Vets Review

February 2019 / Vol IV / Issue I

Progressive Veterinary Doctors Association

Dr. Bidhan Chandra Roy

Vets Review

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February 2019 Vol. IV Issue I

INDEX

Editorial Message

Dear Doctor,

It gives me immense pleasure to wish you Happy New Year 2019 to all our readers/members and veterinary professionals.

The livestock sector in India plays a major contributor to the agricultural economy of our country, not merely in terms of income but also in terms of livelihood and employment. It is usually said that livestock wealth is more equitably distributed than agricultural land. There is an upwards flow of demand for livestock products due to increase in population, growing per capita income and better living standards.

A large number of farmers in India depend on animal husbandry for their livelihood. In addition to supplying milk, meat, eggs, wool and hides animals i.e. cattle, buffalo, sheep, goat, pig etc. are the major source of power for farmers. Thus animal husbandry plays an important role in the rural economy. In this context 'Vets Review' plays as a precursor for the upliftment of animal husbandry sector as well as helps veterinarians to disseminate their scientific knowledge for better management of animal health. We think this is an opportunity for us to renew its usefulness and the value that it will try to provide our readers. We therefore encourage you to write to us with suggestions on how to make it better.

On this hopeful note, we were in our happy journey and let us try to convert it to a National Journal.

Editors

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No. :VCS/WBUAFS/M-5/105
Date : 15.01.2019

MESSAGE

I am extremely happy to learn that the Progressive Veterinary Doctors' Association is going to organize the 3rd Biennial State Conference during 2nd & 3rd February, 2019 at Digha, Purbo Medinipur.

I am further happy to note that the Association has arranged a Scientific Seminar on 'Diagnosis & Control of Hemoprotozoan Diseases of Dairy Animals with Special Refernce to Thileriosis", which will be attended by the Veterinary Professionals, Scientists, Researchers and Consultants from various fields of Animal Husbandry.

I hope that the deliberations during the Scientific Seminar will be fruitful and the scientific personnel present in the Seminar will throw light on the issue and come out with ways and means for the Diagnosis and effective control of the disease.

I wish for all success of the 3rd Biennial State Conference of the Progressive Veterinary Doctors' Association and the Scientific Seminar.

It is also learnt that the Association is going to publish the 4th Edition of its Scientific Magazine "Vets Review". I wish the publication to be worthy.

(Purnendu Biswas)

Dr. Subal Chandra Patra
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Dated the 21st January, 2019

MESSAGE

It gives me immense pleasure to learn that 4th edition of Scientific Magazine "Vets Review" will be published on the eve of 3rd Biennial State Conference of Progressive Veterinary Doctors' Association from 2-3 February, 2019 at Digha, Purba Medinipur.

It is truly a delight to learn that a large number of Veterinary Doctors, Scientists, Consultants at different levels of Animal Husbandry as well as Professors of West Bengal Universities of Animal & Fishery Sciences will attend this conference. The event will surely be a step forward in knowledge exchange with experts in this very important field.

I would like to extend my best wishes to the organizers and the participants of the programme for its success.

(Anil Verma)

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পশ্চিমবঙ্গ সরকার
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Message

I have been informed that the Progressive Veterinary Doctors' Association is organizing their 3rd biennial State Conference on 2nd and 3rd of February, 2019 at Digha, Purbo Medinipur and in this occasion a scientific Seminar on "Diagnosis and Control of Haemoprotozoan diseases with special reference to Theileriosis" will take place along with publication of a souvenir to commemorate this event.

It has also been learnt that the fourth issue of their Scientific Magazine "Vets Review" will be brought out on the occasion of their State Conference in a befitting manner.

I sincerely hope that the magazine will serve as a mirror reflecting various scientific advancement, aspirations and new initiatives in the field of Veterinary Sciences which I believe to be a valuable insight for all veterinarians. I am also sure that this effort will be repeated over the coming years.

I would like to convey my best wishes to the organizers and participants of the Conference and wish the Scientific Seminar and "Vets Review" every success.

18.1.19
Dr (Capt.) A.G.Bandyopadhyay

General Secretary
Progressive Veterinary Doctors' Association

কার্য্যালয় ঃ প্রাণী সম্পদ ভবন, তৃতীয় তল, এল.বি.-২ ব্লক, সেক্টর-৩, লবণ হ্রদ, কলকাতা-৭০০ ০৯৮
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Prof. Shyam Sundar Dana
Registrar

MESSAGE

It is learnt that the "Progressive Veterinary Doctors' Association" is going to publish the 4th Vol; 1st Issue of their technical bulletin - 'Vets Review'. I convey my gleaming wishes to the Association for their effort in publishing the same in successive years. The kind patronage of all the veterinarians is essentially required for the bulletin being its prime readers. The present issue of 'Vets Review' illustrated the latest information for the practitioners, livestock and poultry keepers, breeders as well as the industry personnel.

I wish the publication should portray the experience of the veterinarians in their practicing field of operations in future issues. The endeavour made by the "Progressive Veterinary Doctors' Association" for release of the technical bulletin is thus appreciated.

I hope to see the continued publications of the 'Vets Review'.

(S. S. Dana) 16.01.2019.
Registrar (Actg.)

To
Dr. Subal Chandra Patra,
General Secretary,
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PROGRESSIVE VETERINARY DOCTORS' ASSOCIATION
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PREFACE

This is our great pleasure to inform you that scientific wing of Progressive Veterinary Doctors' Association with their utmost venture and enthusiasm could finally publish the 4th edition of Vets Review.

Progressive Veterinary Doctors Association from the very beginning of its formation, takes pledge to work for the upliftment of Scientific Mindset of our fraternity. We strongly believe that our bulletin is a good platform for exchange of scientific thoughts on animal production and animal health among veterinarians holding different responsible chairs including laboratories, dispensaries, administration, teaching, research and development and extension activities.

Therefore, on the auspicious occasion of 3rd biennial State Conference of PVDA held on 2nd and 3rd February, 2019 at Digha, Purbo Medinipur, we are going to publish the 4th edition of our technical bulletin. The current issue is enriched with vector borne parasitic diseases, post mortem techniques and lesions of poultry diseases as well as entrepreneurship development in livestock sector. These reviews have potential to lead for improvements and explorations in the diagnosis and control of animal and poultry diseases. In addition, it takes into account entrepreneurship development related issues, which would pave a way for development to the livelihood of the poor and marginal farmers.

I would like to thank our scientific magazine committee who has taken such good effort to publish this edition in time. We hope that authors, colleagues, and readers could appreciate all the time and effort expended in preparing this issue.

With thanks

Subal Chandra Patra

(Dr. Subal Chandra Patra)
General Secretary

HAEMOPROTOZOAN DISEASES OF DAIRY ANIMALS

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Dairy animals often get infected with a number of protozoan diseases which are an important constraint to livestock production in developing countries, and are responsible for high morbidity and mortality resulting in decreased production of meat, milk and other livestock byproducts. Protozoa are single celled, eukaryotic organisms, which vary in morphology as well as their site of predilection (blood plasma, blood corpuscles, gastrointestinal tract, lymph nodes, muscles, nervous tissues and reproductive organs). Important protozoan parasites of domestic animals are classified under three phyla, viz., Sarcomastigophora, Apicomplexa and Ciliophora under the kingdom Protista. Some of these are found in blood of domestic animals and are called blood-protozoa, while others cause gastrointestinal disease and one causes reproductive disorders. Some of the important protozoan diseases of domestic large ruminants are discussed below.

