

R4D *Highlights*



PHOTO BY LILIAN VILLAMOR

PCC conducts annual R4D In-House Review

BY CHARLENE JOANINO

Ensuring the congruence of the Philippine Carabao Center's (PCC) research & development (R&D) efforts to its national research for development (R4D) agenda is an objective that PCC aims to achieve annually in its R4D In-House Review.

This year, 39 researches were evaluated during the review held last July 3-5 at the PCC National Headquarters and Gene Pool in the Science City of Muñoz, Nueva Ecija.

“By conducting this yearly, we are not only able to showcase the outputs of the R4D component of the Carabao Development Program but we are also able to monitor

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and evaluate both completed and ongoing researches,” Dr. Annabelle Sarabia, R&D division (RDD) chief said.

The research papers were grouped into six thematic areas: Biosafety, Production Management System, Product Development, Socio-Economic Dimensions of CDP Implementation, Genetic Improvement-Animal Genomics or Genetic Diversity and Cryopreservation, and Genetic Improvement-Reproductive and Cryopreservation Techniques.

Dr. Caro Salces, PCC deputy executive director, emphasized that evaluation of research papers will pave the way toward determining new strategies that can help usher progress in the carabao industry.

Based on the results of the evaluation, recognitions were given in five categories.

The research “Microsatellite-based parentage verification of bovine breeds in the Philippines” by Melinda Reyes, Noriel Esteban, and Dr. Ester Flores won as the “best paper” in the completed research category; the “Comparison of animal relationships and milk yield breeding values obtained from pedigree BLUP and single-step GBLUP in Philippine dairy buffaloes” by Dr. Jesus Rommel Herrera, Dr. Ester Flores, Dr. Naomi Duijvesteijn, Dr. Nasir Moghaddar, and Dr. Julius van der Werf is the “best paper” in the student category; Lilian Villamor was hailed as the “best presenter” for her presentation of “Genetic Diversity of the Philippine Carabao Using mtDNA (COI) and Microsatellite Markers (FAO STRs)”; PCC-RDD’s Biosafety and Environment Section, and Reproduction and Physiology Section have the “Most Number of Approved Research Proposals for the Year 2018” with four proposals each; and the Animal Breeding and Genomics Section have the “Most Number of Presentations” during the review with 10 presentations.

The external evaluators include Dr. Amado Angeles, director of Dairy Training and Research Institute (DTRI) of the University of the Philippines Los Baños (UPLB); Dr. Consuelo Amor Santiago Estrella, associate professor at the Institute of Animal Science (IAS)-UPLB; Dr. Ian Kendrick Fontanilla, director of UP Diliman’s Institute of Biology; and Karla Joy Ty, DTRI-UPLB university researcher. They assessed the technical integrity, relevance, and merits



Dr. Annabelle Sarabia delivers her message during the R4D In-House Review held at the PCC National Headquarters and Gene Pool last July 3-5.

of the presented papers.

More than 100 participants attended the R4D In-House Review, mostly employees from PCC National Headquarters and Gene Pool, PCC regional centers, and students of Central Luzon State University.

The last day of the review was capped off with an orientation seminar on the Philippine Technology Transfer Act of 2009 or RA 10055 with the topics on Basics of Intellectual Property Protection and Application, and Insights on Prior Art and Claim drafting.

The act provides for “the framework and support system for the ownership, management, use, and commercialization of the intellectual property (IP) generated from research and development funded by government and for other purposes.”

Atty. Lucieden Raz, Technology

Licensing Office head of the Technology Application and Promotion Institute, PCC IP officers Charity Castillo and Kristine Prades served as speakers. They discussed the key stipulations of the act such as ownership of IP and revenue sharing between researchers or authors.

Dr. Eufrocina Atabay, PCC IP Technology Transfer and Commercialization focal person, said that PCC is now actively pursuing the commercialization and protection of its technologies through its IP-TBM team.

