Swine News

NATIONAL RESEARCH CENTRE ON PIG, RANI, GUWAHATI

Vol. 06 January-June, 2014 No. 01

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Director's Message

Dear Readers,

It gives me immense pleasure to bring out the 6th volume of institute newsletter "Swine News". As the pig farming is gaining popularity day by day coupled with increase in demand for pork and pork products, the institute is bound to undertake research activities in the areas which will be of much use to the end users i.e. to the pig farmers of the country. Salient findings of some the research works carried out in the institute during the reported period is reflected in this issue of the newsletter. Successful birth of piglets "Rani C-I" through non-surgical embryo transfer has been achieved for the first time in the country at this premier institute. The encouraging result reveals that the use of this cost effective technology will be helpful for multiplication and propagation of endangered indigenous pig germplasm as well as conservation of critically endangered species like pygmy hog (*Porcula salvania*). Studies pertaining to scanning electron microscopy of the pig hair fibres, development of different value added pork products and their marketing in North Eastern states have also been undertaken during the reported period. As determination of virulence associated genes of *P. multocida* helps in understanding the pathogenic potential of the organism, ten novel monoplex PCRs targeting 10 important virulence associated genes have been developed for rapid virulence profiling of this organism from pigs. The Administrative building of Krishi Vigyan Kendra (KVK), Goalpara was inaugurated by Dr. S. Ayyappan, Hon'ble Secretary, DARE and Director General, ICAR during the reported period. This institute has conducted interface meeting between ICAR and stakeholders, organized several trainings, animal health camps and celebrated National Science Day. In addition, several distinguished dignitaries visited the institute during the reported period.

SECTORAL NEWS

Food Security Summit on Agricultural Solutions in Asia Pacific

As the world population edged to seven billion – up from 2.5 billion in 1950 – it has had profound implications for development, with effects on sustainability, urbanization, and access to health services and youth empowerment. Some of the implications of overpopulation include significant food and water shortages. Despite the economies of Asia and the Pacific far out-growing the average global economic expansion, over 700 million people in Asia and the Pacific still live in abject poverty (defined as living on less than $1.25 each day).Reasons for food insecurity are extremely wide ranging and include rising populations and increased consumerism, which will naturally turn out in an increasing demand for food. In particular, according to FAO, the global demand for food is expected to increase by 60 per cent by 2050. The second annual AIDF Food Security Summit: Asia 2014 is taking place in Jakarta on the 8 and 9 October 2014. Over 300 regional governments, NGOs, UN and intergovernmental agencies, investors, research institutes and private sector companies will gather to discuss important issues facing food security in agriculture and nutrition sectors.

Research Highlights

Successful birth of piglets through non-surgical embryo transfer

Successful birth of piglets "Rani C-I" through non-surgical embryo transfer has been achieved for the first time in the country at National Research Centre on Pig, Guwahati. The *in-vivo* derived embryos were transferred to the synchronized recipient using a deep intra-uterine transfer catheter without sedation. The recipient Ghungroo (indigenous pig) gilt gave birth to 11 piglets on Feb 07, 2014. Out of 11 piglets born, seven are growing healthy in the Institute pig breeding farm, two were stillborn and two piglets died few days after birth. The encouraging result reveals that the use of this cost effective technology will be helpful for multiplication and propagation of endangered indigenous pig germplasm as well as conservation of critically endangered species like pygmy hog (*Porcula salvania*) with the additional standardization for cryopreservation of embryos. The project team headed by Dr. S. Naskar,Scientist of this Institute acknowledged the guidance and technical inputs received from Prof. B. C. Sarmah, College of Veterinary Science, Guwahati.

