pagaduan
	Prevalence and risk factors of Trypanosoma evansi infection among water buffaloes in Ubay, Bohol, Philippines	EP Tapdasan
Product Development	Milk Quality and Safety Assurance from Farm to Milk Processing Plant	MP Abella
	Quality Improvement of Acidified Buffalo Milk Products Through Stabilization with Locally Produced Mango Peel Pectin	PCO Saturno
	Product Standardization Across Regional Centers of the Philippine Carabao Center	MP Abella
Institutional Development	Operationalization of Livestock Biotechnology Center	CN Mingala

Appendix 3a. List of On-going Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/Proponents
Technology Transfer	Extension Methods for the Adoption of Dairy Buffalo Technology in Selected Barangays in Nueva Ecija and Ilocos Norte	EP Palacpac
Socio-Economic Dimensions of CDP Implementation	Consumers' Preferences for dairy Buffalo milk and milk products in Bohol Tourism Areas: An Analysis on Market	G Abay-Abay
	Facebook Users' Knowledge, Attitude and Practices towards Consumption of Bohol Dairy Products influenced by Facebook Page	LB Libres
	Best management practices of a primary farmers' cooperative in Visayas: A case study on the organizational culture and performance of Lamac Multipurpose Cooperative (LMPC)	CB Salces
	Effects of Buffalo's Milk Compared with Cow's Milk on Growth Indices of 10-12 Years Old Girls: A Randomized Controlled Trial	MS Samson
Enterprise Development	Strengthening San Agustin Crossbred Carabao-Based Enterprise Development (CBED) Model	AS Sarabia

Appendix 3b. List of Completed Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/Proponents
Biosafety	Anthelmintic Potential of Pochonia chlamydosporia against Fasciola sp. In Water Buffaloes (Bubalus bubalis)	SC Ramos
	Gene Marker Identification Targeting Toll-like Receptor 4 (TLR4), Breast Cancer 1 (BRCA1), and Adenosine Triphosphatase 1 Alpha 1 (ATPIA1) Genes: Assessing Their Association with Subclinical Mastitis Cases in Dairy Water Buffaloes Bubalus bubalis	C Biendima
	Sero-surveillance and Isolation of Bovine Viral Diarrhea Virus, Parainfluenza Virus, and Herpes Virus in the Philippines affecting Large Ruminants	MA Villanueva,
	Development of Loop Mediated Isothermal Amplification (LAMP) Assay based test kit for the detection/screening of caprine arthritis encephalitis virus (CAEV)	MM Balbin
	Genetic assessment of Trypanosoma spp. towards vaccine development	CP Saloma

Appendix 3b. List of Completed Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/ Proponents
Production Management System	Profile of Lactose Fermenting Bacteria on the Digestive Tract Fluid of Young Water Buffaloes Given Different Diets	EY Severo
	Pectinolytic, Proteolytic and Amylolytic Rumen Microbiota in Water Buffalo	CA Singh
	Influence of Selenium Supplementation on the Production of Spermatozoa and Semen Quality of Riverine Buffaloes	DL Aquino
Genetic Improvement	Defining the Culture Medium for the Production of Cattle ( <i>Bos taurus</i> ) Embryos for Vitrification by Cryotech® Method	AD Sayson
	Developmental Competence of Embryos Produced in Vitro from High and Low-Fertile Bulls Classified by Fourier Harmonic Analysis	HDM Daag
	Linkage Disequilibrium and Effective Population Size in Four Philippine Riverine Buffalo Population	JR Herrera
	Epididymal Sperm Cryopreservation as a Tool for the Conservation in Vitro of Indigenous Livestock and/or Endangered Wildlife in the Country: Prospects for Animal Genetic Resources (AnGr) Cryobanking	LCOcampo
	a. Optimizing Epididymal Sperm (ES) Recovery: comparison between Slicing +sperm swim-up (method A) and Mincing + flushing (method B)	
	b. Assessing the duration of motility and liveability of ES after the addition semen extender	
	c. In Vitro Fertilization (IVF) of oocytes derived from ovariectomized female goats using ES	
	d. Cryopreservation of ES recovered from castrated testicles	
	Inheritance of Cutaneous Muzzle Patterns in Water Buffalo ( <i>Bubalus bubalis</i> ) Through Muzzle Printing in the Philippines	JRE Rostigue
Screening for Sperm-Factor (Phospholipase C-zeta) by Molecular Technique as a Novel Biomarker of Bull Fertility for Genetic Improvement in Water Buffaloes	EP Atabay	

Appendix 3b. List of Completed Researches, CY 2017

Thematic Areas	Program/Project Title	Project Leader/Proponents
Genetic Improvement	Optimizing Artificial Reproductive Technologies (Art) in Water Buffaloes Through the Regulation of Ovarian Function a. Enhancing AI Efficiency in Buffalo through Synchronized Ovulation and Fixed Time Insemination in Water Buffaloes	EP Atabay
Product Development	Production and Stabilization of Whey Drink Using Locally Produced Mango Peel Pectin	MP Abella
	Pilot Test on Milk Supplementation for Supplementary Feeding Program Children Beneficiaries	MTR Sawit
Socio-Economic Dimensions of CDP Implementation	Profiling the Modalities of Carabao-based Enterprise Led by the PCC and its Partner Institution	EP Palacpac
	Social Imageability and Socio-Cultural, Economic, and Biophysical Contexts of Selected Philippine Carabao Festivals	PJB Del Rosario LG Battad
	Value Chain Analysis of Carabao and Carabao-based Products in the Philippines	PJB Del Rosario LG Battad
Institutional Development	Strengthening Institutional R&D Capability to Improve Reproductive Efficiency	EC Atabay MP Abella
Technology Transfer	Adoption of Carabao-Based Technologies in the National and Regional Impact Zones in Luzon: Implications to PCC's Technology Transfer Program	EP Palacpac

Appendix 3c. List of Externally Funded and Collaborative Researches, CY 2017

Project Title	Project Leader	Funding/ Collaborating Agency
Screening for Sperm-Factor (Phospholipase C-zeta) by Molecular Technique as a Novel Biomarker of Bull Fertility for Genetic Improvement in Water Buffaloes	EP Atabay	DA-Biotech
Application of Genomic Information in Dairy Buffalo Breeding Program: Genotyping the Philippine Water Buffalo using Medium Density 90k Buffalo SNP Panel	EB Flores	PCAARRD

Appendix 3c. List of Externally Funded and Collaborative Researches, CY 2017

Project Title	Project Leader	Funding/ Collaborating Agency
Screening for Sperm-Factor (Phospholipase C-zeta) by Molecular Technique as a Novel Biomarker of Bull Fertility for Genetic Improvement in Water Buffaloes	EP Atabay	DA-Biotech
Application of Genomic Information in Dairy Buffalo Breeding Program: Genotyping the Philippine Water Buffalo using Medium Density 90k Buffalo SNP Panel	EB Flores	PCAARRD
Improving Artificial Insemination Efficiencies using Fertility Indexed Bulls Selected by Fourier Harmonic Analysis and Screened from Environmental Instabilities	PG Duran	DA-Biotech
Genetic Diversity of the Philippine Carabao mtDNA (COI) and microsatellite markers (FAO STRs)	LP Villamor	DA-Biotech
Epididymal Sperm Cryopreservation as a Tool for the Conservation In Vitro of Indigenous Livestock and/or Endangered Wildlife in the Country: Prospects for Animal Genetic Resource Cryobanking	LC Ocampo	DA-Biotech
Development of Loop Mediated Isothermal Amplification (LAMP) Assay based test kit for the detection/screening of caprine arthritis encephalitis virus (CAEV)	MM Balbin	DA-Biotech
Gene Expression Analysis and Detection of Heat Shock Protein (HSP70) and its Correlation with Buffalo Semen Quality and Seasonal Variation	ERS Maylem	DA-Biotech
Program Title: Enhancing Milk Production of Water Buffaloes through S&T Interventions	AN del Barrio	PCAARRD
Project 1: Development of Feeding Protocols and Practices to Support the Nutritional Requirement of Dairy Buffaloes	DL Aquino	