In 2018, PCC started a partnership with the Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (PCAARRD) in the conduct of PCC’s intellectual property business operation. Last March, the IP-TBM office and marker at the PCC’s Livestock Innovations and Biotechnology Complex were formally launched.

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Industry experts convene for 4th International Livestock Biotechnology Symposium

BY JUSTINE JOY SALVADOR



About a hundred participants comprised of researchers, scientists, international experts, and other distinctive guests involved in livestock biotechnology attended the recently concluded 4th International Livestock Biotechnology Symposium. The event took place at the University of San Agustin, Iloilo City last July 15.

It was organized and spearheaded by the Department of Agriculture-Livestock Biotechnology Center (DA-LBC) with the support of Philippine Carabao Center at West Visayas State University, University of San Agustin, and Department of Science and Technology - National Research Council of the Philippines Division XIII.

In keeping with the theme “Demand-driven Innovation for a Resilient Philippine Livestock Industry”, invited speakers from Japan, Thailand, USA and Philippines have presented their research findings and significant discoveries concerning challenges in livestock production, animal breeding, antimicrobial resistance, food-borne pathogens, and agricultural biotechnology program.

Dr. Claro Mingala, DA-LBC chief,

said that the demand for Livestock resources is rapidly increasing at the global scale. This can be attributed to the growing population, urbanization, and economic development. He emphasized that research and development initiatives, and capacity building in these biotechnological approaches will contribute to the efforts in attaining food self-sufficiency and security in spite of escalating demand.

Ms. Marie Joy Christine Jumalon, project management officer of the Department of Agriculture’s Biotechnology Program, mentioned that they are providing scholarship program to 5 different universities (Central Luzon State University, University of Southern Mindanao, Visayas State University, University of the Philippines Visayas, and University of the Philippines Los Baños) and supported 64 scholars since 2014 in line with the need to have more scientists and researchers in the field of agri-biotech.

Symposiasts were given time to ask questions to the presenters during the open forum. One issue was raised for Dr. Yoko Kato of Kindai University about the perception of the consumers on the consumption of cloned animals. She stated that the public are still having a

negative insight about biotechnological products, which can be attributed to insufficient information to the society. She expressed that the people should be informed properly on the use and benefits of genetically modified products.

The last part of the event was dedicated to the media for the press conference and one question was asked for Dr. Arnel Del Barrio, executive director of Philippine Carabao Center (PCC). The query was about the influence of PCC in the Philippines and how biotechnology is interconnected with PCC. Dr. Del Barrio discussed that PCC has a total of 12 centers distributed around the country and that there are more than a thousand of experts performing artificial insemination and crossbreeding intended for better and greater livestock production.

Overall, the symposium was an opportunity for all of the attendees to discuss and understand the issues and possibilities that our community can achieve through research and development with regards to safe and sufficient production of livestock which is beneficial in promoting a resilient, productive, and globally competitive livestock industry.



PCC IP efforts gear towards better protected research, management, commercialization of innovation and technology

By CHARLENE JOANINO

Another milestone was set as the Philippine Carabao Center's (PCC) Intellectual Property and Technology Business Management (IP-TBM) office started its full operation in 2019 as per the unveiling of IP-TBM marker last March 27, coinciding with PCC's 26th Anniversary.

IP is deemed as "any creation of the mind" that is produced from writing to tangible or intangible asset. Without protection, an IP can be stolen or be used without consideration of the creators and owners.

The said initiative is under the project aimed towards the establishment of IP-TBM in PCC. It is a joint partnership between PCC and the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD).

"Protection of IP is important because you don't only establish ownership of technologies by agency but also give due credit and incentives to the researchers while upholding the benefits of the general public," Dr. Eufrocina Atabay, PCC IP Technology

Transfer and Commercialization focal person, and scientist, said.

PCC was among the 16 consortia member agencies that is implementing IP management program through DOST-PCAARRD funded projects.

The project where PCC is involved, commenced on July 16, 2018 and will end in 2020 but PCC's IP-TBM office will be sustained as part of the agency's "Science and Technology Protocols."