Trypanosomosis

Trypanosomosis, commonly called as 'Surra' is caused by Trypanosoma evansi, a haemoflagellate protozoan parasite, mechanically transmitted by haematophagus flies of the genus Tabanus and Stomoxys. The disease is of considerable economic importance in India. Apart from dairy animals, the parasite can also infect equids, camels, dogs, and a wide range of wild and laboratory animals. T. evansi is found in blood plasma and lymph. The most important clinicopathological finding in surra is progressive anaemia, which is attributed to a number of factors. Muscle fibre degeneration, oedema and degeneration of endocrine glands also occur. Involvement of endocrine glands has been incriminated as the cause of anoestrus and repeat breeding in chronically infected animals. In advanced cases the parasite may invade central nervous system. Thus, chronically infected animals suffer from a multisystemic disease. In camel, the disease is more chronic ('Tei-barsa' which means three year duration) than in horses and comparatively a few parasites may be found in peripheral circulation. However, a fairly high mortality occurs in camels if left untreated. In dogs also the disease is severe. Though surra is common in cattle, water buffalo and pig, these animals show a low parasitaemia with varying clinical signs. These animals can, therefore, serve as important 'reservoirs' for other susceptible livestock.

The pathological changes include enlargement of spleen, kidney, liver and lymphatic tissues, marked anaemia, emaciation, and petechial haemorrhages in different organs.

Clinical Signs: In horses, there is oedematous swelling along the belly and limbs, intermittent fever (lasting for 3-4 days) with high parasitaemia, anaemia, ecchymotic haemorrhage in the eyes, nostrils and anus, urticaria, muscular weakness resulting in reluctance to walk and unsteady gait. The urine becomes viscid and dark yellow. The disease in cattle and buffalo may be peracute to chronic. Peracute cases are characterised by high fever, dullness, sonorous breathing, salivation and abdominal pain. Surra

affected dogs may show corneal opacity and change in voice. Affected camels become progressively emaciated and the hump disappears. The disease in elephants is similar to camel surra.

Diagnosis: Conventionally, diagnosis of surra is made by demonstration of the parasite in wet blood films as well as thick and thin blood smears and lymph node aspirate stained with Romanowsky stain. This method is highly specific but poor in sensitivity. In cases of chronic and subacute trypanosomosis where parasite cannot be demonstrated, concentration techniques are advisable. Examination of fresh or stained blood films, have been modified to improve diagnostic sensitivity by concentrating the blood through centrifugation in a haematocrit tube, namely the haematocrit centrifugation technique (HCT or Woo's technique) or the dark ground buffy coat technique (DG or Murray's method), haemolysis technique using sodium dodecyl sulphate, hypotonic lysis, haemolysis centrifugation technique. In chronic or cryptic cases other methods like animal inoculation test is used. A little blood (0.25 to 1ml) of the suspected animal is collected in a heparin treated tube and injected intraperitoneally into a suitable laboratory host (mouse or rat). The blood of the experimentally infected laboratory animal is examined starting 3 days post inoculation, and it is continued for 3-4 weeks if necessary, for the presence of trypanosomes.

Serology based tests are important for epidemiological surveys. The commonly used serological tests are card agglutination trypanosomiasis test (CATT), indirect fluorescent antibody test (IFAT), enzyme linked immunosorbent assay (ELISA) and latex agglutination test (LAT).

Polymerase chain reaction (PCR), targeting internal transcribed spacer 1 (ITS1), nuclear repetitive sequences, kinetoplast DNA and RoTat 1.2 genes have been used with high specificity. Formerly, various biochemical tests (mercuric chloride test, formol-gel test, stilbamidine test and thymol turbidity test) were used, which detects only a rise in the globulin level, and therefore, is likely to be non specific.

Treatment: The commonly used anti-trypanosomal drugs are suramin (7-10 mg/kg, i.v. in three divided doses at weekly intervals), quinapyramine prosalt (3-5 mg/kg, s.c.), homidium chloride (1 mg/kg, i.m.), isometamidium chloride (0.5-2 mg/kg, i.m.) and diminazine aceturate (3.5-7 mg/kg, i.m.). There are reports of drug resistance against diminazine aceturate.

Control: Since the disease is mechanically transmitted by haematophagous arthropods (specially the tabanids), reducing their number by destroying the breeding places (stagnant water bodies) during monsoon and post monsoon season would reduce the incidence of infection. The tabanids are most active in a sunny weather.

Animals can be protected in endemic areas by injecting them with suramin, antrycide prosalt and isometamidium during peak fly season.

Another trypanosome, T. theileri, is occasionally encountered in dairy animals and are considered to be non-pathogenic. However, under stress condition, the parasite may produce disease.

Babesiosis

Four Babesia species, viz. B. bovis, B. bigemina, B. divergens and Babesia major are known to infect dairy animals around the globe. Out of these, only one species, B. bigemina occurs in India. The disease is also known as 'piroplasmosis' or 'red water fever'. All species of Babesia have more or less similar

pathogenesis. This is mainly due to massive destruction of host's erythrocytes not only by invading merozoites, but also due to release of pharmacologically active substances and immunologically mediated erythrophagocytosis of infected and uninfected erythrocytes. Some species of Babesia (B. bovis) clog the brain capillaries, which is invariably fatal and is known 'cerebral babesiosis'. Inverse age resistance is characteristic of B. bigemina infection. The disease is transmitted through several species of ticks with Rhipicephalus (Boophilus) microplus being the main vector. Transmission is mainly transovarian since one host ticks serve as vectors, but stage to stage transmission is also possible.

Clinical Signs: The disease is characterised by high fever, haemoglobinuria and severe anaemia. The severity of anaemia depends upon the severity of infection. The liver, spleen and kidneys, may also be involved. There is severe splenomegaly and jaundice. Antigen-antibody complex mediated hypersensitivity leads to glomerulonephritis. The released haemoglobin is excreted with the urine which becomes red to almost black in colour. Accordingly, the disease is also called 'red water fever'.

Diagnosis: It is based on clinical signs like fever, anaemia, haemoglobinuria, icterus, and general depression. The disease may be confused with leptospirosis, anaplasmosis or cowdriosis. Confirmed diagnosis can be made by demonstration of intraerythrocytic piroplasms in Romanowsky stained thin or thick blood smears.

Treatment: Berenil @ 3-5 mg/kg by deep intramuscular injection is quite effective. Quinuronium sulfate 1-2 mg/kg by intramuscular or subcutaneous injection. Imidocarb dipropionate (imizole) as subcutaneous or intramuscular injection@ 1-3 mg/kg is the drug of choice. Supportive therapy with haematinics and in severely affected animals, blood transfusion is recommended.

Control: Control of babesiosis is largely dependent upon effective tick control.

Babesiosis in buffaloes is rarely encountered. The disease is highly fatal. There is increasing evidence that buffaloes may harbour species of Babesia other than B. bigemina.

Theileriosis

Bovine tropical theileriosis in India is caused by T. annulata. The parasite occur as round, ovoid, rod, dots or comma-shaped piroplasms within erythrocytes and are found as intracellular parasites in macrophages and lymphocytes. Theileria need two obligatory hosts for the completion of life-cycle. In vertebrate host, the parasites multiply asexually by schizogony in lymphocytes and by binary fission in erythrocytes. The invertebrate host (vector) is a hard-tick (Hyalomma spp.) Transmission of the parasite by the tick vector is through stage-to-stage/transstadial transmission (i.e. if larva picks up infection nymph transmits, if nymphs pick the infection then adult transmits it to a new host).

