

# ANNUAL REPORT **2011**



Department of Agriculture

**PHILIPPINE CARABAO CENTER**

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# OPERATING FRAMEWORK

## Mandate

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 2009, PCC likewise is the lead Institution in Livestock Biotechnology research and development.

## Vision

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

## Mission

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

## Powers and Functions

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

- Conserve, propagate and promote the Philippine carabao as a source of draft animal power, meat, milk and hide;
- Enable the farmers, particularly smallholder-farmers and CARP beneficiaries, to avail themselves of good quality carabao stocks at all times and at reasonable prices through an organized program of production, breeding, training, and dispersal;
- Undertake training programs for farmers, particularly smallholder-farmers and CARP beneficiaries, designed to transfer technology on the proper care and reproduction of the carabao and the processing of its meat and milk;
- Encourage backyard dairy development in rural areas by raising carabaos so as to meet the nutritional needs of the smallholder-farmers and their families and reduce dependence on imported milk by-products;
- Undertake research activities in all disciplines that lead to the improvement of the overall productivity of the Philippine carabao;
- Increase the existing annual population growth of the Philippine carabao to keep pace with human population growth;
- Enter into memoranda of agreement and receive donations through the Department of Agriculture from local and foreign sources. Upon the recommendation of the PCC Advisory Board, the individual carabao centers may enter into agreements directly with funding agencies through their respective board of regents or head of agency;
- Additional responsibilities per DA Administrative Order 9 Series of 2008 as the national lead agency for livestock biotechnology research and development.

# EXECUTIVE SUMMARY

The year 2011 was another productive year for the Philippine Carabao Center (PCC) as it continued to make significant strides in the performance of its mandate. Highlights of PCC's noteworthy accomplishments in 2011 are manifested in the three major components under the Carabao Development Program, namely Genetic Improvement, Enterprise Development, and Research & Development.

## **GENETIC IMPROVEMENT**

Evaluation and selection protocols for purebred dairy buffaloes were continuously implemented at the National Gene Pool, at the institutional herd of the 13 regional centers, and at the level of the farmer-cooperatives. In particular, data on calving rate, calving interval, growth rate, and milk yield (using milk test day) were monitored and entered in a centralized data recording system for appropriate genetic evaluation. The rate of genetic gain for first lactation milk yield trait due to selection has increased from 17kg/year registered in 2009 to 23 kg/year in 2011. Estimated breeding values (EBVs) for dairy buffalo sires (semen donors) were also generated based on the milk yield performance of their daughters. The bull IDs and their EBVs were published in the form of a Sire Directory for reference by interested parties.

A gene pool for the Philippine (native) carabaos were also sustained through the facilities of the PCC at Cagayan State University in Piat, Cagayan and in a satellite station in Isabela State University in Echague, Isabela. Four superior native bulls from the gene pool were selected for training as semen donors. Likewise, in situ (natural) conservation and propagation of native carabaos were maintained in the local communities in Piat, Cagayan, Bangad, Kalinga, and Carlos P. Garcia (Pitogo), Northern Bohol. Groups of animals in these communities are kept as Open Nucleus Herd, wherein low performing animals are culled while new and good performing ones are introduced.

Upgrading of native carabaos and backcrossing of crossbred buffalos with purebred germplasm were also actively pursued through an expanded artificial insemination (AI) program in the villages. The number of AI services was up by 80% in 2011 compared with the 2010 output. This was made possible through the training and mobilization of additional 276 AI technicians, provision of the needed funding and logistics, and aggressive information

campaign nationwide. Some 174 purebred bulls were also loaned out for natural mating with carabaos in areas where AI is not readily accessible.

### **ENTERPRISE DEVELOPMENT**

Development efforts for buffalo-based entrepreneurship were actively pursued in the National Impact Zone or NIZ (province of Nueva Ecija) and the Regional Impact Zones or RIZ (elsewhere in the country). In the NIZ, 37 new cooperatives comprised of 883 farmer-members were organized for the entrustment of 931 Brazilian Buffaloes. In the RIZs, 43 farmer-cooperatives or associations continuously participated in the carabao-based enterprise development activities. Social preparation, appropriate trainings, and technical support were provided for the care and management of the dairy buffalos and for the organizational management of the farmer-cooperatives. Along this line, Participatory Monitoring and Evaluation Teams (comprised of farmer-cooperator-members) were organized to facilitate gathering and reporting of field data in the NIZ.

Aggressive efforts were also made in organizing owners of crossbred buffalos produced out of the AI and Bull Loan programs. These resulted in 57 newly organized dairy or meat-based cooperatives and associations nationwide. A grow-out project for buffalo calves was also put in place. The said animals are managed and raised to breeding age by some 62 smallholder-farmers.

In cooperation with the local government officials, a special project on crossbred buffalo dairying, which involves 13 associations in 13 priority barangays of San Agustin, Isabela, was also strengthened through massive AI services and construction of six communal milk barns and a mini dairy processing plant.

In Nueva Ecija, just beside the PCC National Headquarters, a central milk processing plant with a 1,000 liter capacity per hour was also completed. It serves as a research facility for product development and for meeting the processing requirements of surplus milk produced by dairy buffalo cooperatives in Regions 1, 2, and 3.

## RESEARCH AND DEVELOPMENT

Being the lead institution for livestock biotechnology, the PCC has continued delving in the realms of molecular or DNA-based research. Likewise, the agency became even more visible in the international research arena via its membership in the Asian Reproductive Biotechnology Society (ARBS). In fact, the PCC was chosen to host the next ARBS convention in October 2012 in Manila. The agency also strengthened its R&D partnership with world renowned scientists in the fields of reproductive biotechnology and molecular biology by way of technical seminars and hands-on training for its own researchers and technical staff. Key technical staff members were even sent abroad for short-term trainings (particularly in South Korea and Thailand) to hone their knowledge and skills. Despite these engagements with high-end sciences, the PCC recognized the need to attend to other fields of research that are of equal significance particularly those that are applied in focus. Thus, the year also saw the birth of the Operations Research Task Force, who shall look into the researchable areas on matters related to the agency's field operations.

Research outputs (17 completed and 35 on-going) in various disciplines that included animal nutrition, animal health, breeding and genetics, reproductive biotechnology, physiology, meat and milk products, and socio-economics were also presented in the agency's in-house review; some were presented in other scientific conferences held locally and abroad. Likewise, papers emanating from the said research works were published in local and international peer-reviewed journals.

Information and technologies emanating from the R&D activities were popularized and packaged for dissemination to target clientele through various media (print, video, audio, and internet). A milestone was achieved when the PCC formally launched the International Buffalo Knowledge Resource Service (IBKRS), a web-based hub for all published scientific journal articles on buffalo in the last five years, written by reputable scientists from all over the world.

As a whole, the agency's accomplishments in 2011 were the results of its effective and efficient management of processes and resources that include its people, products, facilities, finances, and social capital (linkages with farmer-clientele and partner-institutions and agencies). A testament to this is the agency's renewal of certification to Quality Management System (ISO 9001:2008) and its imminent certification to the Environmental Management System (EMS-ISO 14001) and Occupational Health and Safety Management System (OHSMS-OHSAS 18001).

# I. Genetic Improvement Program

## Purebred Dairy Buffaloes

***National Gene Pool for Dairy Buffaloes.*** The National Water Buffalo Gene Pool (NWBGP), located within the PCC National Headquarters compound in the Science City of Muñoz, Nueva Ecija, is a facility for continuous selection, testing, and propagation of superior breeds of dairy buffaloes. It also serves as a field laboratory for the development and dissemination of science-based technologies in all disciplines and aspects of dairy buffalo production.

As of December 2011, the NWBGP is maintaining a total of 659 buffaloes, 212 of which are females

that are bred through artificial insemination (AI) using the semen from progeny-tested sires. The conception rate following first AI service was 53.38% while calving rate was 67% at a calving interval of 15 months. Efforts are being made to lower the calving interval to within 13-14 months through further improvements in animal nutrition and mating plan, along with reduction in the service period.

In terms of growth performance, the average daily gains (ADGs) of the animals were 0.60 kg/day from birth to weaning and 0.53 kg/day from post-weaning to two years old.





Through an efficient management system, the mortality incidence among the buffaloes was kept to a minimum, i.e., 1.84% (Pre-weaning), 0.69% (Post-weaning), and 1.69% (Adult). There was also a significant reduction in mastitis cases from 42% in 2010 to less than 20% in 2011.

**Other Institutional Herds of Dairy Buffaloes.** Outside the National Gene Pool, institutional herds of dairy buffaloes are also maintained at the facilities of the 13 regional centers. As of December 2011, the inventory of dairy buffaloes (Murrah-based) in these facilities totaled 1,185 heads (417 cows, 255 heifers, 210 bulls, and 303 calves). All animals are registered in the PCC-wide database recording system and data generated are being subjected to genetic evaluation.

**Purebred Dairy Buffalo Herds in the Care of the Farmers.** Paper-based and electronic animal recording system at the level of the farmer-cooperatives were also put in place. Currently, some 2,465 purebred dairy buffaloes (heifers and cows) from 55 farmer-cooperatives are included in the recording system. For the milk test day, a small percentage of the lactating cows were covered in 2011, while the rest of the cows shall be included in subsequent years.

A total of 314 (150 male and 164 female) purebred dairy buffalo calves were also produced

at the farmer-cooperatives. These shall undergo selection once the performance evaluation of the cows (dams) has been completed.

**Selection and Progeny Testing of Dairy Buffalo Sires.** In 2011, 15 bulls were selected as semen donors; ten were transferred to the semen processing laboratory (SPL) of PCC at CLSU in Digdig Ranch while five were brought to the SPL of PCC at UPLB. Meanwhile, eight young dairy buffalo bulls from elite cows sired by senior AI bulls were selected to be trained as semen donors.

Breeding values were also generated for the 79 bulls (AI and natural mating) based on progeny (daughter) performance. Of the imported frozen semen from the six bulls that were acquired from Bulgaria, five have progeny performance records. Others were pedigreed sires and bulls used for natural mating. The top three ranked AI sires are imported while six island-born AI sires are now in the top 20. With more daughters coming into production in 2012 and onwards, more island-born bulls are expected to have Estimated Breeding Values (EBVs) and make it to the top 20 in the future.

Table 1 shows a list of progeny-tested bulls in 2011 being used in the PCC institutional herds with their corresponding EBVs. The complete dairy buffalo “Sire Directory for 2011” has also been printed and is made available to interested parties.