On IP protection

The Philippine Transfer Act of 2009 or RA 10005 stated that incentives and exclusive rights of inventors and creators to their inventions and its utilization should be considered. This is possible through IP protection.

IP protection is classified as patent, trademark, copyright, utility model, geographical indications, and industrial design.

"Patent" is a "technical solution to a problem

that involves an inventive step, and is industrially applicable." It is valid in the span of 20 years.

Subsequent to patent is the "Utility model" which protects "innovations that are not sufficiently inventive but is industrial applicable", and valid for 7 years.

A "Trademark" or service mark is an expression or art that represents services. It has 10 years' validity.

Any expressive art can be protected through a "Copyright". This involves music, architecture, motion pictures, both original intellectual and artistic expressions' protection against usage for financial gain without permission from the copyright owner for lifetime.

"Geographic Indications" involves usage of sign or image on products, which depicts certain qualities of its place of origin.

Lastly, "Industrial Design" protects a maker's unique creation and its qualities such as patterns as well as shapes from being copied.

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Target to improve country's swine industry is possible thru MAS technology application

By MA. CECILIA IRANG, ESTER FLORES, SHERWIN MATIAS, AND JONATHAN PABLO

Marker-assisted selection (MAS) is the process of using DNA markers to assist in the selection of individuals that would be parents of the next generation. This technology will not replace, but instead, complement conventional breeding and selection systems.

Published information from countries leading in swine production suggested that application of molecular marker-assisted selection offers the highest potential in improving reproductive efficiency and overall swine productivity.

MAS is advantageous for traits that are lowly heritable, sex-limited, expressed or measured only after sexual maturity, and traits that are difficult and expensive to measure. DNA markers allow identification of both males and females carrying beneficial alleles of genes early in life thereby improving accuracy, reducing generation interval and accelerating the genetic improvement of a trait.

Furthermore, MAS is good for traits that cannot be measured until the animal has contributed to the next generation (reproduction, longevity, carcass data) and traits that are genetically correlated with a characteristic that swine raisers do not want to increase (marbling with backfat thickness). In general, MAS improves the efficiency of selecting specific traits and the predictability of the outcome of selection. Thus, having DNA marker information available on individual animals enables selection on traits that would otherwise have been difficult to measure or not at all.

The use of genetic markers associated with economically important traits had been tried in other countries and has resulted in positive results to their industry. Under this assumption, a PCAARRD-supported R&D program titled "Private-Public Partnership in the Application of Animal Genomics to Increase Productivity and Improve Efficiency of



Photo Source: www.google.com

the Philippine Swine Industry (Phase I)" was successfully implemented by PCC in 2012 in partnership with the Bureau of Animal Industry (BAI) and with the Accredited Swine Breeders Association of the Philippines (ASBAP).

The Phase I of the program has developed and initially promoted application of genetic markers in the breeding and selection of pigs in local breeder swine farms through the Swine Genetic Analytical Service Laboratory (SGASL). It has made significant accomplishment in establishing 17 gene marker protocols for genetic testing the includes gene markers that are associated with fertility traits, meat quality, genetic defects, and disease resistance of swine and the establishment of the SGASL that is operated by the ASBAP.

Some examples of these specific gene markers or protocols developed using this technology to assist the DNA evaluation includes Estrogen Receptor (ESR) gene, which is associated with fertility traits specifically with the number of piglets born alive per litter; Leukemia inhibitory factor (LIF) gene, which also contributes to the number of piglets born alive per litter and at the same time influences

the early return to service post-weaning thus, supporting the productivity of the sow; Heart-type fatty acid binding protein (H-FABP), which is associated with intramuscular fat; and Leptin Receptor (LEPR), which is for backfat thickness. The genes coding for H-FABP (heart acid-binding protein) and LEPR (leptin receptor) are considered to be candidates for lipid metabolism and thus affect fat deposition in pigs. Both genes are strongly related to the development and function of fat tissue in pigs; and Halothane (HAL) gene for screening pigs which are carriers of the genetic defect Porcine Stress Syndrome (PSS).