Appendix 3c. List of Externally Funded and Collaborative Researches, CY 2017

Project Title	Project Leader	Funding/ Collaborating Agency
Project 3: Development of Health Care Technologies and Practical Farm Practices in Support of Increasing Buffalo Milk Production	CN Mingala	PCAARRD
Project 4: Milk Quality and Safety Assurance from Farm to Milk Processing Plant	MP Abella	
Project 5: Strengthening San Agustin Crossbred Carabao-Based Enterprise Development (CBED) Model	AS Sarabia	
Operationalization of Livestock Biotechnology Center	CN Mingala	DA-Biotech
Strengthening Institutional R&D Capability to Improve Reproductive Efficiency	EC Atabay MP Abella	PCAARRD
Enhancing the Buffalo Milk Production thru Philippine Carabao Center's NIZ Strategy	ZG Sanchez	PCAARRD
Utilization of DNA Marker Selection in Breeder and Commercial Swine Farm Units	EB Flores	PCAARRD
Establishment of Dairy Cattle Foundation Breeder Herd Thru ET Using Imported Pedigreed Frozen Embryos	J Lopez E Atabay	PCAARRD
Nutritive Value, Digestibility and Performance of Buffaloes Using Banana Stalks and Water Lily	DL Aquino	DA-BAR

Appendix 3c. List of Externally Funded and Collaborative Researches, CY 2017

Project Title	Project Leader	Funding/ Collaborating Agency
Pilot Test on Milk Supplementation for Supplementary Feeding Program Children Beneficiaries	MTR Sawit	DSWD
Surveillance and Characterization of Antimicrobial Resistant Escherichia coli and Salmonella from Livestock Farms, Milk and Meat in the Philippines	CN Mingala	World Health Organization
Quality Improvement of Acidified Buffalo Milk Products Through Stabilization with Locally Produced Mango Peel Pectin	PCO Saturno	PHILMECH
Bovine Vaccine Trial of Schistosoma japonicum Paramyosin	CN Mingala MSL Jiz	Research Institute for Tropical Medicine
Investigation on the Extent of Leptospira Infection Among Different Water Buffaloes in the Philippines	MAVillanueva	Hokkaido University
Genetic assessment of Trypanosoma spp. towards vaccine development	CP Saloma CN Mingala	NIMBB, UP Diliman

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
<p>Defining the Culture Medium for the Production of Cattle (<i>Bos taurus</i>) Embryos for Vitrification by Cryotech® Method</p>	<p>AD Sayson, EP Atabay, EC Atabay, ERS Maylem, MEC Leoveras</p>	<p>The present study was conducted to define a system for embryo production and cryopreservation which resulted in a high rate of embryo development and quality embryos suitable for embryo transfer following vitrification. In Study 1, the presumptive zygotes were randomly allocated to four culture medium treatments: (1) modified synthetic oviductal fluid (m-SOF) for day 1-7; (2) pure commercial medium for day 1-7; (3) commercial medium + 5% Fetal Calf Serum (FCS) for day 1-7; and (4) commercial medium for the first 2 days and supplemented with 5% FCS from day 3 to 7 (Sequential commercial medium). Embryos cultured in m-SOF is significantly lower (<math>P &lt; 0.05</math>) than other treatments in terms of cleavage in blastocyst cell count (<math>P &lt; 0.05</math>). On the other hand, Sequential media has significantly improved morula, blastocyst development and blastocyst cell count. Since the sequential commercial media is the most efficient treatment it was consequently used to produce embryos and were graded using International Embryo Transfer Society (IETS) standard, vitrified and warmed using Cryotech® method. The expanded blastocysts with the IETS code of 1 had the highest rates of re-expansion (92.50%) and hatching development (82.50%) at the post-thaw analysis. In conclusion, Sequential medium involving addition of Fetal Calf Serum on the commercial medium after 3 days of culture, produced high rate of embryo development and better quality blastocysts for vitrification. The success of vitrification is essentially dependent on the culture system, the developmental stage of the embryo, the quality of the embryo, the cell count and lastly the vitrification technique.</p>
<p>Genetic Assessment of <i>Trypanosoma</i> Towards Vaccine Development</p>	<p>CP Saloma, CN Mingala, JE Lazaro, NA Bascos, RI Paynaganan, F Tablizo, NS Abes, MRD Uy, MA Miguel, H Espiritu</p>	<p>Fifteen trypanosoma-positive blood samples were obtained from the field. The strains were propagated in mice then subjected to in vitro drug sensitivity testing and whole genome sequencing. One strain (O14) was found to be highly virulent in vivo and in vitro was resistant to all three drugs in the battery: isometamidium chloride, diminazene aceturate, and melarsamine hydrochloride.</p>

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
<p>Genetic Assessment of Trypanosoma Towards Vaccine Development</p>	<p>CP Saloma, CN Mingala, JE Lazaro, NA Bascos, RI Paynaganan, F Tablizo, NS Abes, MRD Uy, MA Miguel, H Espiritu</p>	<p>The genome sequence of O14 was compared to five less virulent strains, and all strains to the reference strain STIB 805 (tritrypdb.org). Many sequences in the samples were not found in the reference strain. Variant analysis between O14 and the less virulent strains identified a number of distinctive single nucleotide polymorphisms and large scale variations (e.g., deletions) many of which agree with the literature. These genes include the adenosine transporter, variant and invariant surface glycoproteins, paraflagellar components, and genes in energy metabolism, replication and translation, among others. PCR-based methods were devised to assay some of these markers. The frozen viable samples presently constitute a new biobank. The genomic sequences can be mined for surface peptide subunits, and those units cloned and configured as subunit or DNA vaccines. This approach has proven successful in previous studies, some of which are the basis of patents that anticipate a large demand for novel vaccines in the coming years.</p>
<p>Detection and Characterization of Bovine Ephemeral Fever in the Philippines through Reverse Transcription Polymerase Chain Reaction</p>	<p>CN Mingala, NS Abes, MM Balbin, LP Belotindos</p>	<p>Bovine Ephemeral Fever is an arthropod-borne viral disease caused by infection with bovine ephemeral fever virus of the family Rhabdoviridae. In the Philippines, bovine ephemeral fever is currently undetected because it is considered as an exotic disease of both cattle and water buffaloes. At this time, agencies of the country have no official data, no control programs and no vaccine used for prevention of the disease. However, there are field reports from different buffalo and cattle farms within the country wherein their animals showed clinical signs same of bovine ephemeral fever but has not undergone any confirmatory test. Detection of BEF virus in cattle and buffalo blood samples was conducted using reverse-transcription PCR. Its detection was based in the amplification of glycoprotein (G) gene, a conserved region in the BEF virus genome. The samples were collected from 22 cattle and 50 buffaloes with fever and manifestation of clinical signs suggesting ephemeral fever.</p>

