

# SEAFDEC AQD Matters

Newsletter of the SEAFDEC Aquaculture Department (AQD), Tigbauan, Iloilo, Philippines

## APEC 2015 delegates visit SEAFDEC/AQD



The Agricultural Technical Cooperation Working Group of APEC 2015 at the SEAFDEC/AQD ground

### THE FIRST VISIT

The 19th Agricultural Technical Cooperation Working Group Meeting (ATCWG) was held from September 28 to 29, 2015 in Iloilo City. Under this group is the APEC Multi-Year Project (MYP) that brought about 80 delegates from both public and private sectors to exchange information on basic research, current trends, business models, and postharvest technologies in the fishery and livestock industries during the one-day seminar in Iloilo City, Philippines on September 28, 2015. The meeting reviewed the current status and future perspectives of reducing postharvest losses in the supply chain of fishery and livestock products.

The output of the seminar will be discussed and delivered at the APEC High Level Policy Dialogue on Food Security and the Blue Economy (HLDP-FSBE) and other fora.

After one of the on-going seminars, some 100 delegates

of the Agricultural Technical Cooperation Working Group visited the Tigbauan Main Station of SEAFDEC Aquaculture Department on September 29, 2015. The delegates were briefed by Chief Dr. Felix Ayson on the mandates, research and capacity-building activities of SEAFDEC/AQD. The delegates were then ushered to the informative exhibits of the different booths featuring aquaculture commodities and research and information dissemination activities of SEAFDEC/AQD. To make the delegates' visit even more relevant and memorable, they were served crispy soft-shell crabs, abalone, steamed oysters, seaweed fried spring rolls, pickled seaweed and other Ilonggo native delicacies. They also received an impromptu native dance lesson on "tinikling." Iloilo City is currently hosting the HLDP-FSBE also known as the Food Security Week from September 27 to October 6. The meetings are expected to have 900 delegates.

### THE SECOND VISIT

Delegates and participants in the Forum on the Global Alliance for Agricultural Biotech Trade (GAABT) Model Policy on Low-Level Presence (LLP) and GM and Organic Farming Co-existence met during the APEC High-Level Policy Dialogue on Agricultural Biotechnology (HLPDAB) in Iloilo City, Philippines on September 30, 2015.

As part of the efforts to ensure food security among member economies of APEC,

genetically modified crops with various advantageous traits and organic farming are among the topics discussed during the two-day meeting on "Enhancing cooperation on biotechnology for improved resiliency, inclusive growth and food security."

Just as the delegates of the 6th Meeting of the APEC Policy Partnership on Science, Technology, and Innovation (PPSTI) visited the International Rice Research Institute (IRRI) in August, on October 01, 2015 the participants of the APEC



(L to R) AQD Deputy Chief Dr. Takuro Shibuno, AFD Head Ms Kaylin Corre, RD Head Dr. Evelyn Grace de Jesus-Ayson, TVDD Head Dr. Fe Dolores Parado-Estepa and TID Head Dr. Junemie Lebata-Ramos welcoming the guest delegates of APEC

High-Level Policy Dialogue on Agricultural Biotechnology visited the main station of the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC/AQD).

During the visit of the guest delegates at the Tigbauan Main Station of SEAFDEC/AQD, the Chief Dr. Felix G. Ayson narrated to them the history of the Southeast

Asian Fisheries Development Center, which started in 1967 and the inception of the Aquaculture Department in 1973. The SEAFDEC narrative was followed by a talk by the Research Division Head, Dr. Evelyn Grace de Jesus-Ayson, on the various research activities of AQD including technology generation, training and information generation on a wide range of aquaculture disciplines, including broodstock management and seed quality improvement, promotion of responsible and environment-friendly aquaculture, disease diagnosis and control, feed development for the various life stages of the aquaculture commodities and the production of seed stocks for the stock enhancement of threatened species. Dr. de Jesus-Ayson also emphasized that AQD promotes good aquaculture practices and

effective management of aquatic resources to support rural development to alleviate poverty and provide food security. After that, the delegates proceeded to view the aquaculture commodity kiosks and interacted with the resource persons. They also did a food-tasting of deliciously prepared SEAFDEC commodities and Ilonggo delicacies while being entertained by Tribu Panayanon of the Iloilo City National High School, the 2015 Dinagyang Champion and they then toured the hatchery facilities and laboratories of AQD's Tigbauan Main Station including AQD's Fishworld Museum of Aquatic Biodiversity, which caused their extended stay and late departure from AQD. 🙌