Clinical Signs: The disease is characterised by high rise in body temperature followed by lachrymation, nasal discharge, cough, depression, anaemia, icterus, swelling of superficial lymph nodes, spleen and liver and tumefaction of eyelids. Haemoglobinuria may occur. In affected animals, the gums, oral cavity, abomasum and intestine may get inflamed accompanied by diarrhoea. Punched out “button-shaped” necrotic ulcers, 2-12 mm in diameter, in the abomasum and intestine are the pathognomonic lesions of the disease. Immunologically mediated pneumonia and

lung oedema are the immediate causes of death in severely affected animals. The brain may also get affected. Infection with T. annulata is fairly widespread in cattle in India. The indigenous breeds do not suffer much possibly because of innate immunity and preimmunity, though calves below three months of age occasionally succumb to the infection. In buffaloes, the infection is benign and nonpathogenic. However, it is the imported purebred or crossbred animals that are at the greatest risk and there is a very high mortality amongst them.

Diagnosis: It is made by demonstration of the intraerythrocytic piroplasms in Romanowsky stained blood smears and schizonts stages (Koch's blue bodies) inside macrophages/ monocytes/lymphocytes in lymph node aspirate obtained from the superficial lymph nodes. Schizonts are also found in monocytes in peripheral circulation. In the initial phase of the disease, piroplasms in erythrocytes may not be seen and this may lead to false negative diagnosis. It is advisable to examine the lymph node aspirate for the demonstration of the KBB stage for timely institution of specific treatment. In T. annulata about 80% of intraerythrocytic forms are ring-shaped or annular. Serological tests viz., indirect haemagglutination, capillary agglutination, complement fixation, immunodiffusion, indirect immuno-fluorence, ELISA etc. have been tried with promising results. IFAT is the OIE recommended test for international trade. Very low level of infection can be detected by PCR.

Treatment: Buparvaquone (@ 2.5 mg/kg, administered intramuscular) is the drug of choice. If needed, it may be repeated after 48 hours in severe cases. Rolitetracycline (4mg/kg, i.m.) administered daily for 4 days or long-acting oxytertacycline formulation (20 mg/kg) given once markedly reduce the clinical signs. Prompt diagnosis and immediate treatment is the key to success in recovery of the ailing animals.

Control: Currently control of theileriosis is based upon regular tick control in endemic areas and vaccination with cell culture attenuated schizont-infected lymphoid cells. Approximately, 2x106 scizont-infected lymphoblasts are inoculated as vaccine.

POST-MORTEM: PATHOGNOMONIC LESIONS OF SOME IMPORTANT POULTRY DISEASES

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Introduction:

Accurate diagnosis is the most important consideration in poultry disease. It is needless to say that poultry in West Bengal is flourishing industry which has a great economic importance and employment generation. Morbidity and mortality problem is a great concern in poultry industry. However necropsy examination or post mortem is very important to know the actual cause of disease and it is the systemic examination of a carcass with a view to searching for lesions that may point to the causes of death. It is very important diagnostic tool that is used to support other procedures performed in the diagnosis of the disease condition in man, hard or flock of animals, birds and fish. The Post Mortem is done for finding the cause of death, confirming diagnosis, investigating unsuccessful therapy, increasing knowledge or satisfying curiosity. Here, we briefly discuss the pathognomonic lesions of some important poultry diseases during PM examination, which may help the field veterinarians at a glance.

VIRAL DISEASES

A) **Ranikhet Disease:**

Cause : *Paramyxovirus*.

Post-mortem (PM) lesions:

1. Hyperaemia and congestion in respiratory tract.
2. Serous or catarrhal exudates in larynx and trachea.
3. Thickened air sacs may contain yellow exudates.
4. Haemorrhagic lesions in digestive tract with necrosis especially in proventriculus.
5. Haemorrhages in the intestinal lymphoid nodules and caecal tonsils.
6. Enlarged spleen.

B) **Infectious Bursal Disease (Gumboro disease)**

Cause: *Birna virus*.

PM lesions:

1. Swollen and haemorrhagic bursa.
2. Haemorrahages in the thigh and breast muscles.

C) **Marek's Disease**

Cause: *Herpesvirus*.

PM lesions:

1. Affected sciatic nerve are characterized by loss of cross-striations, gray or yellow discolouration, and may be swollen.
2. Lymphoid tumors may be found in the gonads, heart, liver, lung, kidney, spleen, bursa, intestines, muscle and skin.

D) **Infectious Bronchitis (IB)**

Cause: *Corona virus*.

PM lesions:

1. Cloudy air sacs.
2. Swollen pale kidneys with distended tubules and ureters containing urate crystals.
3. Fluid yolk material maybe found in the abdomen (egg peritonitis).
4. Degeneration of the ovary and swollen oviducts.
5. Caseous plug in the trachea.

E) **Inclusion Body Hepatitis (IBH)**

Cause: *Adenovirus*.

PM lesions:

1. Hydropericardium (Clear straw colour fluid in the pericardial sac).
2. Ascitis.
3. Hepatitis and pericarditis.
4. Pulmonary Oedeme.
5. Swollen and discolouration of liver and enlarged kidney
6. Gizzard errosion.

F) **Avian Influenza (HPAI)**

Cause: *Orthomyxo virus*.

PM lesions:

1. Head and neck edema.
2. Severe edema, necrosis and haemorrhage of comb and wattle (cyanotic combs and Wattles).
3. Petechial haemorrhage on internal membrane surfaces.
4. Petechial haemorrhages around the ducts of the proventricular glandular region.
5. Subcutaneous haemorrhages of leg shanks.
6. Lungs-congested and pneumonia with edema

BACTERIAL DISEASES

A) **Colibacillosis**

Cause: *Escherichia coli*, Gram –negative rod

PM lesions:

1. Airsacculitis, perihepatitis and pericarditis-secondary invader as part of chronic respiratory disease results in white or yellow, friable material covering air sacs, liver and pericardial sac. Infection often preceded by Mycoplasma, Newcastle disease, or infectious bronchitis.
2. Omphalitis- swollen, red, crusted navels can be caused by contamination of egg shells through dirty setter, fecal covered eggs, excessive moisture during storage of eggs.
3. Septicemia-hepatosplenomegaly(hepatitis).
4. Salpingitis/peritonitis-especially laying hens, oviduct filled with yellow, cheesy exudate.
5. Cellulitis ("scabby hip") of broiler chickens: yellow exudate underneath skin of hip, leg and breast.

B) **Necrotic Enteritis**

Cause: *Clostridium perfringens* (Type A & C).

PM lesions:

1. Small intestine is distended and filled with foul smelling brown fluid.
2. The small intestine is greatly thickened due to extensive velvet like necrosis of the intestinal lining.
3. The intestinal mucosa is covered by a lose to tight yellow or green layer. Spots or small patches of blood may occur.

C) **Infectious Coryza**

Cause: *Haemophilus paragallinarum*.

PM lesions:

1. Swelling of face and wattle due to accumulation of fluid under the skin.
2. Inflammation of the nasal passage and space present below the eye.

D) **Pullorum Disease**

Cause: *Salmonella pullorum*.

PM lesions:

1. Chicks may have an inflamed, unabsorbed yolk sac.
2. The lungs may be congested.
3. Liver dark and swollen with haemorrhages.
4. Small white necrotic foci found in liver.
5. In adult birds-abnormal ovary.

