

## Some Success Stories

### ***Recombinant Vaccine against Anthrax:***

A technology for production of recombinant Anthrax Vaccine was developed by JNU and transferred to M/s Panacea Biotech Ltd. It is a Non toxic genetically engineered vaccine which provides protection against anthrax. Preclinical toxicity studies, animal efficacy studies up to monkeys and Phase I/Phase IIa human clinical trials have been completed. Phase II b human clinical trials are underway.

### ***Brucellosis Network Program*** (<http://www.dbtbrucellosis.in/>)

Brucellosis is an infectious, contagious and zoonotic disease of animals caused by *Brucella* and is characterized by chronic infections, abortion and sterility in livestock. DBT has supported a Network Project on Brucellosis with 16 network partners for studying the epidemiological status of *Brucella* infections in India and to develop novel diagnostics and vaccines.

#### **Major outcome:**

- A repository was established for storing and cataloguing different *Brucella* species.
- A novel penside diagnostic, lateral flow assay kit, indirect ELISA kit against *Brucella* species and validated.
- A hand held ELISA reader have been developed and validated.
- A mutant S19 strain vaccine for animals has also been developed which is under field trails and
- A recombinant human vaccine is also developed which has shown very good protection in mice.
- A mission program on Brucella free village was also generated as an outcome of this network program.

### ***Classical Swine Fever Network Program***

Classical Swine Fever (CSF) also known as hog cholera is an economically important disease of domestic and feral pigs characterized by high fever, skin lesions, immunosuppression, high mortality, chronic and late onset types of the infection. DBT has supported a Network Program on CSF disease with 7 network partners to setup a national repository, regional CSF referral laboratories, to study molecular epidemiology, to establish a CSF database and to develop novel diagnostics and vaccines for controlling this economically important disease.

#### **Major outcome:**

- A CSF repository has been established which maintains 63 CSF virus isolates and Pestivirus free PK-15 cell lines.
- About 1137 serum samples collected from domestic pigs, wild pigs and pygmy hogs are preserved in the repository.
- A lateral flow test based diagnostic kit has been developed

- Some CSF virus strains have also been identified as potential vaccine candidates.
- A website, [www.tarmir.rgcb.in\\_csf](http://www.tarmir.rgcb.in_csf) was also launched which is exclusively on all aspects of Swine Fever and first of its kind in India on a single animal disease which will facilitate exchange of information between farmers and scientists.
- A live attenuated Classical Swine Fever (CSF) virus vaccine has been developed and its' validation trial has been conducted at an organized piggery farm and also in a commercial pig farm. Good sero conversion has been noticed among vaccinates under field conditions and the live CSF virus vaccine is found to be safe under field conditions as well.

### ***Embryo transfer technology:***

The department initiated a mission mode programme to enhance the productivity of livestock and emphasis was given on standardization of various techniques of Embryo transfer technology (ETT). The technology was successfully standardized in cattle, buffalo, goat, equine, camel, mithun and yak. The department established three main ETT centre and 14 regional ET labs in different parts of the country. Various techniques viz. super ovulation, in vitro culture of embryos, embryos transfer etc. were standardized. ETT demonstration activities were undertaken at the farmers level and a number of cattle and buffalo calves were produced. With the help of ETT an intensive selection among male and female livestock can be carried out in elite herd at an early age using the family information and thus reduce the generation interval and bring about desired change in short span of time.

### ***Open nucleus breeding system:***

The department initiated Open nucleus breeding system (ONBS) for enhancing the productivity of Sahiwal and crossbred Sahiwal cattle at National Dairy Development Board (NDDB), Anand. The nucleus was established from the best animals obtained by screening the base population. The average lactation yield of crossbred cows produced through ONBS in the field was approximately 2500 ltrs. This programme was adopted by NDDB, Anand for continuous production of male Sahiwal and crossbred males for Artificial Insemination programme.