**Table 1.** 2011 Progeny-tested bulls and their EBVs.

| Bull ID  | Estimated Breeding Value (EBV) |
|----------|--------------------------------|
| 2GP07017 | 349.5                          |
| 2GP03015 | 220.0                          |
| 2GP07012 | 204.0                          |
| 2GP06083 | 185.5                          |
| 2GP08020 | 181.5                          |
| 2GP08064 | 180.5                          |

**Genetic Gains among Dairy Herds.** The realized rate of genetic gain for first lactation milk yield trait due to selection increased further to 23 kg/year. This figure is higher than what was reported in 2009 which was 17 kg/year.

## Philippine Carabaos

### **Gene Pool for Philippine Swamp Buffalo.**

The Gene Pool for indigenous Philippine swamp buffalo is at PCC at Cagayan State University (PCC at CSU) with its farm in Piat, Cagayan. Currently, there are 84 selected native carabaos in this institutional herd. Recording growth performance and selecting the best young bulls as breeders are continuing activities and for 2011, four superior swamp buffalo bulls were selected for training as semen donors. Two of the selected bulls were sent to PCC at CLSU's SPL at Digdig.

The satellite facility for PCC Gene Pool at the Isabela State University, Echague, Isabela has been assisted in 2011 to be able to retrieve all data backlogs.

**In situ Conservation and Propagation of Native Carabaos.** There are three sites for natural conservation and propagation of the Philippine carabaos (PCs). Two sites are

being monitored and coordinated by the PCC at CSU, located in Villa Rey, Piat, Cagayan and in Bangad, Kalinga. In these sites, an "entrustment approach" is the scheme, i.e., farmer-cooperators were given selected native carabaos for their normal farming activities. The animals are also raised for breeding purposes. In Villa Rey, there are 15 selected female PCs and one male PC, whereas in Bangad, Kalinga, there are 25 selected female PCs and one male PC. Reproductive performance and growth rates of the carabaos are gathered regularly.

The third site involves ten barangays in the town of Carlos P. Garcia (CPG), also known as Pitogo in northern Bohol, and is being coordinated by the PCC at USF in partnership with the local government of Pitogo and the DA-RFU 7. As of 2011 inventory, Pitogo has 661 native carabaos. The animals are bred by both AI (using high quality PC semen) and natural mating (via the loaning out of 10 native bulls). Data on reproduction and growth rates are also monitored regularly.

Herds in these three sites are kept as an open-nucleus herd (ONH). Some low performing animals are allowed to be culled and new good performing indigenous carabaos are introduced.



## National Crossbreeding Program

The aim of the program is to genetically transform the swamp buffaloes (carabaos) into milk- and meat-type animals by crossing and sustained backcrossing with the riverine breed through artificial insemination and natural mating.

**Artificial Insemination (AI).** In 2011, the network served 45,240 farmers owning 48,289 buffaloes and covering 7,793 barangays in 831 municipalities and cities in 74 provinces of the 15 regions of the country. This significantly increased the number of services by 80% over that of 2010. The AI services were made possible by 768 AI technicians (352 village-based AI technicians (VBAITs), 345 LGU, and 71 PCC).



Consistent with the initiative to privatize AI services in the Philippines, additional 276 AI technicians (VBAIT and LGU) were trained in 2011 in the five PCC Training centers, namely, PCC at CLSU, PCC at CMU, PCC at CSU, PCC at UPLB, and PCC at USF.

A move towards professionalizing the AI services in the country was also initiated during the year by way of standardizing the AI training in Large Ruminant and accrediting the skills and competencies of technicians in collaboration with the Technical Education and Skills Development Authority (TESDA).

In support of the expanded AI program, the semen processing laboratories at PCC at CLSU and PCC at UPLB processed a total of 105,357 doses of frozen semen. Some doses of frozen semen are also stored in the PCC's Semen Bank for genetic resource conservation.

Moreover, during the year the agency sustained its role of ensuring that frozen semen quality are maintained until finally used for AI by LGU and VBAIT by way of sustained sourcing and distributing liquid nitrogen in many areas nationwide without ready access to LN<sub>2</sub> supply.

**Bull Loan Program (BLP).** In areas where the AI services are not accessible, many farmers availed of dairy buffalo bulls through the PCC's Bull Loan Program. In 2011, 174 purebred bulls were loaned out to farmers bringing the total active purebred dairy buffalo bulls loaned out nationwide to 1,002 head. The BLP has benefitted thousands of carabao raisers (owners of the female carabaos naturally serviced and bull handlers) across the country.

## II. Carabao-based Enterprise Development (CBED)

### National Impact Zone (NIZ)

The NIZ has gone through a transformational process that defines the elements of development intervention or modality for effective and efficient program implementation. Basically, the modality involves entrustment of breeding buffaloes, implementation of production management system, provision of animal-related services, process documentation to highlight successful cases of animal-farmer-cooperative technology application practices, establishment of a PME system, and the enhancement of interactions and relationships of key players and stakeholders in enterprise development.

At the NIZ in Nueva Ecija, there are 55 existing dairy cooperatives consisting of 550 smallholder-farmer-members handling a total population of 1,156 Bulgarian Murrah buffaloes (composing of 793 breedable females; 29 heifers, 1-2 years old; 89 female calves; and 245 males of various ages). These cooperatives composed the Nueva Ecija Federation of Dairy Carabao Cooperatives (NEFEDCCO). In 2011, the federation received technical assistance from the Korea International Cooperation Agency (KOICA) for the improvement of milk processing set up, milk quality grading system, product shelf life, and product packing and labeling.



Some 37 new cooperatives, composed of 883 farmer-members as trustees of the 931 heads of Brazilian buffaloes were formed in 2011 following evaluation, social preparation, field validation, and technical training.

In support of the above activities, the farmer-partners were provided with regular free animal consultation and follow-up activities on animal production and management system. Farmers were coached and supervised on animal breeding and reproductive activities, monitoring of animal health, and animal housing sanitation to ensure quality milk production.

**Improvement in Monitoring and Evaluation.** Participatory Monitoring and Evaluation Teams (PMETs) composed of selected farmer-cooperators from the 52 primary-cooperatives were organized in July 2011. Each PMET is composed of a team leader and three to four members. Five training batches



on Participatory Monitoring and Evaluation (PME) system were conducted, including the preparation of seven PME forms on animal breeding and reproduction, animal health, animal nutrition, milk production and handling, animal technician services, waste management, and animal inventory.

**Capability Building and Strengthening.**

In coordination with the Cooperative Development Authority, two batches of training on Cooperative Management and Good Governance were carried out and were participated in by 40 primary cooperatives and one secondary cooperative. Another seminar-workshop delved on the amendments of Cooperative Constitutions and Bylaws, which were participated in by 28 primary cooperatives.

**Regional Impact Zones (RIZ)**

There are 43 existing cooperatives/associations composed of 1,075 carabao owners who are engaged in carabao-based enterprises, in the designated Regional Impact Zones (RIZs) in Luzon and Visayas. The most notable dairy buffalo cooperatives are based in Cavite, Laguna, Rizal, Bulacan, Pampanga, Pangasinan, Cagayan, Isabela, Ilocos Norte, Cebu, and Bohol.

**Models for Crossbred Carabaos Enterprise**

In 2011, nationwide aggressive efforts were channeled to organizing the owners of crossbred carabaos produced out of AI and bull loan programs, and these initiatives resulted in 57 newly organized dairy/meat based cooperatives and associations in 12 regions of the country. In addition, 62 smallholder-farmers in Lupao, Nueva Ecija were organized into associations and were engaged in a buffalo grow-out project. The grow-out project is a very interesting new modality as there are increasing number of dairy farmers who are less interested to raise their young calves to breeding age. Grow-out models such as this has proved to be monetarily rewarding as well.

**San Agustin (Isabela) Project.** San Agustin is a program-cooperating municipality that has been participant in massive AI program for more than 10 years now. Currently, there are 1,308 household-carabao owners representing 32% of the total household population, of which, 467 households (12%) own 1,841 crossbred buffaloes (CBs).

The San Agustin CBED Project started in August 2010 and through 2011 is able to establish the basic social infrastructures crucial in staging its transformation towards a CBED model for crossbred buffaloes (CBs).

To date, there are 13 dairy associations with total membership of 401 farmers in 13 priority barangays out of total 23 barangays. These dairy associations have undergone capacity building activities in line with organizational and leadership development, management and dairy production, and milk collection.



The project has strengthened partnership with the Department of Trade and Industry, Department of Science and Technology, Department of Agrarian Reform, Department of Agriculture, LGU-San Agustin, and Provincial Government of Isabela and accessed more support for the dairy associations.

During the year under review, the project undertook aggressive AI program adopting the VBAIT privatization building the CB herd not only in 13 priority barangays but in all 23 barangays of San Agustin. Also notable during the year is the significant increase in the number of farmer-milkers.

With this development, the provincial and municipal LGU supported the construction of six communal milk barns in priority barangays. Meanwhile, one mini dairy processing plant has been constructed, awaiting delivery of milk processing equipment, and is in direct support of the milk collection scheme established by the primary coops. With the increasing volume of daily milk collected, the coops have sought the well-established milk processor, Alcala Milk Candy, as their primary market at the moment.

## Infrastructure Support to the Dairy Cooperatives

A “central milk processing plant” with a 1,000 liter capacity per hour was completed in March 2011 at Science City of Muñoz, Nueva Ecija.

It is designed as a research facility for milk-based product development, and at the same time, to meet the processing requirements of extra milk produced by the buffalo-based dairy coops in Regions 1, 2, and 3.

Two community-based milk processing plants with 300-500 liter capacity were also constructed in Barangay Bantug, Asingan, Pangasinan and San Agustin, Isabela. These plants were the results of convergence efforts made by the LGUs, cooperatives, and PCC. The



LGUs provided the land (site), PCC contributed the processing plant, while the cooperatives take care of the operationalization of the facility. Similar initiatives are in progress in Visayas and Mindanao. Such facilities are set to be constructed in PCC at USF, Ubay, Bohol and PCC at CMU, Musuan, Bukidnon. These will serve as toll dairy processing facilities for smallholder-farmers in the said areas and are meant to spur the local dairy development.

### **Capability Building Support**

A series of trainings on the various aspects of establishment, expansion and maintenance of

the newly created cooperatives/associations and existing ones were organized and implemented in collaboration with the government and non-government entities to entice and sustain the engagement of smallhold carabao raisers with various enterprises. There were 30 training courses (social preparation, dairy production, dairy processing, milk handling, cooperativism, leadership, cooperative management, business planning for smallhold dairying, etc.) participated in by 10,265 farmer-participants (representing 300% of the 2011 target) spread out nationwide in the service areas of the PCC.