E) **Fowl Cholera**

Cause: *Pasteurella multocida*.

PM lesions:

1. Pinpoint haemorrhages throughout the internal organs.
2. Multiple necrotic area in liver.
3. In the laying hens, free yolk may be present in the abdominal cavity.
4. Swelling of one or both wattles.

F) **Bumblefoot**

Cause: *Staphylococcus aureus*- Gram positive.

Clinical signs: Omphalitis (yolk sac infection); Necrotic dermatitis; Necrotic skin lesions/abscesses; Arthritis and tenosynovitis; Osteomyelitis (infection and inflammation of bone).

PM lesions:

1. Swelling on joints or footpad(bumblefoot)
2. Breast blister (yellow exudate in sternal bursa)
3. Dead chicks with swollen abdomen and crusted navel (omphalitis).
4. Osteomyelitis-yellow, necrotic plug in growth plate of bone.

G) **Chronic Respiratory Disease**

Cause: *Mycoplasma gallisepticum*.

PM lesions:

1. Fibrinous pericarditis
2. Fibrinous perihepatitis
3. Airsacculitis.

FUNGAL DISEASES

A) **Aspergillosis (brooder pneumonia)**

Cause: *Aspergillus fumigatus, A.flavus, A.niger.*

PM lesions:

1. Yellowish-green or whitish caseous (cheesy) nodules in lungs, air sac, brain, eyes.

B) **Aflatoxicosis**

Cause: *Aspergillus fumigatus, A.flavus, A.niger*

PM lesions:

1. Liver is greatly enlarged, yellow and friable.
2. Small haemorrhages may occur due to increased fragility of minute blood vessels. This leads to a condition known as "bloody thigh syndrome"

NUTRITIONAL DISEASES

A) **Vitamin A deficiency**

PM lesion:

1. Inner lining of the Oesophagus shows tiny white raised granules.
2. Kidneys may present gout.

B) **Vitamin E deficiency**

PM lesion:

1. Petechial haemorrhages on the surface of the cerebellum.

METABOLIC DISEASES

A) **Visceral Gout & Articular Gout**

Cause:

1. Low phosphorus diet.
2. Water deprivation at housing.
3. High vitamin D3 in ration.
4. Excessive calcium before sexual maturity (15-16weeks).
5. Nephrotropic infectious bronchitis.

PM lesion: Accumulation of urates on the surfaces of the internal organs (visceral gout) as well as within joint spaces and along synovial membrane (articular gout).

OTHER DISEASES

A) **Heat stress**

Cause:

1. High environmental temperature
2. Inadequate water supply.
3. Inadequate ventilation.
4. Overcrowding.
5. Very low ceiling of the poultry house.

PM lesions:

1. Severely dehydrated and congested.
2. Breast muscles become pale to white and present a "cooked meat appearance".

B) **Femoral Head Necrosis**

Cause:

1. Bacteria-Staphylococci, *E.coli,* Salmonella.
2. Virus- *Reo virus*.
3. Trauma.

PM lesions:

1. The femoral head usually separates from the shaft by a fracture through the neck when hip joints are separated.
2. Both head and proximal portion of femur show marked degeneration.

C) **Egg bound condition**

Cause:

1. Inflammation of the oviduct.
2. Partial paralysis of the muscles of the oviduct.
3. Large egg production.

PM lesions:

1. Egg is found lodged in the cloaca / oviduct.

D) **Fatty liver-haemmorhagic syndrome**

Cause:

1. High energy diet.
2. Nutritional imbalance.
3. High temperature.
4. Deficiency of cholin.
5. Stress, toxin, high egg production.

PM lesions:

1. Large blood clots in the abdomen.
2. Liver is enlarged, fatty is of light-greyish brown to yellow colour and friable.

References:

1. Saif, Y. M. Diseases of Poultry. 12th Edition, 2008. Blackwell Publishing. Oxford, UK.

Ranikhet Disease

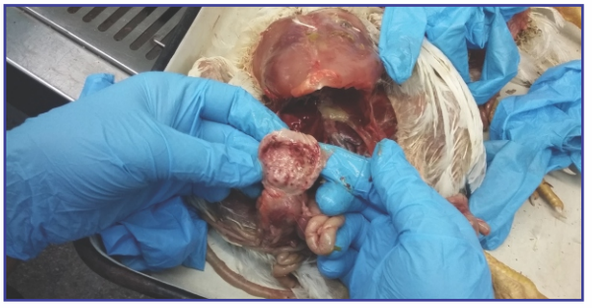

Fig No.-1. Haemorrhagic lesions in proventriculus

Fig No.-2. Haemorrhages in the caecal tonsils.

Infectious Bursal Disease

Fig No.-3. Swollen and haemorrhagic bursa

Fig No.-4. Haemorrahages in the thigh muscles

Infectious Bronchitis (IB)

Fig No.-5. Swollen pale kidneys with distended tubules and ureters containing urate crystals

Inclusion Body Hepatitis (IBH)

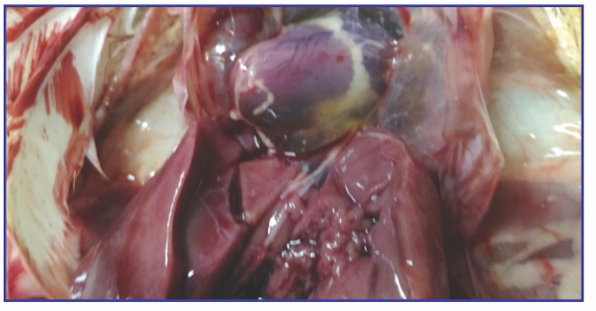

Fig No.-6. Clear straw colour fluid in the pericardial sac

Avian Influenza

Fig No.-7. Necrosis and haemorrhage of comb and wattle (cyanotic combs and wattles)

Colibacillosis

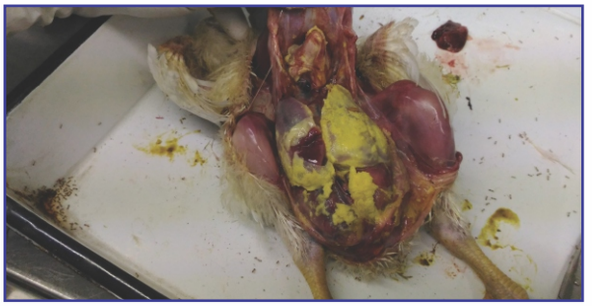

Fig No.-8.Yellow, cheesy, friable material covering air sacs, liver and pericardial sac