— JM ALMENDRAS



APEC delegates doing food-tasting of the sumptuously prepared aquaculture commodities of SEAFDEC/AQD



I-Made Tasma of Indonesia holding an adult sandfish

## AQD Press Briefing APEC 2015



SEAFDEC/AQD Chief Dr. Ayson explains to the media that AQD has five thematic programs and one of them is "Adapting to climate change" the other programs are "Quality seed for sustainable aquaculture," "Healthy and wholesome aquaculture," "Maintaining environmental integrity through responsible aquaculture," and "Meeting social and economic challenges"

During the APEC 2015 press briefing the Southeast Asian Fisheries Development Center Aquaculture Department (SEAFDEC AQD) Chief Dr. Felix Ayson said "There is a need for continuous research and development (R&D) and innovation as well as institutions that will undertake

these to intensify aquaculture production towards food security."

"If you think of a fish species that is really suited for the masses then you should go for fish species that are cheaper to produce – and one of these is milkfish" said Dr. Ayson.

Dr. Ayson elaborated, "We can continue to produce milkfish and address the problem of food security but the problem is the volatility of the market price." At present there are only three countries that are producing milkfish and these are Indonesia, the Philippines and Taiwan. One area in milkfish seed production that



Also present during the press briefing are panel of experts from SEAFDEC/AQD, 2nd from left, Dr. Mae Catacutan, nutrition and feed development expert; Dr. Edgar Amar, fish health; Ms. Rovilla Luhan, seaweed; Dr. Emilia Quinitio, mud crab and Ms. Kaylin Corre, Head of the Administration and Finance Division



TID Head Dr. Junemie Lebata-Ramos, AQD Chief Dr. Felix Ayson entertaining questions from the press

Dr Ayson pointed out that needs further scientific study is on how the embryo and larvae of “bangus” or milkfish would be able to survive water temperatures higher than the present normal levels due to climate change.

He cited studies conducted at SEAFDEC/AQD on the rabbitfish that showed that even at a temperature of 33°C rabbitfish still spawned eggs but the embryos did not survive, where normal levels would be around 30°C.

If milkfish would behave similarly like rabbitfish, then we will have a problem. This scenario would be a threat to aquaculture production because if the embryos would not survive we will have no fry with which to stock milkfish production ponds.

Higher temperatures due to climate change would also affect the survival and growth of seaweeds and mud crabs, the latter a P3-billion industry in the Philippines, and we are having studies to address

these concerns too, he added. The study on seaweeds would focus on how to maintain the production of seaweed seeds based on species-environment interactions while those on mud crabs would be on how to keep them producing offspring at higher temperature. “All these present activities of SEAFDEC/AQD address the global concerns for food security, considering that at present, for every two fishes you see in the market, one of that is produced by aquaculture,” Dr. Ayson added.

— JM ALMENDRAS

## AQD’s plans for 2016



The participants of the Review and Planning Meeting

To evaluate the implementation of SEAFDEC/AQD’s program, this year’s Review and Planning Meeting of SEAFDEC/AQD was held 16-18 September at AQD’s Tigbauan Main Station.

SEAFDEC/AQD senior staff attended the plenary and group discussions to ensure the relevance of AQD’s R&D program. During the three-day activity, program leaders presented the output and progress of the current programs.

SEAFDEC/AQD Chief Dr. Felix Ayson mentioned some of the strategies needed which include closer cooperation and information sharing among the technical and information staff to widen SEAFDEC/AQD visibility and secure more R&D grants and partnership with institutions having the same goals towards sustainable aquaculture.

