

TANUVAS TECHNICAL REPORTER

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Tamil Nadu Veterinary and Animal Sciences University*



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IMPACT OF OESTROUS SYNCHRONIZATION IN COWS AND BUFFALOES UNDER FIELD CONDITION OF TAMIL NADU

The major contributing factors for the widespread infertility problem in cows and buffaloes under field condition are poor heat detection, untimely insemination, poor nutrition and lack of awareness on husbandry practices.

Under a project with the assistance from National Agricultural Development Project / Rashtriya Krishi Vikas Yojana (RKVY), Oestrus Synchronization Technique was adopted in cows and buffaloes in rural Tamil Nadu to improve fertility, reduce inter-calving period, improve milk production and enhance economic return to the farmer.

Programme of activities and methodology followed

Implementing Agency/ Department

- Tamil Nadu Veterinary and Animal Sciences University
- Directorate of Animal Husbandry and Veterinary Services &
- Dairy Development Department, Tamil Nadu

Major steps involved in Oestrus Synchronisation and Artificial Insemination (AI)

1. Potential villages were selected by the veterinarians.
2. Infertility camps were organized, wherein cows and buffaloes were examined individually and identified.
3. Selected animals were given a dose of deworming drug and two kg of mineral mixture to be fed at the rate of 30 g / animal daily.

4. The selected animals were re-examined after 15-30 days and the synchronization protocol was adopted.
5. After three months of AI at induced oestrous the pregnancy was verified in all the animals included.

Implementation

The project was implemented in 20 districts of Tamil Nadu. The experts from Madras Veterinary College, Chennai and Veterinary College and Research Institute, Namakkal had acted as technical consultants and monitored the implementation. The Veterinary University Training and Research Centre/ Krishi Vigyan Kendra/ Farmers Training Centre/ Regional Research Centre/ Veterinary College and Research Institute, Namakkal in the district had directly carried out the oestrous synchronization and co-ordinated the implementation by other two departments in the districts.

Results

- A total of 96 sensitizing meetings with University and Directorate of Animal Husbandry and Veterinary Services and TCMPPF Ltd. Officers were held in the twenty districts.
- 764 bovine infertility camps / mass contact programmes were conducted at village level in all the districts and 30,292 animals were examined
- Out of 30,292 cows and buffaloes examined in the camps conducted in different villages of the twenty centers, only 15,149 animals were

selected for synchronization. The animals were selected based on the breeding history and rectal examination.

- All the selected 15,149 animals were synchronized in the twenty districts and Artificial insemination was carried out in all the animals.

- All the 15,149 animals synchronized were verified for pregnancy. Out of which 9124 animals were found to be pregnant. And the Conception rate is worked out to be 60.23%. The details regarding number of animals verified for pregnancy and the conception rate at different districts are given in the following table.

Number of animals synchronized district wise along with the conception rate

Sl. No	District	Alloted	Cows			Buffaloes		
			AI done and Verified (Nos)	Pregnant (Nos)	Conception rate (%)	AI done and Verified (Nos)	Pregnant (Nos)	Conception rate (%)
1	Thiruvallur	700	518	286	55.21	78	38	48.72
2	Kanchipuram	800	754	437	57.96	86	47	54.65
3	Villupuram	1000	747	480	64.26	263	154	58.56
4	Vellore	750	690	406	58.84	38	33	86.84
5	Thiruvannamalai	700	717	477	66.53	46	31	67.39
6	Cuddalore	700	465	226	48.60	235	120	51.06
7	Tiruchirapalli	700	411	235	57.18	319	190	59.56
8	Thanjavur	700	742	431	58.09	8	4	50.00
9	Nagapattinam	600	522	282	54.02	7	3	42.86
10	Thiruvarur	600	714	379	53.08	26	8	30.77
11	Pudukottai	650	663	428	64.56	0	0	0.00
12	Salem	900	433	275	63.51	467	337	72.16
13	Namakkal	850	252	155	61.51	598	353	59.03
14	Karur	700	278	172	61.87	422	238	56.40
15	Erode	900	288	204	70.83	592	364	61.49
16	Dharmapuri	850	400	253	63.25	450	290	64.44
17	Krishnagiri	700	500	316	63.20	200	127	63.50
18	Dindigul	750	370	259	70.00	380	242	63.68
19	Sivagangai	700	675	377	55.85	0	0	0.00
20	Tirunelveli	750	764	457	59.82	31	10	32.26
	Total -TN	15000	10903	6535	59.94	4246	2589	60.98