## III. Research and Development

The year saw the growth in DNA-based research, few years after PCC has been assigned as the lead agency in livestock biotechnology. This development, however, has not led the PCC to depart from practical and applied R&D that addresses the buffalo sector. In fact, a research task force was formed purposely to address immediately the seemingly recurring operational problems related to program implementation. In 2011, 17 (12 basic and 5 applied) research studies were completed while 35 (28 basic and 7 applied) are ongoing (Tables 2a and 2b). Titles and authors of the completed, published and on-going research in 2011 are summarized in Annex I.

**Table 2a.** Type, numbers and status of Basic Research Studies

| Field                      | Completed | Ongoing   |
|----------------------------|-----------|-----------|
| Animal Nutrition           | -         | 4         |
| Animal Health              | 6         | 5         |
| Breeding and Genetics      | -         | 6         |
| Reproductive Biotechnology | 4         | 7         |
| Reproductive Physiology    | -         | -         |
| Anatomy/Physiology         | -         | 1         |
| Meat and Dairy Products    | 1         | 1         |
| Socio-economics            | 1         | 4         |
| <b>TOTAL</b>               | <b>12</b> | <b>28</b> |

**Table 2b.** Type, numbers and status of Applied (Operations) Research Studies

| Thematic Area  | Completed | Ongoing  |
|--|-----------|----------|
| Increasing Calf Production/<br>Reducing calf mortality | 1         | 2        |
| Increasing forage productivity                         | 1         | 2        |
| Reducing calving interval                              | 2         | -        |
| Increasing milk production                             | 1         | 3        |
| <b>TOTAL</b>   | <b>5</b>  | <b>7</b> |

Research papers emanating from the above studies were presented in local and international scientific conferences. Four of these papers were published in refereed journals, 14 were included in scientific proceedings, six papers are under review while three are still being prepared.

Series of Technical Seminars were also conducted on various topics related to water buffalo production such as genetics and animal breeding, rumen biotechnology, animal products quality evaluation, sexed semen (spermatozoa), cryopreservation of oocytes, and cloning, with participation of scientists from South Korea, Japan, Italy, and the US.

In 2011, the PCC also became a member of the Asian Reproductive Biotechnology Society (ARBS), an independent and non-profit organization that promotes the educational and scientific interests of the reproductive biotechnology research community throughout Asia.



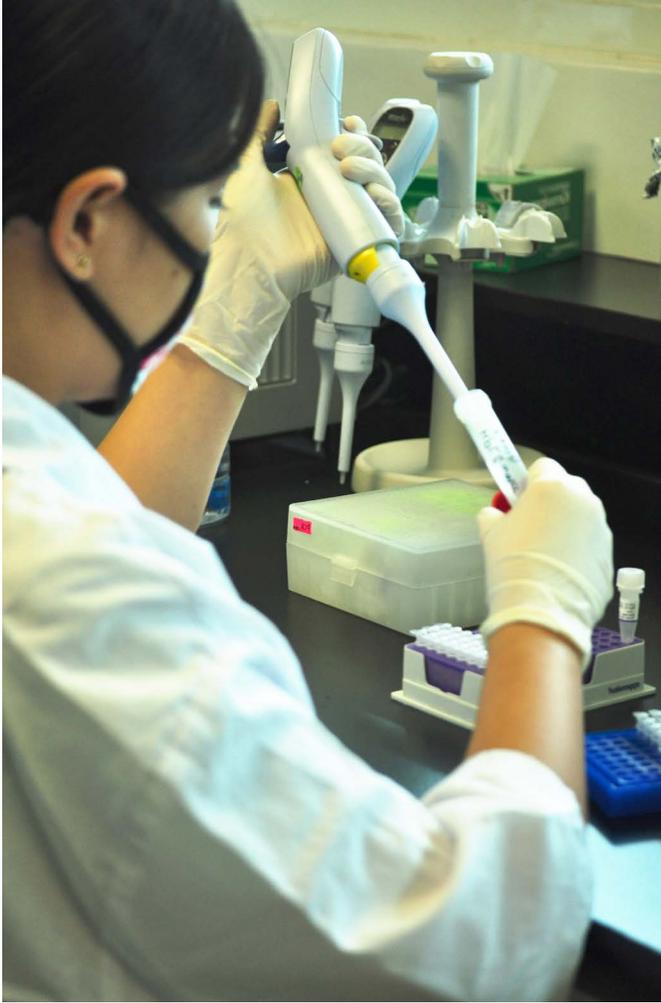
PCC executive director Dr. Libertado C. Cruz (middle), PCC scientists Dr. Danilda H. Duran (extreme left), Dr. Peregrino G. Duran (extreme right), together with scientists from Quangxi Buffalo Research Institute during the 8th ARBS conference held at Guilin City, China from October 25-30.

## Highlights of Some Completed R&D Activities

### *Molecular Genetics*

Research emphasis included marker-assisted selection, and detection of single nucleotide polymorphism (SNP) for milk and milk component traits, pedigree verification, screening for genetic defects, among others.

- a. Identification of sets of markers in dairy buffaloes associated with QTL for milk and milk component traits. Of the five microsatellite markers initially tested using 25 DNA samples coming from female buffaloes with milk production data, two, namely ILST097 and BMS2461 were found to be segregating in the buffalo population that are apparently associated with % milk fat.
- b. Single Nucleotide Polymorphism (SNP) Detection in Buffaloes Associated with Milk & Milk Component Traits. Aside from the eight previously identified SNPs, six (6) additional potential SNPs were found using the rest of the primers.
- c. Pedigree Verification Using Microsatellite Markers. Seven polymorphic markers were found to have potential for pedigree verification.
- d. Potential Random Amplification of Polymorphic DNA (RAPD) markers for differentiating the Swamp and the Riverine buffaloes. This study presents potential markers for modified RAPD-PCR method which can verify genetic identities between the riverine and swamp buffaloes for breed purity confirmation. Modified RAPD technique can also be very useful in breed identification between the purebreds and the crossbreds.
- e. Screening for genetic defect-associated DNA polymorphisms in cattle, water buffaloes and other livestock species. Optimized for cattle using RFLP: BLAD, citrullinemia, DUMPS and freemartinism. Optimized for buffaloes using RFLP: BLAD (but not applicable to buffaloes), Citrullinemia, DUMPS and Freemartinism. However, these have to be proven in live cases in buffaloes.
- f. RT-PCR and RT-LAMP detection kits for



rapid screening of FMD virus infection. Different formulations for the two assays have been tested. Optimized conditions and formulations have been selected and ready for use. Validation with the other laboratories is on process.

- g. Development of diagnostic kits for swine viral enteric infections, especially focusing on viral gene detection of PED-V and TGE-V using Reverse Transcription Loop-mediated Isothermal Amplification method (RT-LAMP). Primers have been designed and synthesized and ready for optimization.

### *Animal Nutrition*

**Improvement in calf rearing using a milk replacer.** The use of infant formula for feeding the buffalo calves was known effective and is

comparable to mother's milk in terms of growth, weaning weight, and health conditions of the feeding calves. It also promoted early weaning of calf with 84 to 90 kg weaning weight and early post-partum reproduction of its dam that led to a daily feed cost savings of about Php60-80/calf.

**Establishment of a standard feeding system to improve the milk production of buffaloes.** Augmented or challenge feeding using by-pass amino acid and slow release non-protein nitrogen (NPN) were used in managing the peak and the persistency of lactation of Brazilian buffaloes. The peak of lactation was observed at 3-4 months from the date of calving with an average milk yield of 6.71-7.15 kg/day. One of the buffaloes gave a peak milk yield of 14 kg/day when subjected to challenge feeding. The use of by-pass amino acid and NPN were not so effective in improving the milk production of buffaloes if given separately in the ration of the cows. However, when mixed and combined in the ration of the dairy cows, it enhanced the milk production until the 8<sup>th</sup> month of lactation.

### *Reproductive Biotechnology*

Major activities were in the field of in-vitro embryo production (IVEP) and transfer. The IVEP is mainly from ovum-pick up (OPU)-derived oocytes. OPU-derived embryos were transferred and on May 2, 2011, one male calf was delivered. Other OPU-derived embryos were vitrified for future transfers.

Three researches were also completed in the areas of oocyte cryopreservation, nuclear transfer, and semen processing while there are seven on-going researches on oocyte cryopreservation, intracytoplasmic sperm injection (ICSI), IVEP, ovulation synchronization, and embryo transfer.

## *Animal Health*

Continuous efforts were made in developing appropriate diagnostic, control, and prevention protocols as derived from laboratory research works, retrospective studies, and risk factors analysis on economically important water buffalo diseases, such as mastitis, blood parasitism (*Trypanosoma* and *Theileria*), and bovine leukemia. Five research studies were completed along the said topics. They are as follow:

- a. “Comparative Effects of Trypanocidal Drugs Against *Trypanosoma evansi* isolated from Philippine Water Buffaloes Using Murine Model”. The study determined the trypanocidal sensitivity or resistance of trypanosome isolates in water buffaloes that will help veterinarians in formulating a better management practice and choosing effective drug in treating surra in the Philippines.
- b. “Detection of Bovine Leukemia Virus (BLV) Infection Using Nested Polymerase Chain Reaction (PCR) Assay”. Application of nested PCR is a vital technique in having high sensitivity and specificity in detecting BLV infection. This is an important tool to detect accurately the infection and to prevent and control the spread of BLV.
- c. “Molecular detection and classification of a new *Theileria* species in the Philippines”. This study successfully detected *Theileria* infection using molecular technique. The detected pathogen can be considered a new Philippine species based on its MPSP nucleotide sequence.
- d. The two other studies were both analysis of previous data gathered for mastitis control. These are titled “Retrospective Study on Antibiotic Treatment of Subclinical Mastitis on Water Buffaloes at the Philippine Carabao Center Gene Pool” and “Prevalence and Risk Factors of Subclinical



Mastitis in Water Buffaloes”. Identified risk factors were insignificant in the occurrence of subclinical mastitis. Different treatment regimens have been recommended to minimize economic losses in dairying. Aside from good management and other control measures, timing of treatment contributed to the decrease in prevalence of subclinical mastitis.

## *Milk and Meat Products*

Major research activities were on developing niche products derived from water buffalo. Along this line, a comparative study on the carcass yields of native and crossbred buffaloes

were made with a conclusion that crossbred male buffaloes have more potential in the meat processing enterprise (particularly high-end meat products market) due to higher dressing percentage and lean cuts yield. Likewise, continuous efforts are being conducted in developing improved dairy products, focusing on extending shelf life of fresh white cheese, pastillas, among others.

### *Social R&D*

Baseline survey of farmer-partners and 53 cooperatives in the NIZ was completed, in September 2011, and data are for analysis and interpretation.