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
Detection and Characterization of Bovine Ephemeral Fever in the Philippines through Reverse Transcription Polymerase Chain Reaction	CN Mingala, NS Abes, MM Balbin, LP Belotindos	All buffalo blood samples were negative while four (4) cattle blood samples were positive for BEF virus. The G gene partial sequence analysis from two BEF virus positive samples showed that they were closely related to Australian isolates.
Developmental Competence of Zygotes Produced In Vitro from High and Low-Fertile Bulls Classified by Fourier Harmonic Analysis	HDM Daag, LS Laruan, R Raterta, PC Duran, MN Daag, DH Duran	Fourier Harmonic Analysis or FHA is a computer-based analysis found effective in predicting bull fertility through in vitro fertilization assay assessed by male and female pronuclear formation. To assess the viability of fertilization and prove the in vitro embryo production potentials of bulls classified as High-fertile by FHA, in vitro matured water buffalo oocytes were in vitro fertilized with frozen-thawed semen from High- and Low-Fertile bulls classified by FHA. The in vitro fertilized eggs were further cultured in vitro for embryo development and cleavage, blastocysts development and hatching rates were determined on Day-2, Day-7 and 10 of in vitro culture with Day-0 as the day of in vitro fertilization, respectively. Results showed significantly higher ( $P < 0.01$ ) cleavage ( $73.5 \pm 0.8$ vs. $60.1 \pm 2.7$ ), blastocysts development ( $27.4 \pm 0.7$ vs. $18.5 \pm 1.6$ ) and hatching rates ( $38.3 \pm 1.2$ vs. $28.7 \pm 2.7$ ) from using High-Fertile than in Low-Fertile bulls. The results demonstrate that High-Fertile bulls classified by FHA produced more embryos in vitro than the bulls that were classified as Low-Fertile. The result suggests that FHA is a potential tool in predicting bull fertility in buffalo species. Efficiency assessment by artificial insemination is warranted.
Enhancing AI Efficiency through Synchronized Ovulation and Fixed Time AI in Water Buffaloes	EP Atabay, EC Atabay, ERS Maylem, RC Tilwani, EB Flores, AS Sarabia	Two studies were conducted to assess the efficiency of Fixed Time AI technology with its initial integration into the reproductive management program in buffaloes. Study 1 validated the efficacy of the widely used ovulation synchronization protocols for FTAI. Non-pregnant animals were randomly allotted into: Protocol A: OVSYNCH, animals received the 1st Gonadotropin-releasing hormone (GnRH) injection (day 0), Prostaglandin (day 7), 2nd GnRH (day 9), and timed AI (day 10). In protocol B: progesterone-supplemented Ovsynch (CIDR-SYNCH),

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
<p>Enhancing AI Efficiency through Synchronized Ovulation and Fixed Time AI in Water Buffaloes</p>	<p>EP Atabay, EC Atabay, ERS Maylem, RC Tilwani, EB Flores, AS Sarabia</p>	<p>the procedure is similar with A except that the Controlled Internal Drug Release (CIDR) device insertion was done simultaneous with the 1st GnRH injection. Study 2 was conducted to compare the effects of ovulatory hormones: GnRH and human chorionic gonadotropin (hCG) in optimizing CIDR-SYNCH protocol. Animals were randomly assigned into protocol A: CIDR-SYNCH-GnRH or protocol B: CIDR-SYNCH-hCG. Follicular dynamics were monitored by ultrasonography at days 0, 7, 8, 9 and 10. Pregnancy diagnosis was performed at day 35 and 60 post-AI. Study 1 revealed a conception rate of 31.63% for OVSYNCH and 43.06% for CIRD-SYNCH which are significantly different (<math>P &lt; 0.05</math>). For Study 2, the mean follicle diameters of <math>&gt;9\text{mm}</math> (day 0), <math>&gt;10\text{mm}</math> (day 7), <math>&gt;11\text{mm}</math> (day 8), and <math>&gt;12\text{mm}</math> (day 9) were not significantly different between the two protocols. However, the size of preovulatory follicles at day 10 of <math>14.0\text{mm}</math> for hCG (vs <math>12.89\text{mm}</math> for GnRH) and subsequent ovulation rate of 90.09% (vs. 70% for GnRH) were significantly different (<math>P &lt; 0.05</math>) between the two treatments. The pregnancy rate of 58.04% achieved with CIDR-SYNCH-hCG is significantly higher (<math>P &lt; 0.05</math>) than that of CIDR-SYNCH-GnRH (43.06%). Essentially, the efficiency of OVSYNCH protocol in terms of pregnancy (31.63%) can be improved with CIDR-SYNCH protocol (43.06%), and the substitution of GnRH with hCG resulted in the largest diameter of preovulatory follicle, highest ovulation, and a conception rate of 58.04%. The size of the follicle at the end of the treatment is a key indicator of an effective ovulation synchronization protocol which holds a huge implication in water buffalo reproduction.</p>
<p>Profiling the Modalities of Carabao-Based Enterprise Led by the Philippine Caabao Center and its Partner Institution</p>	<p>EP Palacpac, RT Jacang, EM Valiente, EC Atabay</p>	<p>In the course of the Philippine Carabao Center's (PCC) implementation and promotion of the Carabao Development Program (CDP) and engagement with its stakeholders, various modalities on CDP's enterprise development component have emerged. While this is so, there has been no deliberate effort to have them documented and understood.</p>

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
<p>Profiling the Modalities of Carabao-Based Enterprise Led by the Philippine Caabao Center and its Partner Institution</p>	<p>EP Palacpac, RT Jacang, EM Valiente, EC Atabay</p>	<p>This study aimed to fill this gap by providing detailed information on the modalities of carabao-based enterprises (CBE) led by the PCC and partner-institutions, as well as to bring forth comprehension, recognition, and appreciation of their existence. To do so, the study gathered and analyzed secondary data and primary data from face-to-face focused group interviews with key informants. Four CBE modalities were identified and described as to their performance measures namely manageability, sustainability, productivity and viability. The CBEs were classified into the following modalities: (1) PCC-Impact Zone, which is anchored on PCC's engagement with, mobilization, and provision of technical assistance and other support services to primary farmer-cooperatives, associations, and federations, (2) Partnership with Academic Institutions, which involved techno-business demo activities in government or private schools, universities and colleges (SUCs), (3) Single Proprietorships and Corporations, which involved private commercial businesses and family enterprises, and (4) Local Government Unit (LGU)-led, which is also anchored on farmer-groups by way of direct assistance from the former and from the PCC to some extent. The LGU-led modality as exemplified by the CHATTO Program seemed to be successful in all performance measures considering its scope, funding and institutional support. On the other hand, in terms of viability of milk production, the PCC-IZ modality seemed to excel because most of the animals entrusted by PCC are purebred dairy buffaloes. Recommendations as to maximize the performance measures of CBEs are provided.</p>
<p>Influence of Selenium Supplementation on the Production of Spermatozoa and Semen Quality of Riverine Buffaloes</p>	<p>MM Santos, DL Aquino, ME Leoveras, E Paraguison, EA Venturina</p>	<p>The primary objective of the study was to determine the influence of different concentrations of selenium in the production of spermatozoa and semen quality of riverine buffaloes. Experimental animals were divided into 6 groups. The first group of animals were not supplemented with selenium and act as a control.</p>