— GK FAIGANI

## Groundbreaking marks SEAFDEC/AQD's auditorium



SEAFDEC/AQD officials and senior staff together with the legal counsel and architectural team graced the groundbreaking of the soon-to-rise auditorium building at AQD's Tigbauan Main Station last 22 October 2015.

The short program that celebrated the special day for AQD consisted of the signing of the building plan and planting of a time-capsule.

During her dedication of site, Dr. Evelyn Grace Ayson said that the new auditorium was made possible by the efforts of all AQD staff and their commitment to their work. She said that this new addition to AQD happened because "the employees deserve it."

AQD will be looking forward to host bigger events once this project is completed.   
— JM DE LA CRUZ



The proposed SEAFDEC/AQD Auditorium and Multipurpose Hall (top) and AQD officials and guests performing the groundbreaking rituals

## SEAFDEC/AQD library goes to Rome



SEAFDEC/AQD's library senior information assistants Mr. Stephen Alayon and Mr. Daryl Superio presented the findings of their research at the 41st International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) Annual Conference and 16th EURASLIC Biennial Meeting in Rome, Italy from 7 to 11 September 2015.

Mr. Alayon presented his research entitled "Aquatic and Marine Information Sources and Dissemination Programs in Asia." His study presents the current status of information sources and dissemination programs available in Asia. He conducted an inventory of information sources & networks, libraries & information centers, institutional repositories and other programs.

Mr. Superio's study is entitled "Responsible Aquaculturists: a Survey on the Information Seeking Behavior of Milkfish Farmers in Zarraga and Leganes; Iloilo, Philippines" which aims to gather baseline data regarding the awareness of milkfish farmers about the selected sections of the [Philippines] Code of Practice for Aquaculture. The results showed that fish farmers of the said locality are somewhat, if not totally, unaware of the said codes. Fish farmers' ignorance about the Code suggests that either the concerned agencies are doing poor information dissemination activities or are not using the proper or preferred medium for communication.

The theme of the conference is "Blue Growth: Motivating Innovations in Aquatic Information Management." The conference created the best venue for discussion and exchange of knowledge & information on various topics on fisheries and aquatic information management. The conference was hosted by the Food and Agriculture Organization of the United Nations.   
— JM DE LA CRUZ

## SEAFDEC/AQD joins Agrilink 2015

AQD officials, scientists, researchers and staff attended the annual Agrilink (22nd International Agribusiness Exhibition and Seminars, 16th International Food Processing, Packaging and Products Exhibition and 11th National Fisheries Exhibition and Seminars) with the theme "Regional Agribusiness Development: Cornerstone of Inclusive

Growth" from 15 until 17 October 2015 at the World Trade Center in Manila.

At AQD's booth, information materials about the technologies on various commodities were displayed and disseminated. AQD technical resource persons provided free consultation on various aquaculture technologies.   
— JM DE LA CRUZ



**AQD booth.** AQD's Training and Information Division head Dr. MJHL Ramos, Chief Dr. FG Ayson, Scientist Dr. ET Qunitio and Administration and Finance Division head Ms. KG Corre with guest

# SEAFDEC/AQD presents at the 16th ISP meeting



The participants of the 16th ISP meeting in Malaysia

Information officers and technical officers of the SEAFDEC Secretariat and the Departments including SEAFDEC/AQD were in Kuala Lumpur, Malaysia from 26-28 October for the Sixteenth SEAFDEC Information Staff Program (ISP) meeting. ISP is a yearly gathering conducted to review the information-related activities of SEAFDEC Departments.

The meeting noted the progress in the implementation of the information strategies this 2015. Acting Secretary-General of SEAFDEC, Mr. Hajime Kawamura and SEAFDEC/MFRDMD Chief Mr. Ahmad Adnan Bin Nuruddin (who hosted the meeting) joined the 19 technical and information officers in discussing the five-point information strategy; (1) production of relevant, timely and useful information materials to meet the requirements of target audience; (2) raising SEAFDEC image at international, regional and national levels; (3)

enhancing communication and information sharing both within SEAFDEC and with member and non-member countries, international/regional organizations and the public; (4) strengthening SEAFDEC capability in information-related activities; and (5) regular monitoring and evaluation of information activities. These strategies aimed at promoting SEAFDEC activities and increasing the center's visibility among its stakeholders.