STEM CELLS IN VETERINARY REGENERATIVE MEDICINE

Regenerative medicine involves replacing or regenerating cells, tissues or organs in order to restore or establish normal function. The components of regenerative medicine are biomaterials or scaffolds, stem cells and regulators or microenvironment. Two large concentrations of work in this field include cell therapy and tissue engineering. Stem cells brings about healing through differentiation, trans-differentiation and by secreting biomolecules or extra vascular secretions which control the microenvironment and brings about healing. Though stem cells of different origins; such as embryonic, fetal, adult and laboratory induced pluripotent stem cells are available, adult stem cells of autologous and allogeneic origin is preferred as therapeutic candidates in regenerative medicine because of their various ethical and therapeutic issues.

Adult stem cells are multipotent cells and are classified as haematopoietic and mesenchymal based on their origin and phenotypic expression. Both have their unique way of contributing to various degenerative diseases. Mesenchymal stem cells are considered as acceptable multipotent cells which can be used for cell based therapies, cell free therapies and tissue engineering and *ex-vivo* culture of whole organs or tissue substitutes because of their lack of immunogenicity, availability and differentiation and trans-differentiation pathways. Mesenchymal stem cells of bone marrow origin and fat or adipose derived stem cells are predominantly used for therapeutic purposes.

In the Centre for Stem Cell Research and Regenerative Medicine, Madras Veterinary College, technology for isolation, characterization and expansion has been standardized and used for therapeutic purposes. The adipose derived mesenchymal stem cells are isolated from omentum and used for allogeneic engraftment with minor manipulation adhering to the National Guidelines for Stem Cell Research and Therapy, India. Clinical grade stem cells are to be cultured in serum free media in a GMP (Good Manufacturing Practices) setup. The GMP setup for clinical grade stem cell production, biomaterials and banking of umbilical cord stem cells for canine, feline and equine is being in the process of establishment and certification and could be the first of its kind in Veterinary institutions in the country. Intra-articular engraftment of allogeneic mesenchymal stem cells with certain biomolecules and collagen type 1, gives good clinical outcome in dogs. Mesenchymal stem cells seeded on collagen type 1 and platelet rich plasma anchored collagen

a) Pregnancy achieved: The most important outcome was that 9,124 cows and buffaloes had become pregnant out of 15,149 synchronized. Induction of heat was almost 100 % in anoestrus (not coming to heat) cows and buffaloes. A conception rate of 59.94 per cent in cows and 60.98 per cent in buffaloes were achieved in mostly infertile cows and buffaloes.

b) Improvement in Milk Production: The implementation of this Project resulted in improvement in milk production by 46.0 Lakh litres (8,550 cows calving x 90 milking days x 6 lit/day) on annual basis. This improvement in milk production comes without increasing the number of animals and exerting pressure on feed resources.

The higher conception rate in buffaloes than in cows revealed that oestrous synchronization protocol effectively alleviated the oestrous detection errors, untimely insemination practices and silent oestrus problems in buffaloes.



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type 1 are used intra-lesionally on injured tendons in horses and provides early healing and favourable clinical outcome. Mesenchymal stem cells alone and seeded on hydrogels are used for wound healing and fracture healing and the results are encouraging. As adipose derived mesenchymal stem cells lack immunogenicity they are used in reconstructive surgery for the pretreatment of graft and wound bed and the results are good and encouraging. Intra-lesional application of mesenchymal stem cells for the management of spinal cord injury in dogs and felines are under investigation. Techniques for labeling and tracking of stem cells has been standardized with iron nanoparticles and can be used for *in-vivo* tracking of stem cells. Isolation, characterization and expansion of spermatogonial stem cells are studied and investigations are under progress for using these cells for establishing a pluripotent stem cell line.