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
<p>Influence of Selenium Supplementation on the Production of Spermatozoa and Semen Quality of Riverine Buffaloes</p>	<p>MM Santos, DL Aquino, ME Leoveras, E Paraguison, EA Venturina</p>	<p>The second and third group were given 10% and 5% below the required selenium for mammals, respectively. The fourth group were supplemented with the required amount of selenium. The fifth and sixth group were supplemented with 5% and 10% above the required selenium respectively. Thirty riverine buffaloes were fed for three months under complete confinement system of management. Parameters such as semen volume, sperm motility, sperm concentration and sperm morphology were evaluated. The results showed that the Treatment 5 (5% above the required selenium for animal) produced the highest value in semen volume, sperm motility, concentration, viability (3.68 mL, 71.82%, 126.84 x 10<sup>7</sup> and 82.91%) and had the lowest abnormal sperm (10.55%) among the treatments. These results indicate that the spermatozoa production and semen quality was affected by dietary selenium supplementation of different concentration in terms of mean values. Supplementing Selenium to a diet provided additional benefit in semen production and sperm quality over the non-supplemented control diet. Therefore, selenium may be tightly regulated by the bull's physiology, thereby standardizing the effects of selenium on semen production and sperm quality.</p>
<p>Pectinolytic, Proteolytic and Amylolytic Microbiota In Bubalus bubalis Digestive Tract as Affected by Weaning Diets</p>	<p>CA Singh, KJ Cruz, CC Divina, VKD Serrano, P Florendo, DL Aquino</p>	<p>This study isolated, characterized, identified and compared the pectinolytic, proteolytic and amylolytic functional bacteria of the calves digestive tract fluid from birth, 6 days old, 16 days old and 30 days old. Ten newly born buffalo calves were used and randomly assigned to two weaning diets: the control groups with milk, forages and calf pellets while the treatment group was fed with raw milk and forage. For the characterization of bacterial isolates, cultural, morphological and biochemical analysis were used. Analysis and evaluation of the feeding composition were also assessed. Identified bacteria include the genera of Streptococcus sp., Bacteroides sp., Prevotella sp., Butyrivibrio sp., Ruminococcus sp., Bacillus sp. and Succinimonas sp. exhibiting properties of pectinolytic, proteolytic and amylolytic functional bacteria.</p>

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
<p>Pectinolytic, Proteolytic and Amylolytic Microbiota In Bubalus bubalis Digestive Tract as Affected by Weaning Diets</p>	<p>CA Singh, KJ Cruz, CC Divina, VKD Serrano, P Florendo, DL Aquino</p>	<p>The isolated bacteria found to acquire multifunctional bacterial properties which are necessary to convert and absorb feed nutrients and provide calves the needed energy. The high fiber content of Pakchong 1' and high protein content of Colostrum and Calf starter together with the minimum content of moisture, ash, and fat promote the gradual growth of functional bacteria as the calves feeding consumption increases. The colony distribution in both weaning diets shows a no significant difference in four sampling dates as affected by the composition of weaning diets. This result implies that early weaning changes and adjusted the bacterial population which may contribute to early rumen development of calves as it is influenced by either of the weaning diets.</p>
<p>Adoption of Carabao-Based Technologies in the National and Regional Impact Zones in the Philippines: Implications to PCC's Technology Transfer Program</p>	<p>EP Palacpac, EC Atabay, EN dela Cruz, EM Valiente, RT Jacang, MTA Manito</p>	<p>The study aimed to analyze the adoption of 18 technologies on dairy buffalo production in selected impact zones of the Philippine Carabao Center (PCC). A total of 740 farmer-informants (666 previously trained on dairy buffalo production and 74 control) were interviewed using semi-structured questionnaire. Dichotomous (yes or no) frequency and percentage responses along five stages, i.e., "awareness", "interest", "evaluation", "trial", and "adoption" were transformed to sigma (Z) scores for adoption. Frequency responses for "number of years of adoption" were likewise transformed to sigma scores. The two sigma scores were added to get the total adoption scores for each technology. The total or combined adoption scores (dependent variable) for all technologies were then tested for linear correlation and multiple regression with selected socio-economic traits, farm characteristics, and other independent variables. Most of the trained farmer-informants adopted technologies with at least 75% adoption rate in animal health care, improved forage feeding, estrus detection, and feeding of calves with colostrum. Multiple regression analysis indicates that attribution scores, years of experience in dairying, technical assistance, animal inventory, distance of the farm from PCC, access to information materials and income from dairying positively and</p>

Appendix 4. Abstracts of some completed researches in 2017.

Title	Researchers	Summary/Abstract
Adoption of Carabao-Based Technologies in the National and Regional Impact Zones in the Philippines: Implications to PCC's Technology Transfer Program	EP Palacpac, EC Atabay, EN dela Cruz, EM Valiente, RT Jacang, MTA Manito	significantly influenced adoption scores. To increase adoption, improving the attribution by farmers to technologies as regards their relative advantage, compatibility with existing farm operations, trialability, and simplicity should be given priority consideration by PCC in designing and implementing its extension modalities since it is the most powerful predictor variable to adoption.

Appendix 5a. Research articles published in refereed journals, CY 2017

Author	Project Title	Journal
Maylem ERS; Leoveras MEDC; Atabay EP and Atabay EC	Assessing the Quality of Bovine Embryos Produced In Vitro Through the Inner Cell Mass and Trophectoderm Ratio	Philippine Journal of Science. 146 (4): 469-474, December 2017
Maylem ERS; Leoveras MEDC; Atabay EP; Atabay EC and Venturina EV	Subpopulation Structure and Changes After Cryopreservation of Sperms from High and Low Fertility Water Buffalo	Journal of Veterinary Andrology ISSN 2542-3045 Vol 2(2) (July-December 2017)
Maylem ERS; Leoveras MEDC; Atabay EP; Atabay EC, and Venturina EV	Identification of sperm subpopulations in water buffalo ejaculates: changes in cryopreservation stages and bull variation	Journal of Agricultural Science and Technology A 7 (2017) 184-192 doi: 10.17265/2161-6256/2017.03.006
Atabay EP; Tadeo RD; Atabay EC; Venturina EV; Fissore RA; and Mingala CN	Molecular Characterization and Comparison of Phospholipase C zeta (PLCZI) Gene Between Swamp (Bubalus carabanensis) and Riverine (Bubalus bubalis) Buffaloes: Its Implications and Future Perspectives, Animal Biotechnology	DOI: 10.1080/10495398.2017.1350689

