

R4D *Highlights*



Four more PCC researchers, including PCC Executive Director Arnel N. Del Barrio, join the agency's growing pool of NAST-conferred Scientists. *See more on page 10.*

PCC transitions toward 'Research for Development'

BY ALMIRA P. BENTADAN

The Philippine Carabao Center (PCC) is gradually transitioning from a research and development (R&D) institution into a more dynamic research for development (R4D) entity that directs its research endeavors toward addressing the needs of the stakeholders in the industry it serves.

This was emphasized by PCC R4D national coordinator Dr. Eric Palacpac during the conduct of PCC's R4D In-House Review.

He pointed out the difference between research and development (R&D) approach as opposed to research for development (R4D) and why there is a need for a new paradigm.

R&D, he said, utilizes the knowledge-initiated approach directed primarily

toward generating information or knowledge without necessitating any practical application. R4D, on the other hand, puts emphasis on development as the end-result of research.

Under the R4D, research undertakings are problem-focused and relevant to the concerns of the industry it serves, he explained.

In the case of PCC, researches conducted

(Continued on page 2)

CONTENTS

OPINION/2

Fixed time AI shows promise for higher pregnancy rate and shorter calving interval/3

Milk enhancer increases dairy buffalo milk production, study's results reveal/4

PCC's Dairy Herd Improvement Program strengthening improved practices in NIZ/5

Enhanced carabao-based dairy farm enterprise thru R&D is seen/6

Molecular characterization of CAEV gag gene in goats to lead the way to eradication of this virus, study says/8

PCC's Roster of Scientists/10

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“Shifting Gears”: Journeying the Road to PCC’s R4D

By ERIC P. PALACPAC, PhD
PCC National R&D Coordinator

Transitioning into a genuine research for development (R4D) institution is not an easy task. For many years, the researchers at the Philippine Carabao Center (PCC) have been used to conducting mostly scientific researches for generating basic or foundational knowledge with no immediate or practical application – “knowledge for science’s sake”, so to speak. It has become a paradigmatic consensus among many PCC’s researchers especially those who work in the laboratories. Theirs are still noble undertakings and such a “worldview” is quite understandable. A person’s mindset that was rigorously built and nourished over time is a hard nut to crack. Nonetheless, with constant exposure to and immersion in the PCC’s

new perspective, a “gestalt switch” among its researchers can happen in due time.

Recent discussions and workshops at the PCC that detailed a strategic shift in the implementation of the Carabao Development Program (CDP) are welcome developments in this regard. The shift now emphasizes on identifying relevant researches that will contribute significantly to the attainment of the agency’s major final outputs. In doing so, research and other operating units at the PCC were asked to interface with one another (via consultative meetings) to evolve a unified or holistic approach in addressing specific areas of concern in the CDP. In other words, an interdisciplinary (or possibly transdisciplinary) strategy

is now being employed. These activities are necessary steps for setting the PCC’s R4D in motion. As anticipated, specific research projects or studies came out of the said consultations, which are aligned with the PCC’s R4D thematic areas, such as genetic improvement, biosafety, production management systems, technology transfer, and socio-economic dimensions of CDP, among others.

The challenge now is how to effectively implement what was initially agreed upon in the interfacing consultations. There should be a deliberate effort for the concerned units and researchers to “walk the talk” and effect more relevant and meaningful outcomes of their research activities.

PCC transitions toward... (From page 1)

should have practical applications in the livestock industry and in the carabao sector, in particular, to better serve its partners and clientele, especially the farmers, he added.

As PCC poises to take on a new research direction, its annual review will also ensure that all the research activities conducted in the agency are aligned with its newly crafted agenda.

For several years, the PCC has been conducting an in-house review to evaluate the limitations and opportunities of its on-going researches, as well as the areas that need improvements.

“As for the researchers, the in-house review serves as a venue for them to share their research results with the scientific community and as a motivation to strengthen their interest in conducting vital studies relevant to the mandate of the agency,” Dr. Palacpac further stated.

Its in-house review this year was held at the PCC national headquarters last June 17-18.

A total of 25 papers were presented, 16 of which were completed and eight are still being conducted. A special paper on dairy

value chain was also presented.

Most of the papers presented dealt with biosafety while the others were on product development, genetic improvement, production management, socio-economic dimensions of Carabao Development Program implementation, and industry and policy thematic areas.

Dr. Eduardo Torres, Professor VIII at the College of Veterinary Medicine at the University of the Philippines – Los Baños (CVM-UPLB) chaired the panel of external evaluators. He was joined by Dr. Fe Perciuncula, a professor at the Central Luzon State University and director of the Ramon Magsaysay Center for Agricultural Resources and Environment Studies in the university; and Dr. Rio John Ducusin, assistant to the dean at CVM-UPLB.

Apart from the regular PCC researchers, students from universities who conducted their studies at the agency under the supervision of PCC experts presented their research papers.

At the end of the two-day review, awards were given to the researchers who excelled in their research activities.

Adjudged best paper in the completed

research category was the study titled, “Molecular Characterization of Gag Gene of Caprine Arthritis Encephalitis Virus of Goats Present in the Philippines” conducted by Ryan Bismark Padiernos, Michelle Balbin, Arman Parayao and Dr. Claro Mingala, a PCC senior researcher.