Evaluation on level of adoption by farmers on AI technology, proper milk handling and production management technologies were done. Other studies include the following:

- a. cost of milk production of farmer-cooperative;
- b. farmer-cooperative dynamism highlighting interaction, relationship, and communication systems;
- c. Intensification of the Carabao-Based Community of Interest and Community of Practice in Selected Farmer-Cooperatives;
- d. Determinants of Sustainability in Relation to the Artificial Insemination and Cooperative Management of the Farmer-Cooperatives.

### *Waste Management*

In mid-2011, a vermicomposting project was also initiated as part of the NWGP's waste management system and as a operational research project. As of November 2011, the said project has already produced 28,300 tons of vermicast. The facilities are being completed to handle total system waste of about 6 tons/day.



## IV. Knowledge Resource Management



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

Through the Applied Communication Section (ACS) of the Knowledge Resource Management Division (KRMD), the efforts to keep clients abreast of information related to the Carabao Development Program (CDP) in the country were sustained.

Four issues of the PCC Newsletter were published in 2011. Other IEC materials published include the PCC Balita (Regular Issue) and PCC Balita San Agustin supplement, R&D Highlights, PCC corporate brochure, Mga Karaniwang Sakit ng Kalabaw, PCC corporate primer, Wow! Gatas ng Kalabaw primer, PCC Service Guide (English and Tagalog), Water Buffalo Sire Directory 2011, IBKRS primer, farmers' comics (AI, bull loan, carabao-based enterprise development, milk quality assurance, and benefits of dairying), technology brief series, and brochure on Impact Zone for CBED. A total of 50,454 copies of these IEC materials were distributed in 2011.

A book titled "Businessing the Carabao" was also launched during the year. It is a presentation of some of the successes of the ventures in businessing the carabao in the country and the objective was to make its readers appreciate the carabao as a means of many beneficial enterprises and possibly engage into them.



## Capitalizing the tri-media

A total of 51 press releases in print and online were dispatched and monitored. This endeavor was complemented with the consistent efforts to promote PCC programs through participation in 14 exhibits and industry-related events.

The PCC's official website URL [www.pcc.gov.ph](http://www.pcc.gov.ph) was uploaded with digital copies of the PCC's IEC materials, available to online users for printing or downloading. Just recently, a message board for PCC website users was also initiated.

## Prioritizing Visitors' Satisfaction

A total of 3,871 visitors were received and oriented in 2011 based on the QMS guidelines. The visitors included farmers, students, government officials, and professionals.

Adhering to the standards set by the PCC's Integrated Management System, the Visitors' Bureau obtained a customer satisfaction rating of 4.76 percent (very good to excellent) and 4.65

percent (very good to excellent), in the aspects of visitors' assistance and audio-visual materials presented, respectively, way above the Agency's Quality Management Systems (QMS) target rating of 4.25 percent.

## The International Buffalo Knowledge Resource Service (IBKRS)

The IBKRS was launched on March 25, 2011 with web address [www.ibkrs.net](http://www.ibkrs.net) (Fig. 1). This is an information resource center designed and dedicated to facilitate the compilation, organization, and dissemination of information on all areas relevant to buffalo production, breeding and genomics, reproductive biotechnologies, animal health and nutrition, feeding management, dairying and dairy technologies, and enterprise development. To date, the IBKRS has a total of 6,869 articles and electronic bibliographic database of refereed and peer-reviewed journal articles on buffalo gathered and downloaded from various sites and databases that are strong on buffalo information.

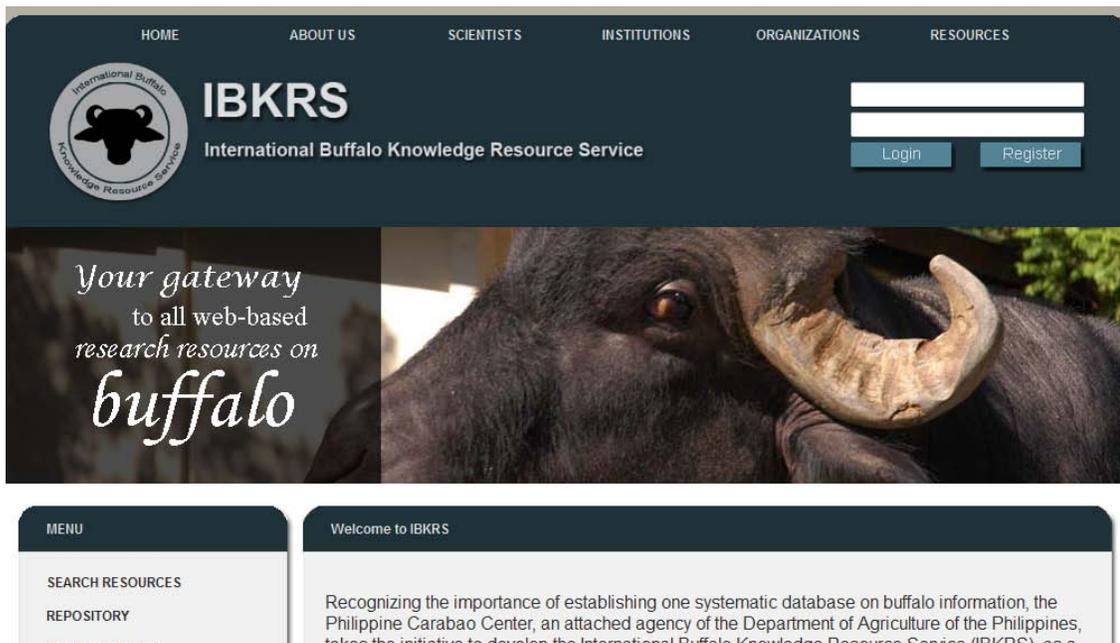


Fig. 1. Interface of the IBKRS's website.

Information are presented in abstracts and full-text pdf formats with a total of 9,690 daily web hits or visitors, and registered users from 40 different countries worldwide.

### Scientific Library Services

The scientific library and information center puts premium to catering to the research and information needs of scientists, specialists and researchers from all functional units of the PCC, farmers, students, and the general public.

The library collection completed in 2011 consists of 2,006 books, 41 serial titles, 566 e-books, 7,827 e-journal articles, and 153 multimedia that can be accessed by all library customers. A union catalog of theses and dissertations containing bibliographic abstracts on buffalo researches from the libraries of state universities and colleges, to include topics of animal science and veterinary medicine; and a database of 2,345 electronic bibliographic records, links to 18 technical journal subscription, one open access scientific journal database and membership in various societies accessible via a web-based library software called Science Information Network Integrated Library Management System (SILMS) (<http://www.krmc.pcc.gov.ph>).

### Information and Communication Technologies

During the year, a good number of computer software and hardware was upgraded by the PCC's Information and Communication Technologies Section (ICTS) to improve the performance and security of the agency's workstations (Table 3).

Also installed were new Internet Service Provider (*PLDT MyDSL; 2Mbps Speed*); back up internet connection (*GLOBE corporate edition -1Mbps speed*); Voice over Internet Protocol (VoIP) and Teleconferencing in PCC-Regional Centers; Document Tracking System (*DocTracks*) to all computer units; and Symantec End Point Protection 11 anti-virus to all servers and computers.

The ICTS has also maintained the software packages installed by the National Computer Center (NCC) in the agency's servers (Fig. 2). These included the Document Tracking System (DocTracks), Human Resource Management Information System (HRMIS), Records MIS, and Property MIS. The latter is still up for improvement by 2012 owing to data encoding issues. Likewise, the design of the PCC website previously developed by the NCC was further improved by the ICTS.

**Table 3.** Software and hardware upgraded in 2011.

| From                                       | To   |
|--|--|
| Windows Server 2003 standard edition       | Windows Server Enterprise 2008R2 edition operating system (create new domain and active directory) |
| ISA Firewall 2004                          | Microsoft Forefront Threat Management Gateway 2010   |
| Windows XP Service Pack 3 operating system | Windows 7 32 and 64 bit operating system   |
| Microsoft Office 2003                      | Microsoft Office 2010  |
| Pentium 4                                  | Core 2 Duo   |

**PHILIPPINE CARABAO CENTER**  
**DOCUMENT TRACKING SYSTEM**

Wednesday April 11, 2012  
1:15 pm  
User : weng

**New Message**

**Process | Query Routing | Reports | Utilities | Logout**

If you have read, forwarded or remarked on the document, please click on **Done** button!! Thank you.

| Control No  | Date       | Subject   | Action                                       |
|-------------|------------|---|--|
| I201204031  | 2012-04-11 | visit to pcc on may 4, 2012                               | View Doc   View file   Forward/Remark   Done |
| I201204019  | 2012-04-03 | science & technology week in July 2012                    | View Doc   View file   Forward/Remark   Done |
| I201204016  | 2012-04-03 | visit to pcc on april 12, 2012                            | View Doc   View file   Forward/Remark   Done |
| I201204015  | 2012-04-03 | regional symposium on august 10, 2012                     | View Doc   View file   Forward/Remark   Done |
| I201204004  | 2012-04-02 | shooting at pcc on april 14, 2012                         | View Doc   View file   Forward/Remark   Done |
| I201203127  | 2012-03-28 | visit to pcc on march 30, 2012                            | View Doc   View file   Forward/Remark   Done |
| IO201203015 | 2012-03-28 | on line course for farmers                                | View Doc   View file   Forward/Remark   Done |
| I201203076  | 2012-03-20 | training for farmers on march 19-20, 2012 at shahani hall | View Doc   View file   Forward/Remark   Done |
| I201203071  | 2012-03-19 | visit to pcc on march 22, 2012                            | View Doc   View file   Forward/Remark   Done |
| I201203047  | 2012-03-14 | visit to pcc on march 15, 2012                            | View Doc   View file   Forward/Remark   Done |
| I201203037  | 2012-03-14 | travel authority to thailand for dr. mamuad               | View Doc   View file   Forward/Remark   Done |
| I201203015  | 2012-03-02 | visit to pcc on march 9-11, 2012                          | View Doc   View file   Forward/Remark   Done |
| I201203014  | 2012-03-02 | visit to pcc on march 15-16, 2012                         | View Doc   View file   Forward/Remark   Done |
| I201203005  | 2012-03-01 | PCC LEARNING RESOURCE CENTER                              | View Doc   View file   Forward/Remark   Done |
| I201203003  | 2012-03-01 | visit to pcc on march 9, 2012                             | View Doc   View file   Forward/Remark   Done |
| I201203002  | 2012-03-01 | visit to pcc on march 9, 2012                             | View Doc   View file   Forward/Remark   Done |
| I201202072  | 2012-02-29 | visit to pcc on march 15, 2012                            | View Doc   View file   Forward/Remark   Done |
| I201202055  | 2012-02-27 | training on virtual store on March 2 & 3, 2012            | View Doc   View file   Forward/Remark   Done |
| IO201202016 | 2012-02-27 | training on cheese production                             | View Doc   View file   Forward/Remark   Done |
| I201202051  | 2012-02-17 | advertisement   | View Doc   View file   Forward/Remark   Done |
| I201202050  | 2012-02-16 | scientist position of dr. claro mingala                   | View Doc   View file   Forward/Remark   Done |
| IO201202013 | 2012-02-16 | ISO Certification and Recertification Audit               | View Doc   View file   Forward/Remark   Done |

The screenshot displays two overlapping windows from a web-based HRMIS. The primary window, 'Employee Information', shows details for an employee named Cecille Garcia with ID 950084. Key data points include a permanent employment status, a monthly salary of 17,305.00, and a date first reported of January 18, 1995. The secondary window, 'Inventory On-Hand Summary', provides a breakdown of assets, listing categories such as 'Land Improvement' and 'Building' with their respective counts and amounts.