Necrotic Enteritis

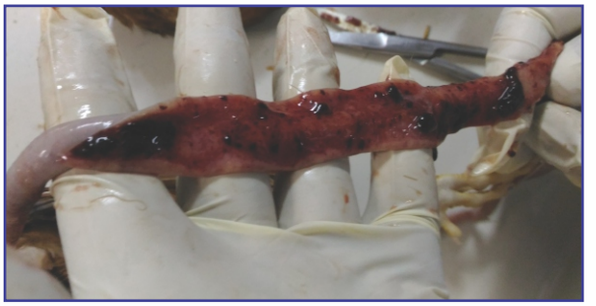

Fig No.-9. Thickening of small intestine with patches of blood

Bumblefoot

Fig No.-10. Swelling on footpad with yellow exudates

Brooder Pneumonia

Fig No.-11. Yellowish-or whitish caseous (cheesy) nodules in lungs, air sac

Vitamin A deficiency

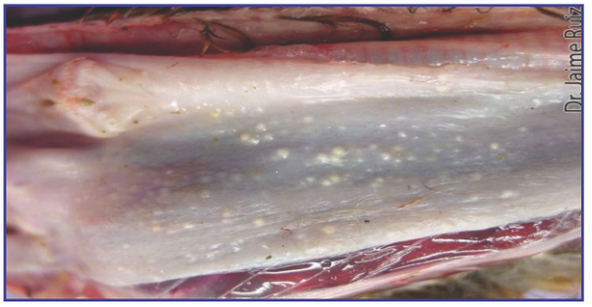

Fig No.-12. 1.Inner lining of the Oesophagus shows tiny white raised granules

Visceral Gout

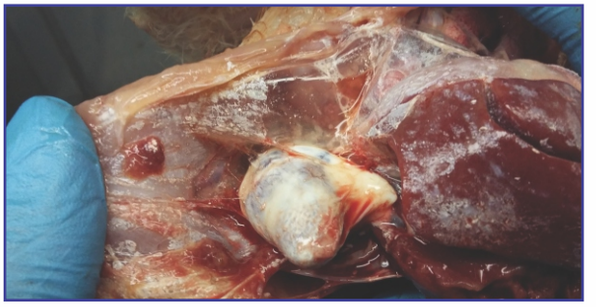

Fig No.-13. Accumulation of urates on the surfaces of the internal organs

Heat stress

Fig No.-14. Breast muscles: pale to white

INTEGRATED STRATEGIES TO CONTROL TICKS AND TICK-BORNE DISEASES – A REVIEW

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INTRODUCTION

Ticks transmit a greater variety of pathogenic microorganisms, protozoa, rickettsiae, spirochaetes and viruses, than any other arthropod vector group and are among the most important vectors of diseases affecting livestock, humans and companion animals. They cause severe toxic conditions such as paralysis and toxicosis, damage to the skin of animals, irritation and allergy. Besides the direct effect, the tick transmitted diseases are considered as major constraint to animal production in tropical and subtropical parts of the world. Recently ticks and tick borne diseases ranked high in terms of their impact on the livelihood of resource poor farming communities in developing countries including India (Perry et al., 2002; Minjauw and McLeod, 2003).

Whereas the global importance of ticks in particularly high for livestock there is also a great impact of ticks on public health, primarily due to Lyme borreliosis and other viral diseases, causing high morbidity and mortality in man. Tick borne pathogens of pets are of economic significance in industrialized countries, but pathogens infecting horses constitute important constraints to international trade and sporting events involving these animals.

Impact on livestock sector

Without acting as vectors of diseases, ticks are decreasing the economic performance of livestock because of their direct effects. The damages caused by tick bites diminishes the value of leather up to 20%. This is also true in case of the tick of short hypostome [Rhipicephalus (Boophilus) sp.] when present in large numbers. Ticks with long hypostome such as Hyalomma spp. and Amblyomma spp. may induce abscesses because of secondary bacterial infection. In this way these species of ticks may cause loss of teats of lameness, depending on the site of attachment. Besides, loss of teats will lead to increased calf mortality. The saliva of certain tick species contains paralysing toxins. For example, Dermacentor andersoni in USA and in Canada can cause death in adult cattle, Ixodes rubicundus induces a severe form of paralysis in sheep in south Africa, and I. holocyclus feed on bandicoots and domestic animals in Australia and considered a very important tick with respect to tick toxicosis. Another form of tick toxicosis is "sweating sickness", an eczema - like condition of calves and other species of livestock in Africa.

The important livestock diseases which are transmitted by ticks are theileriosis, babesiosis, anaplasmosis and cowdriosis. Recovered animals retain the infection and remain immune for long periods, sometimes for life long. In endemic region, due to continuous exposure of animals to ticks and tick borne diseases, the combination of natural and age-associated resistance may result in an endemically stable situation where prevalence

of infection may result in an endemically stable situation where prevalence of infection may be 100% but the disease is not clinically visible. For attaining enzootic stablity tick numbers are important since enzootic stability can only be attained where adequate numbers of infected ticks are present to infect all animals.

The economic impact of TTBD has been estimated differently taking different criteria. In a recent estimate it is reported that the annual loss due to cowdriosis in Zimbabwe could attain 5.6 million US$. Minjauw and McLeod (2003) presented the data on the distribution, the numbers of animals at risk and the cost of the various diseases in eastern, southern, sub-saharan Africa and in India in a systematic way. As per their estimation the annual cost of tropical theileriosis in India is at 384.3 million US$, East Cover Fever (ECF) in smallholder dairy system in Kenya and Tanzania at 54.4 million and 4.41 million US$, respectively. However, in the traditional dairy system the cost has been estimated as 34.1 and 129.5 million US$ in Kenya and Tanzania, respectively.

TTBD Control Method

Tick Vaccines

Some of the greatest problems in a production system heavily reliant on chemicals have resulted from inappropriate use, over or underdosing, poor application, or poor formulation. In that respect, vaccines are a robust technology. They require no formulation on the part of farmer, and if recombinant, they are stable and relatively insensitive to the dose delivered. Recombinant vaccines against Rhipicephalus (Boophilus) microplus were developed and released commercially. The vaccines were based on a gut membrane protein isolated from the tick species. Two procedures were employed for the isolation of the antigen, Bm86. The starting material was semiengorged adult female tick (n=4000) weighing about one kilogram which yielded 100 µg of pure Bm86. As a landmark development in Veterinary Parasitology, Bm86 has been expressed in Eschirichia coli, Aspergillus niduland or niger and Pichia pastoris. Of the three expression vectors, P. pastoris has been seen to be most potent in the expresion on Bm86 protein in particulate form. Feasibility studies were conducted by vaccinating Bos taurus cattle with recombinant Bm86 expressed in E. coli and P. pastoris. Gavac, the Cuban vaccine expressed in P. pastoris has been extensively evaluated in Cuba, Brazil, Argentina, Columbia and in Mexico in 2,60,000 animals. The efficacy of the vaccine was also shown for both chemically sensitive and resistant tick populations derived from different regions of the world. Lysis of tick gut epithelial cells occurs as a result of the binding of anti-Bm86 antibodies and complement with subsequent leakage of material from the gut into the hemocoel. The resulting consequences of this host induced tick pathology is mortality of engorging adults, with a more substantial effect upon the tick reproductive performances. The recombinant Bm86 gut antigen in commercial vaccine formulations also protected animals against Rhipicephalus (Boophilus) microplus annulatus and Rhipicephalus (Boophilus) decoloratus infestations and conferred partial protection against Hyalomma and Rhipicephalus spp. Trials conducted with an Argentinean strain A of Rhipicephalus (Boophilus) microplus resulted in 10% efficacy of Bm86 containing vaccine. Later, Bm86 like antigen from the

strain A has been isolated and expressed in P. pastoris and tested in field condition. The antigen, Bm95 is appeared to be more universal vaccine for the control of Rhipicephalus (Boophilus) microplus infestations. Besides the direct effect on tick stage, an important impact of controlling tick infestations is the reduction of transmission of pathogens. Initial experiments with Bm86 antigen showed that vaccination of cattle resulted in a reduction of incidence of babesiosis.