Surrogate Ghungroo sow with piglets born through non-surgical embryo transfer

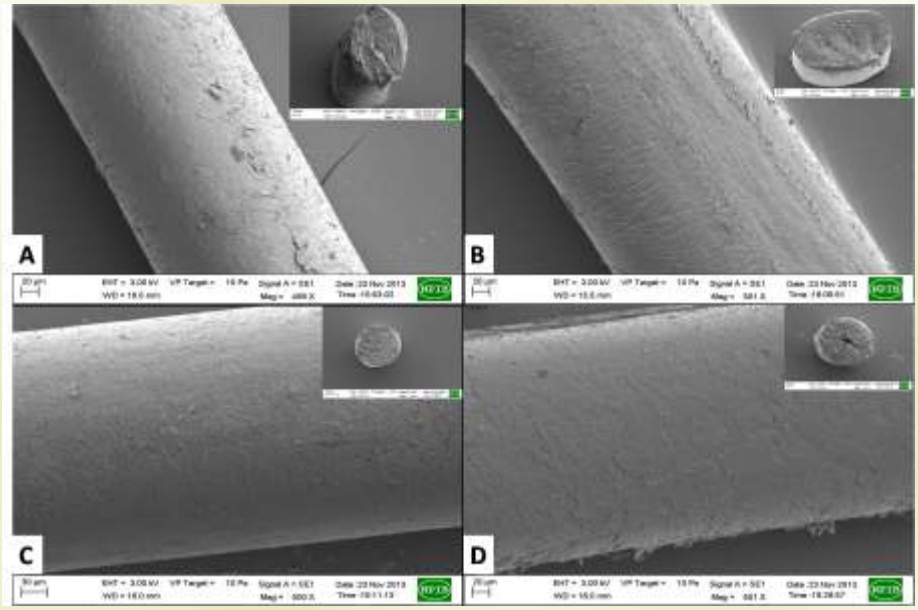
Piglets born through non-surgical embryo transfer

Real-time Ultrasound Imaging - a leap forward in improving reproductive efficiency of swine herd

Ultrasonography is a diagnostic imaging technology used to visualize internal organs, their size, structure and pathological abnormalities using high frequency sound waves (ranging from 2.5-5 MHz) and the technology has made it possible to establish accurate pregnancy diagnosis after 35 days in farm animals and also in farmers' field, as and when occasion demands. Now portable, battery-operated Real-time Ultrasound Imaging machine at a cheaper cost is being used regularly in the institute farm. This trans-abdominal real-time ultrasound imaging with multi-frequency sector probe facilitates pregnancy confirmation and estrous cyclicity status of the breeding sows. The regular pregnancy diagnosis in pig eliminates infertility in breeding herds and protects the economy of production.

Scanning electron microscopy of the pig hair fibres

The surface of pig hairs revealed presence of scales similar to wool, human hair, rabbit hair, horse and felines. The SEM appearance of the pig hair fibre showing the arrangement of cuticles was similar to that of human hair. The scales were arranged as layers, one overlapping the other, separated by a span of 4.58±0.24µm. The mean scale thickness was 0.39±0.02µm and on an average 17.19±1.65 scales (range, 14.76 to 20.42) could observed per 100µm. The elliptical modelling of fibre cross section was done to analyse the mean semi-major and semi-minor axis length, which was measured it to be 316.15±23.24 and 236.71±27.31µm respectively. The average eccentricity, flattening, focus, area and angular eccentricities of the pig hair fibre were 0.60±0.09, 0.25±0.07, 195.16±33.68µm, 0.06±0.01mm^2 and 38.24±6.61° respectively. The results of the present study indicate that the pig hair fibre has an elliptical outline, similar to other protein fibres. The morphological structure of cross-section of fibres is considered important for the measurement of fibre diameter and the evaluation of fibre strength.