**Fig. 2.** Various software packages installed at the PCC servers.

## V. Laboratory and Animal Health-related Services



The Animal Health Laboratory sustained the provision of quality diagnostic services and other animal health-related support services for various clienteles, both in-house and external. This unit also directly assisted in the quarantine of introduced live animals from Brazil. It took series of observations and laboratory testings over a protracted period and proved that the animals imported from Brazil were indeed free from FMD infection.

In implementing the agency's Animal Health Program, in-house and farmer-cooperatives clients were served for the year 2011. Samples obtained/received from scientists were tested either for *Trypanosoma spp.*, California Mastitis Test (CMT), Brucella, CAE or TB. Likewise, lactating animals in the Cooperatives were monitored for mastitis by performing CMT on site and milk samplings for somatic cell count.



The unit also provided support services to the NIZ and the regional centers in the form of acquisition and distribution of veterinary biologics needed for the animal health program.

# VI. Institutional Development

## Planning and Project Development

A Strategic Development Plan for 2011-2025 was crafted within the year. This document captures the historical antecedents of the PCC, including an account of its Strengths, Weakness, Opportunities, and Threats (SWOT), and accomplishments as basis for target setting and planned effects. The plan carries the theme “Propelling PCC Towards a Dynamic Carabao Sector”. This document was used as a reference in the (1) preparation and approval of the 2012 Agency Budget, (2) alignment with DA’s directive and the Medium-Term Philippine Development Plan (MTPDP), (3) preparation and submission of the agency’s Public Investment Program (PIP) for 2011-2016, and (4) alignment and revision of plans compliant to the DA-wide 2011-2017 AFMP (Agriculture and Fisheries Modernization Plan).

The unit also coordinated, reviewed, and reported the overall implementation of all externally funded projects of the agency to include the KR2 (for completion in 2012), PL480, KOICA, BAR, DOST, and PCAARRD projects.

Likewise, the division facilitated the conduct of the following:

1. JICA-PCC Third Country Training Program (TCTP). This is a study program on water buffalo production and management system designed by PCC and funded by JICA for the Livestock Breeding and Veterinary Department of the Ministry of Agriculture and Fisheries of the Government of Myanmar. It has two modules with ten trainees each. Module 1 started last November 17 and lasted until December 3. Module 2 shall run from January 8 to February 24, 2012.
2. TESDA-PCC Training Regulation (TR) on Artificial Insemination (AI). This project aimed to get a national level accreditation for training on AI in large ruminants. After going through a series of workshops with representatives from the private sector, the TR was promulgated on December 15, 2011 at TESDA by the accreditation board. Publication of the TR shall be done after all AI assessors, trainers, and VBAITs go through the “Assessors’ Methodology and Training Courses”. The overall effect of the TR on AI is best seen as a professionalization of the AI service and accreditation of PCC as the National training center for AI.

Another important initiative for the year included the crafting of the Human Resource Development (HRD) Plan, and resubmission of the Agency’s Rationalization Plan.



Participants of the PCC-JICA's study program on water buffalo production system from Myanmar present here their token of appreciation to PCC received by its executive director Dr. Libertado Cruz (4th from R) during the closing ceremonies, December 2, 2011.

## Institutional Linkages

During the year, PCC created new linkages and maintained existing partnerships with various institutions particularly for technical cooperation and R&D collaborations to further strengthen the human capital (Table 4).

**Table 4.** List of partner-institutions, CY 2011.

| Partner Institution/Program  | Nature of Linkage   |
|--|---|
| Regional Agency for the Development and Innovation of Agriculture, Rome, Italy                                     | Technical cooperation on reproductive biotechnology   |
| Animal Science Department and Center for Regenerative Biology, University of Connecticut, United States of America | do -  |
| Reproductive Support Medical Research Center, Tokyo, Japan   | do -  |
| University of New England, Armidale, New South Wales, Australia  | Technical cooperation on genetic evaluation   |
| Hokkaido University Research Center for Zoonosis Control, Hokkaido, Japan  | Technical cooperation and training program on animal health   |
| Laboratory of Infectious Disease, Faculty of Veterinary Medicine, Hokkaido University, Hokkaido, Japan             | R&D and technical cooperation on animal health  |
| Shimane University, Matsue, Shimane, Japan   | Technical cooperation on animal nutrition   |
| Hankyong National University, Anseong, South Korea   | Technical cooperation and training programs on genetic evaluation, molecular genetics, and reproductive biotechnology |
| Sunchon National University, Jeollanam-do, Suncheon, South Korea   | Technical cooperation and training program on dairy product development   |
| Rajamangala University of Technology Thanyaburi, Thailand  | Technical cooperation on dairy production   |
| Korea International Cooperation Agency   | R&D   |
| Japan International Cooperation Agency   | Third Country Training Program (TCTP)   |
| Livestock Breeding and Veterinary Department, Ministry of Agriculture and Fisheries, Myanmar                       | TCTP  |
| Research Centre for Tropical Rangeland and Grazing Animal Production Systems, University of Mataram, Indonesia     | TCTP (explorative phase)  |

| Partner Institution/Program  | Nature of Linkage       |
|--|-------------------------|
| Manila Economic and Cultural Office-Taiwan Economic and Cultural Office  | Technical cooperation   |
| Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development-Department of Science and Technology | R&D                     |
| Central Luzon State University   | R&D                     |
| Molecular Protozoology Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman                    | R&D                     |
| National Institute of Molecular Biology and Biotechnology, University of the Philippines Diliman                                 | R&D                     |
| Technology Transfer and Business Development Office, University of the Philippines System  | R&D                     |
| Bureau of Agricultural Research  | R&D                     |
| Department of Agriculture Biotechnology Program (DA-Biotech)   | R&D; Fellowship Program |
| Department of Agriculture-National Agricultural and Fishery Council  | R&D                     |
| Livestock Development Council  | R&D                     |
| Public Law 480   | R&D                     |
| Kennedy Round (KR) 2   | Development             |

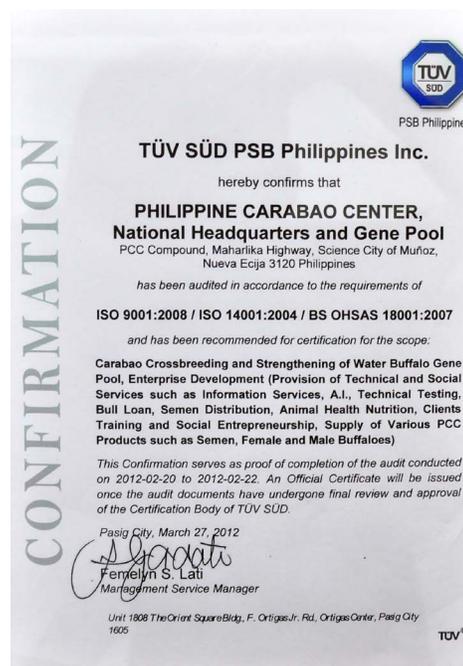
## Integrated Management Audit System

In 2011, efforts were made towards sustenance of National Headquarters and Gene Pool's certification to Quality Management System (QMS) ISO 9001:2008. To further strengthen the delivery of quality service, production of quality products, and internal audit system, more employees were sent to participate in QMS Documentation and Internal Quality Auditing (IQA) Training.

This year's efforts also led to PCC at MMSU's acquisition of a stand-alone ISO 9001:2008 certification in March. Three other centers (PCCs at CSU, UPLB and USF) have (short of internal quality audit) established and documented their respective QMS.

The agency's Environmental Management System (EMS-ISO 14001) and Occupational Health and Safety Management System (OHSMS-OHSAS 18001) were also established

and documented. Activities included the conduct of awareness workshops or sessions with different sections or units, sustenance of validity of permits and licenses by conforming with applicable legal requirements and application for new ones as required by EMS



and OHSAS, and stage 1 audit on EMS and OHSAS, which ascertained certification to both standards.

The agency also collaborated with the Department of Energy (DOE) that resulted in a baseline on energy utilization and in a formulation of an energy conservation program. The collaboration likewise enlisted PCC as one of DOE's recipients of Philippine Energy Efficiency Program (PEEP).

## Resource Management

### Human Resources

In 2011, the total workforce of PCC is comprised of 233 regular (plantilla) staff members, 208 contractual (job-order) employees, and three detailed staff members from other government agencies (Table 5).

The PCC's Human Resource Development (HRD) Unit has continued its efforts in improving productivity and in enhancing capability by putting its resources on few critical priorities which are preparatory for the full implementation of the Rationalization Plan of the Department of Agriculture.

**Organizational Development.** In 2011, the HRD unit has also completed the crafting and documentation of the PCC Human Resource Management (HRM) System. The HRM system was subjected to drilling, review of existing processes, policies, and procedures, which provided inputs to the development of an action plan in support of the rationalization plan of the agency. Organizational diagnosis was also conducted to appropriately design and identify critical intervention in terms of trainings, degree programs, manpower planning, succession planning, and career pathing. Personnel database management system was also installed at the OED and readied for parallel testing.

**Performance Management.** A series of training, coaching, focus group discussion, and information campaign was conducted to improve the adoption of the New Performance Evaluation System. Semi-annual performance evaluation system was administered to both permanent and contractual employees. Results of the evaluation were presented to and issues were resolved by the Performance Evaluation Review Committee. Appropriate policy adjustment was developed for implementation in 2012.