Besides Rhipicephalus (Boophilus) microplus, scientists from different countries are identified candidate vaccine molecules against different species of ticks. In India, although some immunodominant proteins were identified in B. microplus and in H anatolicum anatolicum by immunoblot studies but only recently the immunoreactive/immunoprotective proteins were isolated in pure from from the stages of H. anatolicum anatolicum and Rhipicephalus (Boophilus) microplus. The isolated proteins were tested against experimental challenge infestation and found protective against all the stages of H.anatolicu anatolicum and adults of Rhipicephalus (Boophilus) microplus. One of the isolated antigens has been found to have some effect on the transmission of Theileria annulata. None of the antigens isolated from different stages of the tick has been expressed as a recombinant protein.

Besides the above mentioned antigens, proteins which are critical in host parasite interaction, proteinase inhibitors, anti-complement and anticoagulation factors have been identified as possible vaccine candidate. Sugino et al. (2003) reported the immunization potentially of one such protease, serpin 1 (HLS) and serpin 2 (HLS 2). An aspartic proteinase, yolk pro cathepsin has been found to effect yolk degradation during embryogenesis and thereby affecting reproductive process of Rhipicephalus (Boophilus) microplus. Other potential vaccine candidate are calreticulin and Rhipicephalus (Boophilus) microplus cysteine proteinase.

Recently, the expression library immunization (ELI), in combination with sequence analysis of expressed sequence tags (ESTs), provides a new and efficient global approach for identification of vaccine antigens that is based on rapid screening of the expressed genes. This method allows for antigen identification without introducing prior criteria to direct the selection of candidate genes and thus may result in the discovery of novel and unexpected antigens. Almazan et al. (2003) described the first application of ELI for the identification of protective antigens against larval Ixodes scapularis. Double stranded RNA (dsRNA) induced RNA interference (RNAi) has emerged as one of the most promising technologies for rapid analysis of functional genomics. Recently, Aljamali et al. (2003) reported the application of RNAi to the study of histamine binding in the female tick Amblyoma americanum. The application of this technology to ticks opens the possibility of using RNAi for the characterization of candidate anti tick antigens selected by ELI or other screening approaches, leading to the identification of protection mechanisms.

Parasite vaccines

The vaccines available against babesiosis and anaplasmosis in Australia are not ideal. As a live attenuated Babesia vaccine it cause significant pathology, besides there is risk of reversion to virulence and maintenance of cold condition throughout distribution is a

deterrent. The vaccine against anaplasmosis available in Australia but is less efficacious. The registered A. marginale vaccine previously available in the United states have been withdrawn from the market. Although some encouraging results on development of recombinant B. bovis and A. marginale vaccines have been reported, no commercial vaccines are available. Ideally a combined tick and parasite vaccine would be highly desirable from user's perspective. The combined vaccine may require 4 to 6 recombinant antigens bu the major problem is whether the protective immune response to counter each disease can be elicited by a single vaccine formulation.

The live vaccine against theileriosis is comprised of attenuated culture derived T. annualta, whereas an "infection and treatment" regimen using a T. parva sporozoite stabilate in conjugation with long acting tetracycline is used against ECF schizonts. Similar to acaricide for tick control, this method have a number of drawbacks. Prevention of infection of host cells by sporozoites is the target of vaccine based on p67 surface antigen of T. parva and SPAG-1 of T. annualta. Higher level of protection were achieved by vaccination with SPAG-1 and ISCOMs or mixed with recombinant p67 expressed in a variety of delivery vectors have also shown promising results. Considerable research has also been conducted on the T. annulata merozoite antigens. TAMS-1 and TAMS-2. Cattle immunized with the antigens incorporated into ISCOMs showed excellent protection against T. annulata piroplasm challenge.

In theory, recombinant antigens should have a longer shelf life than vaccine composed of live or attenuated organisms. The difficulty is the identification of the antigens that are targeted by the host's protective immune response and express and deliver those proteins to induce the appropriate memory response. For many protozoan diseases, the severity of infection is directly related to the number of replicating parasites in the host. A subunit vaccine that protects against clinical signs, but allows for limited parasites replication may be an ideal strategy for protecting susceptible individuals.

Acaricides

Acaricides such as arsenic and chlorinated hydrocarbons, known for their high toxicity levels have been replaced by organophosphates, amidines, formamidines, synthetic pyrethroides, avermectins, fluazuron and very recently, fipronil has been developed in Brazil for the control of ticks. The global ectoparasite market has currently been estimated at about US$ 500 millions per annum. Despite their well known disadvantages control of TTBD is solely depend on intensive use of acaricides. The continuous spreads of resistance to acaricides in many parts of the world has forced authorities to seek new alternatives. There is also increasing evidence that present strategies based on acaricides are not cost effective. Over and above the MNC's are not interested to invest on insecticides research due to economic reasons. These consequences, combined with public concern over safety of chemical residues in livestock products and the undesirable effects of chemicals in the general environment, have led to the search for alternative method of control. An integrated approach utilizing vaccination and high host resistance will be most cost effective in controlling TTBDs in the field situation.

Host genetic resistance

Host genetic resistance is life long and heritable, and the degree of expression depends on the stimulation of the immune response to tick feeding. It varies between individuals. While within-breed variation in genetic resistance to ticks could potentially be used for breeding, the between breed variations which are well known in cattle cautioned the use of less resistant B. taurus in areas where the respective tick vector and parasite occur. A number of breeds have been investigated for the resistance to ticks but with similar conclusions. The host genetic resistance has been successfully utilized by cross breeding with resistant B. indicus or other resistant breeds in Australia and in parts of Latin America where European breeds have been replaced by Zebu animals. In developing countries where 3 host ticks cause problems, the indigenous cattle which are already resistant to TTBDs to a significant degree, however, this is disregarded as productivity of these animals is generally low. Studies in Africa suggested that if cattle are selected for resistance against important tick species, this will improve the control of other species as well. Recently a line of B. taurus (Herefold X Shorthorn = Adaptaur) with very high and absolute resistance to B. microplus has been identified. The resistance which is polygenic in nature is acquired in the early life of animal in the presence of ticks and is stable, lasting for the animal's lifetime under the tick-challenge conditions. A major gene, Adapteur anti-tick gene, is reported to be responsible for this phenomenon. This is considered a major advance in tick control that may have wide application.

Integration of different control methods

Workers and scientists in the fields generally accept that traditional, chemical based TTBDs control methods will not work in the long term as they are expensive, environmentally damaging and target ticks develop resistance to chemicals. Due to awareness at government level cost countries have abandoned the chemical based tick control method and accepted that the integrated management is the only sustainable solution. The integrated pest management has been defined as the systematic application of 2 or more technologies in an environmentally compatible and cost-effective manner to control target pest populations which adversely affect livestock. The type of strategy to be implemented in the different regions of the world will depend on a number of factors. A sound knowledge of vector ecology and disease epidemiology are of great importance but the nature of the farming system, the general economic situation of the country and socio-economic considerations will also have an important influence in the success of IPM. A number of limitations need to be reversed in order for IPM to become established as an important component of livestock production system. These are (i) cumbersome, expensive, time-consuming and unclear pesticide regulatory processes, (ii) insufficient funding for research, demonstration, infrastructure and implementation (iii) development of policy without considering IPM, (iv) lack of coordination between different agencies/ sectors in research, planning and implementation. In developing world the implementation of IPM policies is more complicated since IPM proposals depends mainly on economics, eco-climate, livestock production systems and

market demands. It is therefore, important that the proposed IPM procedures are not only economically viable but also simple, robust and they should also be understandable to the policty makers and users.