It was also discussed in the meeting the working schedule and contact persons of each department for the preparation of the regular information materials that SEAFDEC will produce for 2016 that include SEAFDEC Annual Report 2015, Annual Information Compilation CD-ROM 2015, SEAFDEC Newsletter, Special Publication "Fish for the People", and the SEAFDEC Calendar 2017. Likewise, the meeting served as a venue to discuss the detailed outline of the publication of the Southeast Asian State of

Fisheries and Aquaculture or SEASOFIA which will be published in 2017. At the last day of the meeting the participants visited the National Library of Malaysia.

Mr. Nuruddin commended the Departments on their initiatives on SEASOFIA as it is very important document that provides the status of the fishery resources, as well as addressing fisheries issues and challenges in the region. He also expressed his appreciation to the participants for their productive inputs that pave the way for improving the information-related activities of SEAFDEC. Moreover, Mr. Hajime Kawamura encouraged the information staff to work closely with technical staff to package and enhance wider dissemination of good results from SEAFDEC activities to target users and the public. "SEAFDEC should consider improving its activities to generate high-impact outputs in order to attract media to publicize SEAFDEC activities," he added. 🙌  
— GK FAIGANI



One of the staff of the National library shows the participants how they digitalized the old manuscript and Acting Secretary-General and Deputy Secretary-General Mr. Hajime Kawamura and MFRDMD Chief Mr. Ahmad Adnan Bin Nuruddin present a token of appreciation to the staff of the National Library of Malaysia

## SEAFDEC/AQD welcomes guest from USDA

Agricultural Counselor Mr. Ralph Bean and Agricultural Specialist Ms. Pia Francesca Ang of the United States Department of Agriculture (USDA) Foreign Agricultural Service visited SEAFDEC/AQD's main station in Tigbauan on 17 September to get information about SEAFDEC/AQD's research activities on aquaculture and discussed possible collaboration. Mr. Bean toured SEAFDEC/AQD's pilot feedmill, natural food laboratory and experimental hatcheries for marine fish, mud crab, seaweeds, abalone and integrated milkfish broodstock hatchery complex. 🐟 —GK FAIGANI



USDA Agricultural Counselor Mr. Ralph Bean and Agricultural Specialist Ms. Pia Francesca Ang meet with AQD Chief Dr. Felix Ayson and Training and Information Division Head Dr. Ma. Junemie Hazel Leбата-Ramos and Research Division Head Dr. Evelyn Grace Ayson



Technical Assistant Ms. Jonalyn Mateo talks about AQD's research activities on seaweeds and Senior Technical Assistant Mr. Nestor Bayona shows the abalone broodstock

## Panguil Bay Development Council delegates tour AQD



The Panguil Bay Development Council and Iligan Baywide Management Council meeting delegates at SEAFDEC/AQD's Integrated Broodstock Hatchery Complex and looking at a beaker full of newly-hatched milkfish larvae

About a hundred delegates of the 7th Quarter Panguil Bay Development Council and Iligan Baywide Management Council meeting visited SEAFDEC/AQD's hatchery facilities at Tigbauan Main Station, Iloilo, Philippines on 12 September 2015.

SEAFDEC/AQD also presented to the participants its various programs and activities such as the Institutional Capacity Development for Sustainable Development (ICDSA), the ABOT AquaNegosyo (Agree-build-operate-transfer aquaculture business), and the training courses on offer.