Appendix 5a. Research articles published in refereed journals, CY 2017

Author	Project Title	Journal
Atabay EC; Saturno JFL; Atabay EP and Maylem, ERS	Optimizing Chemically-defined medium for the production of bovine ( <i>Bos taurus</i> ) embryos in-vitro	Res. Opin. Anim. Vet. Sci., 7 (1): 20-24.
Bumanlag AC; Harada HL; Divina CC; Ocampo MB; and Ocampo LC	Sperm motility assessment of epididymal sperm from post mortem goat testicles held at 5°C	Entomol Appl Sci Lett, 2017, 4(2):16-18, DOI:10.24896/easl2017424.
San Diego LAB; Salinas MBS; Bumanlag AC; Ocampo MB; and Ocampo LC	Viability of carabao ( <i>Bubalus bubalis carabanensis</i> ) epididymal sperm from post mortem testes in semen extender at refrigerated temperature	Entomol Appl Sci Lett, 4(2) 5-10
Gajeton MB; Tomas JV; Cruz KJ; Ocampo MB; and Ocampo LC	Assessment of post mortem epididymal sperm from non-descript bucklings ( <i>Capra hircus</i> )	Entomol Appl Sci Lett, 2017, 4(1):20-25
Duran DH; Duran PLH; Duran PG and Cruz LC	Production of river buffalo ( <i>bubalus bubalis</i> ) calves by embryo in vitro production-vitrification and transfer techniques in the Philippines	Buffalo Bulletin 2017; 36(4):607-614
Fernando TC and Duran DH	Current trends and developments in the use of assisted reproductive technology and its application in the Philippine livestock improvement program-a review	Buffalo Bulletin (April-June 2017) Vol.36 No.2: 263-280.
Duran DH; Duran PG; Monson R; and Parrish J	Motility and membrane integrity of ejaculated bovine spermatozoa extended and cryopreserved in L-carnitine tris-egg yolk extender	J. ISSAAS Vol. 23, No. 1: 56-67 (2017): 56-67
Biendima CC; Ramos SC; Uy MRD; and Mingala CN	Molecular characterization of BRCA1 as candidate gene marker for subclinical mastitis in dairy water buffaloes ( <i>Bubalus bubalis</i> )	Philippine Journal of Science 146 (3): 293-298, September 2017

Appendix 5a. Research articles published in refereed journals, CY 2017

Author	Project Title	Journal
Cabrera GFS; Balbin MM; Eugenio PJG; Zapanta CS; Monserate JJ; Salazar JR; and Mingala CN	Green synthesis of gold nanoparticles reduced and stabilized by sodium glutamate and sodium dodecyl sulphate	Biochemical and Biophysical Research Communications. 2017 Mar 18;484(4):774-780.
Rivera SM; Padiernos RBC; Abella EA; Konnai S; and Mingala CN	Molecular characterization of lymphocyte activation gene-3 (LAG-3, CD223) of swamp- and riverine-type water buffaloes	Japanese Journal of Veterinary Research 65(2): 6 10.14943/jjvr.65.2.65
Atabay EP; Tadeo R; Atabay EC; Venturina EV; Fissore R; and Mingala CN	Molecular Characterization and Comparison of Phospholipase C zeta (PLCZ1) gene between Swamp (Bubalus carabanensis) and Riverine (Bubalus bubalis) Buffaloes: Its Implications and Future Perspectives	Animal Biotechnology. 2017 Aug 11:1-9. doi: 10.1080/10495398.2017.1350689.
Ashraf A; Imran M; Yaqub T; Tayyab M; Shehzad W; Mingala CN; Chang YF	Development and validation of loop-mediated isothermal amplification assay for the detection of Mycoplasma bovis from mastitic milk samples.	Folia Microbiologica. In Press. 2017 Dec 14. doi: 10.1007/s12223-017-0576-x.
Paraguas AM; Cailipan TC; Flores EB; and Villamor LP	Morphological Characteristics and Inferred Phylogeny of Swamp Buffaloes Bubalus bubalis in Carabao Conservation in Calayan Island.	Philippine Journal of Veterinary and Animal Sciences (Peer-Reviewed Accepted)
Flores EB	Phenotypic trend and estimates of genetic parameters for growth traits of Philippine swamp buffaloes in a nucleus herd, Cagayan province, Philippines.	Philippine Journal of Veterinary and Animal Sciences. 43(2): 67-72

Appendix 5b. Research articles published in scientific proceedings

Author	Title of the paper	Title of the proceedings
Bernardino, Fatima Grace P., Darlene Fe. P. Castro, Lerma C. Ocampo and Marlon B. Ocampo	Isolation and Characterization of the Gonadal Primordial germ cells (gPGCs) of Turkey (Melleagris Gallopavo) from 11-14 days old embryo	Book of Abstracts of the 6th International Conference on Integration of Science and Technology (ICIST) for Sustainable Development 2017. Hotel Supreme and Convention Plaza, Baguio City Philippines November 24-26,2017. Page 64.
Vicencio, Neil G., Virgilio D. Viernes Jr., Lerma C. Ocampo and Marlon B. Ocampo	Gross anatomy of the female reproductive organs of the Philippine native pig ( <i>Sus scrofa</i> L.)	Book of Abstracts of the 6th International Conference on Integration of Science and Technology (ICIST) for Sustainable Development 2017. Hotel Supreme and Convention Plaza, Baguio City Philippines November 24-26,2017. Page 63.
Cajucum, Renz Carlo, Elfren F. Celestino Jr., Lerma C. Ocampo, Virgilio D. Viernes and Marlon B. Ocampo	Meiotic Resumption and Completion in vitro of immature buffalo oocytes after vitrification	Book of Abstracts of the 6th International Conference on Integration of Science and Technology (ICIST) for Sustainable Development 2017. Hotel Supreme and Convention Plaza, Baguio City Philippines November 24-26,2017. Page 39
Bayani, DMA, EF Celestino Jr., VD Viernes, MB Ocampo and LCOcampo	Survivalbility and 1st meiotic completion in vitro of immature bovine oocytes after vitrification	Book of Abstracts of the 6th International Conference on Integration of Science and Technology (ICIST) for Sustainable Development 2017. Hotel Supreme and Convention Plaza, Baguio City Philippines November 24-26, 2017. page 20
Marata, SMA, DFO Castro, LC Ocampo and MB Ocampo	Evaluation of epididymal sperm from post mortem cauda epididymides of ram ( <i>Ovis aries</i> )	Book of Abstracts of the 6th International Conference on Integration of Science and Technology (ICIST) for Sustainable Development 2017. Hotel Supreme and Convention Plaza, Baguio City Philippines November 24-26, 2017. Page 68.
Gautane, Joram J., Flocerfida P. Aquino, Errol Jay Balagan, Elfren Celestino, Marlon B. Ocampo and Lerma C. Ocampo.	Cryotolerance of post mortem goat epididymal sperm germplasm after preservation at cryogenic temperature	Transactions of the NAST, Abstracts of papers on 39th Annual Scientific Meeting Volume 39:1 p39 July 2017 issue, Manila Hotel, July 12-13, 2017 Manila, Philippines
D.H. Duran and P.G. Duran	Developments and prospects of advance reproductive biotechnologies in buffalo production	In: The proceedings of the International Buffalo Symposium (Eds. Devkota, B; Bhattarai, N; Sah, M.K.; Luitel, H) Agriculture and Forestry University, Rampur, Chitwan, Nepal, November 15-18, 2017. Pp. 35-43.