### ***Development of Transgenic Animal:***

A multi-centric programme for development of transgenic animal (mice model) was initiated and technique was standardized. A large number of transgenic mice lines were developed which have application in studying physiological, pathological processes of human diseases and also development of therapeutics and recombinant proteins. A novel mice strain with knocked out kappa casein gene was also developed.

A novel technique i.e. in vivo testicular electroporation of a gene, to generate transgenic animals, was standardized. The technique is cost effective and does not require a highly sophisticated laboratory. The stability of transgene integration and its propagation was

confirmed. This efficient method will ease the generation of transgenic rats which is needed to create better disease models than mice, for certain human diseases.

### **Genetic Improvement:**

Genetic improvement of local sheep breed of Kashmir and Maharashtra using Fec B mutation and their genetic characterization were carried out successfully. Approximate 45% more lambs were produced by the heterozygous ewes having Fec B mutation whereas homozygous ewes gave birth to 65.5% more lambs than non carries ewes. The study confirmed two distinct groups among FecB carrier crossbred ewes with low and high average litter size.

### **Animal By-product:**

Animal cartilage of goat origin was successfully utilized as surgical implantation in Microtia and Rhinoplasty of human patient. Clinical trials of cartilage graft showed satisfactory recovery resulting improved facial look. Biomaterial of fish origin (fish swim bladder) was also developed and its acceptability was confirmed in tissue repair in human and ruminants. The application of the acellular fish swim bladder graft was carried out in clinical cases and satisfactory results were obtained.

### **Reconstituted collagen sheet (RCS):**

A new process for conversion of the Achilles tendons of the bovine origin into reconstituted collagen sheet was developed and named as RCS. This has application in wound healing and technology was transferred to M/s Eucare Pharmaceutical Pvt. Ltd., Chennai.

### **Sex determination:**

A sex determination test for Emu was developed and the technology was transferred and a patent was also filed on molecular method of sexing of Emu. The cryopreservation technique of Emu semen was standardized by adopting slow freezing technique which yielded optimum post thaw motility. The hatchability and fertility were found to be varied depending on the type of semen used for insemination and the period of breeding season.

## 4. Outcome of last 5 years

### **Animal Health:**

- No. of Publications : 126 (Average Impact factor of 1.5)
- No. of patents **filed/granted** : **19/6**
- No. of technologies **developed/licensed/commercialized/Start-up** created : **21+13**
- No. of manpower trained : 378
- Any major facilities supported/created:

**BSL 3 facility at JNU:** The Biosafety Level 3 laboratory has been established at JNU, New Delhi which is fully functional. and being used for

work on four different virulent microorganisms – *B. anthracis*, *M. tuberculosis*, *B. abortus* and *H. pylori*. These microorganisms are cultured, stored, fractionated, handled and challenge experiments involving these are performed in the BSL-3, which are part of number of studies.

**A Translational Research Platform for Veterinary Biologicals (TRPVB)** has been established at Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai in September 2011 as a DBT- TANUVAS partnership initiative. This platform is facilitating translation research by performing product development, validation, regulatory documentation and product commercialization. It also acts as a referral center to strengthen linkages and collaboration in the areas of animal vaccine and diagnostics development, exchange of biological materials, technology assessment, training support, consultation, intellectual property development and project management. It has brought together experts with academic, industry and regulatory expertise thereby enabling bridging of the existing ‘translational disconnect’ across these three spheres ([www\[dot\]trpvb\[dot\]org\[dot\]in](http://www.trpvb.org.in)).

**Small Animal Research Facility:** A GLP enabled small animal research facility has been established to cater high end small animal facility enabled preclinical R&D services and to promote technical manpower development in small facility-based research and services at Sri Balaji Vidyapeeth(Deemed University), Mahatma Gandhi Medical College & Research Institute Campus Puducherry.

#### **Animal Production:**

- No. of Publications : 312 (Average Impact factor more than 1.6)
- No. of patents **filed/granted** : **12/1**
- No. of technologies **developed**/licensed/commercialized/Start-up created : **16**
- No. of manpower trained : 164 approximately.
- Any major facilities supported/created:

Any other relevant information which needs to be highlighted (if any)