The delegates of the meeting were composed of local chief executives and partner agencies (NEDA, DTI, DOST, and the Academe, among others) from the provinces of Lanao del Norte, Misamis Occidental and Zamboanga del Sur. 🐟

— RH LEDESMA

## Letter from our trainee: "My first try at catfish fry production"



Mr. Lluç performing induced spawning of catfish

“ This is to inform you that my first try at African catfish fry production after attending SEAFDEC/AQD's training course last August 2014 under the able guidance of Ms. Ruby Bombeo as Course Director has proven successful so far (this is still Day 5). The breeders I used are a 1.2 kg female from Davao and a 1kg male from Bukidnon. The HCG I injected was 3000 IU/kg. For the initial feeding at Day 3, I provided 8gm per day at 2 times per day the Z-Mel micro encapsulated feed and *Artemia* nauplii. The estimated number of catfish larvae at Day 5 is roughly 100,000. I am very thankful to SEAFDEC/AQD for the training, especially Ms. Ruby Bombeo, who was very thorough and methodical in her approach. I am likewise very thankful to Mr. Rito Bombeo without whose help during the hatching operation I doubt if I could have made it, especially when I am still recuperating from a medical operation. As a retired City Administrator of Iligan City, my time and money spent for the catfish training at SEAFDEC/AQD were good investments. I just cannot contain my excitement now because recently, I am receiving orders for my catfish fry. ”

Once again thank you and Mabuhay!

Very truly yours,  
Pacifador Lluç Jr.

# Research seminars



**S**EAFDEC/AQD scientist Dr. Roland Pakingking Jr. presented his study on “Sanitary quality of Oysters (*Crassostrea iredalei*) produced in selected areas in Panay, Western Visayas, Philippines” on 24 September 2015 at the AQD’s Tigbauan Main Station.

The sanitary quality of oysters mirror the conditions of the culture environment, hence monitoring of the production areas are essential to ensure the safety to human consumption – especially because oyster farming is an important source of livelihood in many coastal communities in the country. The study aims to evaluate the bacteria (*Escherichia coli*, *Salmonella*, *Vibrio cholerae* and *V. parahaemolyticus*) load of in oysters’ meat and fecal

coliforms of the rearing water in selected sampling sites in Roxas City (Brgy. Culajao and Brgy. Gagay with 3 and five sampling stations, respectively) and Ivisan (Brgy. Cabugao with 4 sampling stations).

The results showed that coliform counts are higher in all sampling stations of Brgy. Culajao and Brgy. Gagay while the coliform counts in Brgy. Cabugao are within the acceptable range (set by the US Shellfish Sanitation Program’s Shellfish Harvesting Area Classification Criteria) during the warmest dry month (May).

As for the detection of bacteria, *Salmonella* was erratically detected in oysters collected from all sampling stations. *E. Coli* counts in

oyster’s meat are higher during the warm dry months but the counts are comparable during the rainy months. *V. cholerae* were not detected in any of the oyster samples whilst *V. parahaemolyticus* count was detected but was within the acceptable range. However, according to current data, oysters harvested from these areas are safe for human consumption provided that they undergo proper relaying and depuration procedures.

The study suggested for the farms to shift from stake method (which causes an increase in organic matter and sulfur levels in the sediments) to a more environment-friendly method such as raft or longline.



**A**QD laboratory manager Ms. Margarita Arnaiz presented the result of a “Five year monitoring of seawater quality along TMS coastline” conducted by AQD’s Laboratory Facilities for Advanced Aquaculture Technologies (LFAAT) staff on 8 October 2015.

The study aims to answer the questions “are we [AQD] polluting the seawater along TMS coastline?” and “is the quality of our [AQD] water source acceptable for our experimental use?” The LFAAT staff monitored the water quality for five year (August 2010-July 2015) with five sampling sites: near TMS

inlet pipe (about 100 m from the shoreline; Nanga (about 100 m from the shoreline fronting Nanga-Buyuan bridge); near TMS discharge pipe; reservoir and discharge canal.

The purpose of the study is to check the effect of TMS effluents on seawater quality in terms of parameters monitored (physical, chemical and microbiological) and monitor the quality of seawater source used in TMS experimental tanks.