**Training and Development.** The HRD expenditure for FY 2011 was channeled on strengthening the middle management on leadership and execution. Trainings conducted for the year are based on the critical competency gaps as identified in the previously conducted training needs assessment of the agency. Two major trainings on the Four-Disciplines of Execution (4DX) were conducted for middle managers and program coordinators which aim to improve leadership, planning, and execution. A comprehensive HRD intervention was also implemented by way of funding participation in local and international conferences, seminars, and trainings by the agency's staff.

Foreign experts were also invited to share their expertise to PCC's technical teams (Table 6).

The training participated in by PCC staff in 2011 are summarized in Annex 2.

**PCC PRAISE.** A revision and implementation of the PCC's Program on Awards and Incentives for Service Excellence (PRAISE), as mandated by the Civil Service Commission, was made. This agency-wide award and incentive system gave recognition to four outstanding PCC employees during the 18<sup>th</sup> Anniversary Celebration after going through a rigorous and objective evaluation process.

**Table 5.** Distribution of PCC Personnel, CY 2011.

| Particulars   | Plantilla Position |                       | Total | Contracted Staff | Detailed Staff* | Total |
|---|--------------------|-----------------------|-------|------------------|-----------------|-------|
|   | Technical Staff    | Support & Admin Staff |       |                  |                 |       |
| Office of the Executive Director and National Gene Pool & R&D Station | 22                 | 28                    | 50    | 75               | 1               | 126   |
| PCC at CLSU   | 30                 | 2                     | 32    | 30               | 1               | 63    |
| PCC at UPLB   | 24                 | 2                     | 26    | 14               |                 | 40    |
| PCC at CSU  | 13                 | 1                     | 14    | 7                |                 | 21    |
| PCC at MMSU   | 8                  | 1                     | 9     | 6                |                 | 15    |
| PCC at DMMMSU   | 7                  | 1                     | 8     | 2                |                 | 10    |
| PCC at USF  | 13                 | 1                     | 14    | 17               |                 | 31    |
| PCC at VSU  | 8                  | 2                     | 10    | 11               | 1               | 22    |
| PCC at WVSU   | 8                  | 1                     | 9     | 8                |                 | 17    |
| PCC at LCSF   | 11                 | 1                     | 12    | 9                |                 | 21    |
| PCC at CMU  | 11                 | 4                     | 15    | 2                |                 | 17    |
| PCC at USM  | 10                 | 1                     | 11    | 15               |                 | 26    |
| PCC at MSU  | 10                 | 1                     | 11    | 6                |                 | 17    |
| PCC at MLPC   | 11                 | 1                     | 12    | 16               |                 | 28    |
| Total   | 186                | 47                    | 233   | 208              | 3               | 454   |

**Table 6.** Visiting technical experts on reproductive biotechnology

| Name of Expert           | Field of Specialization         | Date of Visit (2011)    |
|--------------------------|---------------------------------|-------------------------|
| Dr. Antonio Precicce     | Ovum pick up                    | November 25-December 10 |
| Dr. Masashige Kuwayama   | Oocyte and embryo vitrification | December 14-20          |
| Dr. Xiuchun "Cindy" Tian | Molecular biology/Cloning       | December 14-20          |



## Budget and Finance

**Fund Source and Utilization.** The summary of fund sources, allotment and usage for 2011 is presented below.

| Fund Source        | Allotment | Usage   |
|--------------------|-----------|---------|
| 2011               | 617.22    | 209.33* |
| 2010 continuing    | 115.06    | 113.08  |
| Trust/Project Fund | 324.12**  | 162.12  |

\* does not include P381.33M C.O. for stock infusion now under bidding

\*\* cumulative balances of various multiyear project, mostly external funds

The figures on the utilization of 2011 C.O. allocation is low due to failed bidding on the infusion of breeder stocks amounting P381.33M, representing 61.73% of the 2011 allocation.

On the other hand, the 2011 Trust/Project funds in the amount of P324.12 is a cumulative balances of various projects, including external sources.

Allotment and usage of GAA 2010 and 2011 fund, by object, are presented in Figure 3. Except

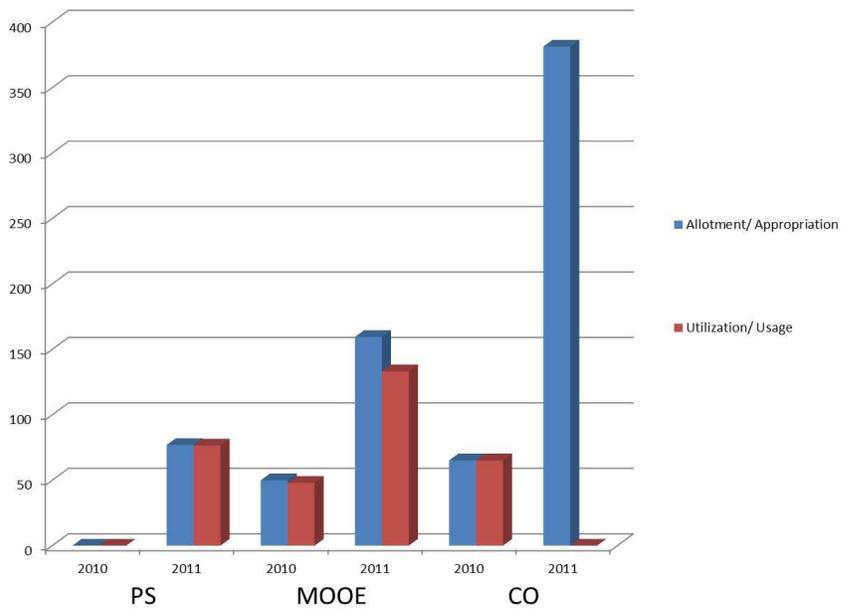
for the C.O. allotment in 2011 in the amount of P381.33M which are still under bidding up until December 2011, all GAA available fund were utilized almost 100%.

**Financial Condition.** The agency's total assets as of December 31, 2011 amounted to Php1,605.08 million comprising mainly of the agency Property, Plant & Equipment (PPE) and Other Assets. The significant change in current assets represents the increased in cash in bank local currency account from the receipts of fund for the implementation of special projects.

Total liabilities posted Php588.82 million and total equity reached Php1,016.26 million. Significant increase in total liabilities is mainly attributed to the accounts payable for the second batch infusion of dairy buffaloes which was not yet consummated, pending the issuance of Import Permit.

**Table 7.** Statement of Financial Condition as of December 31, 2011 (PhpM).

| Particulars                     | FY 2011  | FY 2010  | % Change |
|---------------------------------|----------|----------|----------|
| Assets                          | 1,605.08 | 1,636.79 | 2%       |
| Current Assets                  | 352.26   | 442.79   | -20%     |
| Property, Plant & Equipment     | 711.51   | 632.67   | 12%      |
| Other Assets                    | 541.31   | 561.33   | -4%      |
| Liabilities                     | 588.82   | 304.33   | -93%     |
| Government Equity               | 1,016.26 | 1,332.46 | 24%      |
| Total Liabilities & Gov. Equity | 1,605.08 | 1,636.79 | 2%       |



**Fig. 3.** GAA fund allotment and usage, by object and by year.

**ANNEX 1**

**List of completed researches for CY 2011**

| DISCIPLINE/THEMATIC AREAS          | TITLE   | RESEARCHER  |
|------------------------------------|---|---|
| Basic Research                     |   |   |
| Animal Health                      | Cloning of the 2B Region from Footh-and-Mouth Disease Viral Genome as Potential External Positive Control for FMD Detection                           | J.A.C. Sanchez, J.V. Bagunu and R. Paraguison-Alili   |
|                                    | Comparative Effect of Trypanocidal Drugs in Trypanosoma evansi Isolated from Water Buffaloes (Bubalus bubalis) using Murine Model                     | B.B. Macareg, J.V. Lazaro, N.S. Abes, C.A. Gutierrez, M.A. Villanueva and C.N. Mingala                  |
|                                    | Prevalence and Risk Factors of Subclinical Mastitis in Water Buffaloes (Bubalus bubalis)  | J.M.C. Beltran, R.T. Salvador, N.S. Abes, C.A. Gutierrez, M.A. Villanueva and C.N. Mingala              |
|                                    | Retrospective Study on Antibiotic Treatment of Subclinical Mastitis of Water Buffaloes at Philippine Carabao Center Gene Pool                         | N.M. Villanada, N.P. Medina, N.S. Abes, C.A. Gutierrez, M.A. Villanueva and C.N. Mingala                |
|                                    | Molecular Detection and Classification of a New Theileria species in Cattle in the Philippines  | L. P. Belotindos, J. V. Lazaro, M.A. Villanueva & C. N. Mingala   |
|                                    | Detection of Enzoonotic Bovine Leukosis in Cattle Using Nested Polymerase Chain Reaction Assay  | J.A. Uera, J.V. Lazaro & C.N. Mingala   |
| Reproductive Biotechnology         | Effect of All-trans Retinoic Acid During In vitro Maturation on the Development, Carbohydrate Uptake and Midkine Expression in Water Buffalo Oocyte   | L.A.Cajuday, A.A. Herrera and D.H. Duran  |
|                                    | Ultra Rapid Vitrification of In-vitro Matured Buffalo Oocytes by Minimum Volume Cooling Methods   | E.P. Atabay, E.C. Atabay, F.P. Aquino, R.V. de Vera and L.C. Cruz                                       |
|                                    | Successful Production of Kids Following the Use of Optimized Extenders in the Cryopreservation of Goat Semen for Artificial Insemination <sup>1</sup> | M.A.G. Beltran, E.P. Atabay, E.C. Atabay, F.P. Aquino, A. Soriano, J.P. Angoya, E.C. Cruz and L.C. Cruz |
|                                    | Survivability and Fertilizability of Immature and Mature Bovine Oocytes After Vitrification   | L.S. Guzman and M.B. Ocampo   |
| Product Development (Meat Product) | Carcass Yield of Native and Crossbred Buffaloes Slaughtered at Two Years of Age   | R.M. Lapitan, A.N. del Barrio, J. R.V. Herrera, T.L. Canaria  |
| Socio-Economics                    | An Assessment of the Economic Viability of 5 -Cow Dairy Buffalo Module in Cavite  | J. C. Canaria, J. C. Malijan, R. M. Lapitan and A. N. del Barrio  |

| DISCIPLINE/THEMATIC AREAS                              | TITLE   | RESEARCHER  |
|--|---|---|
| <b>B. Operations Research</b>                          |   |   |
| Forage and Pasture                                     | Performance of <i>Andropogon gayanus</i> cv. Gamba Grass Grown Under Marginal Grasland of PCC at CLSU Ranch   | N.P. Garcia, J.E.F. Malamug and L.T. Alfonso  |
| Increasing Milk Production                             | Milk Production Performance of Bulgarian Murrah and Crossbred Buffaloes Raised at the PCC-UPLB Institutional Farm   | J.R.V.Herrera, R.M. Lapitan, T.A. Saludes, J.C. Canaria & A.N. Del Barrio   |
| Increasing Calf Production/<br>Reducing Calf Mortality | Feeding Milk Replacer to Calves at PCC-UPLB   | TA Saludes, AG Tandang, JRV Herrera, RM Lapitan and AN del Barrio   |
| Reducing Calving Interval                              | Improving the Breeding Performance of Bulgarian Murrah and Crossbred Buffaloes Raised at the PCC-UPLB Institutional Farm<br><br>Development of Animal Health and Management Protocol for Grazing Buffaloes. Component 3. Development of Protocol in the Implementation of Artificial Insemination Program at PCC-USF Dairy Farm | A.N. del Barrio, J.C. Canaria and P.O. Abrigo, J.R.V. Herrera, R.M. Lapitan<br><br>G.P. Bajenting, A. Casinilio, O. Godinez and C.B. Salces |