The student thesis titled, “Detection of Horse and Rat Meat from Meat Products Declared as Pork, Beef or Poultry Meat in the Philippines Using Polymerase Chain Reaction Assay” conducted by Guiao Dimalanta and Leslie Domingo, Jr., veterinary students from CLSU, was also given the best paper award. They were supervised by Dr. Mingala.

On the other hand, Ariel Galamgam, a Master’s in Animal Science student from UPLB who presented his paper titled, “Motion Kinematics of Goat (*Capra hircus*) Spermatozoa as Influenced by Penetrating Cryoprotectants under Various Stages of the Cryopreservation Process,” was chosen as best presenter.

During the closing program, Dr. Palacpac encouraged the pool of researchers to continue conducting researches that are pragmatic and relevant to the thematic areas under the PCC’s R4D agenda.

PCC technician Joselito del Rosario performs timed AI on one of the hard breeders at PCC’s institutional herd.



Fixed time AI shows promise for higher pregnancy rate and shorter calving interval

By ALMIRA P. BENTADAN & MA. CECILIA C. IRANG

The Philippine Carabao Center (PCC), through its Reproductive Biotechnology Unit, has adopted the “fixed-time artificial insemination (FTAI)” technique in an effort to improve the efficiency of AI among the post-partum buffaloes in its institutional herd.

Currently, FTAI procedures are being optimized and evaluated for their suitability under the Philippine condition.

The FTAI technique is a widely-used technology that further enhances the efficiency of the traditional AI. It combines the use of induced ovulation and timed AI and therefore does not depend on heat detection.

“Normally, we conduct the AI procedure when the animal shows signs of estrus. However, using ultrasonography, we learned that even 3-5 days after heat detection, there are cases when ovulation has not yet occurred,” Dr. Eufrocina Atabay, lead researcher of the project, said.

There are also times, she added, when the buffaloes do not show any outward signs of estrus because they are generally silent heaters.

With FTAI, the AI is performed upon induced ovulation using different hormones without the need for heat detection, therefore not requiring constant estrous monitoring.

Among the protocols developed on ovulation synchronization is the commonly used Ovsynch that has yielded higher pregnancy rate among cattle and water buffaloes in other countries.

“At the start of the estrous cycle, we inject the gonadotropin-releasing hormone (GnRH) to induce the ovulation of the dominant follicle present in the ovary. A new follicular wave will then emerge that will continue to mature and develop. Seven days after, we administer the prostaglandin to regress the corpus luteum (CL) and subsequently trigger

estrus or heat among the animals. A second dose of GnRH is then injected on the ninth day. Timed AI is subsequently conducted 14-15 hours after injection in time for the ovulation of the follicle and the release of egg cells with 24th to 32nd hour,” Dr. Atabay explained.

The study also uses ultrasonography to monitor the progress, growth and development of the follicles. The experiment is currently conducted among the hard breeders or those that are not responding to normal AI.

“Our partial result shows a higher efficiency among the repeat breeders subjected to the procedure,” Dr. Atabay revealed.

With a highly efficient procedure, problems on calving interval will also be addressed since it can be performed on the second estrous cycle of the animal upon calving, she said.

(Continued on page 9)

Milk enhancer increases dairy buffalo milk production, study's results reveal

By MA. CECILIA C. IRANG

Bulgarian and Brazilian buffaloes given milk enhancer in their first three months of lactation can provide higher milk production, preliminary results of a study showed.

The study, "Effects of Milk Enhancer in Primiparous Dairy Buffaloes", was conducted to evaluate the effects of giving milk enhancer to dairy buffaloes and to determine its benefits in daily ration of animals.

The researchers, led by Jeffrey Santos, PCC science research assistant, used a total of 16 primiparous and near-calving buffaloes which comprised eight Bulgarian Murrah and eight Brazilian Murrah buffaloes in the feeding trial. The animals were from the PCC Gene Pool farm.

In the field of human obstetrics, primiparous means a woman due to give birth to her first child.