The water quality was evaluated based on the DENR standards (for public use) and PHILMINAQ, ASEAN

standards (for aquaculture use). As a result for the physical parameters, the temperature, salinity, pH, dissolved oxygen and total suspended solids are within the acceptable levels for both criteria. For the chemical parameters, the TMS effluent has high toxic N however, it diffuses upon mixing with the sea and the phosphate-P & pesticides were detected in all sites. Only coliform has reference value for the microbiological parameters and in some years exceed the allowable limit.



**M**s. Karen Grace Andrino-Felarca of the Institute of Aquaculture, College of Fisheries and Ocean Sciences, University of the Philippines Visayas, presented her paper “Dietary nucleotides: Its effects on the growth, immune response and survival of juvenile pacific white shrimp (*Penaeus vannamei*) challenged with white spot syndrome virus (WSSV)” on 28 August 2015.

**T**he study evaluated the effect of nucleotides as a dietary supplement on the immune response, survival against white spot syndrome virus (WSSV) and growth

of the Pacific white shrimp *Penaeus vannamei* juveniles. Ms. Andrino-Felarca and her co-researchers tested the various concentrations of nucleotides (0%, 0.2%, 0.4%, and 0.6% kg-1 of feed) as a supplement to the basal diet of Pacific white shrimp.

Ms. Andrino-Felarca shared that shrimp survival was 92-97% and was not significantly different among treatments. However, the results of her study show that specific growth rate, feed conversion efficiency and protein productive value of shrimp fed with nucleotide-supplemented diet were better than the

shrimp fed with the control diet. Furthermore, during the WSSV infection challenge, Ms. Andrino-Felarca said that the survival of shrimp fed with nucleotide-supplemented diet were significantly higher than the control. She elaborated further that, immune response indices (i.e. total hemocyte count, respiratory burst activity and phenoloxidase activity) were significantly enhanced in shrimp fed with nucleotide-supplemented diet. She also mentioned that 0.2% nucleotide was the optimum concentration for diet supplementation.



**S**EAFDEC/AQD researcher Ms. Milagros de la Peña shared the results of her study on “Settlement Rate, Growth and Survival of the Donkey’s Ear Abalone *Haliotis asinina* (Linne) Fed Five Benthic Diatoms” last 21 September 2015.

Ms. de la Peña explained that SEAFDEC/AQD’s research project on the refinement of hatchery technology is focused on increasing the production of 1-1.5 cm abalone juveniles by improving the larval settlement rate. To achieve this goal, local benthic diatoms were isolated, mass produced and tested to induce settlement and serve as food for abalone postlarvae and juveniles.

Ms. de la Peña and her research team conducted a 15-day experiment to determine the effect of feeding locally isolated diatoms (*Nitzschia* sp., *Cocconeis* sp., *Tryblionella* sp.) on the settlement and post-settlement survival of abalone postlarvae and were compared with *Navicula ramossisima* + *Amphora* sp. as the control. They found out that settlement rate is significantly higher in *Nitzschia* sp. fed postlarvae

after 5 days (6.1%) and 10 days (7.2%) of rearing. Moreover, post-settlement survival (15 days) of abalone postlarvae fed with *Cocconeis* sp. (1.9%) was comparable with *Nitzschia* sp. (1.7%) and *Tryblionella* sp. (1.4%).

The team also conducted an experiment on the effect of feeding five diatom species on the growth and survival of 3 and 5 mm shell length (SL) early juveniles. The result shows that 3 mm abalone juveniles have significantly higher specific growth rate (SGRSL) when fed with *Amphora* sp. (2.0% SL d-1) and *N. ramossisima* (1.9% SL d-1) compared to abalone juveniles fed with *Nitzschia* sp. (1.6% SL d-1). In terms of body weight, significantly higher specific growth rate (SGRBW) was attained in *Amphora* sp. (4.7% BW d-1) and *Nitzschia* sp. (4.1% BW d-1) compared to *N. ramossisima* (3.2% BW d-1), *Tryblionella* sp. (1.1% BW d-1) and *Cocconeis* sp. (1.0% BW d-1) fed abalone. In addition, highest survival of 71% was recorded in abalone fed with *Nitzschia* sp.