## List of on-going researches for CY 2011

| DISCIPLINE/THEMATIC AREAS | TITLE   | RESEARCHER  |
|---------------------------|---|---|
| <b>Basic Research</b>     |   |   |
| Animal Health             | Bovine Vaccine Trial of <i>Schistosoma japonicum</i> Paramyosin   | M.A. SL. Jiz, & C. N. Mingala   |
|                           | Genotyping and Molecular Characterization of NRAMP1/-2 Genes as Location of markers for Resistance and/or Susceptibility to <i>Mycobacterium bovis</i> In Swamp and Riverine Water Buffaloes                                    | C.N. Mingala, N.S. Abes, C.A. Gutierrez, M.A. Villanueva & L.C. Cruz                |
|                           | The use of Intramammary Teat Sealant Device as Preventive Management for Subclinical Mastitis in Water Buffaloes ( <i>Bubalus bubalis</i> )   | M.B. Villamor, N. Medina, N.S. Abes, C.A. Gutierrez, M.A.Villanueva & C. N. Mingala |
|                           | Program Title: Development of LAMP Assay and Quick Test Kits for Gastro Intestinal Infections of Swine Project Title: Development of LAMP Assay and Quick Test Kit for Viral Gastro Intestinal Infection (PED and TGE) of Swine | R.P. Ailli, M. Balbin, E. D. Sace,<br>M. L.L. Dela Cruz                             |
|                           | RT-PCR Breeding and RT-Lamp Detection Kits for Rapid Screening of FMD Virus Infection   | R.C. Paraguison, J.R.V. Herrera & L.C. Cruz   |
| Animal Nutrition          | Development of Buffalo Feeding Regimes from Enhanced Sweet Sorghum Biomass of Bio-ethanol Production  | P.C. Florendo, N.P. Garcia, M.P. Abella, M. Roguel & F.V. Mamuad                    |
|                           | Isolation, Characterization, Preservation Of Rumen Microbes Associated with Cellulose Ethanol Production  | P.C. Florendo, S.P. Bangit & F.V. Mamuad  |
|                           | Comparative Performance of Nursing Buffalo Calves Fed with Pure Milk, Cattle Milk and Milk Replacer   | D.L. Aquino, P.G. Duran, M.V. Del Rosario & K. F. Vergara                           |
|                           | Augmented Feeding with By-pass Amino Acids and Slow Release Non-protein Nitrogen (NPN) Supplements for Dairy Buffaloes  | D.L. Aquino, P.G. Duran, M.V. Del Rosario & K. F. Vergara                           |

| DISCIPLINE/THEMATIC AREAS  | TITLE   | RESEARCHER  |
|----------------------------|---|---|
| Breeding and Genetics      | <p>Use of DNA “Fingerprinting” and Other Molecular Markers in Genetic Resource Conservation and Improvement of Water Buffaloes</p> <p>a. Parentage Verification of Riverine and Swamp Buffaloes Using Microsatellite Markers</p> <p>b. Identification of Sets of Markers in Dairy Buffaloes Associated with QTL for Milk &amp; Milk Component Traits</p> <p>Characterization of the Swamp and Riverine Buffalo Genome</p> <p>a. Microsatellite Genotyping of the Philippine Swamp &amp; Riverine Buffaloes</p> <p>b. Single Nucleotide Polymorphism (SNP) Detection in Buffaloes Associated with Milk &amp; Milk Component Traits</p> <p>PCC Breeding Program for Philippine Dairy Buffaloes: Genetic Evaluation and Breeding Value Estimation in Philippine Dairy Buffaloes for Milk Yield Traits Using Milk Test Day Records</p> <p>Development of Molecular Markers as Potential for Use in Breeding program of Local Livestock Species in the Philippines: Screening for Genetic Disease-associated DNA Polymorphism in Water Buffaloes</p> | <p>E.B. Flores, J.R.V. Herrera, L.A.M. Del Barrio and L.C. Cruz</p> <p>E.B. Flores, J.R.V. Herrera, L.C. Cruz</p> <p>E.B. Flores, J.R.V. Herrera, L.A. M. Del Barrio, T. Fernando &amp; L.C. Cruz</p> <p>E.B. Flores, J.R.V. Herrera, A.S. Villanueva &amp; L.C. Cruz</p> <p>E.B. Flores and J.F. Maramba</p> <p>R.C. Paragusion, R.G. Cacho, L.M. Labonite, E.B. Flores, J.R.V. Herrera and L.C. Cruz</p>  |
| Reproductive Biotechnology | <p>Optimizing Chemically-defined Culture System for Production of Buffalo and Bovine Embryos In-vitro</p> <p>a. Optimizing Culture Condition for the In Vitro Development of IVF and Nuclear Transfer-Derived Buffalo Embryos: The Effect of Gas Environment, Culture Medium and Embryo Density During Culture</p> <p>Cryostorage of vitrified Immature Bovine And/ Or Bubaline Oocytes Using the Cryoloop Device</p> <p>Vitrification of Buffalo Oocytes by Minimum Drop Size Technique</p> <p>In Vitro Fertilization By Intracytoplasmic Sperm Injection (ICSI) in Buffaloes</p> <p>Viability of Goat Embryos Maintained in Portable Incubator During Transit for Embryo Transfer-on-hold</p> <p>Enhancing Cryoviability of In-Vivo Derived Goat Embryos by Optimizing Embryonic Stage and In-Vitro Culture of Morula to Blastocyst Before Freezing</p> <p>Synchronizing Ovulation Using OVSYCH-CIDAR- Based Protocol for Fixed Tiome Transfer (FTET) in Water Buffaloes</p>  | <p>E.C. Atabay, E.P. Atabay, D.H. Duran, R.V. de Vera, F.V. Mamuad and L.C. Cruz</p> <p>LC Ocampo , FP Aquino, EP Atabay, PB Pedro, MB Ocampo and LC Cruz</p> <p>MB Ocampo , FP Aquino, EP Atabay, PB Pedro, LC Ocampo and LC Cruz</p> <p>P.B. Pedro, PG Duran, E.P. Atabay, E.C. Atabay, L.C. Ocampo and L.C. Cruz</p> <p>FP Aquino, E P. Atabay, EB. Flores, N V. Marzan and L.C. Cruz</p> <p>EP Atabay, FP Aquino, E C. Atabay, EB. Flores, N V. Marzan and L.C. Cruz</p> <p>PG. Duran, E.P. Atabay, P.B. Pedro, D.H. Duran, E.C. Atabay, F.P. Aquino, E.B. Flores &amp; L.C. Cruz</p> |

| DISCIPLINE/THEMATIC AREAS                              | TITLE  | RESEARCHER  |
|--|--|---|
| Anatomy/Physiology                                     | Ultrasonographic Features of the Spleen, Liver, Kidney and Udder of Buffaloes at Different Stages of Lactation   | J.L Constante, J.A. Acorda, A.N. Del Barrio   |
| Product Development (Dairy Product)                    | Development of Chilled Coffee Flavored Buffalo Milk-Based Drink  | LMParungao, TLCanaria, RMLapitan  |
| Socio-Economics  | Determinants of Sustainability on the effectiveness and efficiency of Artificial Insemination Services in the Implementation of the Carabao-based Enterprise Development at the National Impact Zone | M.U. Aquino et al.  |
|  | Profitability Assessment of PCC-USF Institutional Dairy Processing and Marketing Center  | C.B. Salces, G. Abay-abay and C. Maturan  |
|  | Assessment of Performances of the Buffalo Bulls Under the Bull Loan Program in Central Visayas   | B.A. Hingpit, J.A. Bigcas and A.A. Anoos  |
|  | Development of a Sustainable Village-Based Artificial Insemination System: The VBAIT Approach  | G.M.R. Recta, W.A. Gudoy, L.G. Battad, A.S. Sarabia and M.M. Alimbuyuguen   |
| <b>Operations Research</b>                             |  |   |
| Reducing Calf Mortality/<br>Increasing Calf Production | Reducing Calf Mortality at PCC-MMSU through Improved Health and Management Schemes   | C.P. Dabalos, F.T. Malicad, R. Sair, J. Donato, A. Padulip  |
|  | Growth Performance of Swamp Buffalo on Grazing Management Condition with Supplementation   | F. Rellin, M. Wandagan, R. Piñera, et al.   |
| Increasing Milk Production                             | Effects of the inclusion of Tyrolac in the diet of lactating buffaloes from 20-80 days of lactation  | R. Piñera, F.T. Rellin & A. Morales   |
|  | Studies on Increasing Milk Production of Dairy Buffaloes based on Actual Dairy Farm Operations and Existing Feed Resources.  | P.C. Florendo, F.V. Mamuad, N. Lorenzo, R. Santiago, S. Lorenzo, H. Venturina, V. Mamuad, F. Venturina, M. Abella and L.C. Cruz |
|  | Milk Production Performance Evaluation of BMB Milking Herd of PCC at CMU   | L.C. Paraguas, A.G. Racho, M.E. Renacia & V.L. Canatoy  |
| Improving Forage and Pasture                           | Performance of Grass Legume Pasture Fed to Dairy Buffaloes under Cooperative Management System   | MB Wandagan, RB Carag, Ludivico Agumboy   |
|  | The Influence of Vermicast on the Growth, Yield and Nutrient Composition of Selected Forages (Ruzi grass and Forage peanut)  | Eduardo U. Corpuz, Jr., Benjamin John C. Basilio & Diosdado E. Corpuz   |