The development of molecular methods of identifying genetic markers and the establishment of the swine genetic analytical service laboratory (SGASL) have provided opportunity for breeders and raisers to hasten the rate of genetic improvement and improve the prolificacy and production efficiency of local swine industry in conjunction with conventional method of culling and selection.

Such undertakings have paved the way

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Shortening calving interval leads to more income

By CHARLENE JOANINO, EDWIN ATABAY, AND ROSELINE TADEO

One of the most common problems faced by a dairy farmer is the detection of pregnancy of a buffalo at the earliest time possible. The shorter the calving interval is, the more profit a farmer gains because rebreeding can be done promptly and additional expenditures can be avoided. Not only silent heaters can be determined but non-pregnant buffaloes as well.

Researchers at the Philippine Carabao Center (PCC) found that the presence of Pregnancy-Associated Glycoproteins (PAGs) in female buffalo's milk and blood at a certain level is an indication of pregnancy. PAG is a protein secreted by the binucleated cells in the placenta and released in the blood circulation at 22 days of pregnancy.

In line with PCC's Triple E strategy effort on "Early Detection of Pregnancy", two

researches involving the determination of PAGs were conducted. The strategy also includes Effective Rebreeding Program and Enhancing Pregnancy Rate.

The first research is titled "Determination of PAGs during and after Pregnancy in Riverine Buffaloes (*Bubalus bubalis* Linn.)" by Lucia Rigos, Dr. Edwin Atabay, Eufrocina Atabay, John Paul Apolinario, Dr. Jessica Gay Ortiz, and Dr. Ramesh Tilwani.

The second research is "Early Pregnancy Diagnosis in Buffaloes through Detection of Pregnancy-Associated Glycoproteins (PAGs) in Milk Using Enzyme-Linked Immunosorbent

Assay". It was authored by Danica Dematera Matias, Dr. Eufrocina Atabay, Dr. Edwin Atabay, Dr. Annabelle Sarabia, Roseline Tadeo, Zeshalyn Fajardo, Dr. Jessica Gay Ortiz, and John Paul Apolinario.

Results on the said researches showed that compared to rectal palpation whose confirmation can be done 3-4 months after breeding, detection of PAGs in blood and milk to detect pregnancy can be done the earliest at 25 and 28 days after breeding, respectively.

PAGs in Blood (Plasma)

PAGs primarily combine with blood amongst others, which makes it an

effective means of detecting pregnancy. Plasma comprises a huge portion of blood and is extracted from the animal. The process is invasive and makes use of 18 gauge needles on a heparinized tube in obtaining samples.

Fixed Time Artificial Insemination (FTAI) was administered to a total of 24 female cows who served as the sources of 10 ml blood samples. FTAI is a means of breeding that is done at a determined time instead of the traditional method of mating using bulls.

The conducted FTAI had a conception rate of 54.17%. Levels of PAGs in blood

increased gradually and decreased at day 270 to day 300. It was observed that PAGs from previous pregnancy disappear after 8-10 weeks.

Laboratory results on PAGs in blood as they relate to pregnancy diagnosis were validated through the use of Trans-rectal Ultrasonography at day 40 after insemination.

PAGs in Milk

The research on PAGs in milk using Enzyme-Linked Immunosorbent Assay made use of 5ml samples from the selected female dairy buffaloes

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The prevalence of surra is existent both in institutional, small hold farms in Ubay, study says

By CHARLENE CORPUZ

The prevalence of surra was 25% at the farm level and 16% at the animal level, which clearly states that *Trypanosoma evansi* infection, also known as surra, is present not only in the institutional farms but also in small hold farms of Ubay, Bohol. This is the first time that an animal from outside a commercial farm in the province was detected to be infected with the blood parasite.