Appendix 5b. Research articles published in scientific proceedings

Author	Title of the paper	Title of the proceedings
P.G. Duran and D. H. Duran	Fourier Harmonic Analysis as tool in predicting bull fertility from improved buffalo breeding	1. In: The proceedings of the International Buffalo Symposium (Eds. Devkota, B; Bhattarai, N; Sah, M.K.; Luitel, H) Agriculture and Forestry University, Rampur, Chitwan, Nepal, November 15-18, 2017. Pp. 118-126.
Danilda Hufana-Duran	Livestock reproductive biotechnologies: Role in land preservation and green agriculture	In: Proceedings of the ISSAAS 2017 International Congress and Meeting, Vietnam National University of Agriculture, Hanoi, Vietnam, 14-16 October 2017. Pp. 6 (Abstract)
Danilda Hufana-Duran	Technological innovations on water buffalo reproduction for sustainable livestock production growth and improvement	In: Proceedings of the International Society for Southeast Asian Agricultural Sciences 2017 National Congress and General meeting, MMSU, Ilocos Norte, 21-23 September 2017. Pp. 42 (Abstract)
Danilda H. Duran	Fourier Harmonic Analysis as tool in predicting bulls with non-compensable fertility problem	In: Proceedings of the 17th Conference of the Science Council for Asia, PICC, Manila. June 14-16, 2017. Pp 24 (Abstract)
Maylem, ERS, Rivera SM, Atabay EP, Atabay EC, and Venturina EV	Thermotolerance Identification in Water Buffalo Using Heat Shock Protein 70 (HSP70) and its effect to Semen Quality in varying Environmental Conditions	PSAS Conference, Cebu City, October 18-21, 2017.
Maylem, ERS, Ramos GE, Rivera SM, Atabay EP and Atabay EC	The Role of HSP70 Gene Expression in Blood Lymphocytes of Water Buffaloes with Different Calving Intervals	The 44th Philippine Society of Biochemistry and Molecular Biology, November 27-30, 2017.
Aquino, F.P., Flores, E.B., Maylem, E.R.S. and Atabay, E.P	Effect of Long Distance Transport on the Viability of Fresh and Frozen-Thawed Goat Embryos Stored in Portable Incubator	
JJ Gautane, FP Aquino, EJ Balagan, EF Celestino Jr, MB Ocampo, LC Ocampo	Cryotolerance of post mortem goat epididymal sperm germplasm after preservation at cryogenic temperature	NAST, Abstracts of papers on 39th Annual Scientific Meeting Volume 39:1 p. 39 July 2017 issue, Manila Hotel, July 12-13, 2017 Manila, PHILIPPINES

Appendix 5b. Research articles published in scientific proceedings

Author	Title of the paper	Title of the proceedings
AJDS Escudro, LP Villamor, AM Paraguas	Allele Frequency and Polymorphism of Swamp Buffaloes ( <i>Bubalis bubalis</i> ) in selected Luzon Populations using 30 FAO Microsatellite DNA Markers	Philippine Society for Biochemistry and Molecular Biology (PSBMB) Central Luzon Chapter's 1st Biotechnology Symposium August 25, 2017
AM Paraguas, TC Cailipan, EB Flores, LP Villamor	Morphological and phylogenetic analysis as tools for conservation management of swamp buffaloes ( <i>Bubalus bubalis</i> ) in Calayan Island	The Philippine Society of Animal Science 54th Scientific Seminar and Annual Convention October 18-21, 2017 p. 20
TC Cailipan, LP Villamor	Paternal lineage of swamp buffaloes from 14 Luzon populations using SRY-gene	The Philippine Society of Animal Science 54th Scientific Seminar and Annual Convention October 18-21, 2017 p. 18
LP Villamor, AM Paraguas, EB Flores	Inferred Phylogeny and New COI Haplotypes in <i>Bubalus bubalis</i> Swamp-type in Luzon, Philippines	2017 International Society for Southeast Asian Agricultural Sciences: International Congress and General Meeting Vietnam National University of Agriculture, Hanoi, Vietnam on October 13-15

Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.

Title	Venue (Local)	Date (2017)	No. of PCC participants
GK Business Summit	Gawad Kalinga, Angat, Bulacan	January 20	2
Control of Documented Implementation	Manila	January 27	1
Seminar-Workshop on Agri-Biotech Funding Opportunities	Catarman, Northern Samar	February 7-8	1
Training workshop on Capillary sequencing and fragment analysis	UP Diliman	February 9-10	3
DOST 2nd National R&D Agenda	Manila Hotel	February 15,	5
84th PVMA Scientific Conference and Annual Convention	Baguio Country Club, Baguio City	February 21-24	31
Environmental Laws & Regulations	Pampanga	February 27-March 2	2

Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.

Title	Venue (Local)	Date (2017)	No. of PCC participants
Farmers training on Proper feeding management and Practices for Raising Buffalo Calves from Birth to Weaning	PCC National Headquarters and Genepool, Science city of Munoz, Nueva Ecija	February 28	3
International Conference on food & Agriculture	UP LB	March 2-3	1
Orientation Seminar on environmental Laws, Rules & Regulations for Managing Heads	Clark, Pampanga	March 9	1
NRCP Division 6, ICS	UPLB	March 9	1
Training on Product Standardization; Milk Processing and Quality Evaluation	PCC Milka Krem	March	3
Business Taxation and Percentage center	Manila	March 13	1
UPLB IAS Graduate Seminar Series	UPLB	March 17	1
NRCP Annual Scientific Conference & 84th Gen. membership Assembly	PICC	March 22	5
ISO 9001:2015 Awareness & Internal Auditing Training	UPLB	March 22-24	1
R4D Pre In-House Review	PCC-National Headquarters, Science City of Munoz, Nueva Ecija	March 24 & 29	115
Philippine Society for Microbiology, Inc. Cluster 2 Symposium	Diliman, Quezon City	March 25	1
PAGBA quarterly seminar and meeting	Baguio City	April 5-8,	5
BIOTECH 101: Training Course for Regulatory Officers	PhilRice	April 18-20	1
Seminar-Workshop on the Formulation of Nanotechnology R&D Agenda for Agriculture, Aquatic and Natural Resources	De La Salle University, Manila	April 20-21	2
Results-based Project Management	Asian Institute of Management, Makati City	April 24-28	1
20th Dairy Congress and Expo	Provincial Convention Center, Mambajao, Camiguin	May 3-5	22

Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.

Title	Venue (Local)	Date (2017)	No. of PCC participants
ICTS Resources Acquisition Project	Quezon City	May 8-12	3
Japan Overseas Cooperation Volunteers-Phils.	General Santos City	May 10-12	1
NAST Regional Scientific Forum	Baguio City	May 15	5
Seminar Workshop on Records Disposition Administration	General Santos City	May 23-25	3
GACPA 39th National Convention	Iloilo City	May 24-27	8
Psychological Association of the Phils.	Dumaguete City	May 25-26	1
17th Conference of the Science Council of Asia	Manila	June	1
45th VPAP Annual Scientific Conference	Luxent Hotel, Quezon City	June 22-23	1
9th SAPS-Secretaries & Admin Professionals	Pasay City	June 22-23	2
Public Procurement Specialist Certification Course Level 1	UP Diliman	June 30-July 1,7,8,14,15,21	1
2017 Public Sector HR Symposium	Pasay City	July 4-6	2
R4D In-House Review	PCC-National Headquarters, Science City of Munoz, Nueva Ecija	July 4-7	130
5th Annual Research Symposium and General Assembly meeting of the Japan Society for the Promotion of Science Alumni Association in the Philippines (JAAP)	SMX Convention Hall	July 12	2
45th VPAP Annual Scientific Conference	Luxent Hotel, Quezon City	June 22-23	1
R4D In-House Review	PCC-National Headquarters, Science City of Munoz, Nueva Ecija	July 4-7	130
5th Annual Research Symposium and General Assembly meeting of the Japan Society for the Promotion of Science Alumni Association in the Philippines (JAAP)	SMX Convention Hall	July 12	2

Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.