However, in 5 mm abalone juveniles, no significant difference was observed in the SGRSL between diatom strains. Highest SGRBW was obtained in *N. ramossisima* (2.8% BW d-1) followed by *Nitzschia* sp. (2.5% BW d-1) and *Amphora* sp. (2.2% BW d-1) fed abalone. Highest survival of 65% was attained in abalone fed *N. ramossisima*. Feed preference and digestibility studies were also conducted to support the results of feeding experiments. Highest percent incidence of 20.8% juvenile h-1 moved to *Nitzschia* sp. patch but was not significantly different with the percent incidence of juveniles that moved to *Cocconeis* (20.4%), *N. ramossisima* (16%) and *Amphora* sp. (15.8%). Fecal analysis of 3, 5 and 7mm SL early juveniles showed that digestion efficiency was highest in *Nitzschia* sp. fed abalone.

Thus, according to Ms. de la Peña, the results of her study showed that *Nitzschia* sp. is a potential diatom for larval settlement while *Amphora* sp. and *N. ramossisima* are the preferred diatoms for bigger abalone juveniles.



**A**QD scientist Dr. Myrna Teruel presented her study “Test of refined formulated feeds for the grow-out culture of tropical abalone *Haliotis asinina* Linne in concrete land-based tanks” on 24 September 2015 at AQD’s Tigbauan Main Station.

The study aim to assess the suitability of refined formulated feeds for a shorter culture period of tropical abalone. Refinement procedures focused on the application of additional binder (sodium alginate), use of different feed forms (molo and noodle), and incorporation of *Spirulina* sp. as additional protein source in partial replacement to fish meal.

The study used twenty two post-larval abalone harvest from the natural spawnings at the mollusc nursery of AQD. These were stocked in plastic trays suspended in a 2-tonner concrete land-based tanks and were fed with refined formulated diet, molo form (RF-M), refined formulated diet, noodle form (RF-N), unrefined formulated diet, noodle form (UF-N), unrefined formulated diet, molo form (UF-M) and seaweed (NF) with five replicates.

As a result, the abalone fed with RF-N has the highest mean weight gain (WG), shell length (SL), daily increase in shell length (DGSL) and specific growth rate (SGR).

Abalone given RF-N and RF-M showed significantly lower mean WG and SL. Survival was generally high in all treatments and FCR was highest with NF fed abalone. There’s also a high apparent digestibility of the dry matter of both the RF and UF. However, the meat quality of the final product didn’t show significant variations in taste, color, odor and general acceptability. The results have demonstrated that the refinement done on the formulated feed may enable the abalone to grow to its marketable size of about 5-6 m in a shorter culture period (180 days) in concrete land-based tanks.



**D**r. Satoshi Watanabe from National Research Institute of Aquaculture, Fisheries Research Agency presented a paper about the “Suspended culture of the Manila clam (*Ruditapes philippinarum*) to utilize effluent from the red sea bream (*t*) aquaculture in Hazamarura Cove, Japan” last October 22.

According to Dr. Watanabe, their team is developing techniques for suspended culture of Manila clam to utilize the nutrients from the red sea bream aquaculture. He explained that the amount of nitrogenous waste from the red sea bream culture is equivalent to 12,560 tons of Manila clam. He added that if Manila clam is cultured from 20 mm to 40 mm in shell length at 2 m depth

for 300 days, it is calculated to filter 80 g of nitrogen, and the assimilation is only 0.067%, with the majority of nitrogen being rejected or excreted to the environment. He concluded that Manila clam has high potential in nutrient cycling, which contributes to the provision of nutrients to primary and benthic production.



**A**back-to-back seminar by AQD Scientist Dr. Mae Catacutan and Associate Researcher Ms. Sheryll Avanceña was held on September 30.