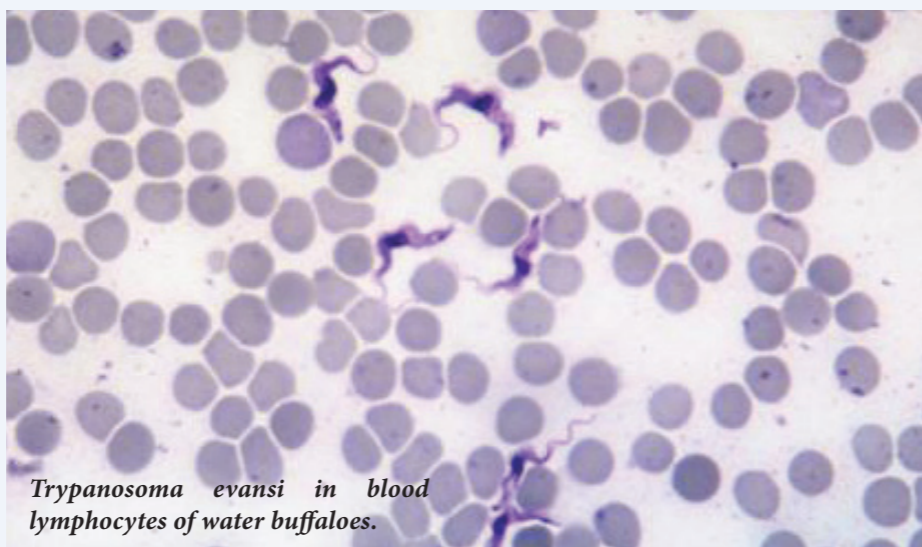
This is concluded in a research study titled “Prevalence and risk factors of *Trypanosoma evansi* infection in water buffaloes (*Bubalus bubalis*) in Ubay, Bohol, Philippines” conducted last 2018 by researchers at the Philippine Carabao Center at Ubay Stock Farm (PCC@USF).

The disease is present in the Philippines and has become a serious problem for the livestock industry due to its wide range and extensive distribution in tropical countries. It is characterized by fever, progressive anemia, weight loss, jaundice, progressive weakness and lethargy, edematous swellings of the lower parts of the body, urticarial plaques in the skin, petechial hemorrhages of the serous membranes, abortions, and deaths.

Surra has affected buffaloes, horses, and cattle resulting in serious economic losses caused by reduced productivity, mortality, and cost of treatment.

This research aimed to determine the prevalence and risk factors of *Trypanosoma evansi* infection in Ubay, Bohol as well as the knowledge, attitudes and practices (KAP) of water buffalo raisers regarding the infection.

A cross-sectional study involving 85 farms and 130 water buffaloes was conducted in Ubay where outbreaks of the disease had been reported. Blood



samples were collected to test for *Trypanosoma evansi* antibodies and DNA using CATT/*Trypanosoma evansi* and PCR assay, respectively. Data on KAP and risk factors were obtained using a structured questionnaire.

Risk factors identified

The study showed that water buffaloes grazed or tethered by their owners near (around 30 meters) other water buffaloes, goats and pigs were more likely to get infected with *Trypanosoma evansi*.

Water buffaloes given with dewormer every 6 months are less likely to be infected with *Trypanosoma evansi* compared to those dewormed every 12 months with 10.5 times risk. The study says that deworming of water buffaloes every 12 months only may not be enough to control intestinal helminths, which could lead to malnutrition - a is known risk factor for surra.

Also, water buffaloes having a body condition score of 2.5 (between average and thin) have more tendencies to be

infected with *Trypanosoma evansi*. Other risk factors identified were stress-related conditions such as physical labor, pregnancy and calving, which could result in reduced resistance and higher susceptibility to diseases such as surra. Non-specific risk factors were also identified such as the year when the animals were brought in the farm and the number of hours the water buffaloes wallowed per day.