SEM appearance of the pig hair fibres

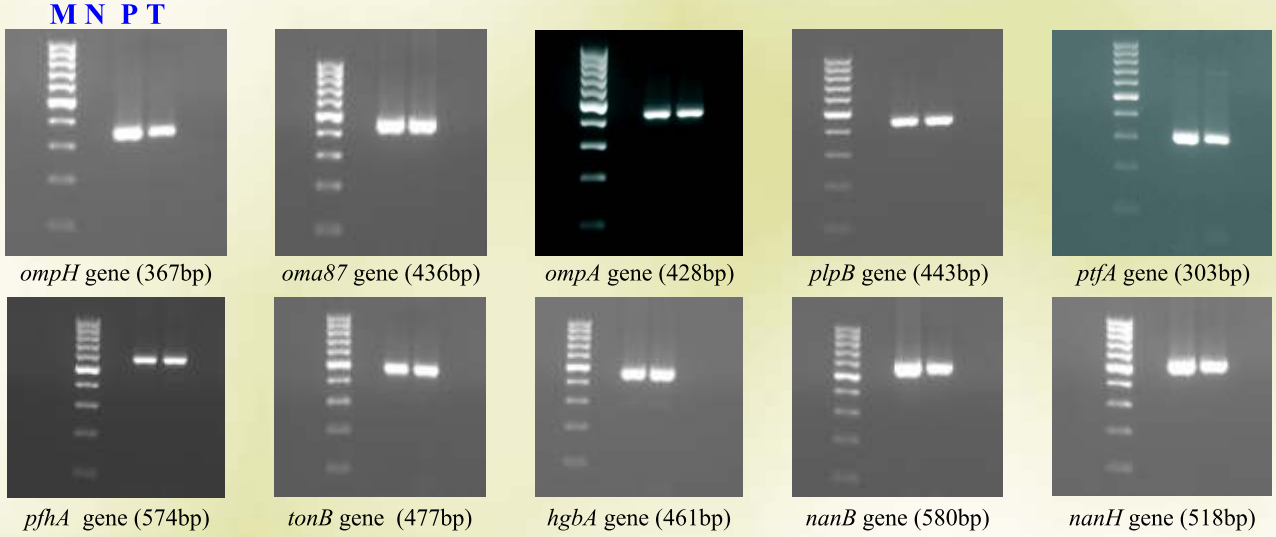
Popularization and marketing of value added pork products in North Eastern Region

Institute has refined/standardized the technologies for value addition of pork and processing of an array of value added pork products through its state of the art R&D pork processing plant. Due to its keen interest in transfer of the said technologies for further commercialization and as a part of entrepreneurship development programme, institute has already entered into a public private partnership with M/s Arohan Foods, Guwahati. Currently, 22 different value added pork products (viz. hot dogs, cocktail, ham, nuggets, salami, bacon, mortadella, pepperoni of different flavor and taste) are being marketed in all the states in NE region through over 200 retail outlets. The products have already established a strong base in the country's retail market and the customer feedback reports indicate that the products have very good acceptance among the consumers and they are ready to pay more for good quality pork and pork products, if made available. Through this initiative, the Institute is not only trying to demonstrate that there exists a potential market for quality pork and pork products in the region, but also making efforts to show the public that, there exist a better way for processing and marketing of pork and pork products and thereby it is possible to curtail the mushroom growth of unhygienic pork shops in the country.

Pork products marketed under PPP mode.

Development of novel simplex PCRs for detection of important virulence associated genes (VAGs) of *Pasteurella multocida* from pigs

As determination of virulence associated genes of *P. multocida* helps in knowing the pathogenic potential of the organism, a study was undertaken to develop novel simplex PCRs for detection of ten (10) important VAGs of *P. multocida* from pigs. The ten virulence genes selected were *ptfA* and *pfhA* (diverse adhesions), *tonB* and *hgbA* (iron acquisition proteins), *nanB* and *nanH* (sialidases) and *OmpA*, *OmpH*, *Oma87* and *plpB* (outer membrane proteins). The primers for these genes were designed (by primer designing software) by using gene sequences available in GenBank. Primers at a concentration of 20 pmol each (forward and reverse), 3µl of template, 10× PCR buffer, 2 mM of $MgCl_2$, 200 µM of each of the four deoxynucleotide (dNTPs) and 1 U Taq DNA polymerase in a final volume of 25µl were used, reaction conditions were optimized and 10 simplex PCRs have been developed for detection of these 10 important VAGs of of *P. multocida* from pigs.



Detection of different VAGs of *P. multocida* from pigs by the developed PCRs
M: Molecular marker (100bp DNA ladder), N: Negative control,
lane P: Positive control, lane T: Test organism

Relative expression of genes (GH, FSH, ESR and HSP70) for different genetic groups of pig during winter season

Studies on expression of various genes for different genetic groups of pigs during winter season revealed that among grower pigs, expression level of GH gene was 0.371 times higher in exotic and 1.948 times lower in crossbred (CB) compared to native (indigenous) pigs. Similar trend was also observed in adult female pigs with 1.4 fold higher expression in exotic and 1.088 fold lower expressions in CB as compared to indigenous pigs.