Pre and Post-engraftment appearance of an Osteoarthritic dog

A male German Shepherd dog suffering from Osteoarthritis of both the hip joints was treated with intra-articular injection of allogenic omental derived Mesenchymal stem cells along with bio-active molecules of Ascorbic acid and Dexamethasone. Clinical improvement and quality of improved after one month of engraftment.

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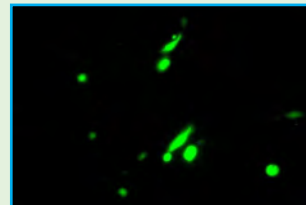
RESEARCH HIGHLIGHTS

(2014-15)

Control of Newcastle disease using siRNA-mediated inhibition of viral replication *in vivo*

▲ siRNA constructs - siNDVF4888 & siVP1597 have been validated for their specificity to inhibit ~80% replication of Newcastle and Infectious bursal disease virus respectively *in vitro*. A chitosan based nanoparticle also has been prepared for coupling the siRNA and delivery of this siRNA's *in vivo*.

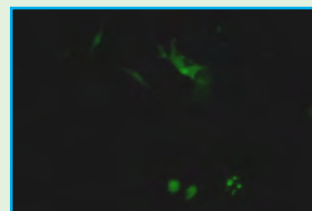
GREEN FLUORESCENT PROTEIN EXPRESSED IN FIBROBLAST CELLS



Positive control with Lipofectamine showing green fluorescence



Negative control with no fluorescence

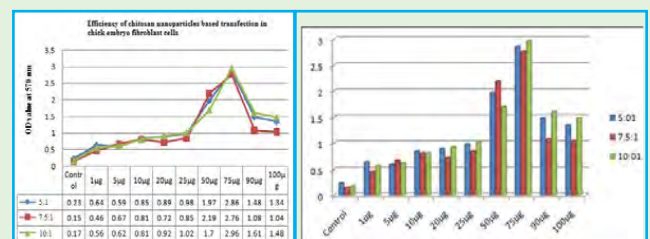


7.5:1 chitosan nano particle showing green Fluorescence



10:1 chitosan nano particle showing green Fluorescence

ASSESSING THE CYTOTOXICITY OF CHITOSAN NANOPARTICLES IN CHICK EMBRYO FIBROBLAST CELLS USING MTT ASSAY



Principal Investigator: T.M.A. Senthil Kumar

Professor

Department of Animal Biotechnology,
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 DBT Project, New Delhi

Influence of toxin binders on the pharmacokinetics and bioavailability of enrofloxacin in broiler chicken

- ▲ Pulse dosing is a suitable and practicable method for mass medication of broilers though bioavailability was numerically high in single oral bolus dose.
- ▲ Activated charcoal (AC) non specifically binds enrofloxacin when administered as single pulse dosing. Both Hydrated Sodium Calcium Aluminosilicate (HSCAS) and AC significantly altered the pharmacokinetic parameters after multiple pulse dosing.
- ▲ Enrofloxacin at 10mg.kg⁻¹ b.wt. every 24h was found to treat only moderately sensitive organisms and in the presence of toxin binders the dosage has to be increased to 15mg.kg⁻¹ b.wt every 24h.
- ▲ Feed containing toxin binders, either HSCAS or AC should be withheld during treatment with enrofloxacin since they were found to decrease the bioavailability of enrofloxacin administered as pulse dosing in broiler chicken.

Dr. Mekala, Ph.D., Scholar,
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Chairman: Dr. A. Jagadeeswaran

Effect of nano mineral supplementation in TANUVAS Smart Mineral Mixture on the performance of lambs

- ▲ Yield of Nano form of dicalcium phosphate (with particle size and zeta potential of 46.60 nm and -26 mV) and copper sulphate (44.87nm, -20.5mV) was 25g/hour and 100g/hour in ball mill respectively.
- ▲ Cytotoxicity assay revealed that up to 10% did not cause any cell inhibition and was considered safe at this level.
- ▲ A validation study on growing Sandyno lambs supplemented with TANUVAS SMART mineral

mixture Vs nano form of dicalcium phosphate at 50% and nano form of copper sulphate at 25% exhibited no significant variations between treatments in growth rate, feed conversion ratio, tibial retention of calcium and phosphorus, liver retention of copper, serum calcium, phosphorus, copper, ceruloplasmin concentration, superoxide dismutase activity, slaughter characteristics, wool yield and quality.