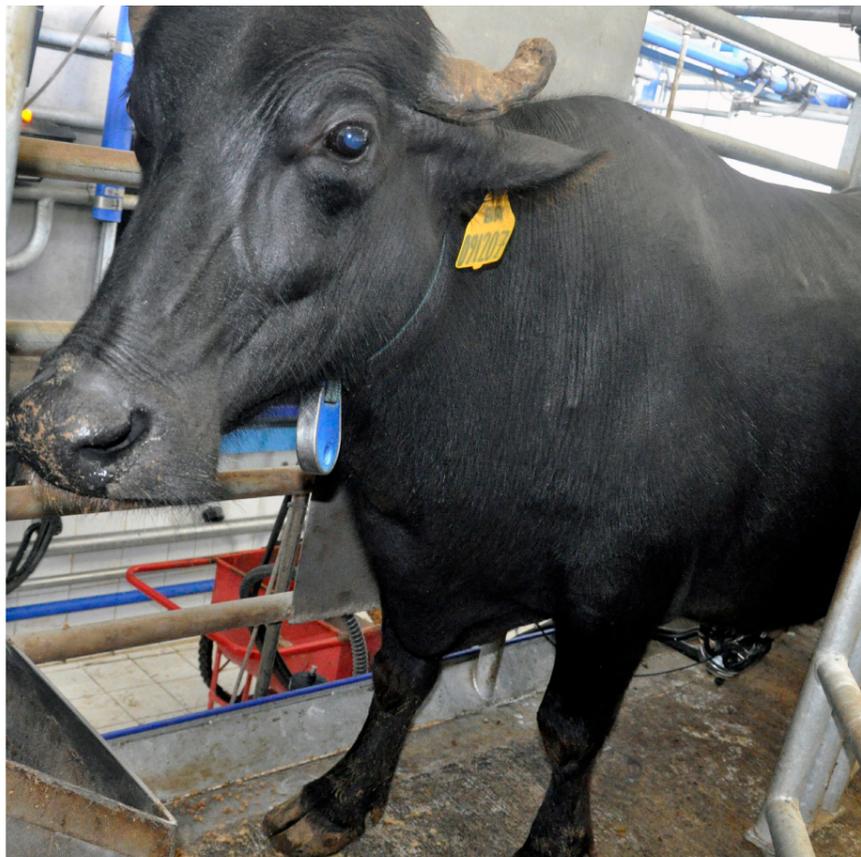
"This study was intended to determine the possibility that the milk enhancer can be considered and included as one of the standard feedstuffs for dairy buffaloes," Santos said.

Based on the monthly milk production of the experimental buffaloes, it was shown in Santos' study that milk enhancer increased the milk yield by 63.89% for the Bulgarian buffaloes and by 55.02% for the Brazilian.

In the experimental method, the animals were divided into two breed groups. Each breed group was subjected to two treatments with T1 as a control (no feed enhancer) and T2 for the group with feed enhancer. Each treatment group was composed of four Bulgarian and four Brazilian buffaloes and each animal served as an individual replicate.

All the experimental buffaloes were nurtured for three months in an intensive management system wherein they were situated in a free-stall barn in group with the lactating cows. They were driven to the exercise area every after milking.

Their daily milk yield was recorded and



milk samples were collected monthly for the evaluation of the milk composition and somatic cell count.

As part of the study, health management was included in which all the experimental buffaloes were monitored daily for any morbidity cases specifically the incidence of mastitis. Proper hygiene and sanitation were also regularly practiced at the barn and milking parlor.

In terms of the feeding management, all the animals were given lactation ration such as urea-treated rice straw, silage, and dairy buffalo concentrate pellets. The milk enhancer was top-dressed during the feeding of concentrates while the experimental animals were being milked at the parlor.

They were given 20 grams per head which started immediately after calving up to 90 days or three months of lactation. The control group, on the other hand, was given a regular ration developed at the

Gene Pool.

Data gathered encompassed the ration given to the buffaloes, animal performance such as its milk yield and composition.

"We presupposed that if the milk production of dairy buffaloes will be enhanced, dairy farmers will surely benefit a lot. It will provide additional income and profit to the rural farming families," Santos said.

With the positive results of the initial study, the research team will have a follow-up study to cover and determine the data on the nutrient intake, milk composition, post-partum reproductive performance of dairy buffaloes, and a simple cost analysis.

About the researcher

A graduate of BS Chemistry, Jeffrey Santos is currently a Science Research Analyst at the PCC Animal Nutrition Unit. His primary research focus is on the development and evaluation of different feedstuffs to enhance the milk production of dairy carabaos.

PCC's Dairy Herd Improvement Program strengthening improved practices in NIZ

By CHRISSALYN L. MARCELO



A dairy farmer in San Jose, Nueva Ecija feeds his purebred buffaloes with grasses.

Through its Dairy Herd Improvement Program (DHIP), the Philippine Carabao Center (PCC) is helping much its dairy farmer-partners and dairy cooperatives in Nueva Ecija in strengthening their animal husbandry practices as it also helps improve and increase their dairy herd.

The DHIP was set-up in 2013 as a program designed specifically to help the farmers in the National Impact Zone (NIZ) to adopt various technologies of the PCC in buffalo management.

It serves as a valuable tool in evaluating as a whole the progress of the carabao-based dairy enterprise in Nueva Ecija and the performance of the dairy herd in the province.

It also targets to create a progressive, profitable and sustainable carabao-based dairy industry in the NIZ and replicate it in other parts of the country in due time.

The DHIP is designed to capacitate the partners of PCC on the knowledge and skills in buffalo husbandry and breeding management. These partners involved the farmers, village-based artificial insemination technicians (VBAIT's), local government units (LGU, Provincial Veterinarian Officers (PVO), among others.

Five-year Plan

DHIP designed a five-year plan to pursue.

In 2013, the team of Dr. Peregrino Duran, project leader of the DHI at NIZ, conducted an evaluation to know the status of the following: (1) present number of herds in the NIZ, (2) animal productivity of the buffaloes, (3) technology adoption by the farmers regarding buffalo management, (4) dairy enterprise in the NIZ, (5) NIZ program management, and (6) partners of the PCC in the dairy industry.