With respect to FSH gene, 1.636 times higher expression was observed in exotic and 1.616 times lower expression in CB compared to indigenous grower pigs. Similarly, higher level of FSH gene expression in exotic (2.563) and lower level of expression in CB (0.847) as compared to indigenous adult female pigs were observed.

Exotic grower pigs had 1.704 fold higher and CB grower pigs had 3.459 times lower expression of ESR gene than indigenous grower pigs. In case of adult female pigs, exotic had 1.691 fold higher and CB had 0.48 fold lower expression than Indigenous pigs.

Relative expression (RE) of HSP70 gene in CB and exotic grower pigs were 1.146 and 2.274 times lower than that of indigenous pigs respectively. In contrast, it was 13.415 times higher in CB adult female pigs than that of indigenous pigs. Further, level of expression of HSP70 gene in exotic adult female pigs was lower than indigenous pigs.

Dietary inclusion of omega-3 fatty acids alters systemic progesterone and IGF-1 levels in gestating sows

Endocrine response to dietary omega-3 fatty acid supplementation during early gestation was evaluated in multiparous sows. A total of eighteen healthy crossbred sows were selected to assess the effect of dietary n-3 polyunsaturated fatty acid (*n-3 PUFA*) supplementation on various hormonal profiles during pre-mating period and early gestation. The selected sows were randomized to receive diets containing 4% (wt/wt) cold-pressed flaxseed oil as n-3 PUFA source or standard control diet i.e. Maize-Wheat bran-Soyabean meal diet containing 3.22 Mcal ME/kg, iso-nitrogenous and iso-caloric to treatment diet. Animals were fed n-3 PUFA diet or control diet (2.5 kg/day) starting from first day of detected estrus up to 35 days and they were artificially bred on the second estrus. The study revealed that dietary inclusion of n-3 PUFA alters systemic progesterone levels during early gestation and this may have positive influence on subsequent reproductive response and fertility in sows. Further, dietary inclusion of omega-3 fatty acids elicited significant rise ($p<0.05$) in maternal plasma IGF-I concentrations during post-breeding period. Animals of both groups had significantly higher ($p<0.05$) levels of plasma IGF-1 during estrus than mid-luteal phases. Relatively similar plasma estradiol-17β levels were observed in sows of both the groups at all intervals with no significant difference ($p>0.05$) in overall means.

Studies revealed that STEC isolates from pigs are negative for STEC autoagglutinating adhesin (Saa).

As *E. coli* infection is very common in piglets a study was undertaken to determine the prevalence of different virulence genes in Shigatoxin producing *Escherichia coli* (STEC) isolates recovered from pigs. For this purpose a total of 782 *E. coli* isolates recovered from piglets from major pig producing Northeastern states of India were screened by the polymerase chain reaction (PCR) assay for the presence of virulence genes characteristic for STEC, that is, Shiga-toxin producing gene(s) (*stx1*, *stx2*), intimin (*eae*), enterohemolysin (*hlyA*) and STEC autoagglutinating adhesin (Saa). Overall STEC were detected in 113 (14.4%) piglets and the prevalence of *E. coli* O157 and non-O157 STEC were 4 (0.5%) and 109 (13.9%), respectively. None of the O157 STEC isolates carried gene encoding for H7 antigen (*fliCh7*). The various combinations of virulence genes present in the strains studied were *stx1* in 4.6%, *stx1* in combination with *stx2* gene in 5.1%, *stx1* in combination with *stx2* and *ehxA* in 0.6%, *stx1* in combination with *stx2* and *eae* in 0.2% and *stx2* alone in 3.7%. All STEC isolates were found negative for STEC autoagglutinating adhesin (Saa).

INSTITUTIONAL NEWS

Meeting and Other Activities

Interface meeting between ICAR and stakeholders

An Interface meeting was organized between ICAR and stakeholders for 'Identification of critical issues on pig husbandry in North Eastern and Eastern states of India' on 16th January, 2014. Dr. K.M. Bujarbaruah, Hon'ble Vice-Chancellor, Assam Agricultural University was the Chief Guest and Dr. R. S. Gandhi, Hon'ble ADG (AP&B) was the Guest of Honour. Directors and Joint Directors of Animal Husbandry Departments, progressive pig farmers and entrepreneurs of eastern and north-eastern states participated in the meeting.