Knowledge, Attitudes and Practices (KAP) on Surra

A huge majority (96%) of buffalo raisers in Ubay have never heard about surra. However, a great margin of them had the right attitude regarding water buffalo diseases. Most of the buffalo raisers strongly agreed on the following issues: some diseases are serious and life-threatening to water buffaloes (71%), a veterinarian or livestock technician should be consulted if a water buffalo has a disease (78%), it might be a greater risk if a sick water buffalo is left untreated (88%), information from the government

about water buffalo diseases is helpful (95%), and there should be control in the movement of water buffaloes and checking for diseases before they are moved to other provinces (86%). On the other hand, a huge number of buffalo raisers did not practice fly population control measures (86%). Horse flies (*Tabanus* spp.) are the mechanical transmitters of surra.

Recommendations of the study

It is recommended to conduct a province-wide surra surveillance on water buffaloes, pigs and goats with a BCS of 2.5 or below (average and thin) and treat infected animals to prevent the spread of surra. Moreover, animals for dispersal should be checked for *Trypanosoma evansi* infection before they are distributed to farmers especially if surra was detected in the source farms. More importantly, it is suggested that a surra control program be established in the province of Bohol to prevent the disease from further spreading. The program may include components of surveillance, IEC campaigns, capacity building and provision of prophylaxis and treatment.

The researchers were Dr. Emerson Tapdasan, Dr. Loinda Baldrias, Dr. Claro Mingala, Dr. Billy Divina, Dr. Gundolino Bajenting, Dr. Caro Salces.

About the researcher

Dr. Emerson Tapdasan is a Senior Science Research Specialist and the head of the institutional farm of Philippine Carabao Center at Ubay Stock Farm in Bohol. He obtained Doctor of Veterinary Medicine at Central Mindanao University in 2006 and Master in Veterinary Epidemiology at University of the Philippines Los Baños in 2018. He was also a recipient of Field Epidemiology Training Program for Veterinarians in Thailand from 2012 to 2014.

PCC IP efforts... (From page 4)

PCC IP Initiatives

PCC IP Technology Transfer officers Charity Castillo and Kristine Prades joined the IP master class of DOST-PCAARRD's Technology Commercialization Seminar from July to December 2018. Meanwhile, Dr. Atabay and Jan Czarina Salas of PCC became IP Technology Commercialization officers upon finishing the “DOST –PCAARRD Technology Commercialization Mentorship Series” held from January to May 2019.

To cascade IP learnings from said IP-related activities, an “Echo seminar on IP protection and Application” was conducted. A technical lecture on Technology Transfer Act of 2009 was done by Attorney Lucieden Raz last July.

As of November 2019, PCC has six applications to the Intellectual Property of the Philippines and another four applications being assisted by DOST-Technology Application and Promotion Institute. One was granted “utility model” while the others are still on process.

An IP Policy and Technology transfer protocol had been approved by PCC Executive Director Arnel Del Barrio last November 16, which provides the legal basis for the implementation of the IP Management Program of PCC.

Shortening calving... (From page 7)

from PCC Gene pool. FTAI was administered to 37 buffaloes. The 8 buffaloes that became pregnant and 8 buffaloes that aren't were chosen for the study.

In comparison to blood collection for PAGs detection that uses needles, collection of milk is not stressful to the animal.

Blood sampling and use of ultrasonography was also simultaneously done upon acquiring milk samples to compare the efficiency of the three and determine if there is any significant relationship.

A key difference of milk analysis for PAGs detection is that its components such as protein have an effect to the value of PAGs. Therefore, the level of PAGs in blood is different from that of PAGs in milk at pregnancy.

Laboratory results using IDEXX Milk Pregnancy Test showed that PAGs increase from day 26 to day 40 and decreases at day 60.

Both of these researches are geared towards the development of a portable kit similar to a person's pregnancy kit. More related researches on PAGs by PCC are expected to be conducted in the years to come.

About the researchers

Dr. Edwin Atabay is PCC's Scientist I. He took Doctor of Veterinary Science and Medicine, and Masters in Animal Science at Central Luzon State University. Dr. Atabay finished Doctor of Philosophy in Veterinary Medicine at Hokkaido University in Sapporo, Japan.