Based on the initial results of the evaluation, the DHIP documented the following:

- (1) the breedable animals in the NIZ were 2,239 out of its total population of 3,025 dairy buffaloes;
- (2) the dairy buffaloes in the NIZ had low productivity in terms of its meat and milk production;
- (3) the adoption of the PCC's technologies by the farmers was still slow and incomplete;
- (4) the status of the dairy enterprise was not yet well-developed;
- (5) the NIZ program management of the PCC needed to be strengthened; and

(6) the PCC's partners in the industry need to be capacitated some more through various trainings that will enhance their skills and capability in buffalo management.

Dr. Duran said that based on the results of the study, his team is now working to help the NIZ farmers improve their management practices.

He also emphasized that they will focus on increasing the breeding efficiency in the NIZ to increase the number of herds in Nueva Ecija toward achieving increased income of the NIZ farmers.

He said that to increase the breeding efficiency, DHIP will conduct massive artificial insemination (AI) activities in the various parts of Nueva Ecija.

Likewise, he said, the NIZ farmers will also be advised to practice night corralling for their loaned bulls in their respective areas to enhance the success of natural mating.

"AI is an artificial process of impregnating the carabaos. In night corralling, the bull is corralled along with the breedable female carabaos for natural mating purposes," said Dr. Duran.

He explained that doing this practice, the breeding efficiency at the NIZ can be increased from 27% (per 2013 findings) to 35% this year.

"We also have other plans in the DHIP for the succeeding years of implementation. These plans are focused on improving the current extension services of PCC to its farmer-partners in the dairy industry and in improving the monitoring and evaluation efforts of PCC," Dr. Duran said.

He added they will also provide trainings for all the key players of PCC in the dairy industry to enhance the skills of these key players in their practices on animal husbandry, cooperative development, leadership, membership, enterprise or business development and developing markets, and market linkages.

These key players are the champion
(Continued on page 9)

Enhanced Carabao-based dairy farm enterprise thru R&D is seen

By KHRIZIE EVERT M. PADRE

Carabao-based dairy farming has become a viable enterprise in the Philippines. Experts said it is an emerging industry that is seen to have the ability to address food security and income-generating opportunities to Filipinos.

According to the Philippine Statistics Authority, in 2013, milk production in the country was 19.5 million liters. This was 5.59 percent higher than last year's level of 18.5 million liters. Of this total, 33.6% were from carabao's milk.

Despite the potential of this industry, however, local milk production can only contribute 1% of the dairy requirement. Dairy products are the country's third largest agricultural import after wheat and soybean meal (Philippines. Dairy and Products Annual. Oct. 2014/AgroChart.com).

To meet the demand for this commodity, milk production research and development (R&D) interventions and effective strategies to boost the supply are being continuously introduced to contribute to the development of this industry.

Dairy R&D initiatives

As part of pursuing development goals for the dairy industry through science solutions in the country, the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCAARRD) bared its Industry Strategic S&T Plans (ISP) for dairy. The Philippine Carabao Center (PCC) is seen as playing a big role in the implementation of the plan.

The PCAARRD ISP for dairy is aimed at increasing production to meet local demand and decrease import requirements by 2020. Alongside with it is the need to enhance the processing efficiency of milk and other dairy products.

Its strategic R&D focuses on technology transfer through the promotion of genetically improved dairy buffalo, commercialization of food safety compliant milk handling and other

processing technologies and, community-based technology promotion and transfer for increased milk production.

Through S&T interventions, the PCAARRD provided funding support to seven technology transfer projects across Regions III, IV, VII and VIII through its S&T Community-Based Farm (STBCF) and TechnoMart (TM) modalities. These projects have a combined budget of Php23.9 million, wherein 70% (16.7 million) is from PCAARRD and the rest from PCC and other stakeholders.

STBCF and TM are two important components under the Pinoy S&T Services for Farmers and Entrepreneurs (PSF) Program. These modalities are PCAARRD's transition platform from technology demonstration to technology commercialization.

STBCF promotes wider adoption of S&T interventions to increase productivity and empower farmers in a given community. It aims for sustainable supply of raw materials in support of the TM enterprise.

TM aims to fast track the movement of S&T products from source to the markets, increase product value, establish and implement business match, synchronize strategies with other sectors involved and track the road toward the commercialization of the S&T products.

Of the seven projects, three are on-going. These are 1) "Commercialization of Grass/ Forage Corn Silage for Dairy Buffaloes in

Lupao, Nueva Ecija through TechnoMart; 2) Community-Based S&T Project on the Preparation & Utilization of Urea-Treated Rice Straw (UTRS) as Fodder for Dairy Buffaloes; and 3) Enhancing the Carabao-Based Dairy Enterprise in Magdalena, Laguna through TechnoMart.

The results of the on-going STBCF and TM projects will provide bases for more effective and efficient implementation of the PCAARRD ISP for Dairy.

Commercialization of Grass/ Forage Corn Silage

The project for grass/forage corn silage for dairy buffaloes is meant to support the carabao-based dairy farming enterprises at the National Impact Zone (NIZ) in Nueva Ecija through the production of sustainable supply of conserved/preserved forages for feeding of dairy buffaloes.

Specifically, this project aims to: 1) establish private or coop-led commercial producers of silage in Nueva Ecija; and 2) promote community-based commercial silage production as a source of additional income for farmers.