**ANNEX 2**

# List of trainings and seminars attended by PCC staff

| Date (2011)          | Title   | Venue  | No. of Participating Staff Members |
|----------------------|---|--|------------------------------------|
| <b>International</b> |   |  |                                    |
| Feb. 16-18           | 16 <sup>th</sup> Congress of the Federation of Asian Veterinary Associations (FAVA)   | Waterfront Hotel and Casino, Lahug, Cebu City  | 1                                  |
| Feb. 22-25           | Short Training on the Use of FLOTAC Technique   | Facolta di Medicina Veterinaria, Universita Degli Studi Di Napoli Federico II, Naples, Italy | 1                                  |
| Mar 8-20             | Training Course on Molecular Biology and Biotechnology for Screening Genetic Defects and Functional Traits for Livestock and Poultry              | Taiwan Livestock Research Institute, Taiwan  | 2                                  |
| Jul 29- Nov 25       | Advance Training Course for Zoonosis Control  | Sapporo, Japan   | 1                                  |
| Aug 22- Sept 06      | Basic Dairy Technology Training   | Thailand   | 2                                  |
| Sep 1-7              | Exchange Program on Livestock Production  | Chonburi, Thailand   | 2                                  |
| Sept 5-18            | Training in Hokkaido University Research Center for Zoonosis  | Sapporo, Japan   | 1                                  |
| Sept 18-24           | Study Tour of Thai Dairy Plants and Farms for Filipino Dairy Plant Managers and Operators, Milk Quality Technicians and Dairy Marketing Personnel | Ratchaburi, Thailand   | 1                                  |
| Sept 19-28           | Advance Pedigree and Performance Data Recording   | Armidale, New South Wales, Australia   | 1                                  |
| Oct 17-21            | International Lecture on Regional Project on Tropical Dairy Animal and Related Topics   | Suncheon National University, Suncheon, South Korea  | 1                                  |
| Oct 24-30            | 8th Annual Conference of the Asian Reproductive Biotechnology Society   | Guilin City, Guangxi, China  | 3                                  |
| Oct 11- Nov 30       | Empowerment for Genetic Improvement of Dairy Cattle in the Philippines- The Project Enhancing Livestock Sector Performance in the Philippines     | Hankyong National University, South Korea  | 3                                  |
| Oct 11- Dec 22       | Empowerment for Genetic Improvement of Dairy Cattle in the Philippines- The Project Enhancing Livestock Sector Performance in the Philippine      | Geongi-do, South Korea   | 6                                  |
| Dec 13-17            | 3 <sup>rd</sup> Rajamangala University of Technology International Conference   | Pattaya, Chonburi, Thailand  | 4                                  |
| <b>NATIONAL</b>      |   |  |                                    |
| Jan 15               | LIS Congress  | UP Diliman, Quezon City  | 1                                  |
| Jan 24- Feb 4        | Advanced Biosafety Officer Training Pilot Certificate Program in the Philippines  | Hotel Kimberly, Pedro Gil St., Malate Manila   | 1                                  |
| May 30- June 8       |   | Eugenio Lopez Center, Antipolo City  |                                    |
| July 11-July 22      |   | Bayview Park Hotel, Manila   |                                    |
| Sept. 12             |   | Hyatt Hotel, Manila Philippines  |                                    |
| Jan 25               | The Use of NIR in Crop and Livestock Production   | Philippine Rice Research Institute, Science City of Muñoz, Nueva Ecija                       | 1                                  |

| Date (2011)   | Title   | Venue   | No. of Participating Staff Members |
|---------------|---|---|------------------------------------|
| Feb 7-9       | Workshop on Pagbabago Tungo sa Matuwid na Daan: Building a more Responsive and Dynamic Agricultural and Fish Extension in Region III and Beyond | Angeles City, Pampanga                            | 1                                  |
| Feb. 16-18    | 78 <sup>th</sup> Philippine Veterinary Medical Association (PVMA) Annual Convention and Scientific Conference                                   | Waterfront Hotel and Casino, Lahug, Cebu City     | 1                                  |
| Feb 21-Mar 16 | Training on Artificial Insemination and Pregnancy Diagnosis   | UP Los Baños                                      | 1                                  |
| Feb 23        | Leading at the Speed of Trust   | Shangri-La Hotel, Makati City                     | 6                                  |
| Feb 23-24     | ISO 9001:2008 QMS Documentation   | PTTC, Pasay City                                  | 2                                  |
| Feb 28- Mar 7 | Vermiculture Technology Training  | BARFARM, Pandi, Bulacan                           | 2                                  |
| Mar 8-9       | Managing the Operations Function  | ABS-CBN Bayan Academy, QC                         | 3                                  |
| Mar 9         | Annual Scientific Meeting of the National Research Council of the Philippines   | Manila Hotel                                      | 1                                  |
| Mar 14        | Commercialization of Livestock and Agricultural Biotechnology By-Products   | Imperial Palace Suites, Quezon City               | 22                                 |
| Mar 14-15     | Internal Quality Audit  | PTTC, Pasay City                                  | 2                                  |
| Apr 2         | Library 2.0: Enhancing Librarians' Competencies   | UST, Manila                                       | 1                                  |
| Apr 5-7       | Basic HR for Line Managers  | Ateneo Graduate Business School                   | 2                                  |
| Apr 25-29     | Training Course on Research Design, Data Analysis and Interpretation for Livestock and Poultry Researchers                                      | PCCARD, Los Baños                                 | 5                                  |
| May 9-13      | Impact Assessment of R&D Projects   | CLSU, Science City of Muñoz                       | 1                                  |
| May 30- Jun 3 | Training Course on Poultry R&D Project Implementation Techniques  | PCCARD, Los Baños                                 | 3                                  |
| Jun 15-17     | Highly Efficient and Effective Project Implementation and Monitoring/Evaluation   | DCAAP, UP Diliman                                 | 2                                  |
| Jun 21-24     | Property and Supply Management System   | PDO-COA   | 2                                  |
| July 12       | OYSI 6 <sup>th</sup> Annual Meeting and Convention  | Manila Hotel, Manila                              | 1                                  |
| July 13-14    | 33rd Annual Scientific Meeting, National Academy of Science and Technology  | Manila Hotel, Manila                              | 9                                  |
| Aug 12        | 22nd Regional Symposium on Research and Development   | Baler, Aurora                                     | 1                                  |
| Aug 15-17     | Cash Management and Control System  | PDO-COA   | 2                                  |
| Aug 18-19     | ISO 9001:2008 QMS Documentation   | PTTC, Pasay City                                  | 6                                  |
| Aug 20        | 3rd Annual Symposium of the Philippine Society of Developmental Biology in the Philippines  | UP Diliman, Quezon City                           | 1                                  |
| Aug 22        | 22 <sup>nd</sup> CLARRDEC Regional Symposium on Research and Development  | Aurora State College of Technology, Baler, Aurora | 1                                  |
| Aug 28-30     | International Conference on Libraries, Archives and Museums Services  | CBS Int'l Conference Center, Manila               | 1                                  |

| Date (2011)               | Title  | Venue  | No. of Participating Staff Members |
|---------------------------|--|--|------------------------------------|
| Aug 31- Sept 2            | Systematic Evaluation and Utilization of Monitoring Results                                    | DCAAP, UP Diliman  | 1                                  |
| Sept 2                    | Insights and Opportunities in Microarray-based Studies   | National Institutes of Health, UP Manila                           | 1                                  |
| Sept 8-9                  | Internal Quality Audit   | PTTC, Pasay City   | 7                                  |
| Sept 12-14                | 5S in Records Management   | Garden Oases Resort, Davao City                                    | 2                                  |
| Sept 13-16                | Internal Control Structure   | PDO-COA  | 1                                  |
| Sept 15                   | Veterinary Forum, "Animal Industry: Where are we going?"                                       | Central Luzon State University, Science City of Muñoz, Nueva Ecija | 1                                  |
| Sept 16                   | Blended Librarianship  | SMX Convention Center, Pasay City                                  | 1                                  |
| Oct 6-7                   | Food Packaging and Labeling for Processed Food   | PTTC, Pasay City   | 1                                  |
| Oct 10-11                 | 22nd Annual National Research Symposium  | DA-BAR   | 5                                  |
| Oct 10-14                 | Basic Occupational Safety and Health Training  | Camelot Hotel, Quezon City   | 1                                  |
| Oct 13-14                 | Risk Analysis: Food Safety   | PTTC, Pasay City   | 2                                  |
| Oct 20-22                 | Seminar on Enhancing the Culture of Integrity, Accountability and Transparency                 | Davao City   | 5                                  |
| Oct 25-27                 | Seminar Workshop on the Assessment of Good Animal Husbandry Practices in APEC Member Economies | Tagaytay City  | 1                                  |
| Oct 26-28                 | 48th Annual PSAS Conference  | L'Fisher Bacolod City, Negros Occidental                           | 14                                 |
| Nov 2-10                  | Post Graduate Course on Occupational Health and Safety   | UP Manila  | 1                                  |
| Nov 8-9                   | ISO 9001:2008 QMS Documentation  | PTTC, Pasay City   | 5                                  |
| Nov 21-26                 | National Biotechnology Week  | DENR, Quezon City  | 1                                  |
| Nov 23-25                 | IMS Internal Audit Training  | Neville Clarke Phil., Manila                                       | 6                                  |
| Dec 19                    | Symposium on Recent Advances in Reproductive Biotechnologies                                   | EDSA Shangri-La, Ortigas Center                                    | 30                                 |
| <b>IN-HOUSE TRAININGS</b> |  |  |                                    |
| Feb 28- Mar 2             | Technology Assessment Protocols  | PCC-NHGP   | 7                                  |
| Mar 16                    | Appreciation Course on Occupational Safety and Health  | PCC-NHGP   | 5                                  |
| March 23                  | National Performance Management Seminar-Workshop   | PCC-NHGP   | 155                                |
| May 23-25                 | 2011 PCC In-House Review   | PCC-NHGP   | 85                                 |
| May 23-27                 | Training Course on Scanning Electron Microscopy  | PCC-NHGP   | 1                                  |
| Aug 22-26                 | 1 <sup>st</sup> Writeshop for PCC Info Officers and Regional Correspondents                    | PCC-NHGP   | 3                                  |
| Oct 5-6                   | Cooperative Good Governance  | PCC-NHGP   | 5                                  |
| Nov 4                     | Hazardous Waste Management Training  | PCC-NHGP   | 44                                 |
| Dec 1-2                   | 4 Disciplines of Execution   | PCC-NHGP   | 30                                 |

## ANNEX 3

# PCC Advisory Board

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**DR. DAVINIO P. CATBAGAN**

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Farmer-Representative (Visayas)

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ANNEX 4

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