A number of universities, research institutions, national and international organizations are currently engaged in various aspects of TTBDs work. Often the technological advances are driven by small research groups which prefer to impose their products/vaccines on the market. Further most of the cases the concerned group of scientists are highly focused on one disease or even one specific aspect of a disease. As TTBD control moves into the era of integration, there is a need for a responsible and coordinated global approach to the problem. Towards the direction scientists of 33 different countries working on TTBD have formed a consortium "Integrated Consortium on Ticks and Tick-borne diseases" funded by European Commission. The consortium is working under the strong leadership of Prof. FFrans Jongejan of Utrecht university.

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ENTREPRENEURSHIP DEVELOPMENT AND EMPLOYMENT GENERATION (EDEG) AND DAIRY ENTREPRENEURSHIP DEVELOPMENT SCHEME (DEDS) : BANKABLE PROJECTS UNDER ARD DEPARTMENT

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Introduction :

Livestock plays an important role in State economy. It provides livelihood to two-third of rural community. It also provides employment to a considerable population in the State. Livestock sector contributes 3.89% of State Domestic Product (SDP) and nearly 20.34% of Agriculture production in West Bengal. The State ranked 4th in egg, 2nd in meat and 12th in milk production in India. There is a clear cut gap in between demand and supply of milk, meat & egg in the State (Table-1). The annual shortfall is about 1.44 million tonnes of milk, 3642 million number of egg and 372 thousand tonnes of meat.

Due to rapid urbanisation during last few decades and consequent increase of health consciousness among people demand for milk, meat egg and their products has increased many fold which in turn create huge marketing opportunity for these items. On the other side, rapid urbanisation and subsequent socio-economic change in and around the city and town areas result in change of production system from rearing of traditional low input cows to meet up home demand only to organised dairy farming in suburban and periurban regions of the state. At present, scope for entrepreneurship development through establishment of small dairy, goatery, piggery, poultry etc. has increased many folds and expected to increase further, even in remote villages also.

Table 1: Requirement and Availability of milk, meat & egg in West Bengal

Sl. No.	Item	W.H.O. Recommendation	State Demand	Actual Availability (2016-17)
1.	**Milk** (gm./day/head)	**220** (gm./day/head)	**180** (gm./day/head)	**144.5** (gm./day/head)
2.	**Meat** (gm./day/head)	**60** (gm./day/head)	**30** (gm./day/head)	**19.5** (gm./day/head)
3.	**Egg** (No./year/head)	**180** (No./year/head)	**100** (No./year/head)	**62** (No./year/head)

Entrepreneurship Development and Employment Generation (EDEG) under National Livestock Mission (NLM) and Dairy Entrepreneurship Development Scheme (DEDS) are two centrally sponsored bankable schemes is being implemented by NABARD throughout the

country in collaboration with Animal Resources Develop-ment Department of States and Union Terri-tories. Financial assistance including 25-33% back ended subsidy is available under these schemes to establish small entrepreneurship under ARD sector e.g. establishment of small scale dairy farm, goat farm, sheep farm, pig farm etc.

Objectives:

A. Entrepreneurship Development and Employment Generation: The main objectives of the scheme are-

1. To enhance employment opportunities in rural areas.
2. To improve production & productivity of poultry, goat, sheep, pig & other species like quail, ducks, turkey etc.
3. To provide Financial assistance for establishment of small scale goat ,sheep, rabbit & pig farm.
4. To encourage value addition of meat & meat products for better income.

B. Dairy Entrepreneurship Development Scheme: The main objectives of the scheme are-

1. To generate self-employment opportunities and provide infrastructure for dairy sector,
2. To set up modern dairy farms and infrastructure for production of clean milk,
3. To encourage heifer calf rearing for conservation and development of good breeding stock,
4. To bring structural change in the un-organised sector, so that initial processing of milk can be taken up at the village level
5. To upgrade traditional technology to handle milk on a commercial scale and
6. To provide scope for value addition of milk through processing and production of milk products.

Implementing Agency and area of operation:

The National Bank for Agriculture and Rural Development (NABARD) is the nodal agency for implementation of EDEG as well as DEDS scheme in all the States and Union Territories throughout the country. The agency provide financial assistance through sanction of loan and back ended capital subsidy (25-33%). Farmers/entrepreneurs can get financial assistance by submitting bankable projects may dully vetted by the notified Block/Mandal level officers (e.g. Block Livestock Development Officer in West Bengal) to the Banks (Commercial banks/Regional Rural & Urban banks/State Co-operative banks/ State Co-operative Agriculture & Rural Development banks etc.).

Eligible Beneficiaries:

Farmers, Individual Entrepreneurs and Groups of Unorganised and Organised Sector are eligible under the scheme. Group of organised sector includes Self-Help Groups (SHG) on behalf of their members, Dairy Co-operative Societies, Milk Unions on behalf of their members, Milk Federation, Panchayati Raj Institutions (PRI) etc. are also eligible as beneficiaries under the scheme.

Pattern of Assistance:

1. Back ended capital subsidy (with a minimum lock-in period of 3 years) @25% of the project cost for general category and @ 33% for SC/ST/BPL farmers. The component – wise subsidy ceiling is notified by NABARD from time to time.
2. Entrepreneur contribution should be at least 10% of the project cost.
3. Bank loan is provided for the balance portion of total project cost.

Sanction of projects by banks and release of subsidy:

1. The entrepreneur will prepare a project as per norms of the scheme and submit to the bank for sanction.

2. The bank shall appraise the project as per administrative approval and if found eligible, sanction the total outlay excluding the margin money, as bank loan.

3. After sanction of the project they will upload the details as per template prescribed in the Ensure Portal of NABARD (http://ensure.nabard.org) within 30 days of sanction and block eligible subsidy amount.

4. On successful upload and post verification, the bank will release the 1st instalment and again upload/update the details of 1st instalment within 30 days of first upload and thus booked the subsidy amount.

5. If the first instalment details are not uploaded within 30 days, the system will delete the application automatically.

6. Category wise (Gen/SC/ST) Subsidy allocation/availability can be shown at home page of NABARD Ensure Portal (http://ensure.nabard.org) by clicking "view budget report".

Table 2: Important Components of EDEG

SN	Components	Ceiling of Subsidy
A.	**Sub-component: Poultry Venture Capital Fund (PVCF)**	
1	Establishment of Hybrid layer unit of poultry upto 20000 layer birds	At 25% project cost level subsidy- Subsidy ceiling @ Rs. 2.0 lakh for 2000 layer unit. (33.33 % subsidy for SC/ ST/BPL)
2	Establishment of Hybrid broiler unit of poultry upto 20000 layer birds under all-in & all-out system.	At 25% project cost level subsidy- Subsidy ceiling @ Rs. 0.56 lakh for 1000 broiler unit. (33.33 % subsidy for SC/ ST/BPL)
3	Rearing of poultry like low–input technology variety and other alternative species like turkey, quail, duck etc	At 25% project cost level subsidy- Subsidy ceiling Rs. 5.0 lakh per unit. (33.33 % subsidy for SC/ ST/BPL)
B.	**Sub-component: Integrated Development of Small Ruminants & Rabbit (IDSRR)**	
1	Establishment of commercial units of 10 ewe/doe + 1 ram/buck	At 25% project cost level subsidy- Subsidy ceiling Rs. 12500/-. (33.33 % subsidy for SC/ ST/BPL). An entrepreneur can avail max. 4 units.
2	Establishment of Breeding farms with 100 ewe/doe + 5 ram/buck	At 25% project cost level subsidy- Subsidy ceiling Rs. 2.5 lakh. (33.33 % subsidy for SC/ ST/BPL)
3	Establishment of Rabbit farm –Angora unit with 15 female + 5 male	At 25% project cost level subsidy- Subsidy ceiling Rs. 0.75 lakh. (33.33 % subsidy for SC/ ST/BPL)