Project leader Dr. Eric P. Palacpac, who is PCC's R&D coordinator, said that corn silage is an enriched forage that can help address problems on nutrition and forage deficiencies during lean months. Silage-making can be easily adopted by farmers for farm use or in a commercial scale because it only requires simple equipment and low input costs, he added.



Farmers at Lupao, Nueva Ecija prepare corn silage.

The ongoing three-year project (April 2013-March 2016) is piloted in Lupao, Nueva Ecija. A group of farmer-cooperators, whose members were selected due to their significant production of corn forage and having land availability for corn planting in the targeted area, is involved in the project.

To be successful, S&T interventions are being applied to meet the expected outputs. These include formation of farmer-led business opportunity for commercially producing silages, promotion of community-based, commercial silage production as a source of additional income for farmers, increasing the supply of conserved forages during lean months to address forage requirement of at least 32%, increasing adoption of feeding conserved forages for dairy buffaloes, establishing linkage between producers of silage and the clients and disseminating promotional materials for the marketing of silages.

As of September 2014, a total of 397,658 kilograms of forage/silage were produced by the selected farmer-cooperators from about 13 hectares of land. The forage/silage was sold to farmers, private farms and PCC-operated dairy farms and generated a net income of Php448, 920.55.

Sets of trainings, field day, study tours and promotional activities were initiated to spur the interest of other farmers to patronize the use of silage in their animal feeding management.

Constant project monitoring and conduct of team meetings were regularly conducted to document and analyze the farmer's feedback and report generation.

Community-based preparation, utilization of UTRS

In response to the need of sustainable production and supply of conserved forages for feeding of dairy buffaloes, the CBSTF intervention through the feeding of urea-treated rice straw (UTRS) was introduced as another dairy technology for community adoption.

"Rice straw is forage with poor quality but when treated with the right amount of urea and/or molasses, it will improve its crude protein contents from 4% to 7%," project leader Dr. Daniel L. Aquino said. "The improvement in the nutritive value will lead to the enhancement of its palatability and digestibility. In effect, this helps increase the feed intake and overall productivity of the buffaloes," he added.

Three project collaborators were identified as recipients of the three-year project (April 2013- April 2016). They are the Kapitbahayan sa Mabini Cooperative in Llanera, Nueva Ecija Punla Multi-Purpose Cooperative in General Natividad, Nueva Ecija and Casile Dairy Producers Cooperative-----?.

To effectively promote the adoption of the technology, the S&T intervention capacitated the three participating primary cooperatives and 30 partner-farmers on the production and feeding of UTRS through collection and stacking of rice straw, treatment, filling, compacting, sealing and storage of UTRS and harvesting and feeding of UTRS.

The conduct of feeding intervention was also provided to selected recipient-farmers and applied to the dairy animals. The feeding trial was monitored and evaluated. The results generated was reported and submitted to PCAARRD.

Trainings of farmers and actual demonstration in the preparation and feeding of UTRS were also conducted as part of the technology transfer and monitoring of the adoption rate of the project.

To support the project, nine bunker silos were constructed for the production of UTRS. The silos were equally distributed to the three partner-cooperatives. Supplies and materials were also distributed in the production process.

During the first year of its implementation, 38 dairy farmers from the three partner-cooperatives in Llanera and General Natividad, Nueva Ecija were trained for UTRS production and feeding. They were able to produce 73 tons of UTRS from the collected 200 tons of rice straws.

Ninety-two percent of the rice straws targeted for collection for the 1st production cycle was already achieved. Forty-seven percent of these were already produced as UTRS.

The produced UTRS were use as feeding intervention for 12 lactating cows which were on their third month of feeding intervention. The animals were able to produce 4.7 kilograms of milk per day each compared to the 3.5 kilograms milk produced from the controlled cows in the study.

For three months, (each cow ba?) produced 423 kilograms of milk. This translated to a gross sale of Php17, 766.00



Preparation of urea-treated rice straws.

at Php42.00 per liter. An additional Php3, 702, or 30.20% increase' in income was realized when the cows were fed with UTRS.

The actual UTRS demonstration benefited 45 farmers from Nueva Ecija and 73 farmers from Pangasinan. Based on the 2013-2016 plans, the project is aiming to encourage 100 dairy farmers to adopt UTRS feeding to their dairy buffaloes and this was more than achieved.

Enhancing Carabao-based Dairy Enterprise in Magdalena

In the TM dairy project, improvement of the quality of milk produced by the community-based farms through commercialization of food safety, compliant milk handling and other processing technologies is endeavored.

Specifically, it aims to: 1) increase volume and ensure quality of raw milk collected through the establishment of community cluster milk collection system; 2) comply with food safety and GMP standards; 3) capacitate major stakeholders/partners and team members to manage and sustain a profitable carabao-based dairy enterprise through capacity-building, and 4) increase sales and profit through product development and promotion.

In order to achieve these, S&T interventions were applied. These included formation of a community/cluster milk collection system, conducting milk quality testing (raw and end-product

(Continued on page 9)

Molecular characterization of CAEV gag gene in goats to lead the way to eradication of this virus, study says

BY KHRIZIE EVERT M. PADRE

Molecular characterization of Caprine Arthritis Encephalitis Virus (CAEV), can now be used as a tool in the control and eradication of the virus that causes ill-effect on goats.