- ▲ Nano form of copper sulphate has better anthelmintic effect compared to its coarse counterpart, which could be probed further.

Dr. J. Ramesh, Ph.D., Scholar,
Department of Animal Nutrition,
Madras Veterinary College, Chennai
Chairman: Dr. C. Valli

Assessing the demand for quality attributes and consumer preference for dairy products in Chennai city

- The study results revealed overall proportion of expenditure towards milk and milk products on total food expenditure was of 17 per cent and the overall monthly average consumption and expenditure on dairy products were more in high income group.
- Semi-log functional analysis for household consumption of fluid milk, ghee and butter revealed that family size, education status of the head of the household, monthly family income and food habit of the family were found to be significantly influencing the consumption of dairy products.
- Ordered Probit model results revealed that as the family size increased, consumers tend to prefer dairy products with good texture, good color and odor, high quality, low price and good packaging.

Dr. J. Shilpa Shree, M.V.Sc, Scholar,
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Technology Developed at TANUVAS Innovations and Instrumentation Centre

TANUVAS – ILFC - Creep Feeder for Piglets



- ✦ TANUVAS – ILFC Creep feeder for piglets is specially designed to provide creep feed to piglets in the creep area of the farrowing pen.
- ✦ It is designed to ensure the availability of correct quantity of feed to piglets.
- ✦ It enhances concentrate feed intake among nursing piglets thereby improving daily weight gain and early weaning.
- ✦ It is made up of 6 small plastic trays mounted on a metallic frame which is elevated at one side to provide easy access to piglet and to avoid wastage due to non accessibility.
- ✦ Easily to carry and transport and prevents wastage of feed.
- ✦ Prevent contamination of feed with faeces and urine thereby minimizes the health issues.
- ✦ Easy to clean.
- ✦ One feeder is enough for up to 10 piglets.
- ✦ Cost effective and user friendly for small, medium and large farmers.
- ✦ Price Rs.900/-

**Inventors : Dr. E. Rachel Jemimah,
Dr.T. Muthuramalingam and Dr. P. Tensingh Ganararajj**

TANUVAS – ILFC - Low Cost Hydroponic device



- ✦ It is a soil less fodder production technology by which fodder can be grown to feed livestock such as cattle, buffalo, horse, pig, sheep, goat and poultry.
- ✦ It require only minimal land, water and labour.
- ✦ The low cost mode consist of 8 rows each with holding capacity of 4 trays .
- ✦ About 8 kg of fodder can be produced from 1.65 kg of maize seed.
- ✦ As a seed also comes along with fodder and sprout mat, the whole fodder along with root and seed is utilized by the animals without wastage.
- ✦ Different types of seeds that can be grown in to hydroponic fodder are maize, sun hump, horse gram, jowar etc.,

Procedure

- ✦ Select seeds with high sprouting quality and moisture less than 12%.
- ✦ Place the seeds in to tub / tank and add water.
- ✦ Wash the seed by stirring with stick and drain the water.
- ✦ Add water and soak the seeds for 24 hours.
- ✦ Pack the soaked seeds in to gunny bags.
- ✦ Place these gunny bags under shade (avoid keeping near / under direct sun light).
- ✦ Sprinkle water once in every 3 hours on to the gunny bags.
- ✦ Allow the seeds to sprout in the gunny bag itself for one day.
- ✦ Transfer the sprouted seeds from the gunny bags on to the trays and spread them evenly upto a height of 1/2 inches within the tray.
- ✦ Rack the trays in to the lower section of the machine (i.e) in to the day 1 row.
- ✦ Switch on the sprinklers in every two hours for sprinkling water daily.
- ✦ Change / shift the trays to next row on every other day.
- ✦ After completion of 8th day (i.e.) 8th row the fodder can be utilized for feeding farm animals.
- ✦ Usually the growth period is 8 days in which the fodder grows to a maximum height of 25 to 35 cm.
- ✦ It can be purchased from University Research Farm, TANUVAS by placing order.
- ✦ Cost Rs.48,000/-

**Inventors : Dr. P. Tensingh Ganararaj, Dr. E. Rachel Jemimah and
Dr.T. Muthuramalingam**