Interface meeting on 16th January, 2014

Inauguration of the administrative building of Krishi Vigyan Kendra (KVK), Goalpara

Dr. S. Ayyappan, Hon'ble Secretary, DARE and Director General, ICAR, has inaugurated the Administrative building of Krishi Vigyan Kendra (KVK), Goalpara, Assam on 26th March, 2014. The Chief Guest of the function, Dr. S. Ayyappan, welcomed the farmers to the function and emphasized on the role of ICAR in general and KVK in particular in holistic support to agriculture and allied sectors through its farmers first approach. During the occasion, Dr. K.M.L. Pathak, Hon'ble DDG (Animal Sciences), Dr. S.V. Ngachan, Director, ICAR Research Complex for NEH region, Dr. S.N. Puri, Hon'ble Vice-Chancellor, Central Agricultural University and Dr. Apurba Chakravarty, Director of Research (Vety), AAU were also present to grace the occasion. The DG and other dignitaries planted coconut saplings in the KVK campus and also visited the exhibition organized on the sidelines of the event. About 200 farmers, staff of KVK, Scientists of NRC on Pig and other ICAR Institutes, personnel from line agencies, print and electronic media attended the inaugural function.

Inauguration of the administrative building of Krishi Vigyan Kendra (KVK), Goalpara by Dr. S. Ayyappan, Hon'ble Secretary, DARE and Director General, ICAR

Organization of Farmers' training-cum-workshop on piggery management

Farmers' training-cum-workshop on piggery management' was organized under the NAIP sub-project 'Value chain on Novelty Pork products under organized pig farming system' in Nahira Village, Bejoynagar on 30th January, 2014. Dr. R. Ezekiel, National Coordinator, NAIP Component-II was the Guest of Honour. During the workshop, Farmer-scientists interaction meeting was also organized in which more than 150 progressive farmers and farm innovators actively participated.

Farmers' training-cum-workshop

Organization of Animal Health Camps

Animal Health Camps were organized on 22nd January and 11th March, 2014 at Batabari and Rajapanichanda villages, Kamrup, respectively. The health camps were organized under Tribal sub-plan (TSP) and a total of 97 farmers at Batabari and 118 farmers in Rajapanichanda participated in these health camps.

Animal Health Camp in Batabari village

Celebration of National Science Day

National Science Day was celebrated at the Institute on 28th February, 2014. Dr. Kulendhu Pathak, Former Vice-Chancellor, Dibrugarh University was the Chief Guest on the occasion.

Organization of trainings

- Three days training cum outreach programme on "promoting scientific aptitude through exposure training" was conducted under DBT sponsored Institute Biotech Hub (IBH) programme on 5th, 7th and 10th March, 2014. Approximately 100 students of three schools were given an exposure visit to laboratory, farm and slaughter house facility of the Institute for increasing scientific aptitude.

Training under Institute Biotech Hub

❖ One day training programme on Scientific pig management' was organized in Batabari village on 15th March, 2014. The event was organized under NAIP project-'Value chain on Novelty Pork products under organized pig farming system'.

Training programme on 'Scientific pig management' in Batabari village

Distinguished visitors

❖ Dr. R.M. Acharya, Ex-DDG (AS), ICAR visited and interacted with the scientists on 6th January, 2014.

❖ Dr. Charan Das Mahant, Hon'ble Union Minister of State for Agriculture and Food Processing, visited the Institute on 9th January, 2014. He took stock of activities going on at the Institute and interacted with the Scientists and other staff. The Minister acclaimed the strong progress made by the Institute during past few decades and appreciated the research efforts being made by the scientists benefiting the farmers in the area of pig production, health and product processing.

❖ Dr. Suresh Honnappagol, Hon'ble Animal Husbandry Commissioner, Govt. of India visited and interacted with the scientists on 4th February, 2014.

❖ Tejas Bhatt from Global Food Traceability Centre, Washington visited National Research Centre on Pig, Guwahati to discuss regarding food traceability on 06th February 2014.