“This is significant, said lead researcher Ryan Bismark C. Padiernos of the Animal Health Unit of Philippine Carabao Center (PCC). “It was the first in the country in so far as the genetic characteristics of CAEV is concerned,” he added.

It can help in developing detection kit specific for local strain of CAEV and in responding to the emerging issues of small ruminant lentiviruses in the country, he further said.

The study “Molecular Characterization of Gag Gene of Caprine Arthritis Encephalitis Virus of Goats Present in the Philippines” was funded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD).

Previous studies indicated that CAEV is a retroviral infection of goats that is typically transmitted through ingestion of virus-infected colostrum or milk from infected does and horizontal transmission

through respiratory exudates. Currently, there is no specific treatment or commercially available vaccines against CAEV. Infection is usually controlled by eradication of infected goats.

Big losses in the goat industry in the country, it said, are attributed to CAEV. Thus, the Department of Agriculture classified this infection as an emerging disease, making CAEV a potential threat to the goat industry.

In the study of Padiernos’ team, goat blood samples were collected from (big) farms with history of CAEV infection and from backyard farms that are not exposed to the virus. These farms were described as having sporadic clinical cases of carpal arthritis, mastitis and emaciation among breeding stocks. Those considered backyard farms were chosen for the collection of samples because of the assumption that CAEV infection might be present among pure native goats.

Using nested PCR and designed set of primers for amplification, the researchers were able to detect CAEV in the gag gene, which is the highly conserved region of the virus.

Result of the study showed that only 3.77% of CAEV samples that were positive to β -actin PCR were successfully amplified.

The amplified gag gene was sent to First Base Malaysia for DNA sequencing. Sequence data analysis and homology analysis were done using the Basic Local Alignment Search Tool (BLAST) search of the National Center for Biotechnology Information (NCBI).

BLAST is an algorithm for comparing primary biological sequence information, such as the amino-acid sequences of different proteins or the nucleotides of DNA sequences.

Multiple sequence alignment and phylogenetic trees were generated using the Mega Evolutionary Genetics Analysis Version 5 (MEGA 5).

MEGA is an integrated tool for conducting automatic and manual sequence alignment, inferring phylogenetic trees, mining web-based databases, estimating rates of molecular evolution, and testing evolutionary hypotheses.

DNA sequencing analysis showed homology of 86%-93% between Philippine CAEV and 86%-91% between other known CAEV genome registered in GenBank, respectively. However, the study cannot conclude the over-all diversity of Philippine CAEV due to the reason that only small number of animals showed positive result of the virus.

It was also found out that there are 17 amino acid deletions in the Philippine CAEV isolate that can indicate a new strain of virus based on the amino acid sequence alignment conducted. This new strain may have been already present in the country even before the start of goat importation.

The variable region in the amino acid sequence was also detected similar to the variable sequence of Canadian CAEV sequence based on researches done in the past.

The study further confirmed that the



The researcher preparing materials for the PCR

Advanced carabao-based... (From page 7)

assessment), performing laboratory analysis of dairy products produced, monitoring of record-keeping and accounting, improving product and packaging and enhancing marketing and promotion activities.

The Magdalena Dairy Raisers Association (MADRA) was identified as the recipient of the two-year project (March 2013-March 2015).

During its first year, two milking clusters were established in Barangays Balanac and Saladsad in Magdalena town. Records showed that milk collection in these two villages increased by 66%-166% owing to the 50-80 liters collected daily compared to their previous collection of 30 liters a day. This was due to the increase of raw milk suppliers which was from the previous four to 13 suppliers to an average of 18 suppliers.

The association was also provided with

processing facility and was given sanitary permit. The production staff was trained for good manufacturing practice (GMP) and food safety protocol.

To improve the quality of the dairy products produced, daily milk quality testing was done both for raw and processed products.

The Department of Science and Technology (DOST) in Region-IVA conducted the microbial analysis to dairy products such as pasteurized milk, chocomilk and white cheese, pastillas, yoghurt drink and frozen yoghurt mix.

Appropriate product packaging with label was also applied in conformance to the basic Food and Drug Authority (FDA) standards.

New packaging and labels were appropriately developed for the dairy products.

In August to December 2013, a total of 9, 345 liters of milk were collected on a daily basis, an increase of 124% compared from previous year’s collection of 4, 163 liters. The milk collected translated into a gross income of Php743, 187 or 198% increase from the earnings of Php249, 795 in previous year.

The marketing and promotion of the dairy products were likewise improved. The product distributors now include white cheese makers, Baryo Froyer enterprises, individual product retailers, dairy processors, Mr. Moo & More Pasalubong Center, PCAARRD and Kamay ni Hesus Shrine in Lucban, Quezon.

With all these efforts, the PCAARRD STBCF and TM project for the dairy sector, hope for enhancing the industry stakeholders and cooperators’ capabilities and the continuing linkage of R&D and the industry in bringing the S&T products to the market and its consumers are expected to be realized.

PCC’s Dairy Herd... (From page 5)

farmers in the NIZ, the dairy cooperatives officials and members, the VBAIT’s and the LGU’s in Nueva Ecija.

“We will also put an effective and practical proper recording system to properly monitor all the necessary data for the improvement of the NIZ,” he added.