Roseline Tadeo finished Bachelor of Science in Biology in Central Luzon State University where she also currently takes her Masters in the same field. She works as Science Research Specialist I in PCC.

2019 AWARDS

ANIMAL BREEDING AND GENOMICS SECTION

1. **Most Number of Presentation**, R4D in House Review 2019
2. **Best paper (Completed Research Category)**, R4D in House Review 2019, “*Microsatellite-Based Parentage Verification of Bovine in the Philippines*” by Ms. Melinda N. Reyes, Noriel B. Esteban, and Dr. Ester B. Flores
3. **Best Paper (Completed Research -Student Thesis Category)**, R4D In House Review 2019 , “*Comparison of animal relationships and milk yield breeding values obtained from pedigree blup and single step GBLUP in Philippine Dairy Buffaloes (Bubalus bubalis)*” by Dr. Jesus Rommel V. Herrera, Dr. Ester B. Flores, Dr. Naomi Duijvesteijn, Dr. Nasir Moghaddar, and Dr. Julius van der Werf
4. **3rd place Scientific Poster Presentation**, IUBMB 2019 Education Conference and 46th PSBMB Annual Convention, “*Comparative Analysis of Cast Gene for Meat Tenderness in Different Breeds of Water Buffalo and Cattle*” presented by Melinda N. Reyes

NATIONAL IMPACT ZONE

1. **Civil Service Commission Pagasa Award** – Ms. Wilma T. del Rosario
2. **Special plaque of commendation award**, Philippine Extension and Advisory Services Network, Inc. (PhileASNet) Biennial Symposium-NIZ Project

LIVESTOCK BIOTECHNOLOGY CENTER

Outstanding Livestock Biotechnologist, 4th Filipino Faces of Biotechnology- Dr. Claro Mingala

REPRODUCTIVE AND PHYSIOLOGY SECTION

1. **Best Poster Presentation**, 41st NAST Annual Scientific Meeting 2019, “*Selection of Water Buffalo Bulls by Sperm Nuclear Shape and Relationships to Sperm In-Vitro Fertility and Computer Assisted Sperm Analysis*” presented by Dr. Danilda H. Duran
2. **2nd Place, Poster Presentation**, Agri-Fishery Category, 46th PSBMB Annual Convention, “*Changes on the Heat Shock Protein 70 in Water Buffalo (Bubalus bubalis) Spermatozoa revealed the Capacitation-like Eveny in Cryopreservation*” presented by Shanemae M. Rivera
3. **Most Number of Approved Research Proposals for the Year 2018**, R4D in House Review 2019

BIOSAFETY AND ENVIRONMENT SECTION

Most Number of Approved Research Proposals for the Year 2018, R4D in House Review 2019

CRYOBANK

1. **Best Presenter**, R4D in House Review 2019, “*Genetic Diversity of the Philippine Carabao using mtDNA (COI) and microsatellite markers (FAO STRs)*” - Lilian P. Villamor.
2. **Qualifier**, 31st National Research Symposium, “*Genetic Diversity of the Philippine Carabao using mtDNA (COI) and microsatellite markers (FAO STRs)*” by Lilian P. Villamor, Dr. Ester B. Flores, Alexander M. Paraguas, Aivhee Jhoy DS. Escuadro, and Therese Patricia C. Cailipan



Target to improve... (From page 5)

for the improvement of swine industry in the Philippines as it lags behind other pig-producing countries in terms of reproductive parameters. It has been noted that the productivity, production efficiency, and profitability of swine farms are highly dependent on sow reproductive performance, an area that the Philippine swine industry needs to improve on.

The slow progress in improving the reproductive aspect of swine performance could be attributed to inherent biological and management-related factors (i.e., low appreciation of good genetics by swine raisers and limited access to genetically superior breeder pigs). Another important factor is the lack of service providers that would facilitate identification and access of genetically superior breeder pigs to swine raisers.