SN	Components	Ceiling of Subsidy
C.	**Sub-component: Pig Development**	
1	Establishment of commercial units of 3 sow + 1 boar	At 25% project cost level subsidy- Subsidy ceiling Rs. 25000/-. (33.33 % subsidy for SC/ ST/BPL). An entrepreneur can avail max. 4 units.
2	Establishment of Pig Breeding farms with 20 sow + 4 boars	At 25% project cost level subsidy- Subsidy ceiling Rs. 2.0 lakh. (33.33 % subsidy for SC/ ST/BPL)

Table 3: Important Components of DEDS

SN	Components	Unit Cost	Ceiling of Subcidy
1	Establishment of small dairy units with crossbred/indigenous descript milch cows/graded buffaloes upto 10 animals (Min. Unit size is 2 cows with an upper limit of 10 cows)	Rs 7.00 lakh for 10 animals unit. Min. unit size should be 2 animals.	At 25% project cost level subsidy- Subsidy ceiling @ Rs. 17500/- per animal. (33.33 % for SC/ ST farmers)
2	Rearing of heifer calves – crossbred, indigenous descript milch breeds of cattle and graded buffaloes – upto 20 calves	Rs 9.70 lakh for 20 calves unit	At 25% project cost level subsidy- Subsidy ceiling @ Rs. 12100/- per animal. (33.33 % for SC/ ST farmers)
3	Vermi compost with milch animal unit (not separately)	Rs. 25,200/-	At 25% project cost level subsidy-Subsidy ceiling Rs. 6300/-. (33.33 % for SC/ ST farmers)
4	Purchase of milking machines/ milkotesters/bulk milk cooling unit (upto 5000 lt. Capacity)	Rs. 20 lakh	At 25% project cost level subsidy- Subsidy ceiling Rs. 5.0 lakh. (33.33 % for SC/ ST farmers)
5	Purchase of dairy processing equipments for manufacture of milk products	Rs. 13.20 lakh	At 25% project cost level subsidy- Subsidy ceiling Rs. 3.30 lakh. (33.33 % for SC/ ST farmers)
6	Establishment of Dairy marketing outlay/ Dairy parlour	Rs. 3.0 lakh	At 25% project cost level subsidy- Subsidy ceiling Rs. 0.75 lakh. (33.33 % for SC/ ST farmers)

Table 4: Model Unit Cost of Establishment of Small Dairy Units with 10 Crossbred Cows under Dairy Entrepreneurship Development Scheme (DEDS)

4.1. Techno – Economic Parameters:

1.	No of Animal (unit)	10
2.	Cost of Animal (in Rs.) per animal	45000
3.	Cost of Concentrate per kg. (in Rs.)	17
4.	Cost of Fodder per kg. (in Rs.)	0.5
5.	Avg Milk Yield (in Ltrs.)	12
6.	Sale price of Milk per lt. (in Rs.)	27
7.	Days in a year assumed	360
8.	Cost of Labour	0
9.	Labour Charges	0
10.	Insurance Charge (%)	5% + 18% GST
11.	Cost of Gunny Bag (in Rs.)	15
12.	Cost of Veterinary Aid (in Rs.) per animal	1500
13.	Rate of Bank Interest per annum (%)	12
14.	Owner Share (%)	10

4.2. Unit Cost :

SN	Item	Amount (Rs.)
1	Cost of 10 no of Animals	4,50,000
2	Shed & Machine	1,50,000
3	Waste management including drainage & manure pit	20,000
4	Utensils	15,000
5	Insurance Cost	26,550
6	Cost of concentrate mixture (5 kg/day x 30 days x 10 cow x 17.00/-)	25,500
7	Veterinary Aids etc	15,000
8	**Total Project Cost**	7,02,050
	Or Say	**7,00,000**

4.3. Financial out Lay :

SN	Source of fund	Amount(Rs.)
1	NABARD's Capital Subsidy (at 25% Project cost level)	1,75,000
2	Owner Share (at 10% Project cost level)	70,000
3	Bank Loan	4,55,000
	Total	**7,00,000**

Table 5: Model Unit Cost of Establishment of Goat Units with 10 doe + 1 buck under Entrepreneurship Development and Employment Generation (EDEG)

5.1. Unit cost:

Sl No	Item	Specification	No of Unit	Unit cost (In Rupees)	Total cost (In Rupees)
1.	Construction of Night Shelter for Buck, Doe and Followers	200 sq.ft.	1	80/-per sq.ft.	16000.00
2.	Procurement of Animal				
a.	Buck	> 10 kg body weight	1	4000/-	4000.00
b.	Doe	> 8 kg body weight	10	2000/-	20000.00
3.	Transportation Charges		11	100/- per animal	1100.00
4.	Cost of Insurance	5% + GST	11		1500.0
5.	Cost of Supplementary feeding				
a.	Concentrate feed	@ 150 gm/pregnant Doe for 120 days	180 kg	25/- per kg	4500.00
b.	Concentrate feed	@ 200 gm/Buck for 120 days	18 kg	25/- per kg	600.00
6.	Cost of Veterinary Aid, vaccination,etc.		11	@ 100/- per animal/ year	1100.00
7.	Miscellaneous cost				1200.00
	Total				**50,000.00**

5.2. Financial out Lay :

SN	Source of fund	Amount (Rs.)
1	NABARD's Capital Subsidy (at 25% Project cost level)	12,500.00
2	Owner Share (at 10% of Project cost level)	5,000.00
3	Bank Loan	33,000.00
	Total	50,000.00

Conclusion:

These schemes have enough potency to boost up milk, meat & egg production as well as employment generation and hence gaining overwhelming response throughout the country. But successful implementation of the scheme in our state is not encouraging enough mainly due to lack of awareness among farmers and poor response from the part of financial institutions. To implement these schemes in large scale in our state importance on mass awareness, dissemination of information and active participation on behalf of the financial institutions are essential. These bankable schemes may be a weapon for income generation of the livestock farmers in near future along with improvement of production and productivity of milk, meat & egg in our state.

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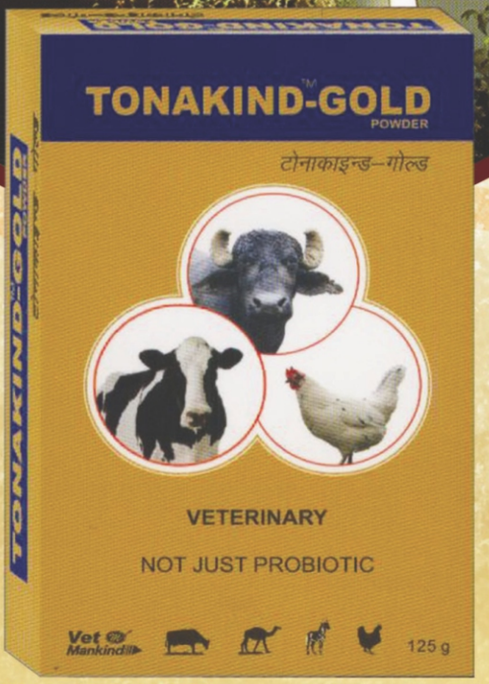

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