Finally, he said:

“When all these plans and interventions are finally accomplished by the PCC, there will be no doubt that our agency can strengthen further the buffalo industry in Nueva Ecija. If this happens, our mission to create a progressive and profitable livestock industry in the NIZ and in the country can happen in due time.”

Fixed time AI shows... (From page 3)

“We can also program the breeding of the animals so that calving will occur on the lean season of milk production. This will ensure an all-year-round milk production,” Dr. Edwin Atabay, co-researcher added.

The study is currently testing the efficiency of the different hormones used in the FTAI and is exploring the possibility of a more cost-effective procedure to make the technology affordable to smallholder dairy farmers.

“The cost of ovsynch ranges from Php700 to Php1000 depending on the hormones used. It is more practical for commercial-scale farming and for propagating genetically superior animals,” Dr. Eufrocina Atabay said.

With further study, the research team

intends to use the technology on the institutional herds of the different PCC regional stations and include the heifers. They will also study its efficiency among native carabaos, both cows and heifers, by 2015.

Apart from Drs. Eufrocina and Edwin Atabay, the research team is composed of Dr. Ester B. Flores, Excel Rio S. Maylem, Dr. Marlon B. Ocampo, Dr. Lerma C. Ocampo, Dr. Danilda H. Duran, Dr. Floerfida P. Aquino, Dr. Daniel L. Aquino, and Dr. Annabelle S. Sarabia.

About the researcher

Dr. Eufrocina Atabay is the head of PCC’s Reproduction Biotechnology Unit. She is an expert in animal reproductive biotechnology focusing on In-Vitro Embryo Production in buffaloes, animal sexing and intracytoplasmic Sperm Injection, among others. She currently spearheads the optimization of reproductive technologies through understanding the ovarian function and follicular dynamics of the carabaos in the country.

About the researcher

Ryan Bismark Padiernos who is a graduate of BS Biology from the Central Luzon State University (CLSU), has embarked on several studies on livestock disease prevention, particularly on immunology and virology since joining the PCC as a Science Research Assistant at the Animal Health Unit in 2013. Apart from his research endeavors in PCC, he is also currently involved in the promotion of the Livestock Biotechnology Center of the Department of Agriculture.

PCC's Roster of Scientists



Dr. Arnel N. Del Barrio

As a scientist in the field of ruminant nutrition, Dr. Arnel N. Del Barrio, newly appointed acting executive director of the Philippine Carabao Center (PCC), is the pride of PCC in creating innovations and development in livestock industry in the country.

While still the center director of the Philippine Carabao Center at the University of the Philippines Los Baños (PCC at UPLB) which was prior to his appointment as PCC acting executive director, Dr. Del Barrio modeled the carabao-based dairy enterprise in his area of coverage in the provinces of Cavite, Laguna, Rizal, Batangas and Quezon.

His remarkable imprint is best exhibited in the success of the General Trias Dairy Raisers Multi-Purpose Cooperative (GTDRMPC) in Cavite, which emerged as a showcase of PCC at UPLB's creation of a sustainable and profitable livestock industry.

Dr. Del Barrio's contribution in the science community is focused on the understanding of the rumen function of buffaloes, determination of nutritive values of different feed ingredients in carabaos, development of appropriate feed supplementation strategies for buffaloes, and the formulation of practical feeding systems for small holders and commercial production of buffaloes.

His researches, especially with regard to the determination of buffaloes' potential in meat and milk production generated

a substantial number of technologies and information that help in the continuous development of the livestock industry.

As the current PCC head, Dr. Del Barrio is very eager to develop a robust carabao-based enterprise development in the whole country.



Dr. Claro N. Mingala

An Outstanding Young Scientist awardee in 2011, Dr. Claro N. Mingala was the very first scientist of the Philippine Carabao Center (PCC) to be conferred "scientist" designation under the National Academy of Science and Technology's (NAST) Scientific Career System.

Dr. Mingala's field of specialization is on the management of infectious diseases in ruminants particularly in buffaloes.

Dr. Mingala, in his early age, had already conducted numerous researches on the management of infectious diseases.

Considered very important in the development of the livestock industry, his researches tackled the following: immunology of water buffaloes by evaluating the immune responses at the molecular level, providing the baseline information necessary for the development of DNA-based technologies in the production of vaccines, diagnostic tools, and other therapeutic agents.

Dr. Mingala also involved himself

in studying the epidemiological assessment and diagnostic identification of important water buffalo diseases such as the trypanosomiasis, Mastitis, Cryptosporidiosis and other viral diseases. He is currently the program coordinator for the Livestock Biotechnology Center.



Dr. Eufrocina Atabay

Also a scientist in the field of animal reproductive biotechnology, Dr. Eufrocina Atabay, head of the PCC's reproductive biotechnology, is one of the well-respected scientists in the PCC network.

While she and her husband (Dr. Edwin Atabay) are involved in several researches to improve the livestock industry in the country through innovations in animal biotechnology, Dr. Eufrocina's researches specifically focused on the development of In-Vitro Embryo Production in buffaloes, Embryo Sexing, Intracytoplasmic Sperm Injection technique and cryopreservation of semen, oocytes, embryos, and somatic cells for buffaloes.