Title	Venue (Local)	Date (2017)	No. of PCC participants
NAST 39th Annual Scientific Meeting	Manila Hotel, Manila	July 12-13	13
Training on DNA/RNA extraction and capillary sequencing- July 17-21, 2017 Philippine Genome Center	UP Diliman	July 17-21	2
Strategic Planning and Writeshop for Animal Schistosomiasis Prevention and Control Program	Icon Hotel, North EDSA, Quezon City	July 18-20	1
26th Annual Philippine Biodiversity Symposium	Ateneo de Manila University	July 18-22	1
2016 Revised implementing Rules and Regulations of R.A. 9184(Government Procurement Reform Act)	Puerto Princesa	July 19-22	15
Sales Management Seminar	Makati City	July 19-21	1
Inception Workshop of the Philippine component of the project entitled “Engaging the food and agriculture sectors in sub-Saharan Africa and South and South-east Asia in the global efforts to combat antimicrobial resistance using a One Health approach (GCP/ GLO/ 710/ UK)”	Sequoia Hotel, Quezon City	July 20	1
ITCPH – Training of Trainers on practical application of swine genomics		July 24 – 28	1
Food Safety Road Show	PCC-National Headquarters, Science City of Munoz, Nueva Ecija	August 1	7
Understanding and implementing a quality management	Pasig City	August 8	1
Microplate reader technology in natural products and food testing	Makati City	August 14	2
Training Program on Project Development & Management	UP Diliman	August 14-18	2
Workshop on RA 9184, Government Procurement Reform Act	Tagaytay City	August 16-19	2

Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.

Title	Venue (Local)	Date (2017)	No. of PCC participants
19th General Assembly & OSH National Convention	Bellevue Hotel, Bohol	August 23-25	3
1st Philippine Society of Biochemistry and Molecular Biology Central Luzon Chapter Symposium 2017	Philippine Rice Research Institute	August 24-25	6
Training on Operation and Maitenance of Bucket Milking Machine	PCC National Headquarters and Genepool, Science city of Munoz, Nueva Ecija	August 25	5
2nd International Livestock Biotechnology Symposium	B Hotel, Quezon City	August 30	24
Nano Biosensors for rapid diagnosis of medical and agricultural diseases	DLSU	August 31	1
USAID-STRIDE Innovation Workshop: Advancing Dairy Products Development Through Technology	PCC-National Headquarters, Science City of Munoz, Nueva Ecija	August 31	7
Policy Formulation Analysis	UP Diliman	September 4-8	2
Executive Assistant Training	Pasig City	September 5-6	1
How to get key decision markers to say to your project ideas: A training course for project implementers	DOST-PCAARRD Innovation and Technology Center, Los Baños Laguna	September 5-7	1
RA 9184-2016 Revised Implementing Rules & Regulations	Bayview Park Hotel, Manila	September 6-9	1
QMS24 ISO 9001:2015 Internal Auditor Training and Performance Based Approach	Pasig City	September 7-8	2
QSM24 ISO 9001: 2015 Internal Auditor Training (Process Risk and Performance Based Approach)	Pasig City	September 7-8	1
Basic Monitoring and Evaluation	Pasig City	September 11-13	2
Current Good Manufacturing Practices	PCC NHQ and Gene Pool	September 13	22
PhilAAST 66th Annual Convention and International Symposium on Research Translation	Hotel Jen, Roxas Blvd, Pasay City	September 19-20	1
Risk based thinking in ISO 9001:2015	Pasig City	September 21	1

**Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.**

<b>Title</b>	<b>Venue (Local)</b>	<b>Date (2017)</b>	<b>No. of PCC participants</b>
AASSA-NAST Phil International Symposium	Taal Vista Hotel, Tagaytay	September 21-22	3
Utility of Microsatellite Markers for Species Identification and Genetic Diversity Studies on Livestock	PCC National Headquarters & Gene Pool, Muñoz, N.E.	September 21-23	12
Round Table Discussion on Avian Influenza How do we Prevent its Entry and Spread: Policy Implications Towards Early Detection, Management and Mitigation	Manila	September 26	1
Workshop for the Standardization of Antimicrobial Susceptibility Testing Protocols based on the Standards of the Clinical and Laboratory Standards as Part of the National Program to Address the Concern on Antimicrobial Resistance	Quezon City	September 26	1
Seminar Contract Administration and Management	Baguio City	September 27-30	3
Hazard Analysis and Critical Control Point (HACCP) Training	PCC NHQ and Gene Pool	September 28	22
Laws & Rules on Government Expenditures (LARGE)	Quezon City	October 3-6	5
Agripreneurship: The Gamechanger Towards Prosperity for All	SMX Convention Center, 2nd Floor Function Room 1&2, Manila, Pasay City	October 4	1
Genomics (DNA extraction to capillary sequence training)	Quezon City	October 4-5	3
Association of Government Internal Auditors, Inc(AGIA) Annual Convention Cum Seminar	Baguio City	October 4-6	1
Agrilink/Food Link/Aqua Link	World Trade Center, Metro Manila	October 5	1
Training on Pest Control Machine	PCC-CDCPF	October	9
International Conference on Public Sector Productivity	Tagaytay City	October 10-11	1
Halal Lead Auditors Training	Pasay City	October 10-12	1

Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.

Title	Venue (Local)	Date (2017)	No. of PCC participants
Work Environment Measurement Training Workshop	Legaspi City	October 10-12	2
Refresher training course on real-time ultrasound scanning of eye muscle area in buffaloes	PCC NHQ	October 9-13	2
54th Philippine Society of Animal Science Scientific Seminar and Annual Convention	Bayfront Hotel Cebu, Cebu City	October 18-21	64
22nd Course on Food Safety	Manila	October 23-27	3
International Conference on Carabao-based Enterprise Development	PCC-National Headquarters, Science City of Munoz, Nueva Ecija	October 26-27	22
Training on Project Development and Evaluation	Manila	November 6-10	2
13th National Biotechnology Week Activity: Agriculture Forum	Fisher Mall, Quezon City	November 20-24	14
Appreciation of the Coops operation and visit to dairy processing plants and other facilities	Lamac, Cebu	November 21-23	7
29th National Research Symposium	DA-BAR, Quezon City	November 22-23	3
6th National Congress Federation of Goat and Sheep Producers and Association of the Philippines	Baguio City	November 22-24	3
Technology Accelerating Economic Growth and Development	Clark, Pampanga	November 23-24	1
Conference on Electronic Financials Users (EUC)	Clark, Pampanga	November 23-24	2

Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.