Realizing the barriers and the need to enhance the productivity and efficiency of swine production in the country, adoption of updated and appropriate tools and techniques in breeding and selection to improve swine reproductive

efficiency was considered. Thus, the PCC through its Animal Genomics and Breeding Section conducted a follow-up (Phase II) study titled “Utilization of DNA marker Selection in Breeder and Commercial Farm Units” engaging researchers namely Dr. Ester Flores, Sherwin Matias, and Jonathan Pablo.

Through the help of this technology, swine raisers or breeders can now have a guide to determine at an early stage the potential and quality of their piglets. They don't have to wait for it to grow to determine its performance, thus, they would know which pig or piglet to invest on.

For paying clientele, the selection of genes to be tested per sample submitted in the laboratory were determined by the swine raiser but is limited to the list of abovementioned 17 tests being offered by the SGASL.

Meanwhile, for validation of marker effect, raisers that submitted samples for specific tests were approached if they could provide the phenotype (performance records) as well. The

validation of marker effect was limited to selected genes that are associated with economically important positive phenotypes.

Once results are available, the client could request for a meeting to discuss the results and the implication of such. However, for results related to genetic defects, the SGASL will initiate the meeting.

The study further recommended that breeder animal be sourced out from farms that regularly conduct genetic tests to hasten the improvement in prolificacy and production in commercial swine population. Furthermore, breeder boars and imported semen should have been tested to be a non-carrier of genetic defect, most importantly, the HAL gene.

About the researcher

Dr. Ester Flores, supervising science research specialist, is a technical expert on animal genetics and is currently the PCC's National Genetic Improvement Program Coordinator. She also works as the head of PCC's Animal Breeding and Genomics Section.

OPINION



In pursuit of research for development

ANNABELLE S. SARABIA, PhD
PCC National R4D Coordinator

Research for Development (R4D) perpetuates progress of the livestock industry. Over the years, the Philippine Carabao Center's (PCC) R4D efforts encompassed massive developments that are evident in the bountiful benefits enjoyed by our clients, the carabao raisers who are now dubbed as, 'carapreneurs', a portmanteau of the words "carabao" and "entrepreneurs".

As a component of PCC's Carabao Development Program, R4D focuses on various disciplinary areas such as Reproduction and Physiology, Animal Breeding and Genomics, Biosafety and Environment, Production Systems and Nutrition, Socio Economic and Policy, Animal Genetic Resources Conservation and Utilization, and Carabao Enterprise Development.

We had answered to the call for solutions for industry problems not just on buffalo but also livestock biotechnology in general as our mandate had also been broadened.

Since I started as PCC's R4D National Coordinator in 2016, I've seen PCC's research means and strategies developed. From basic research, we now delve in applied research, which is geared towards the production of effective technologies. Annually, we shift the R4D agenda in a dynamic manner to cope with the changing needs of time in order to reach our end goal and that is to help improve the livelihood of our clients.

Nowadays, one of the challenges we face is the advent of 4th Industrial Revolution

or the 4IR. The 4IR is characterized by the fusion of technologies that can be deemed double-edged. While it holds the power to make tasks easier, it also brings forth the dilemma of adoption since it requires digitization, and financial capability.

As an attached agency of the Department of Agriculture, PCC is committed not just to cascade technologies, but also make sure that its clients are empowered and capacitated with technologies through consolidation of small hold farms that may lead to large scale production, which equates to more profit.

This year, PCC had started its full implementation of initiatives on Intellectual Property and Technology Business Management. This is to not only protect copyright of researches and technologies but also to encourage farmers to become capable carapreneurs since said resources would be commercialized.

As an experienced researcher who has been on this field for decades, I am happy knowing that my efforts help better the lives of local farmers. I'm also proud that I served as one of the pillars in helping our clients succeed in their carabao-based ventures. More than any monetary rewards there is, I believe such emotion is beyond measure.

As this is my last year as the R4D National Coordinator, I hope the younger generations will continue to pursue the field of research as passionate as I am in serving the Filipino farmers and carapreneurs.

R4D Highlights[®]

R4D 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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