She spearheaded the optimization of other reproductive technologies at PCC through better understanding of ovarian function and follicular dynamics of the carabaos in the country.

These technologies are Ovulation and Estrus Synchronization, Fixed Time Artificial Insemination (FTAI), and Multiple Ovulation and Embryo Transfer (MOET).



Dr. Danilda H. Duran

As a scientist in the field of animal reproductive technology, Dr. Danilda Duran also dabbles in conducting researches at the PCC Reproductive Biotechnology Unit.

She specializes on the following: development, refinement and improvement of in vitro culture systems for the production and cryopreservation of water buffalo embryos in vitro, separation of motile and non-motile sperm cells of bulls with low post-thaw motilities, and use of embryo transfer that resulted in the birth of live calves and realization of advanced reproductive biotechnologies as a tool for genetic improvement in water buffaloes.



Dr. Peregrino Duran

Specializing in the field of animal breeding and reproduction, Dr. Peregrino Duran, head of the Dairy Herd Improvement Program (DHIP)

of PCC is a pioneer researcher of PCC starting in the 1990's to the present.

With his wife, Dr. Danilda Duran, he also earned a distinction particularly on the understanding of physiological mechanism of buffaloes, ovarian function, and follicular dynamics of buffaloes' reproduction and others. These researches paved the way for the application of estrus synchronization, ovulation induction, and the successful implementation of the artificial insemination technique.

He likewise pioneered the use of ultrasound-guided ovum pick up techniques in water buffaloes, which was considered a breakthrough in the buffalo industry in the Philippines.



Dr. Edwin C. Atabay

As a scientist in the field of animal reproductive biotechnology, Dr. Edwin C. Atabay, center director of the Philippine Carabao Center at Central Luzon State University (PCC at CLSU), is one of the PCC's prides in its network.

His major contributions were on the development of somatic cell nuclear transfer (SNCT) procedures in buffalo, cloning of buffalo's embryo for embryo transfer, cryobanking and the enhancement of other PCC's important reproductive biotechnology techniques such as the artificial insemination (AI), multiple ovulation and embryo transfer

(MOET) and cryopreservation of oocytes and embryos of buffaloes, goats and cattle.



Dr. Rosalina M. Lapitan

A ruminant nutrition scientist, Dr. Rosalina M. Lapitan specializes on the provision of good nutrition for the buffaloes. She is currently the officer-in-charge of the PCC at UPLB.

Her researches contributed significantly to the development of appropriate feed supplementation strategies that increased the feeding values of crop residues of the feeds for buffaloes. Her researches have helped improve the growth and productivity of buffaloes.

Dr. Lapitan also established appropriate fattening technologies for crossbreed carabaos under intensive feeding system that improved lean-fat ratio of buffaloes' meat. Likewise, she pioneered the development of high-end gourmet sausages from carabeef which created a significant value-adding property to this particular raw meat as well as a niche market for the product. Her pioneering work in this area is considered as an industry breakthrough in the Philippines.

Dr. Lapitan also optimized the small-scale production of dairy products from buffalo's milk which helped improve the income of dairy cooperatives and served the interest of other regional centers of PCC.

Call for PROPOSALS



Livestock Biotechnology Center



Priority Research & Development Areas on Livestock:

Funds are provided for R&D projects addressing the following identified priority research areas that:

- Improve livestock production and competitiveness through reproductive biotechnologies, Marker Assisted Selection (MAS) and other biotechniques
- Develop and/or improve reproductive biotechnologies in livestock for more meat and/or milk
- Develop and/or improve animal feed stuff, vaccines, antibiotic production and waste utilization and management; and,
- Provide viable solution to pressing problems in livestock production and sustainability

Particular Topics

1. Animal Genetic Resource
 - a. Conservation
 - Genes
 - Tissue
 - Live Animal
 - b. Improvement
 - Characterization: genetic and phenotypic
 - c. Utilization
 - Breed improvement and development (climate change resiliency)
2. Reproductive Biotechnologies for the production of genetically superior animals and livestock production improvement
3. Food Safety and Quality
 - a. Food-borne pathogens
 - b. Food traceability (farm-market-fork)
 - c. Residues
 - d. Adulterants
4. Animal Health/Public Health
 - a. Vaccines
 - b. Diagnostic methods
 - c. AMR (anti-microbial resistance)
 - d. Feed additive residues
5. Nutrition
 - a. Feeding system
6. Product Development
 - a. Prebiotics
 - b. Probiotics
 - c. Synbiotics

How to submit research proposals?

DA Biotech has a customized internet-based database application called ESMES (Electronic Submission, Monitoring and Evaluation System) developed by the Program as a tool in proposal submission, monitoring and evaluation of supported projects of the DA Biotechnology Program. ESMES is a cost effective and time-efficient system since it allows paperless web-based transactions for timely review, approval, monitoring and evaluation of projects. ESMES can be accessed at <http://www.dabiotechnet.net>.

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R&D Highlights[®]

R&D Highlights, an annual publication of the Philippine Carabao Center, publishes in popularized form the agency's completed researches presented in its annual R&D Review. This publication reaches out to a wide scope of readers both in the science and non-science profession as well as the interested public.

For comments and suggestions, please write to the Editor-in-Chief in this mailing address:

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1976