Title	Venue (Local)	Date (2017)	No. of PCC participants
Safety Orientation and Handling of Liquid Nitrogen	PCC National Headquarters & Gene Pool, Muñoz, N.E.	November 24	5
6th ICIST conference	Hotel Supreme and Convention plaza	November 24-26	1
44th Annual Convention of the Philippine Society of Biochemistry and Molecular Biology	Taal Vista, Tagaytay	November 27-30	4
Skid Loader Operations and Maintenance and Operation Safety Procedures	PCC National Headquarters and Genepool, Science city of Munoz, Nueva Ecija	November 28	4
ISO 9001 Lead Auditor's Course (LATC)	Pasig City	December 4-8	1
Postgraduate Course on Basic Occupational Safety & Health for Nurses	Mandaluyong city	December 4-9	1
Chemical Usage and Storage	PCC CDCPF	December 5	22
Externally Funded Projects Year-End Evaluation	Development Academy of the Philippines, Tagaytay City	December 7-9	50
12th Global Technology and Information Search Seminar (GTIS)	DOST-PCAARRD Innovation and Technology Center, Los Baños Laguna	December 11	1
Hands-on training on ADI 3500 Genetic Analyzer- preventive maintenance, troubleshooting and data analyses	PCC NHQ	December 11-13	4
Symposium Workshop Towards Holistic approach to combating Lepto in the Phils.& the Region		December 14-15	3
Symposium Towards a Holistic Approach to Combating Leptospirosis in the Philippines and the Region	Pan Pacific Hotel, Manila	December 14-15	4

**Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.**

<b>Title</b>	<b>Venue (International)</b>	<b>Date (2017)</b>	<b>No. of PCC participants</b>
International Plant and Genome Conference XXV	San Diego California	January 14-18	1
2017 Armidale Animal Breeding Summer Course	University of New England Armidale New South Wales, Australia	January 30 - February 3	1
ASEAN Training Program on Buffalo Production Using Reproductive Biotechnology	ICAR-CIRB, Hisar, India	January 31 to February 9	2
22th World Congress on Genetics and Applied Livestock Production LP Internationa Congress	Auckland, New Zealand	February 11-16	1
Product Training of Foss Milk Analyzer and Somatic Cell Counter	New Zealand	March 23 – April 7	2
Partnering Workshop for UK-China-Philippines-Thailand Swine and Poultry Research Initiative	Thailand	May 31 to June 2	1
Science Council for Asia		June 14-16	1
3rd International Workshop for Regulation of Animal Biotechnology	USA	June	1

**Appendix 6. Conferences, Seminars, Symposia, Workshops, and Trainings , CY 2017.**

<b>Title</b>	<b>Venue (International)</b>	<b>Date (2017)</b>	<b>No. of PCC participants</b>
World Health Organization Global Workshop Towards Successful Implementation of AGISAR Pilot Projects by taking a One Health Approach	Sapporo, Japan	September 12-14	1
ISSAAS International Congress 2017	Vietnam	October 14-18	2
2nd Conference on “Pig Genetic Networking – Philippines and Taiwan” – Swine Genomics R&D in the Philippines	Tainan, Taiwan	October 25	1
Capability Building on Animal Products Quality Evaluation Technology Development with Traceability System	Sejong, South Korea	November 5-18	1
International Buffalo Symposium 2017	Nepal	November 13-17	2
Genomic Application in Breeding Stocks	Tainan, Taiwan	November 20-24	1
JVPA VMP Asia Forum 2017	Tokyo City	December 6-8	2
Sustainable Diversification in Tropical Crop-Livestock System in Asia: Biological Nitrogen Fixation by Forage Legume	Hainan, China	December 11-14	1

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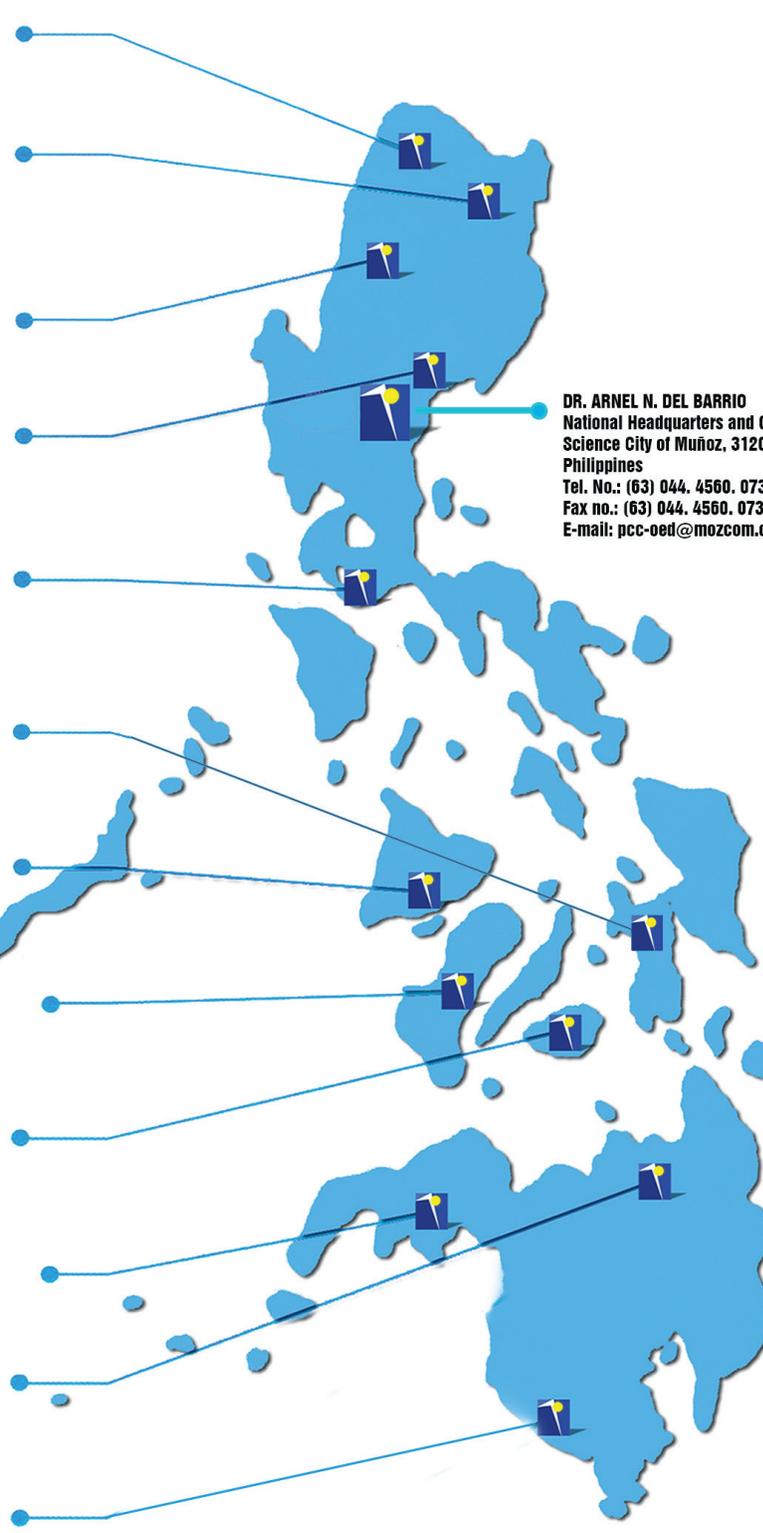
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A photograph of several water buffaloes in a lush green field. In the background, there are rolling green hills under a blue sky with scattered white clouds. A white rectangular box is overlaid on the center of the image, containing contact information for the Philippine Carabao Center.

[www.pcc.gov.ph](http://www.pcc.gov.ph)

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