Dr. Catacutan talked about her study Digestibility and effective level of meat and bone meal in practical formulated diet for milkfish, *Chanos chanos* Forsskal in freshwater. In her experiment the fish (wet weight less <5g) in triplicate groups were fed for three months with either of the six test diets formulated to be of the same protein content with varying dietary level of meat and bone meal (MBM) at 0%, 7.5%, 15%, 22.5%, 30% and 37.5%. The result of her study showed that the fish survival was 100% in all treatments and

the protein of MBM was digestible to milkfish. She also discussed that based on growth efficiencies, survival data and histology of tissues examined; milkfish was able to utilize a dietary level of MBM at 30%. She likewise added that milkfish assimilation of organic matter in test diets that contained MBM at 7.5% to 30% was high.

Ms. Avanceña, on the other hand, presented her study on Abdominal segment deformity disease (ASDD) syndrome and fused body segment deformity (FBSD) in cultured *Penaeus indicus*. According to her, shrimp with ASDD have deformed abdominal segment, jagged gut line and bumpy surfaces. Some shrimps with ASDD had also symptoms of FBSD where the number of

body segment was reduced from six to five, due to fusion of some segments and had four instead of five pair of legs. Out of 2,000 shrimp sampled, 11.3% were ASDD and 6.1% were FBSD. She also noted that the shrimp samples were screened to be negative from known viral infectious diseases. It simply means that the deformities were not caused by the viral infectious diseases. She explained that ASDD does not affect growth however FBSD are significantly shorter compared to normal shrimp. This could lead to major economic loss to shrimp farmers if not addressed properly. She said that further studies are needed to determine the cause of these deformities.





**D**r. Tsuyoshi Sugita, visiting scientist from Japan International Research Center for Agriculture Sciences (JIRCAS), discussed his study about the “Development of low fish meal feed for aquaculture using indigenous ingredients in Southeast Asia to get off from fish-meal-dependence syndrome” on 15 October 2015.



During his talk, Dr. Sugita mentioned that feed cost is the most costly item among aquaculture management expenses; hence, it is important to reduce feed cost. Fish meal (FM) is the most important protein source for aquaculture feed but FM is very expensive. Thus, the development of low FM feed and utilization of alternative protein sources for aquaculture feed is needed. According to Dr. Sugita, required conditions for alternative protein sources in Southeast Asia are: (1) very low or no commercial value, (2) availability in large quantity, (3) stable quality, and (4) not utilized for human consumption. Thus, ideal candidates as alternative protein sources

are mass-produced industrial by-products such as poultry by-product meal (PM), feather meal, and copra meal. For his study, Dr. Sugita evaluated the growth performance of milkfish juveniles fed with diets containing PM. Milkfish juveniles tested had an average body weight of 60 g and were fed for 12 weeks on 2 experimental diets containing PM (5.5 and 11%) and sardine FM (14 and 21%) levels and the control diet contains 28% sardine FM.

The result shows that weight gain and feed conversion ratio were about 540% and 1.95, respectively. These values were not significantly different among the dietary groups. Therefore, these findings suggest that sardine FM in milkfish diet can be replaced by PM.

On the same date, another visiting scientist from JIRCAS, Dr. Masashi Kodama, talked about his research titled “Environmental impact of Milkfish culture in the coastal area.”

Dr. Kodama discussed that water and sediment qualities together with physical parameters (i.e. depth, current intensity and scale of milkfish culture) were evaluated at nine sites in Region 1, 7, and 11 of the Philippines to know the environmental characteristics of a typical milkfish mariculture area.

According to Dr. Kodama, he and his team found out that there is a significant positive relationship between the acid volatile sulfide and oxygen consumption rate (OCR) of the sediment. Moreover, a significant positive correlation also exists between OCR and phosphate concentration in the water column.

In addition, the results also showed that the ratio of dissolved inorganic nitrogen to phosphate is lower than the average ratio of marine phytoplankton in the water column of all the nine sites. Dr. Kodama explained that this is an indication that phosphate is oversupplied in those sites due to sediment deterioration caused by intensive milkfish culture.



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